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C09K19/42 *(2006.01)*　*G02F1/13* *(2006.01)*

(30)優先權：2011/12/20　德國　102011121665.4

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(56)參考文獻：

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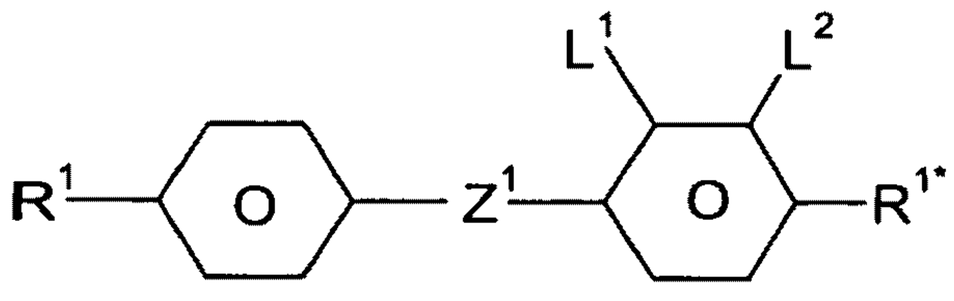
(54)名稱

液晶介質

(57)摘要

本發明係關於一種包含至少一種式 I 化合物之液晶介質，



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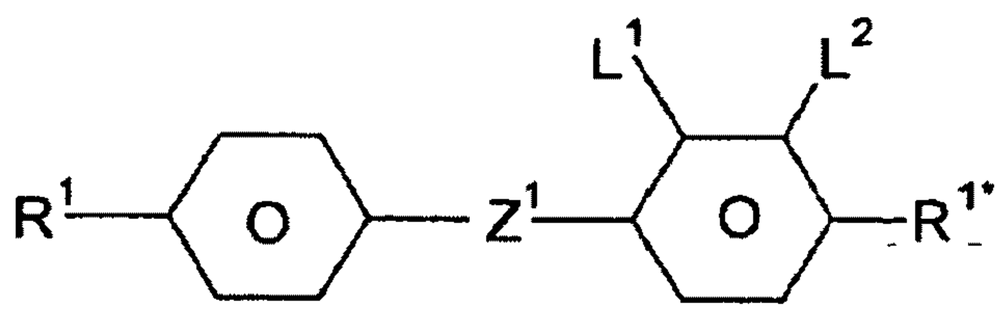
其中：R^1、R^{1*}、Z^1、L^1 及 L^2 具有技術方案 1 所示之含義，及關於其用於主動矩陣式顯示器，尤其基於 VA、PSA-、PS-VA、PALC、FFS、PS-FFS、PS-IPS 或 IPS 效應之主動矩陣式顯示器之用途。

The invention relates to a liquid-crystalline medium which comprises at least one compound of the formula I,



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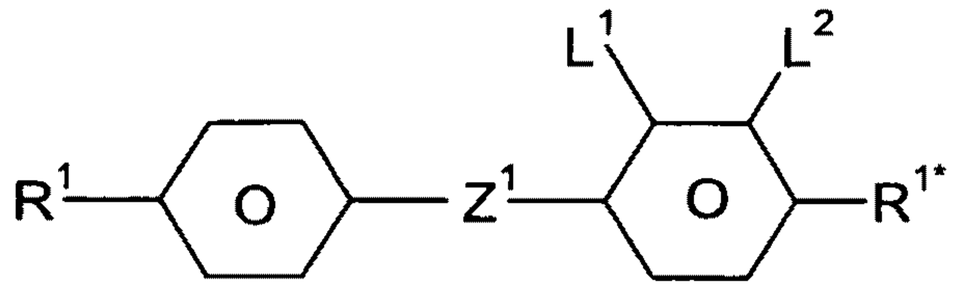
in which R^1, R^{1*}, Z^1, L^1 and L^2 have the meanings indicated in Claim 1, and to the use thereof for an active-matrix display, in particular based on the VA, PSA-, PS-VA, PALC, FFS, PS-FFS, PS-IPS or IPS effect.

特徵化學式：



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公告本

發明摘要

※ 申請案號：

※ 申請日：　　※IPC 分類：

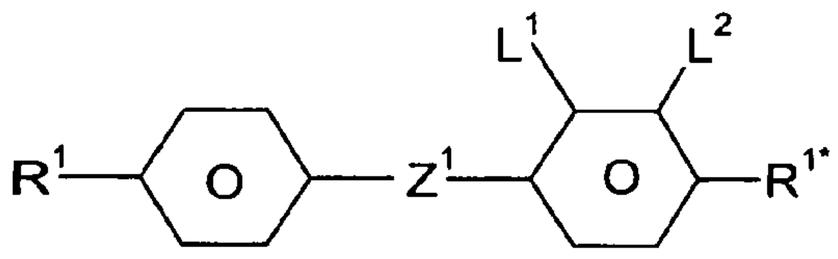
【發明名稱】

液晶介質

LIQUID-CRYSTALLINE MEDIUM

【中文】

本發明係關於一種包含至少一種式I化合物之液晶介質，



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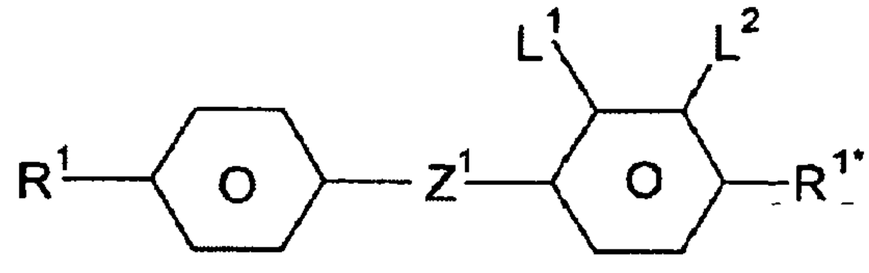
其中：

R^1、R^{1*}、Z^1、L^1及L^2具有技術方案1所示之含義，

及關於其用於主動矩陣式顯示器，尤其基於VA、PSA-、PS-VA、PALC、FFS、PS-FFS、PS-IPS或IPS效應之主動矩陣式顯示器之用途。

【英文】

The invention relates to a liquid-crystalline medium which comprises at least one compound of the formula I,



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in which

R^1, R^{1*}, Z^1, L^1 and L^2 have the meanings indicated in Claim 1,

and to the use thereof for an active-matrix display, in particular based on the VA, PSA-, PS-VA, PALC, FFS, PS-FFS, PS-IPS or IPS effect.

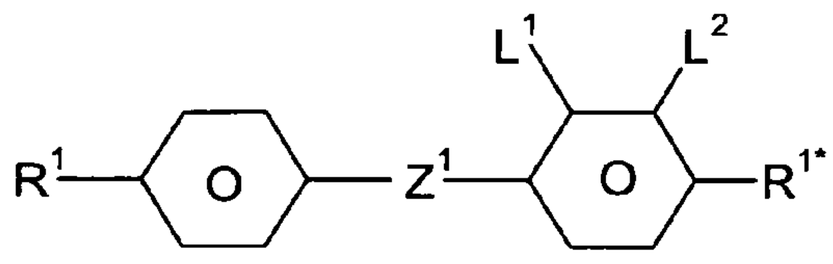
【代表圖】

【本案指定代表圖】：（無）。

【本代表圖之符號簡單說明】：

無

【本案若有化學式時，請揭示最能顯示發明特徵的化學式】：



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發明專利說明書

（本說明書格式、順序，請勿任意更動）

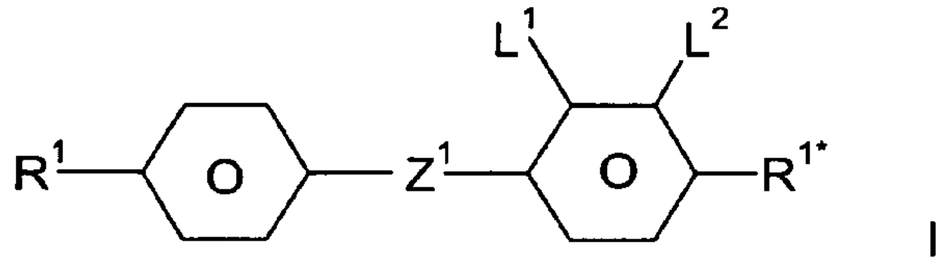
【發明名稱】

液晶介質

LIQUID-CRYSTALLINE MEDIUM

【技術領域】

本發明係關於一種包含至少一種式I化合物之液晶介質，



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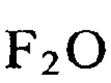
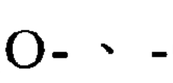
其中：

R^1及R^{1*}各自彼此獨立地表示具有1至15個C原子之烷基或烷氧基，其中，另外，此等基團中之一或多個CH_2基團可彼此獨立地經-C≡C-、$-CF_2O-$、-CH=CH-、  、  、-O-、-CO-O-、-O-CO-以使得O原子不彼此直接連接的方式置換，且其中，另外，一或多個H原子可經鹵素置換；

Z^1表示單鍵、$-CH_2CH_2-$、-CH=CH-、$-CH_2O-$、$-OCH_2-$、$-CF_2O-$、$-OCF_2-$、-COO-、-OCO-、$-C_2F_4-$、-CF=CF-、-CH=CHCHO-；

L^1及L^2各自彼此獨立地表示F、Cl、CF_3、OCF_3或CHF_2。

【先前技術】

此類介質尤其可用於基於ECB效應且具有主動矩陣式定址之電光顯示器及共平面切換型(in-plane switching；IPS)顯示器或邊緣場切換型(fringe field switching；FFS)顯示器。

電控雙折射(electrically controlled birefringence；ECB)效應或配向相畸變(deformation of aligned phases；DAP)效應之原理首次描述於

1971年(M.F. Schieckel及K. Fahrenschon, 「Deformation of nematic liquid crystals with vertical orientation in electrical fields」, Appl. Phys. Lett. 19 (1971), 3912)。此後由J.F. Kahn (Appl. Phys. Lett. 20 (1972), 1193)及G. Labrunie與J. Robert (J. Appl. Phys. 44 (1973), 4869)之論文描述。

J. Robert與F. Clerc (SID 80 Digest Techn. Papers (1980), 30)、J. Duchene (Displays 7 (1986), 3)及H. Schad (SID 82 Digest Techn. Papers (1982), 244)之論文顯示液晶相必須具有較高之彈性常數比K_3/K_1值、較高之光學各向異性Δn值及≤ -0.5之介電各向異性Δε值，以便適用於基於ECB效應之高資訊顯示元件。基於ECB效應之電光顯示元件具有垂直邊緣配向(VA技術=垂直配向(vertically aligned))。介電負性液晶介質亦可用於使用所謂的IPS或FFS效應之顯示器中。

使用ECB效應之顯示器，如所謂的垂直配向向列型(vertically aligned nematic；VAN)顯示器，例如在多域垂直配向(multi-domain vertical alignment；MVA，例如：Yoshide, H.等人, 論文3.1: 「MVA LCD for Notebook or Mobile PCs ...」, SID 2004 International Symposium, Digest of Technical Papers, XXXV, Book I, 第6頁至第9頁，及Liu, C.T.等人, 論文15.1: 「A 46-inch TFT-LCD HDTV Technology ...」, SID 2004 International Symposium, Digest of Technical Papers, XXXV, Book II, 第750頁至第753頁)、圖案垂直配向(patterned vertical alignment；PVA，例如：Kim, Sang Soo, 論文15.4: 「Super PVA Sets New State-of-the-Art for LCD-TV」, SID 2004 International Symposium, Digest of Technical Papers, XXXV, Book II, 第760頁至第763頁)、先進的超級視圖(advanced super view；ASV，例如：Shigeta、Mitzuhiro及Fukuoka、Hirofumi, 論文15.2: 「Development of High Quality LCDTV」, SID 2004 International

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Symposium, Digest of Technical Papers, XXXV, Book II, 第754頁至第757頁)模式中，已確定其為當前最重要(尤其對於電視應用)之三種較新類型液晶顯示器中之一種，此外還有共平面切換型(in-plane switching；IPS)顯示器(例如：Yeo, S.D., 論文15.3: 「An LC Display for the TV Application」, SID 2004 International Symposium, Digest of Technical Papers, XXXV, Book II, 第758頁及第759頁)及早就已知之扭轉向列型(twisted nematic；TN)顯示器。該等技術在例如Souk, Jun, SID Seminar 2004, Seminar M-6: 「Recent Advances in LCD Technology」, Seminar Lecture Notes, M-6/1至M-6/26，及Miller, Ian, SID Seminar 2004, Seminar M-7: 「LCD-Television」, Seminar Lecture Notes, M-7/1至M-7/32中以一般形式比較。儘管現代ECB顯示器之回應時間已藉由使用超速驅動的定址方法顯著改良，例如：Kim, Hyeon Kyeong等人, 論文9.1: 「A 57-in. Wide UXGA TFT-LCD for HDTV Application」, SID 2004 International Symposium, Digest of Technical Papers, XXXV, Book I, 第106頁至第109頁，但視訊相容性回應時間之達成，尤其關於灰度切換仍為尚未得到圓滿解決之問題。

此效應在電光顯示元件中之工業應用需要LC相，其必須符合多項要求。此處尤其重要的是對濕氣、空氣及物理影響(諸如熱、紅外、可見及紫外輻射以及直流與交流電場)之化學抗性。

此外，工業可用之LC相必須在適合之溫度範圍內及低黏度下具有液晶中間相。

迄今為止所揭示之一系列具有液晶中間相的化合物中無一者包括滿足所有此等要求之單一化合物。因此，通常製備2至25，較佳3至18種化合物之混合物，以便獲得可用作LC相之物質。然而，不可能以此方式容易地製備最佳的相，因為迄今為止未能獲得具有顯著負介電各向異性及足夠長期穩定性之液晶材料。

矩陣液晶顯示器(MLC顯示器)係已知的。可用於個別像素之個別切換的非線性元件為例如主動元件(亦即電晶體)。接下來使用術語「主動矩陣」，其中可區分兩種類型：

1.在作為基板之矽晶圓上之金屬氧化物半導體(metal oxide semiconductor；MOS)電晶體

2.在作為基板之玻璃板上之薄膜電晶體(thin-film transistor；TFT)。

在類型1之情況下，所用電光效應通常為動態散射或客體-主體效應。使用單晶矽作為基板材料限制顯示器尺寸，因為即便是各種作為部件之顯示器之模組總成亦會在接合處產生問題。

在較佳之較具前景之類型2的情況下，所用電光效應通常為TN效應。

區分兩項技術：包含化合物半導體(諸如CdSe)之TFT或基於多晶或非晶矽之TFT。後一項技術正在全球範圍內密集地起作用。

將TFT矩陣應用於顯示器之一塊玻璃板之內部，而另一玻璃板在其內部載有透明反電極。與像素電極之尺寸相比，TFT極小且對影像幾乎無不利效應。此項技術亦可延伸至有完全色彩能力之顯示器，其中紅色、綠色及藍色濾光器之鑲嵌體以使得濾光器元件與各可切換像素相對的方式配置。

此處術語MLC顯示器涵蓋具有整合非線性元件之任何矩陣顯示器，意即，除主動矩陣之外，亦具有諸如變阻器或二極體之被動元件之顯示器(MIM =金屬-絕緣體-金屬)。

此類型之MLC顯示器尤其適用於TV應用(例如袖珍TV)或汽車或飛機構造中之高資訊顯示器。除關於對比度之角度依賴性及回應時間之問題外，在MLC顯示器中亦產生由於液晶混合物之不足夠高的比電阻而導致之困難[TOGASHI, S.、SEKIGUCHI, K.、TANABE, H.、

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YAMAMOTO, E.、SORIMACHI, K.、TAJIMA, E.、WATANABE, H.、SHIMIZU, H., Proc. Eurodisplay 84, 1984年9月：A 210-288 Matrix LCD Controlled by Double Stage Diode Rings, 第141頁及其後內容, Paris；STROMER, M., Proc. Eurodisplay 84, 1984年9月：Design of Thin Film Transistors for Matrix Addressing of Television Liquid Crystal Displays, 第145頁及其後內容, Paris]。隨著電阻減小，MLC顯示器之對比度劣化。因為液晶混合物之比電阻由於與顯示器內表面之相互作用而通常在MLC顯示器之壽命內下降，所以高(初始)電阻對於必須在長操作期內具有可接受的電阻值之顯示器很重要。

仍極需要在具有大工作溫度範圍、短回應時間及低臨限電壓的同時具有極高比電阻之MLC顯示器，藉此可產生各種灰度。

常用之MLC-TN顯示器的缺點係由於其相對較低的對比度、相對較高的視角依賴性及在此等顯示器中產生灰度之困難。

VA顯示器具有顯著較佳之視角依賴性且因此主要用於電視及監視器。然而，在此情況下仍需要改良回應時間。然而，同時必須不減弱諸如低溫穩定性及可靠性之特性。

【發明內容】

本發明係基於提供尤其用於監視器及TV應用，基於ECB效應或基於IPS或FFS效應之液晶混合物之目的，該等液晶混合物無上文所示之缺點，或僅具有降低程度之上文所示之缺點。詳言之，必須確保監視器及電視在極高及極低溫度下亦工作，且同時具有短回應時間且同時具有改良的可靠性行為，尤其在長操作時間之後不展現影像殘留(image sticking)或展現顯著降低的影像殘留。

出人意料的是，若在液晶混合物中，尤其在具有負性介電各向異性之LC混合物中，較佳用於VA顯示器之LC混合物中使用一或多種(較佳兩種)通式I之極性化合物，則有可能改良旋轉黏度值且從而改良

回應時間。藉助於式I化合物，有可能製備具有短回應時間同時具有良好的相位特性及良好的低溫行為之液晶混合物，較佳VA、PS-VA、PSA、IPS及FFS混合物。

本發明因此係關於一種包含至少一種式I化合物之液晶介質。

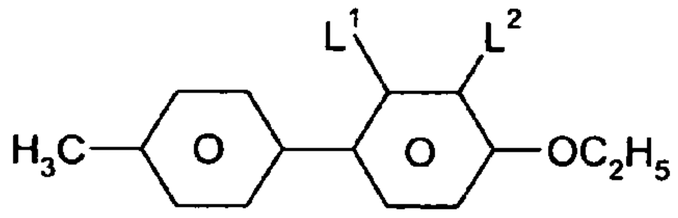
本發明之混合物較佳展現極寬的向列相範圍，清澈點≥ 70℃，較佳≥ 75℃，尤其≥ 80℃；極有利之電容臨限值、相對較高之保持率值及同時在-20℃及-30℃下極良好之低溫穩定性，以及極低旋轉黏度值及短回應時間。此外，本發明之混合物的特徵在於除旋轉黏度γ_1改良之外，亦可觀測到相對較高的彈性常數K_{33}值用於改良回應時間。式I化合物尤其適用於製備意欲$\Delta n > 0.1$之負性$\Delta\varepsilon$混合物。

本發明混合物之一些較佳實施例如下所示。

在式I化合物中，R^1較佳表示直鏈烷基，尤其CH_3、C_2H_5、n-C_3H_7、n-C_4H_9、n-C_5H_{11}及n-C_6H_{13}。

在式I化合物中，R^{1*}較佳表示直鏈烷氧基，尤其OC_2H_5、OC_3H_7、OC_4H_9、OC_5H_{11}、OC_6H_{13}；此外為烯氧基，尤其$OCH_2CH=CH_2$、$OCH_2CH=CHCH_3$、$OCH_2CH=CHC_2H_5$；此外為烷基，尤其n-C_3H_7、n-C_4H_9、n-C_5H_{11}、n-C_6H_{13}。

較佳之式I化合物為式I-1至I-145之化合物：



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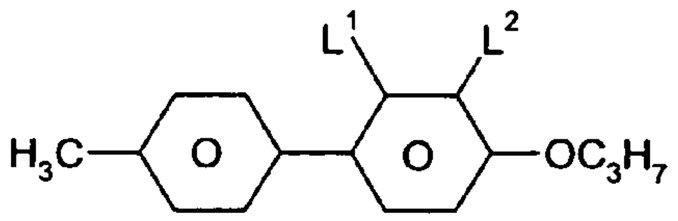

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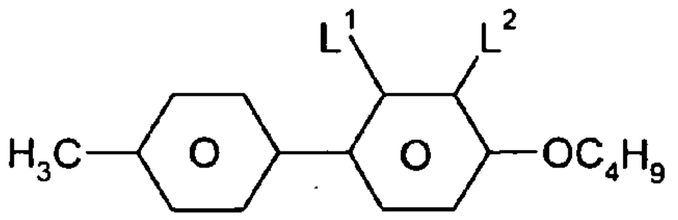

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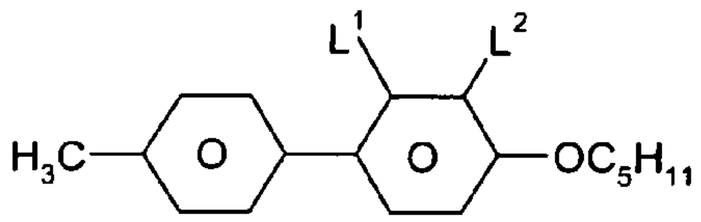

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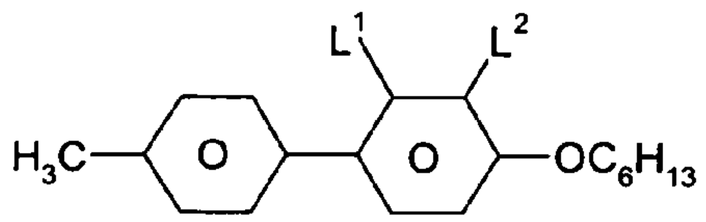
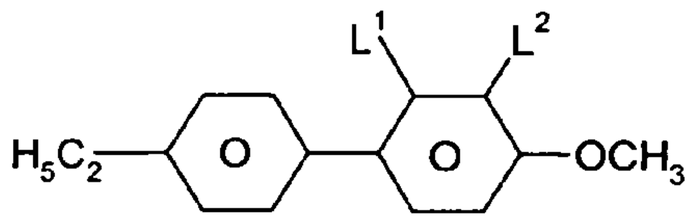


I-5



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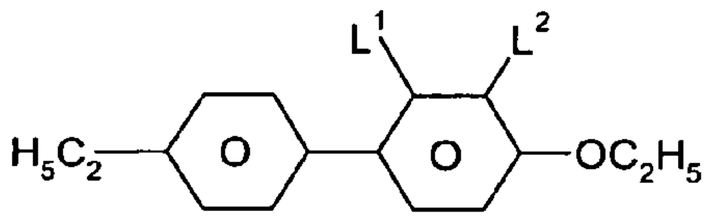

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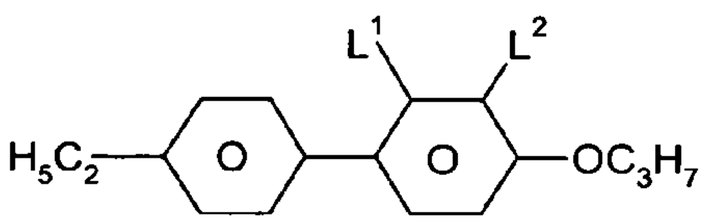

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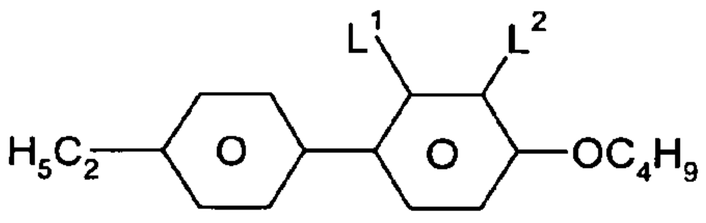

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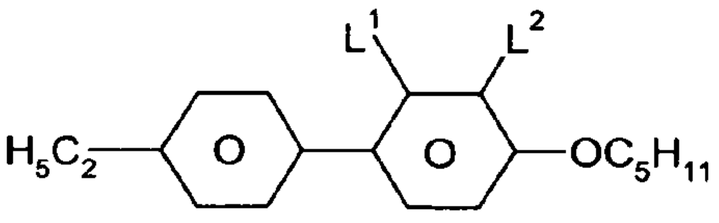

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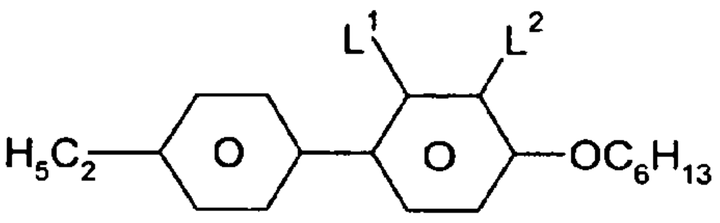

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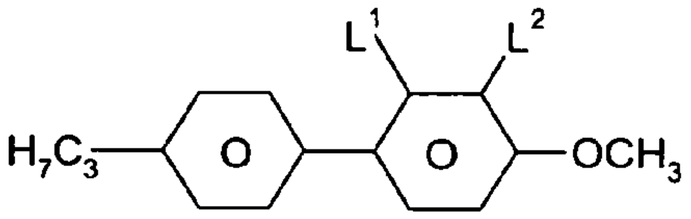

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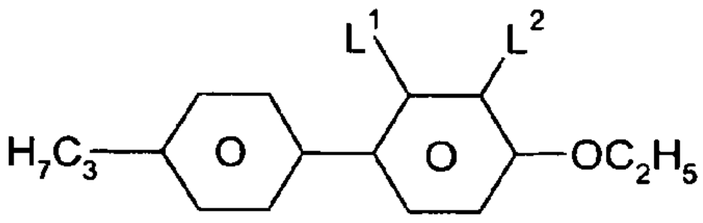

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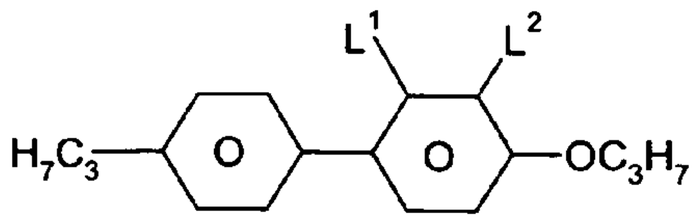

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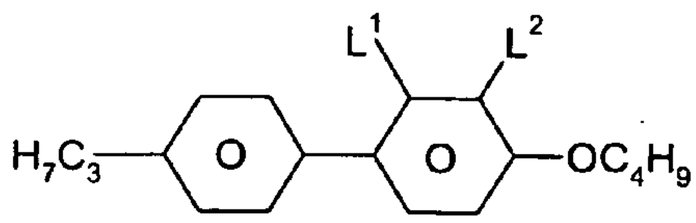

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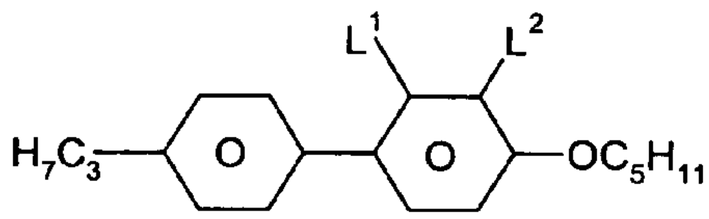

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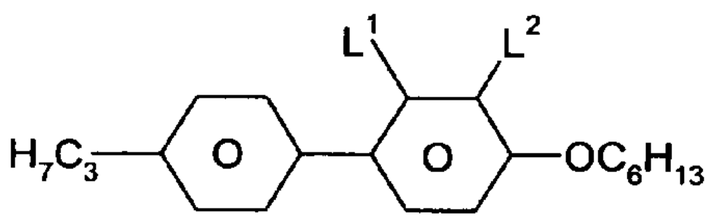

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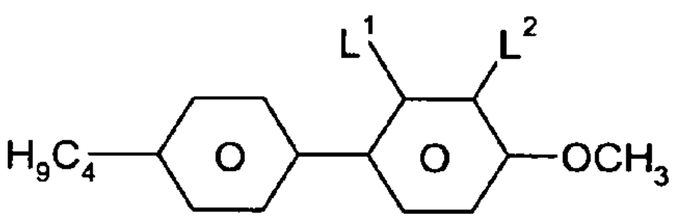

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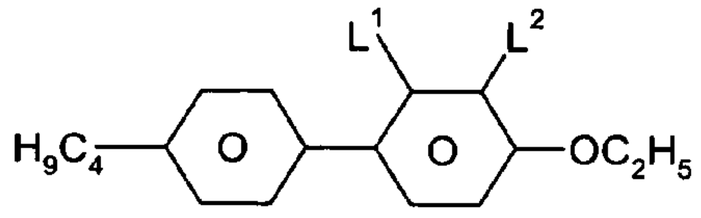

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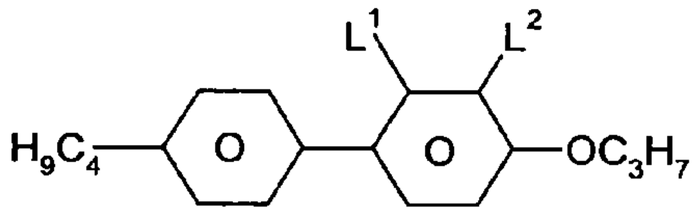

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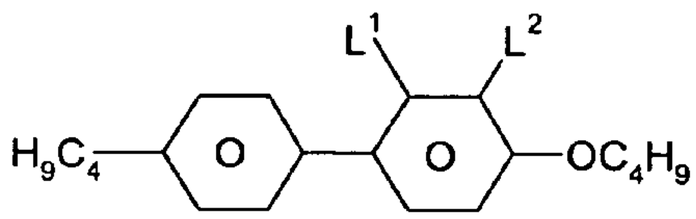

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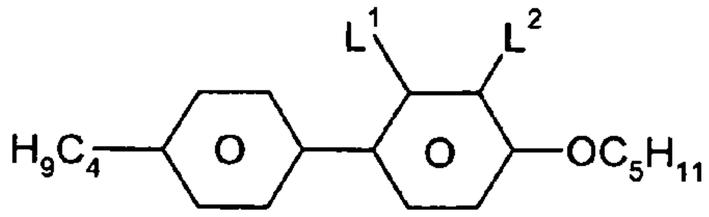

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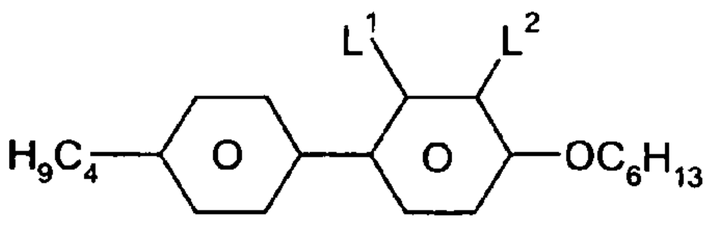

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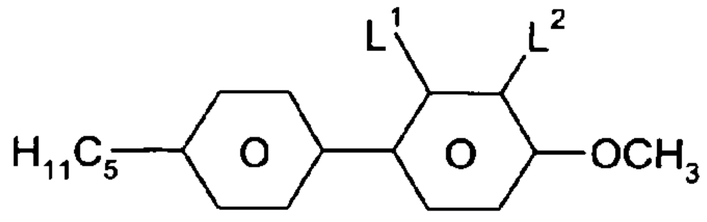

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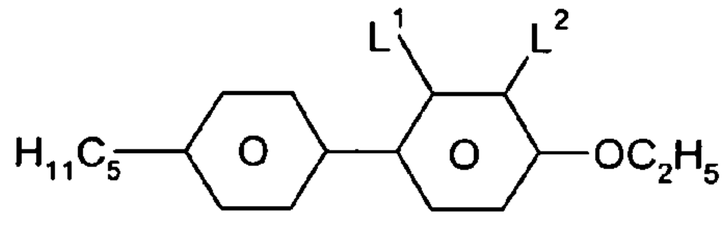

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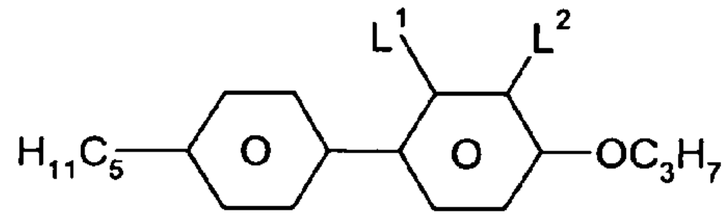

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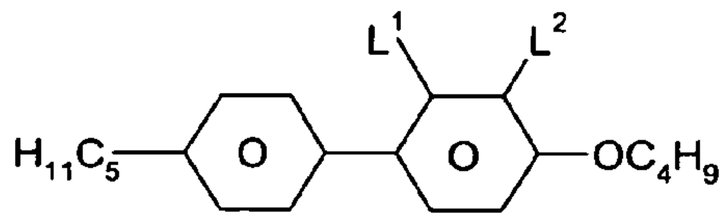

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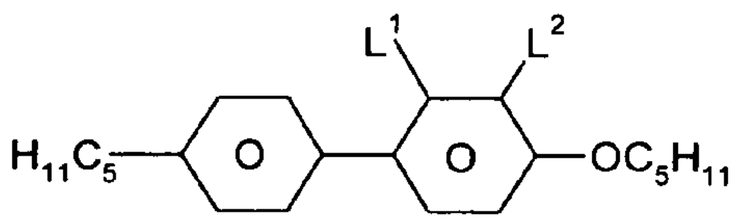

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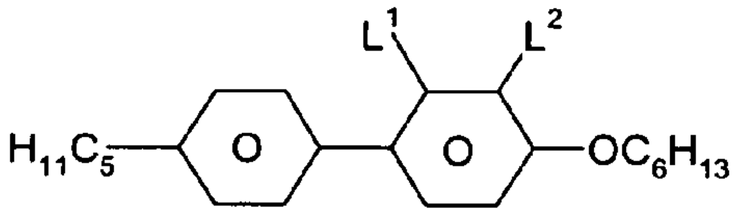

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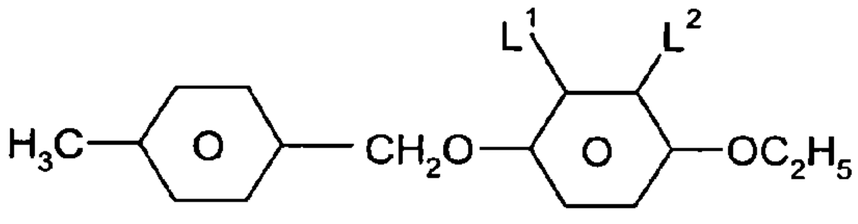

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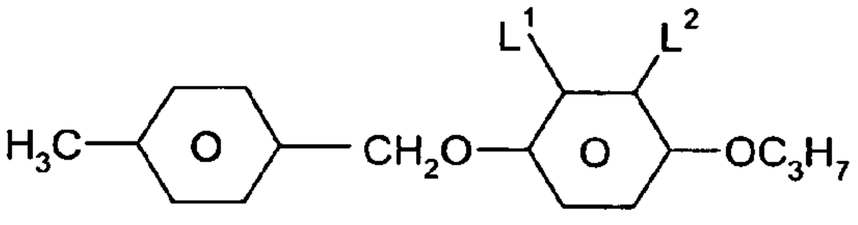

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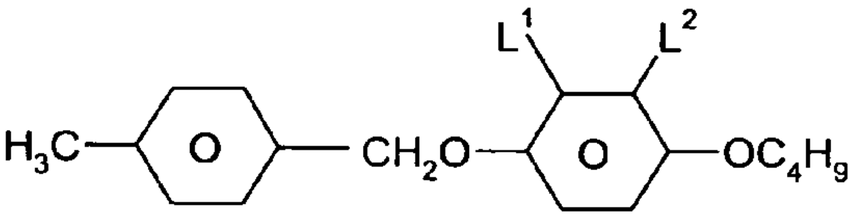

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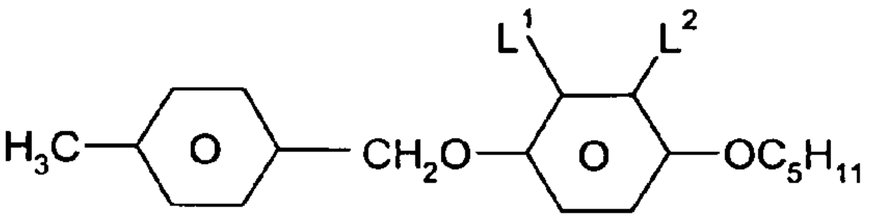

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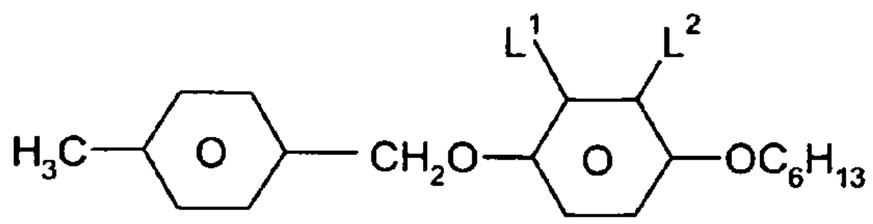

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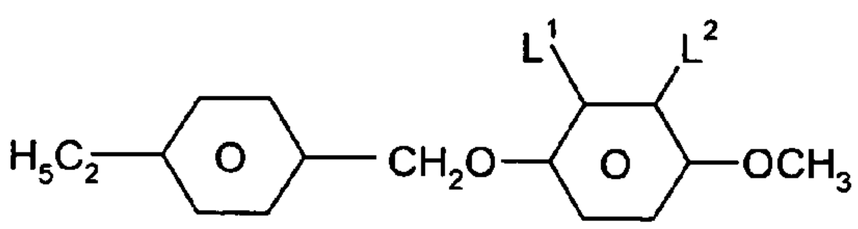

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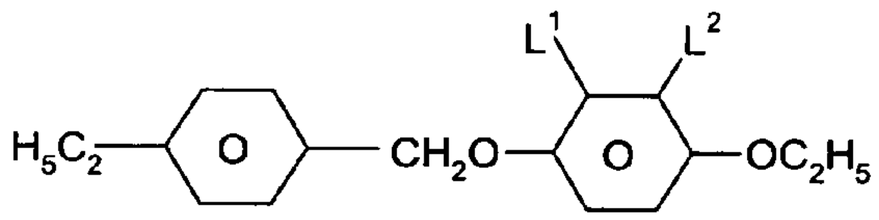

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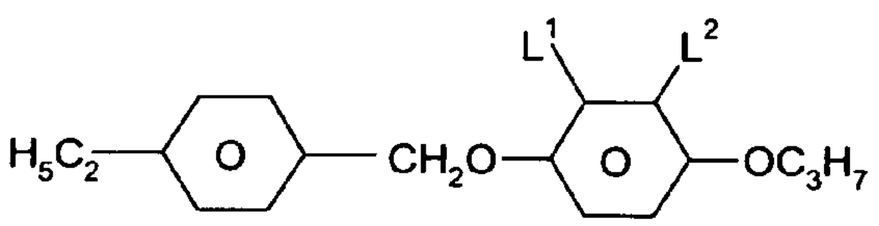

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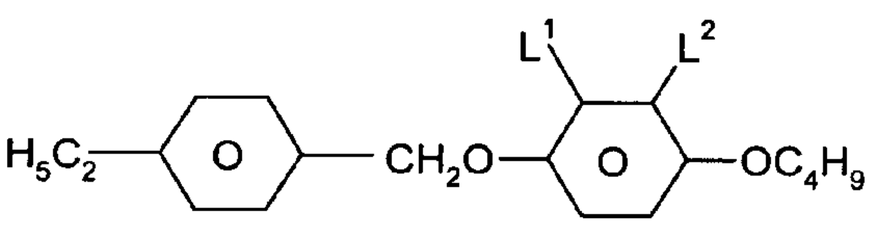

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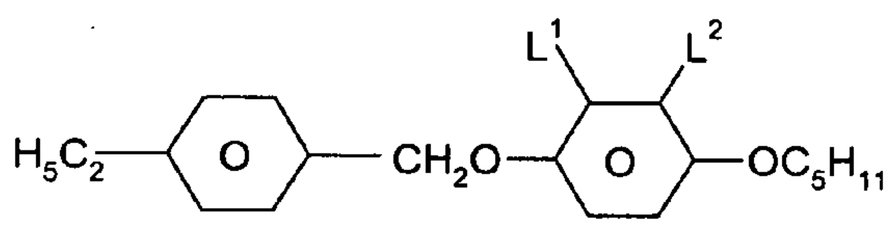

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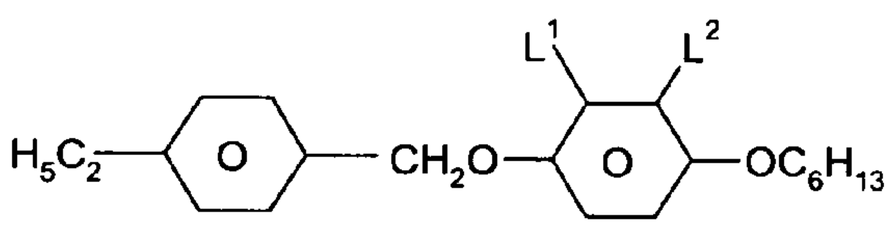

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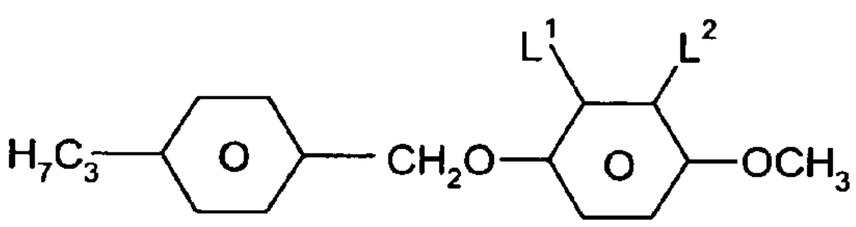

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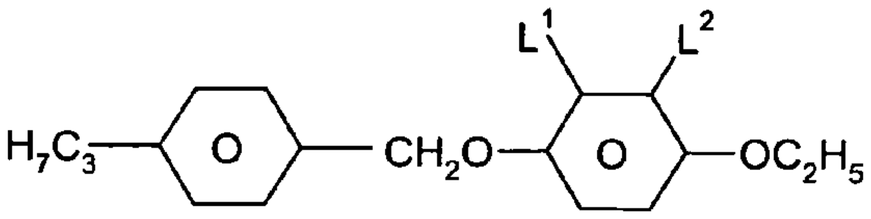

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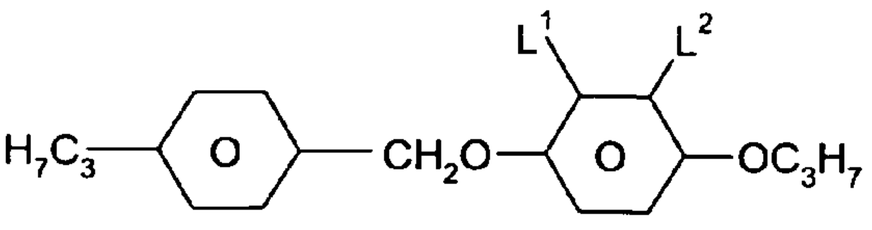

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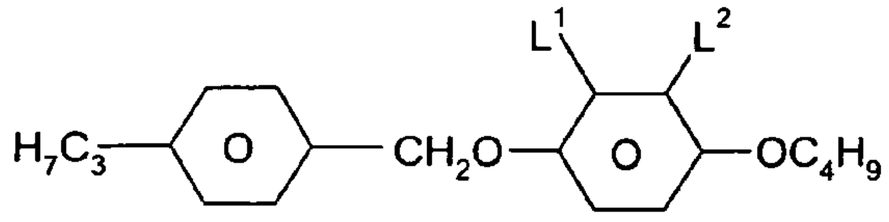

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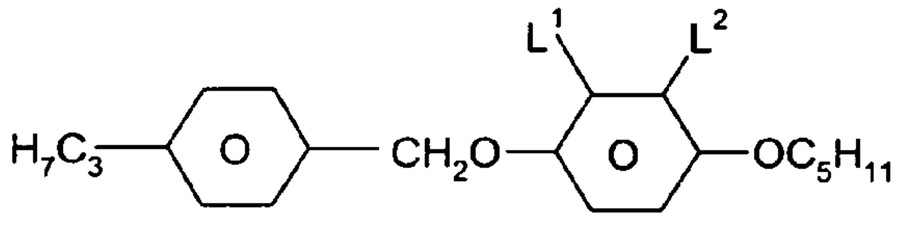

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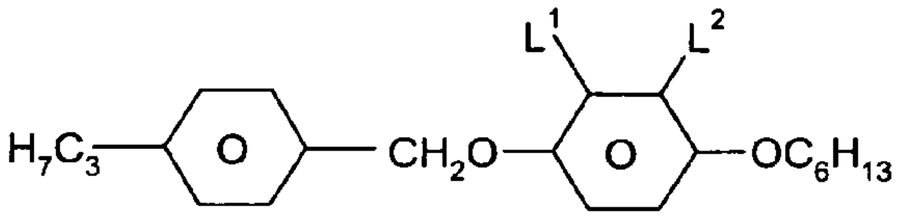

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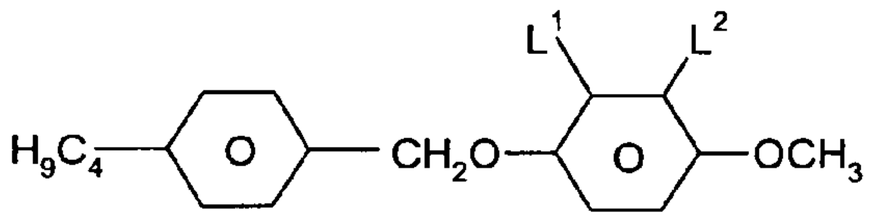

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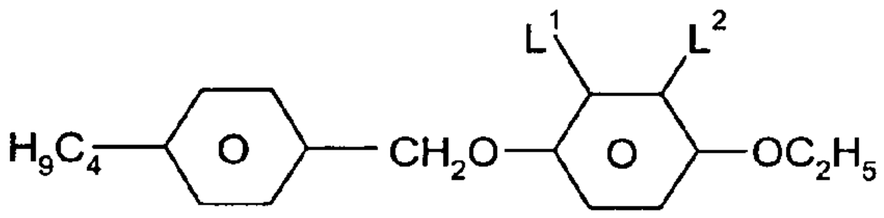

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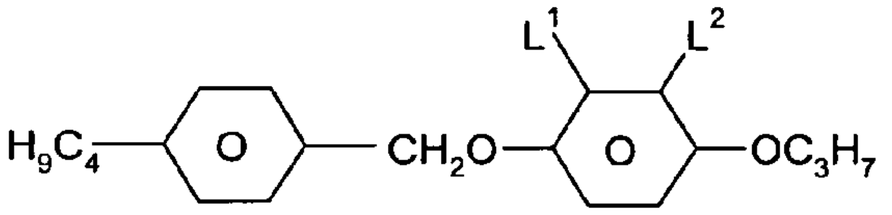

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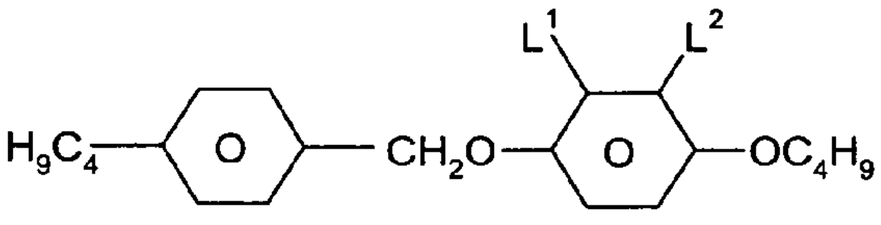

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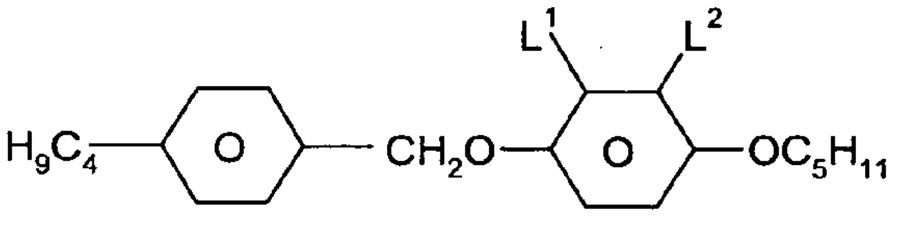

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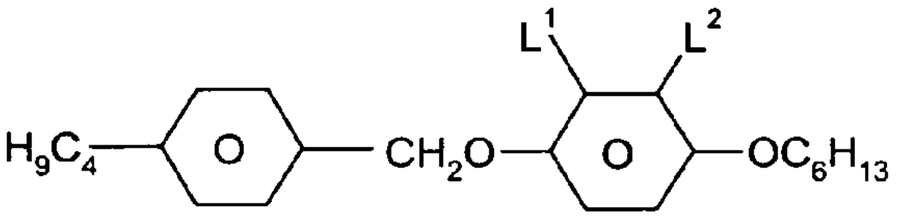

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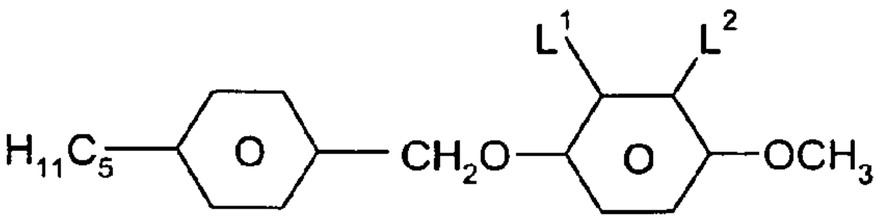

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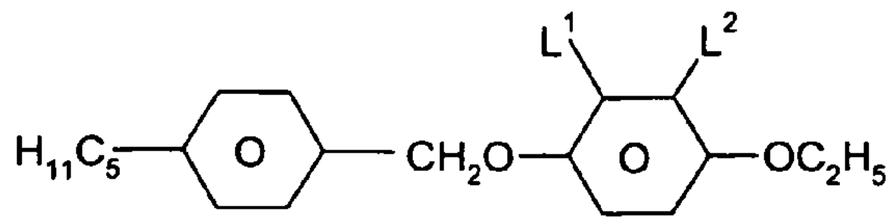

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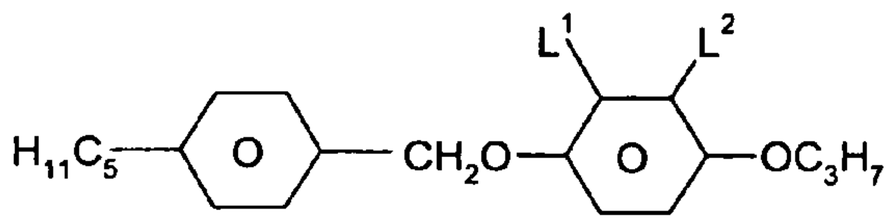

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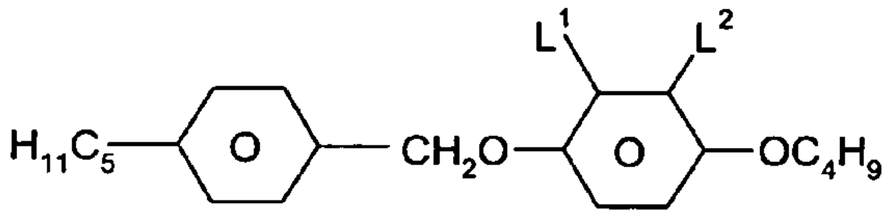

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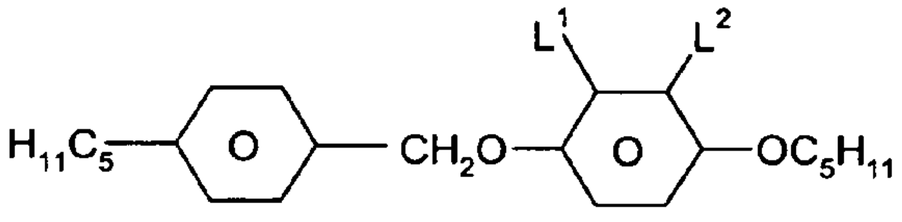

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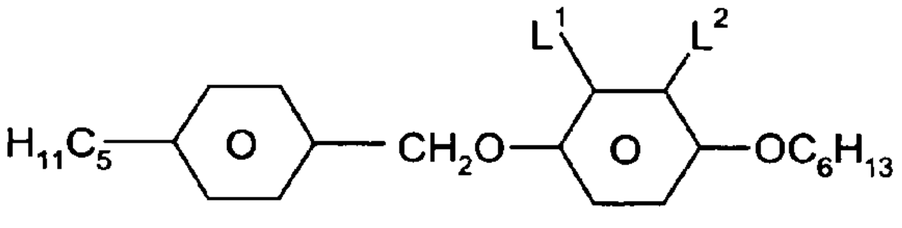

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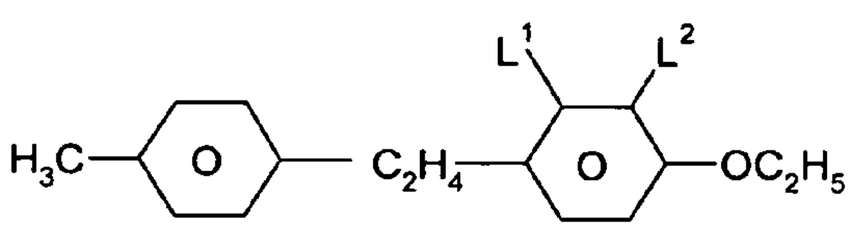
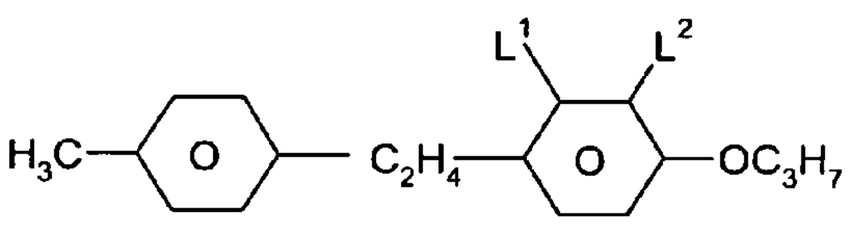


I-59



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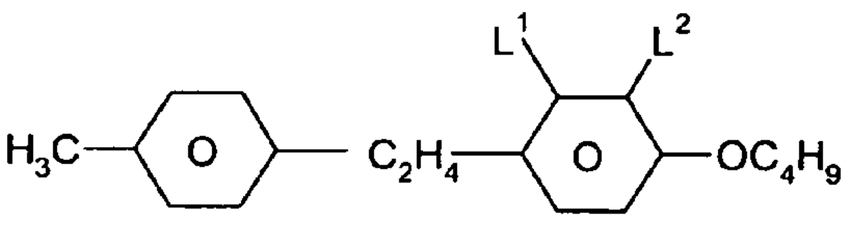

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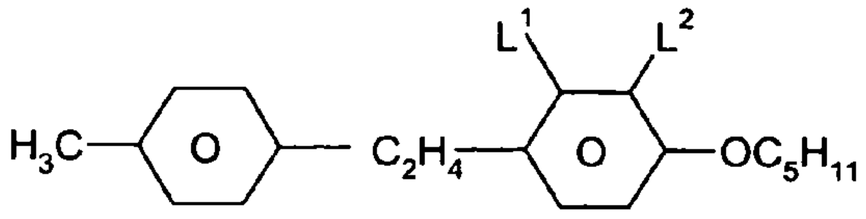

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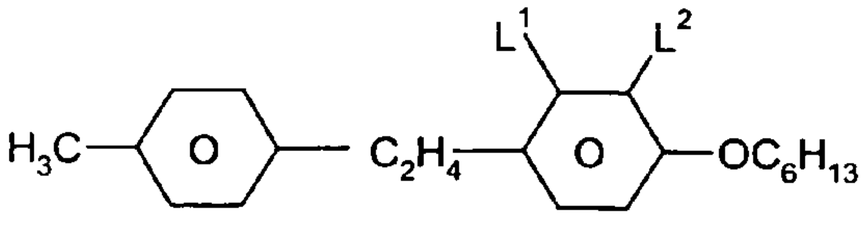

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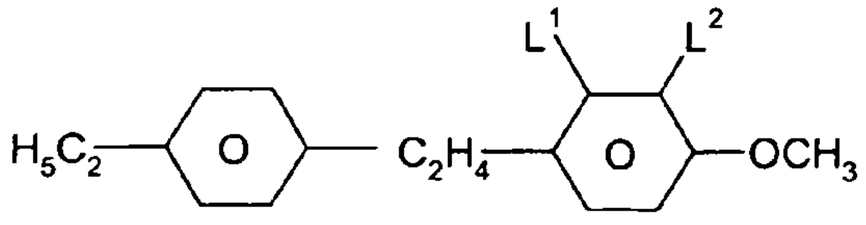

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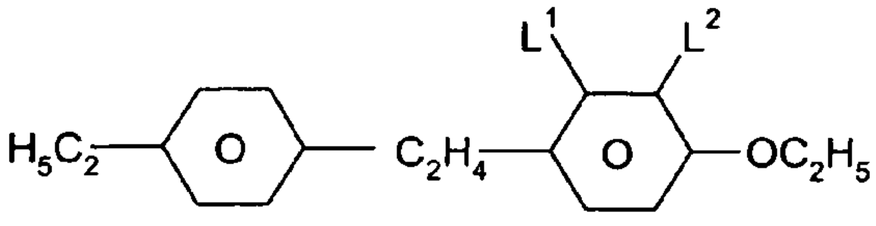

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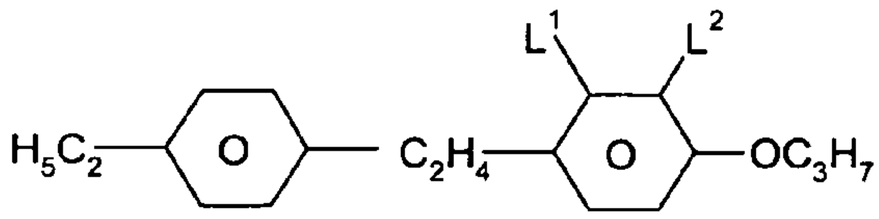

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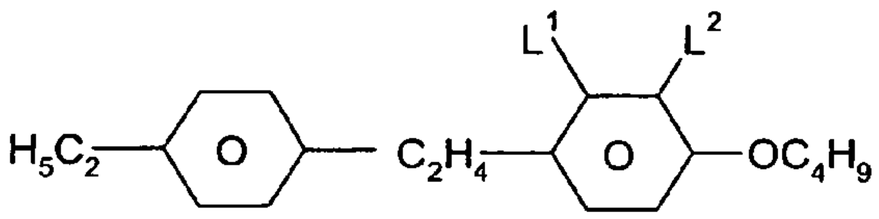

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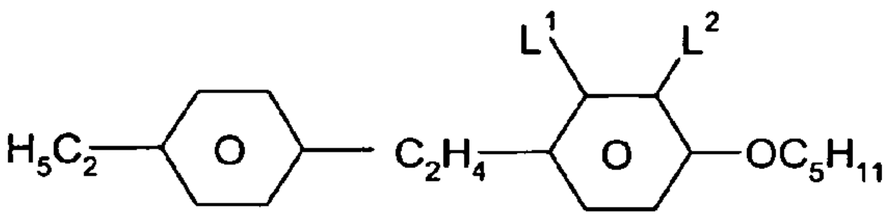

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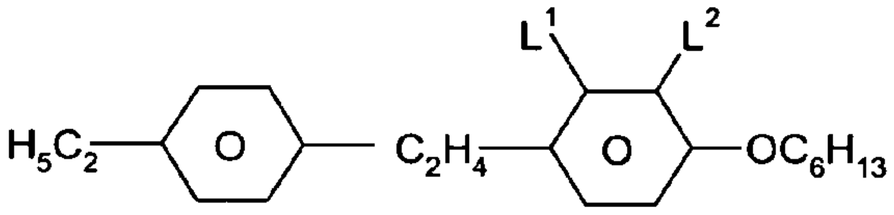

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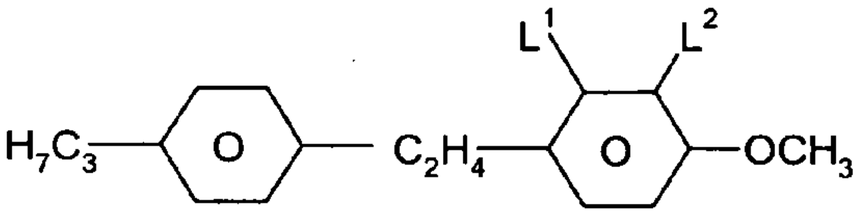

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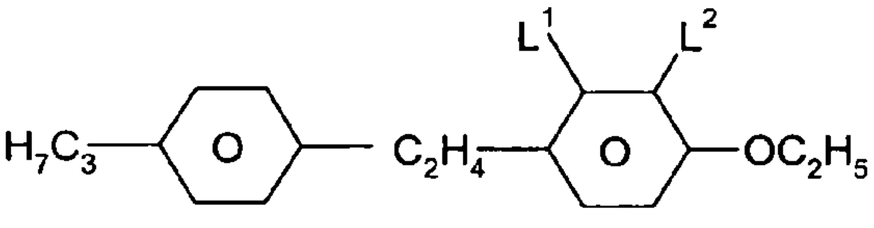

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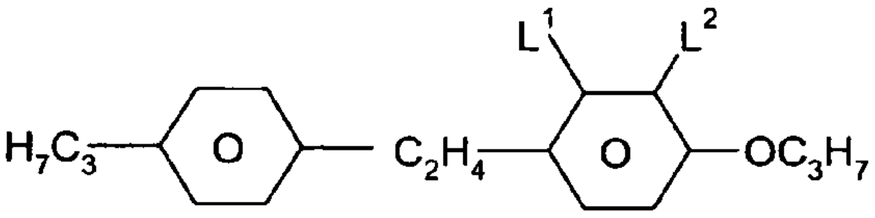

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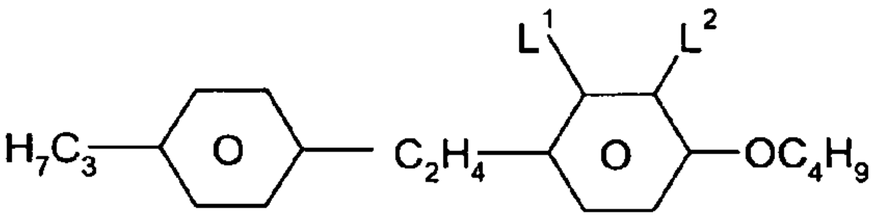

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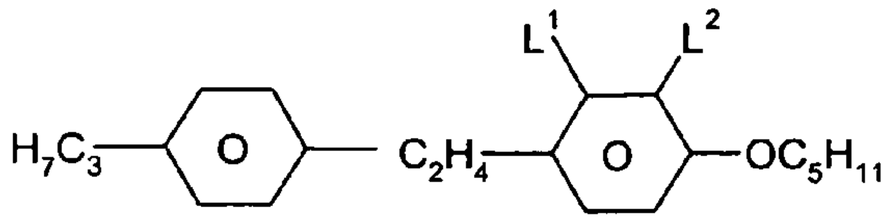

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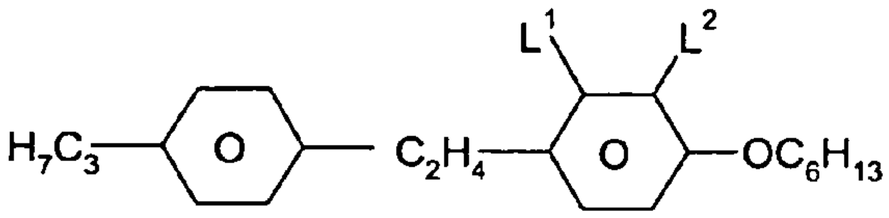

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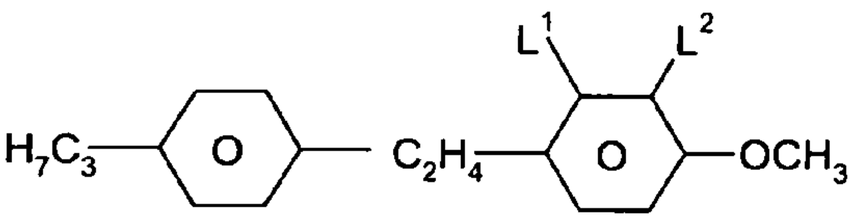

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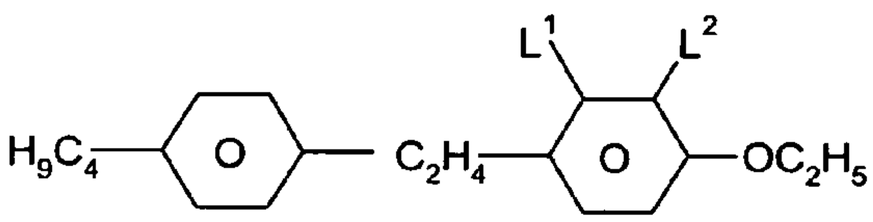

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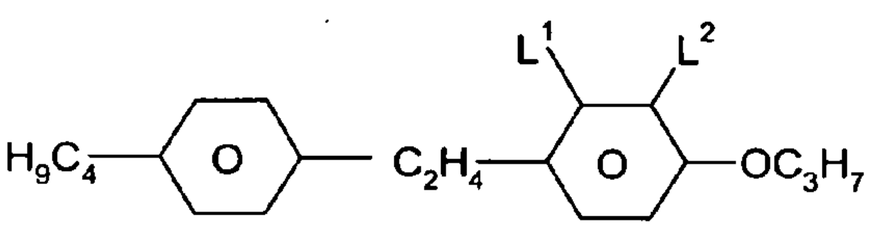

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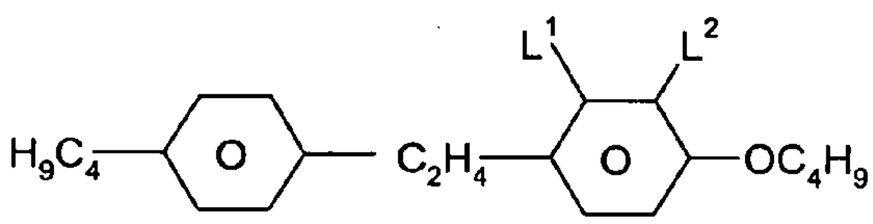

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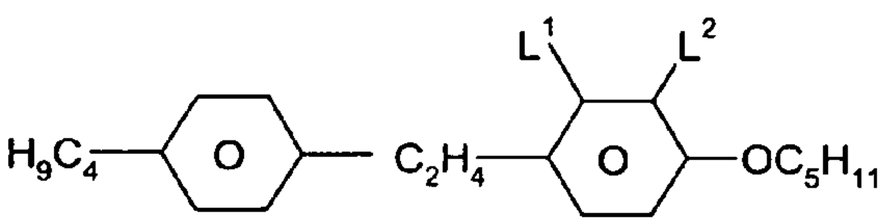

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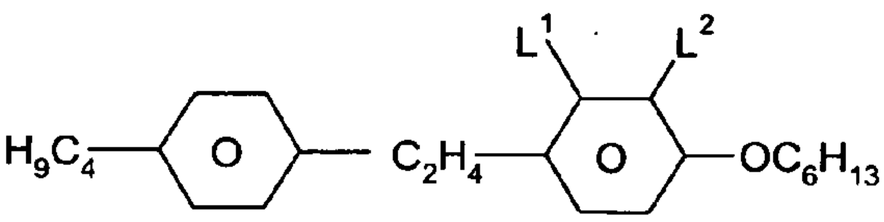

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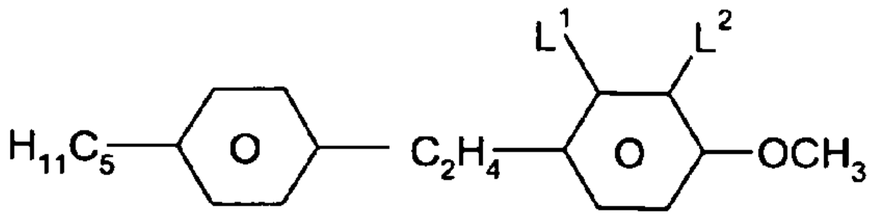

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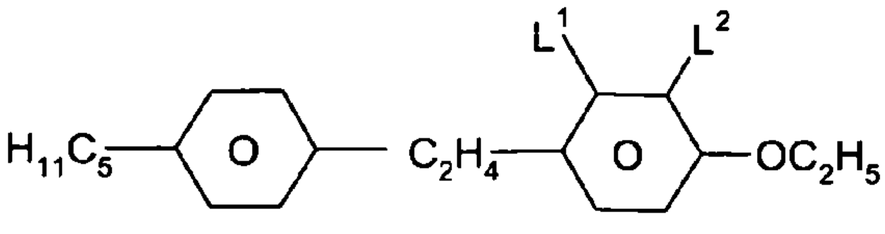

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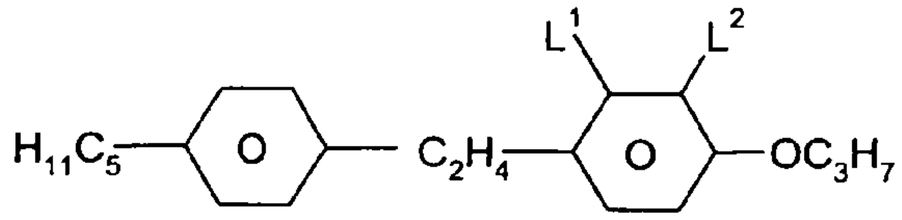

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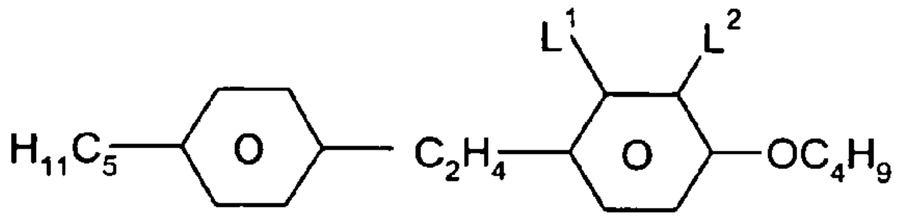

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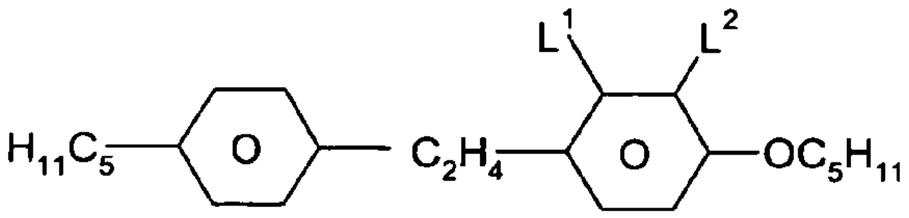

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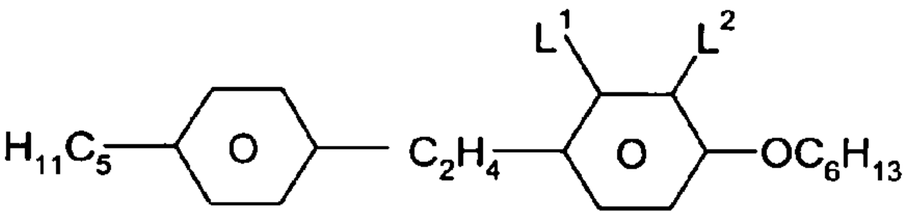

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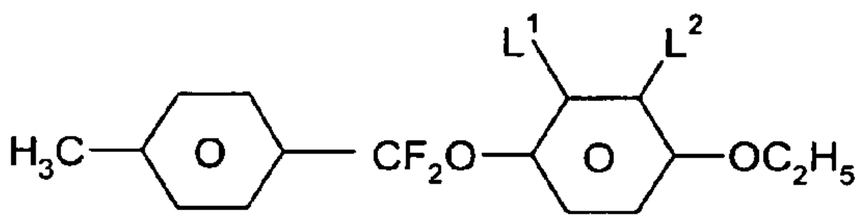

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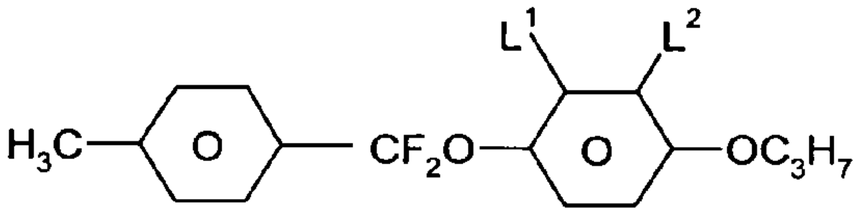

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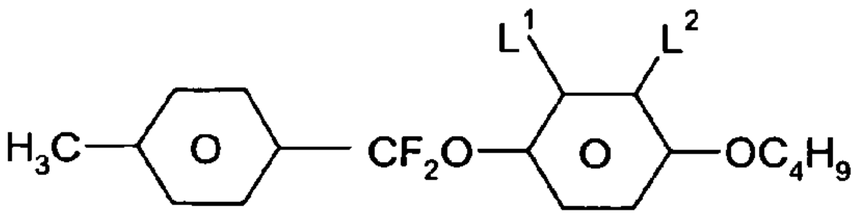

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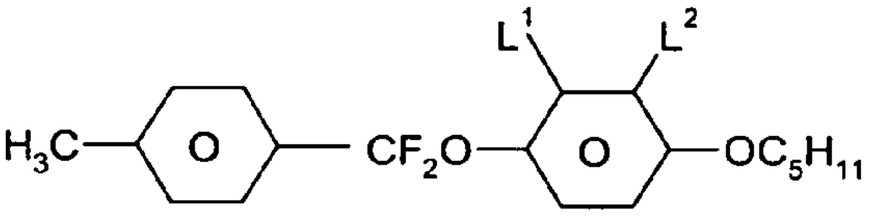

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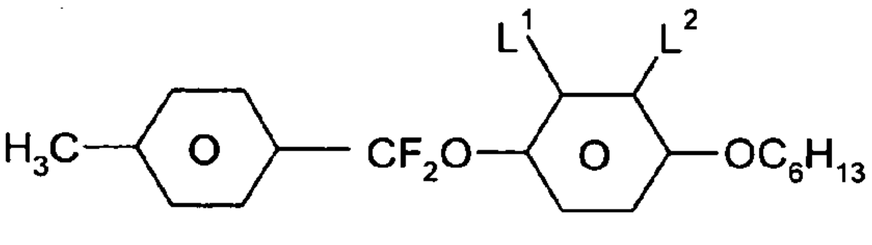

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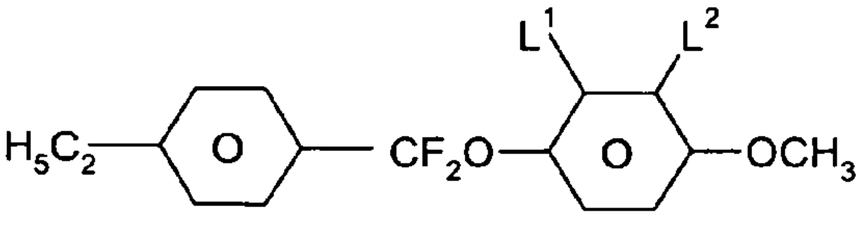

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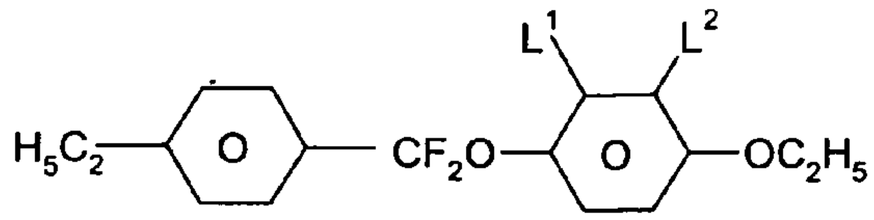

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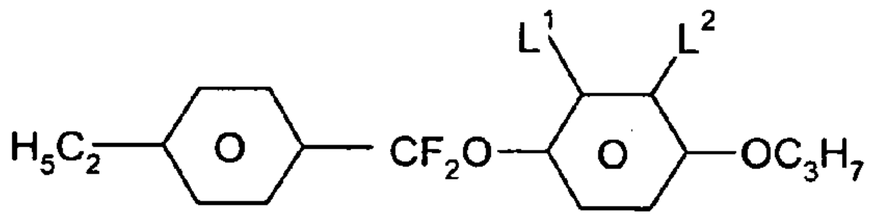

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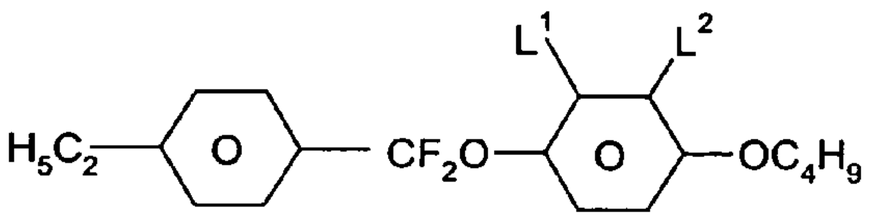

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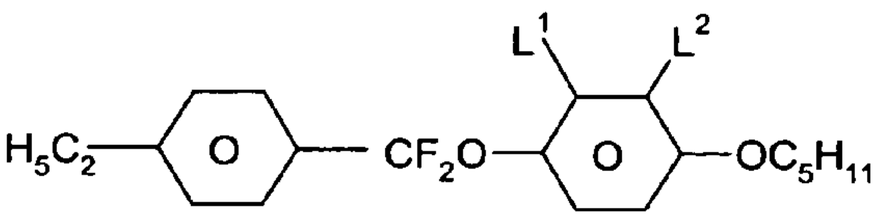

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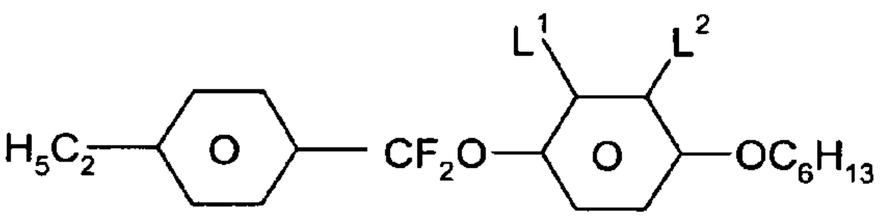

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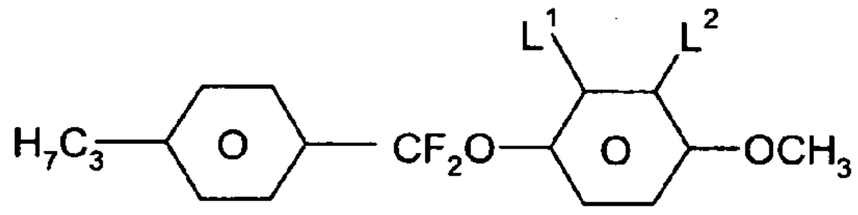

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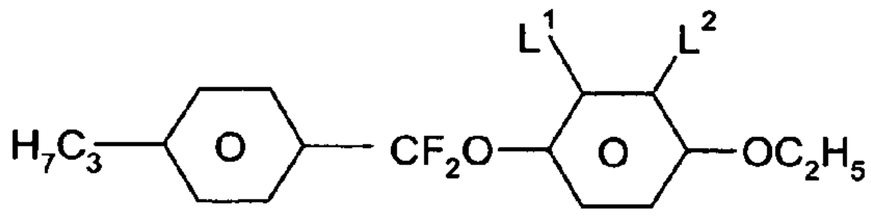

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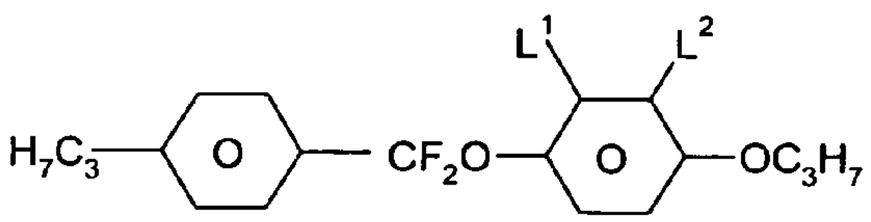

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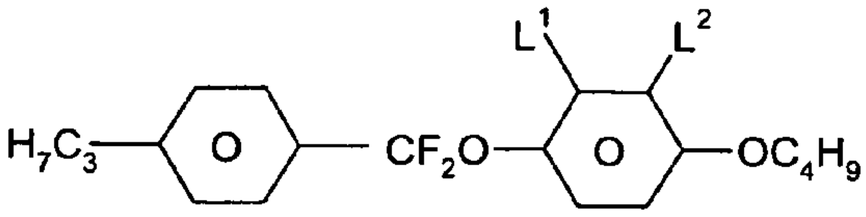

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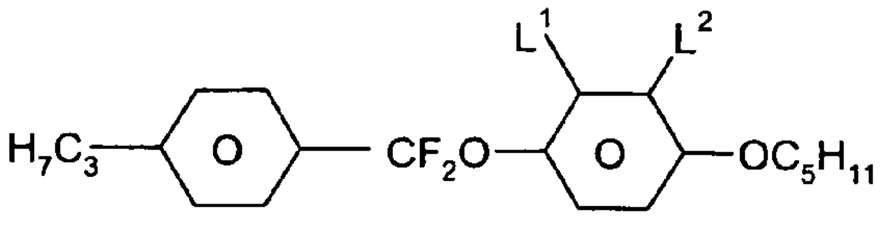

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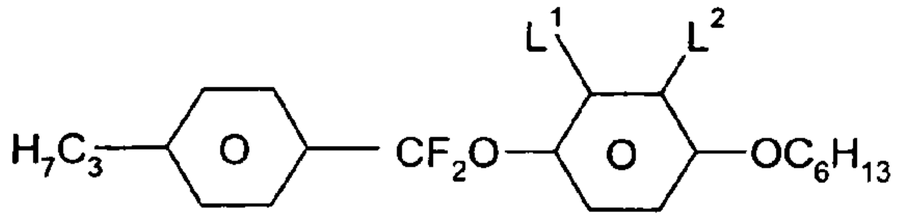

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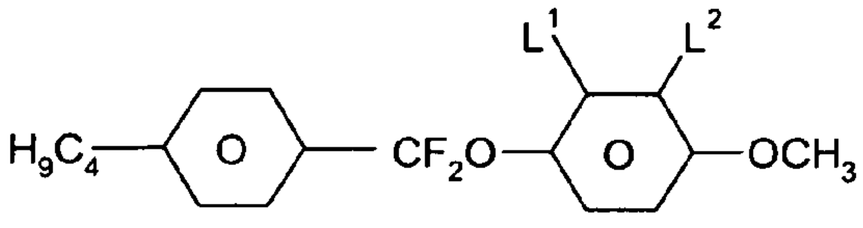

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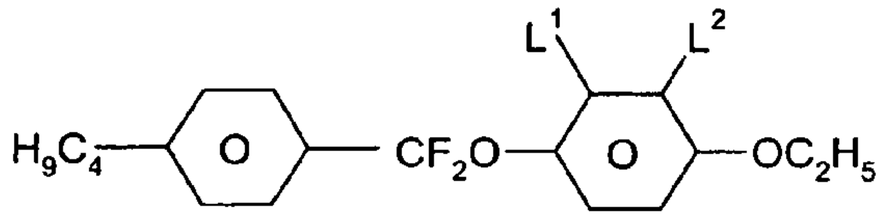

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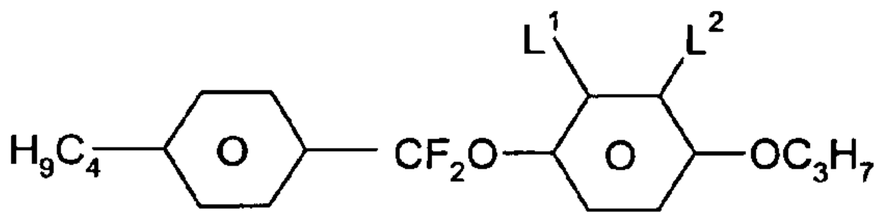

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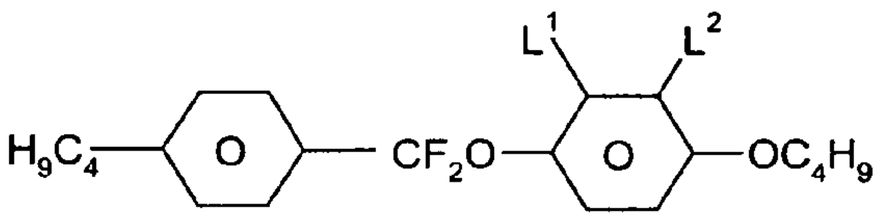

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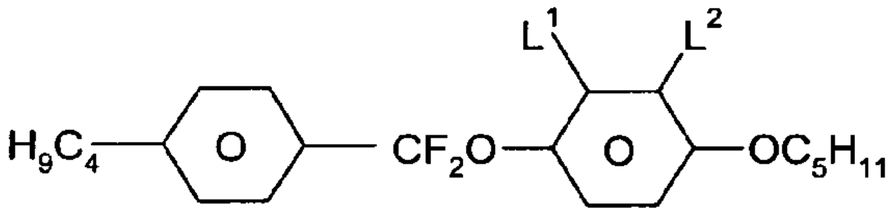

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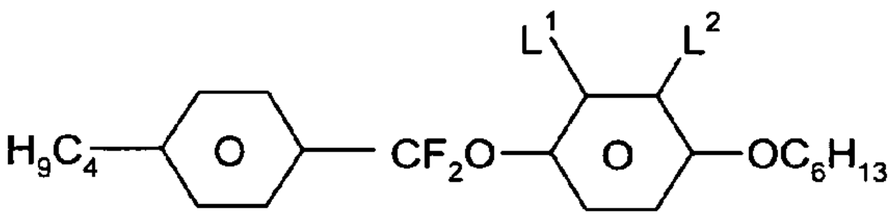

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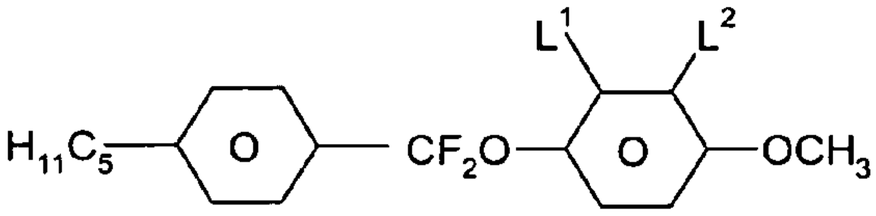

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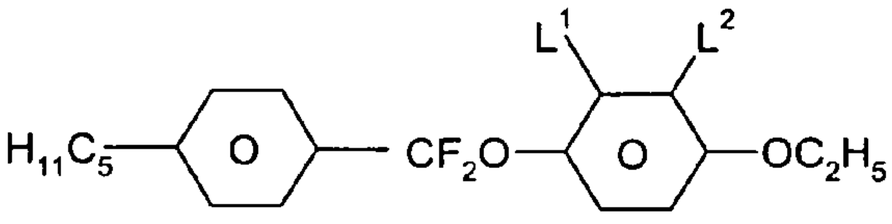

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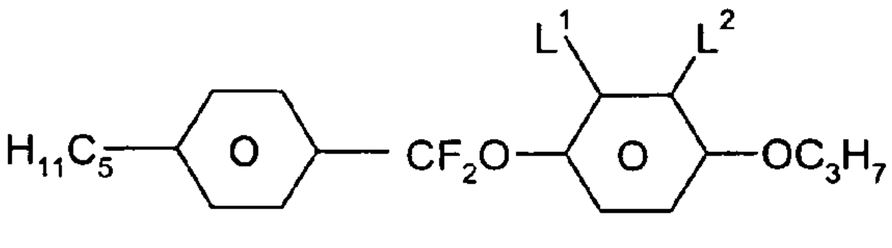

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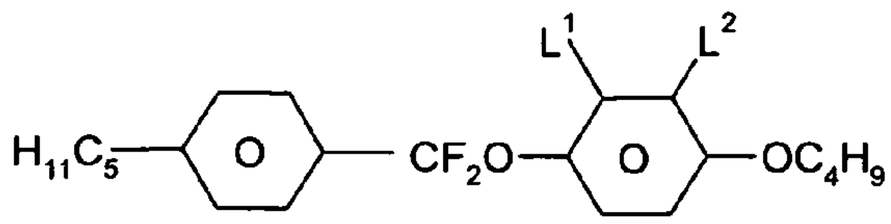
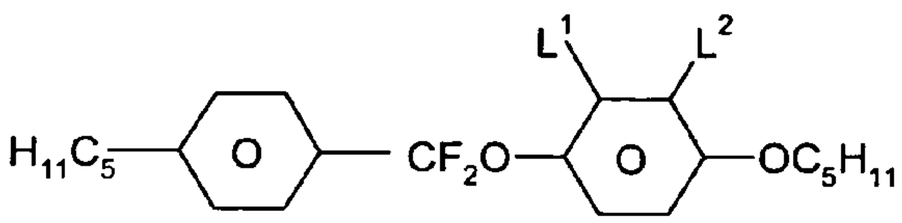
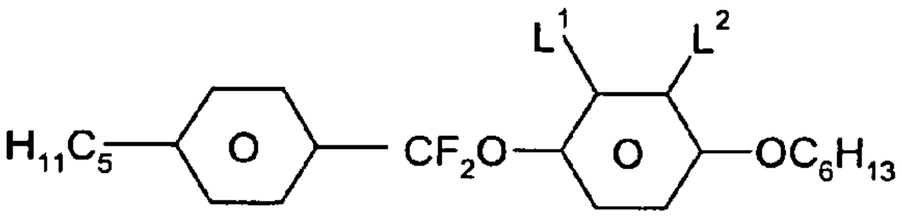


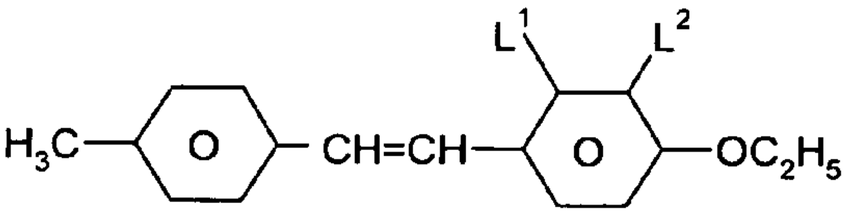
I-114



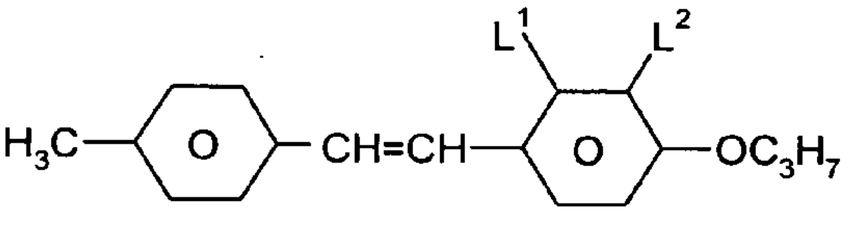
I-115



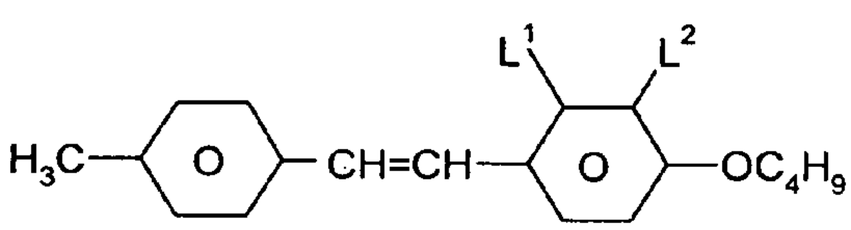
I-116



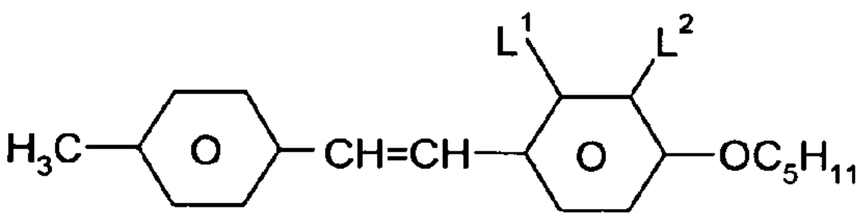
I-117



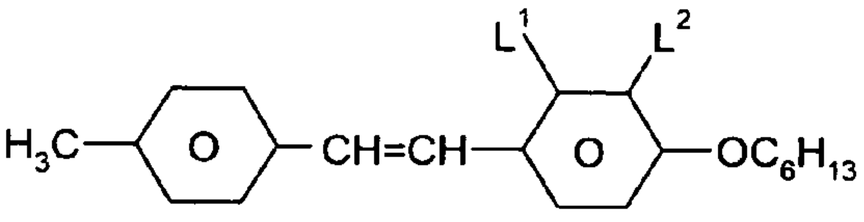
I-118



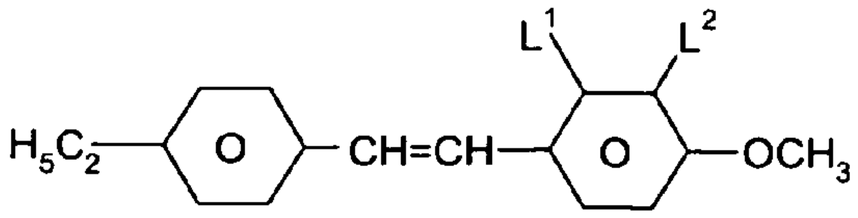
I-119



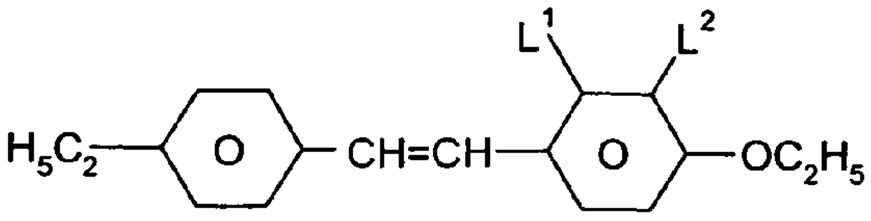
I-120



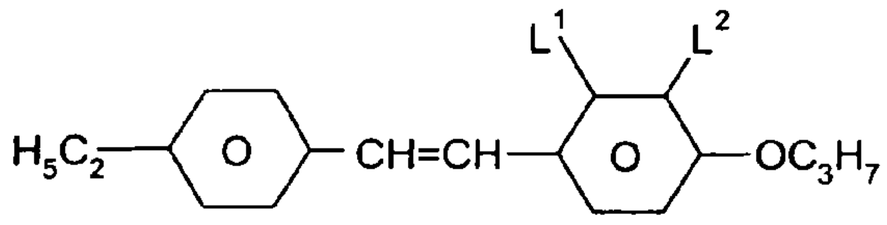
I-121



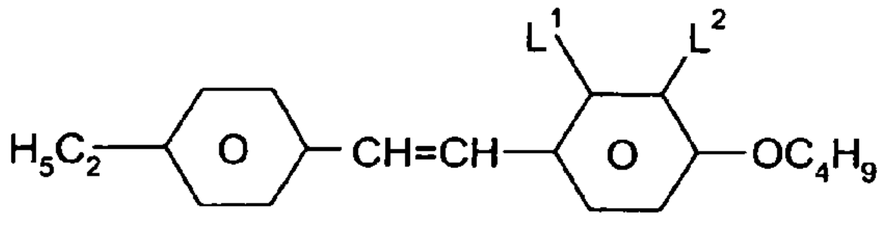
I-122



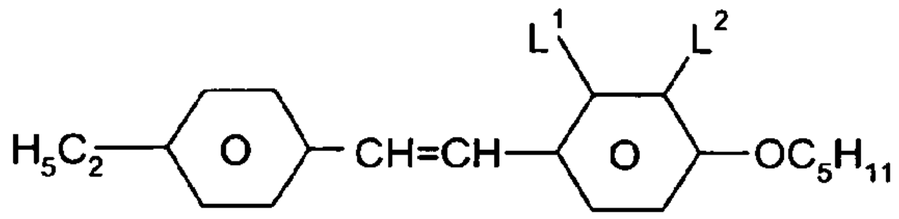
I-123



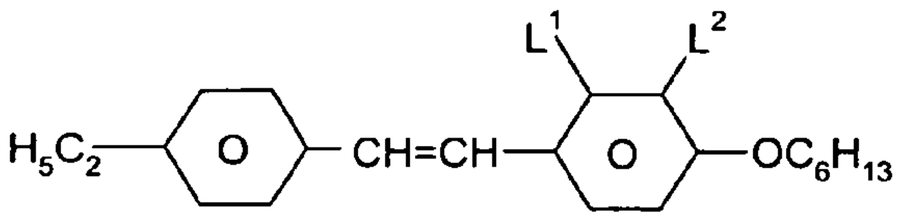
I-124



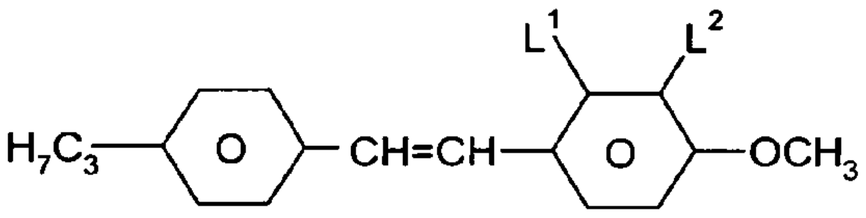
I-125



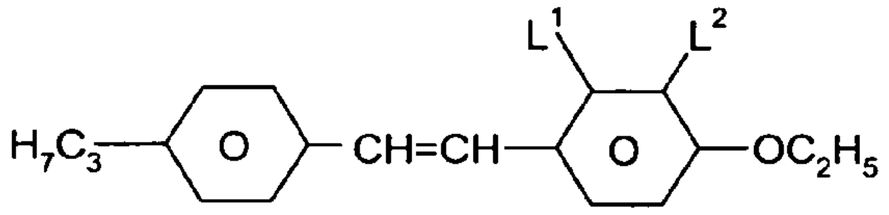
I-126



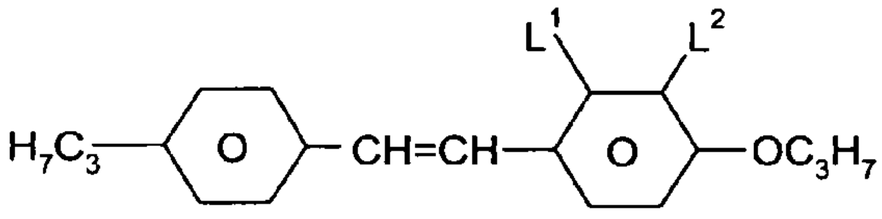
I-127



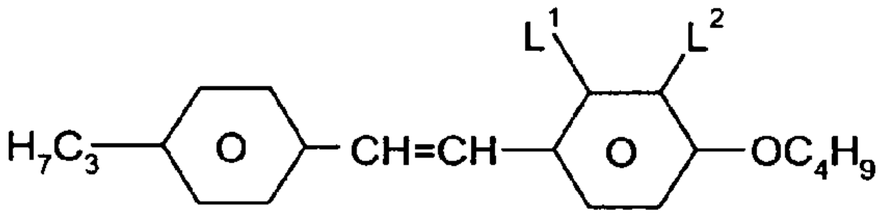
I-128



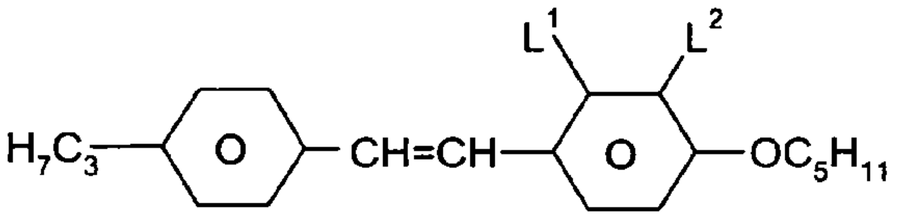
I-129



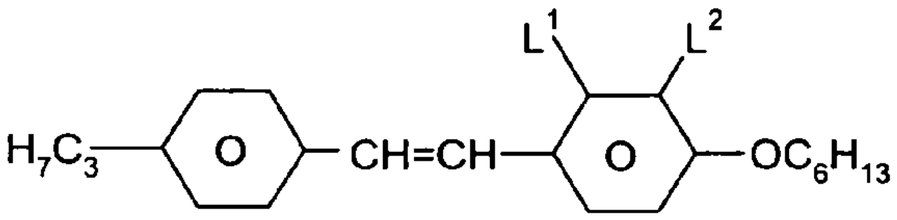
I-130



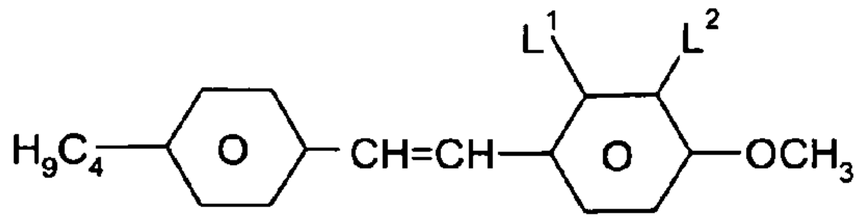
I-131



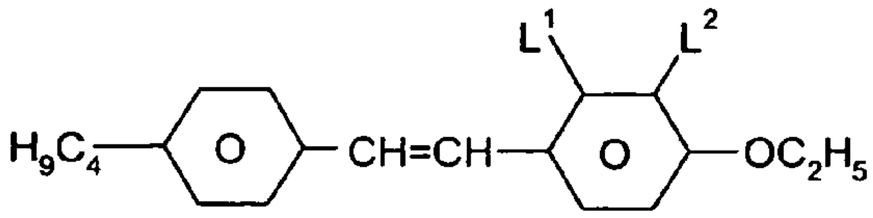
I-132



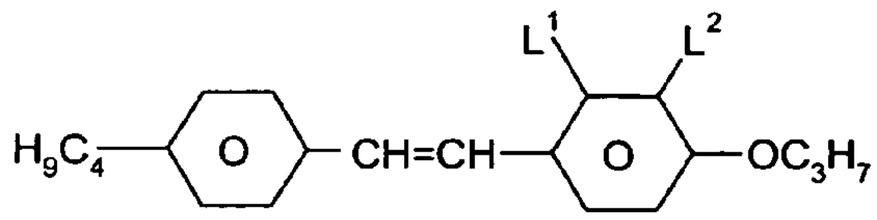
I-133



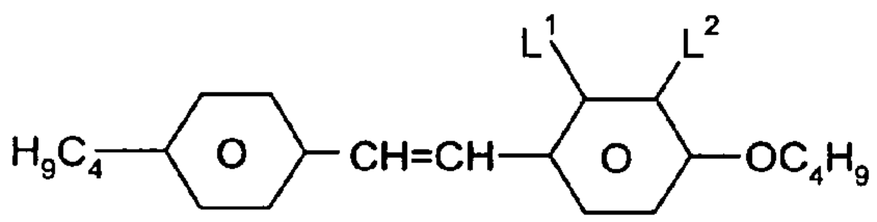
I-134



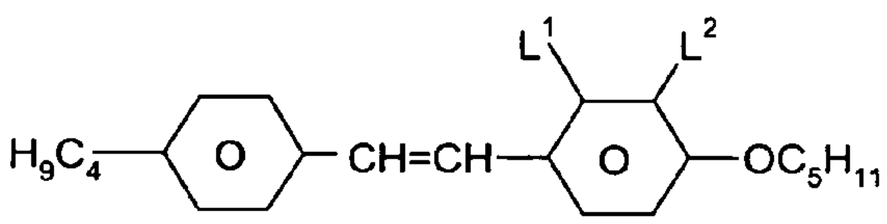
I-135



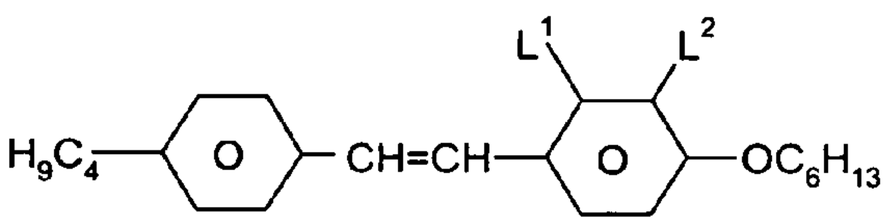
I-136



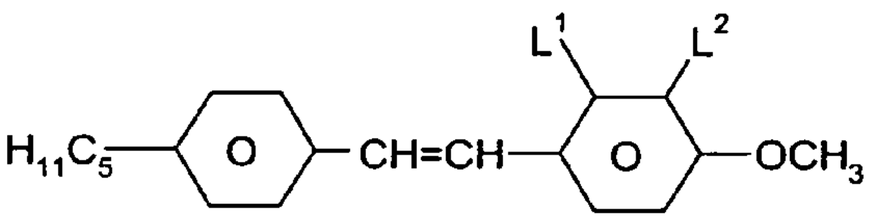
I-137



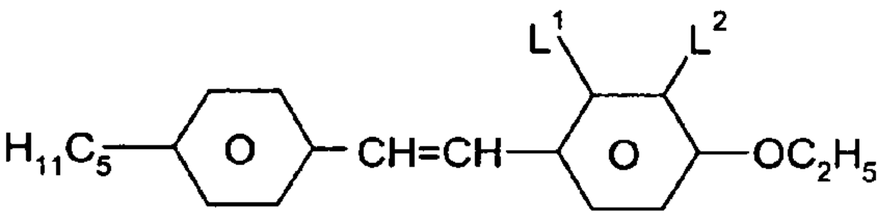
I-138



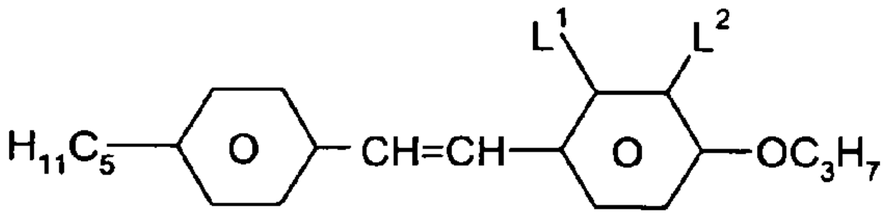
I-139



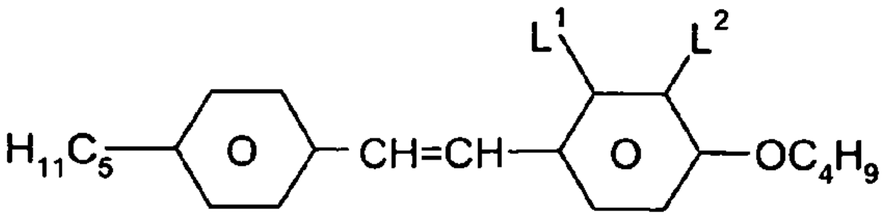
I-140



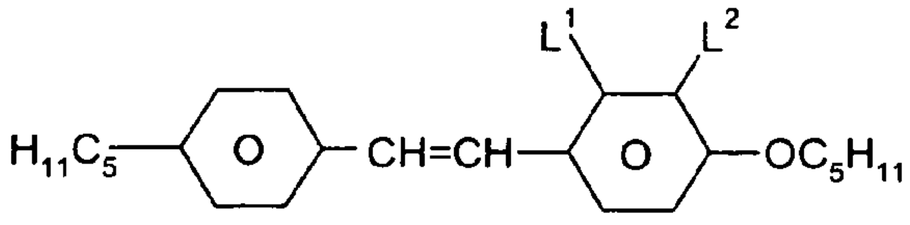
I-141



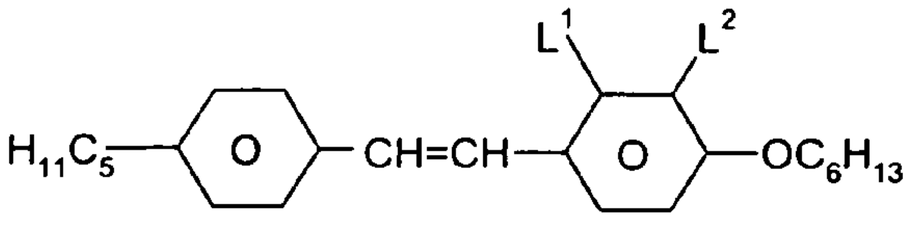
I-142



I-143



I-144



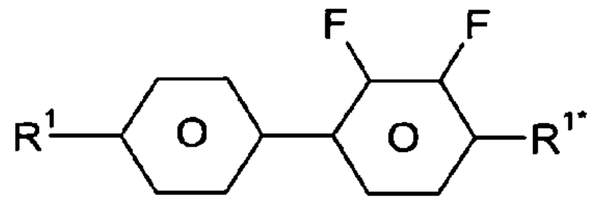
I-145，

其中：

L^1及L^2各自彼此獨立地表示F或Cl。在式I化合物及子式I-1至子式I-145中，較佳$L^1 = L^2 = F$。Z^1較佳表示單鍵。

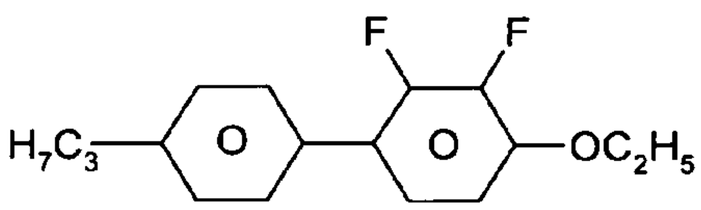
尤其較佳為式I-1、式I-3、式I-7、式I-13、式I-15、式I-19、式I-25及式I-26之化合物。

本發明之混合物尤其較佳地包含至少兩種式I-A化合物：

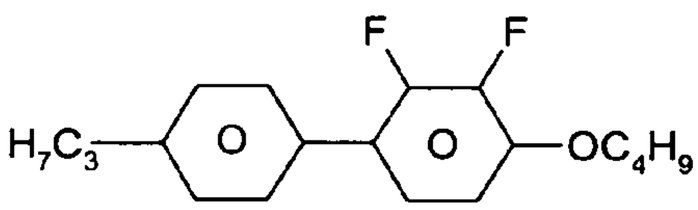


I-A。

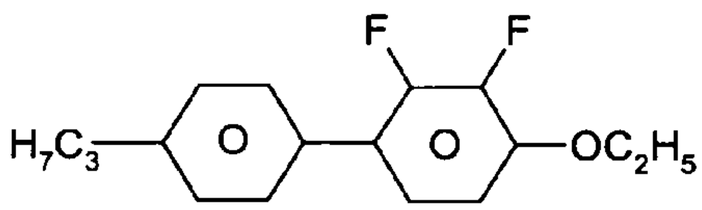
本發明之混合物尤其較佳地包含以下群組中之至少兩種化合物：



及



或



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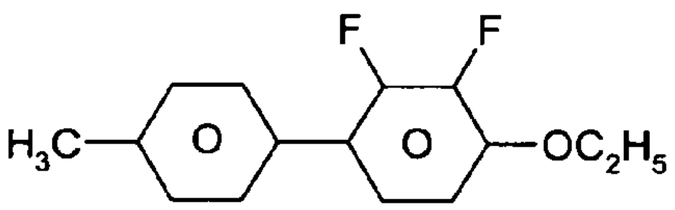

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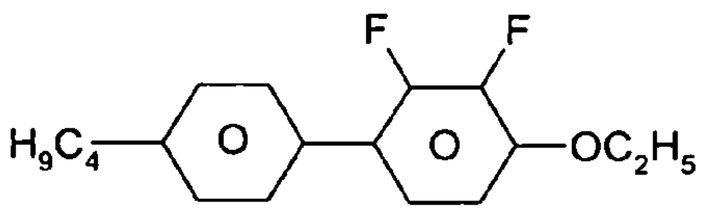

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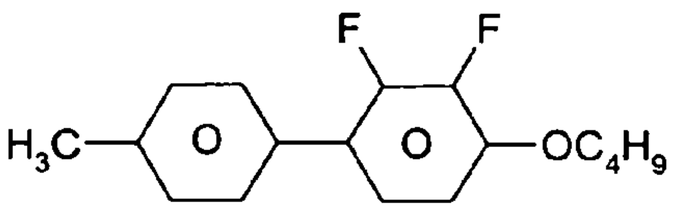

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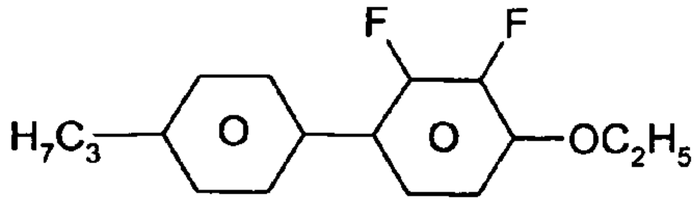
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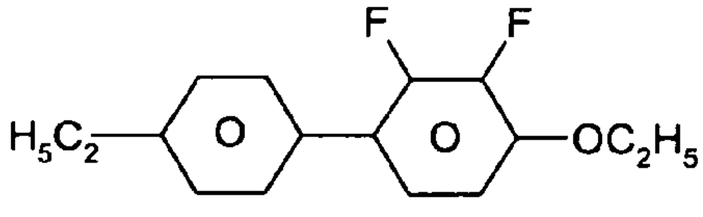

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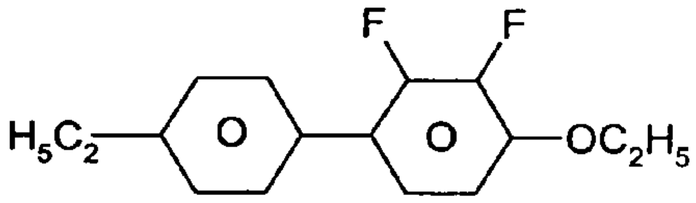
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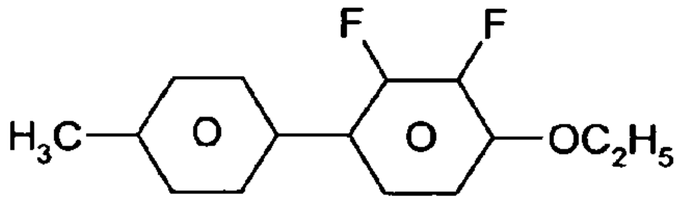

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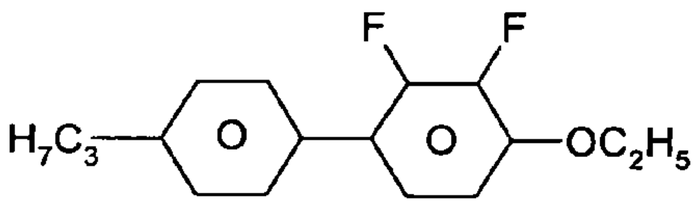
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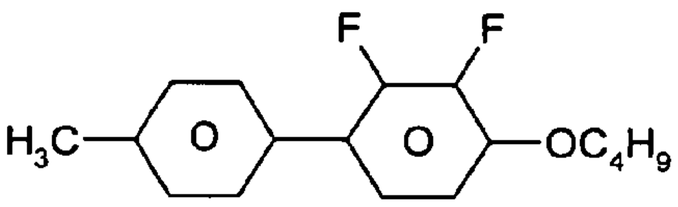
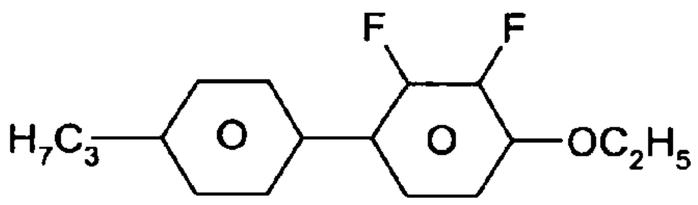


或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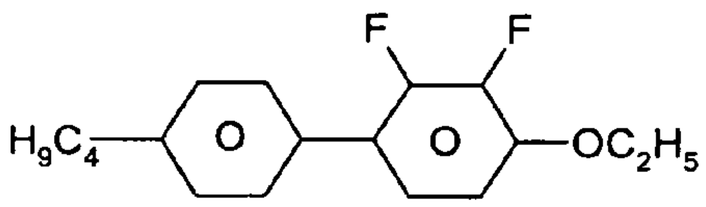

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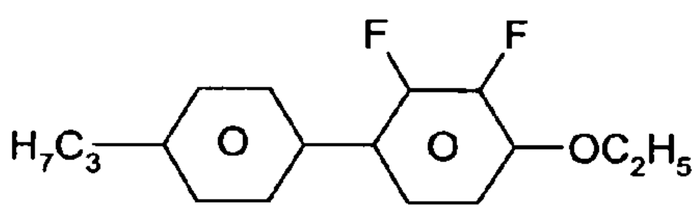
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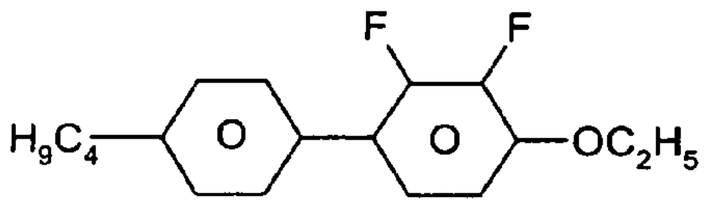
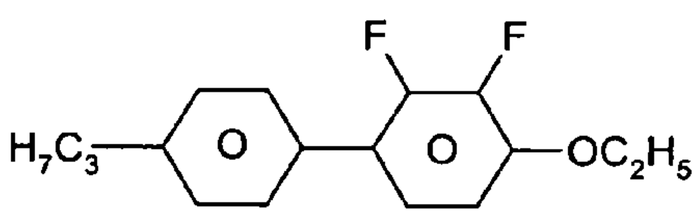
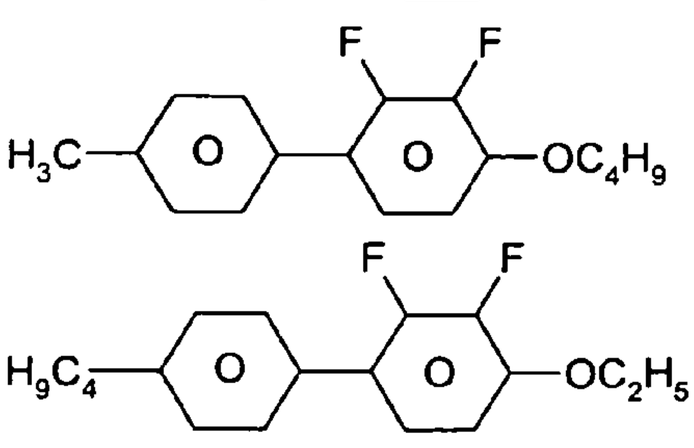
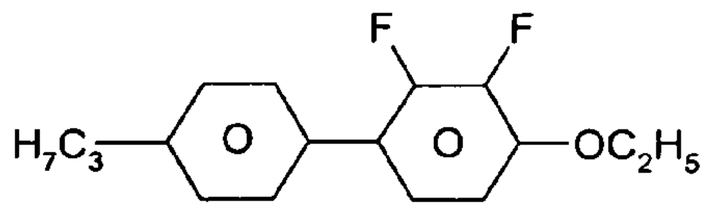

。

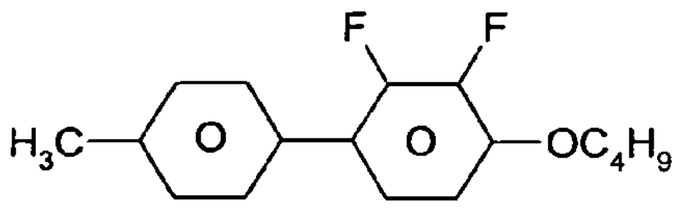
此外較佳為包含至少三種式I化合物之混合物。本發明之混合物較佳包含以下三種化合物：

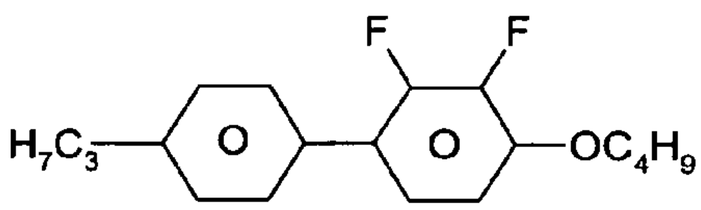




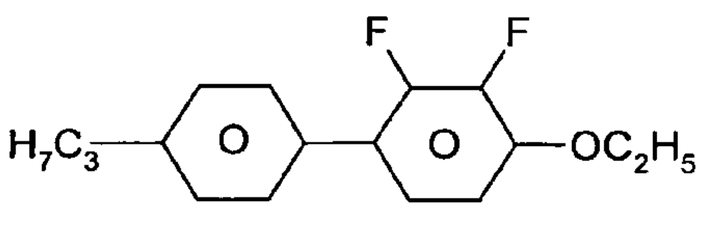
或

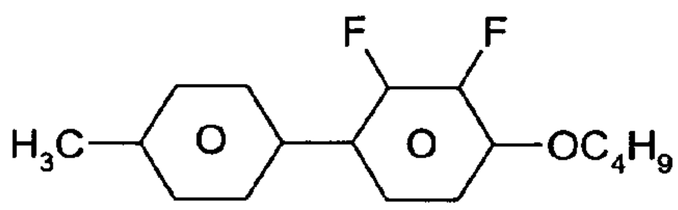


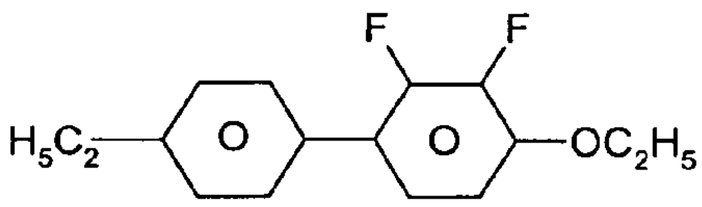




或







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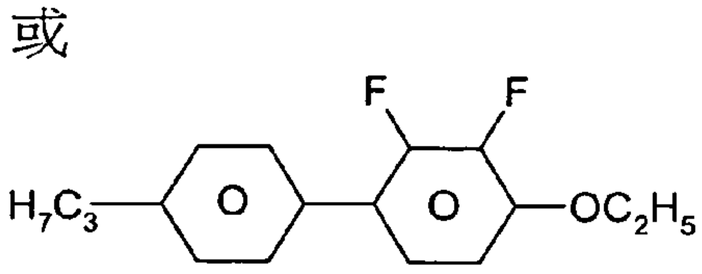
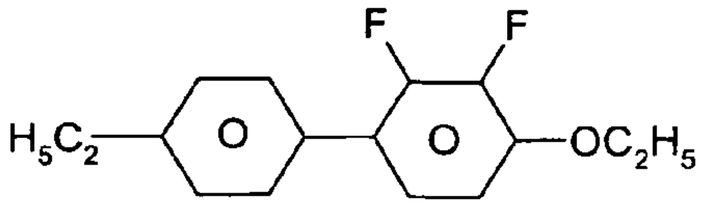
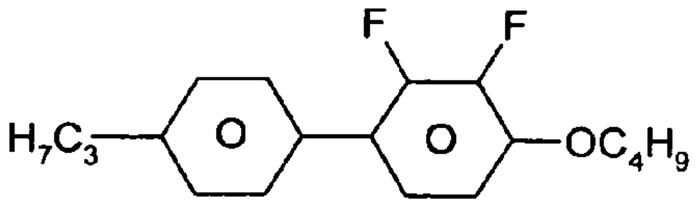






。

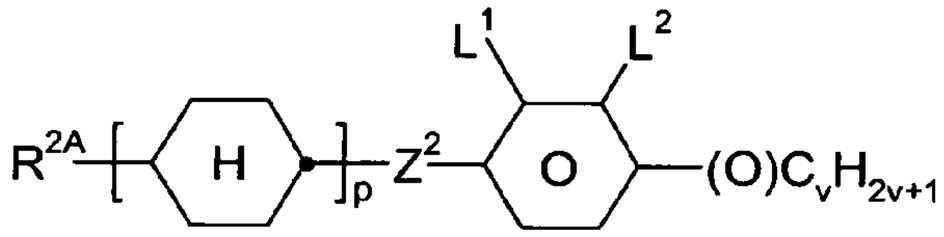
式I化合物例如來自U.S. 5,273,680且可藉由已知方法製備。

本發明之介質較佳包含兩種、三種、四種或四種以上，較佳兩種或三種式I化合物。

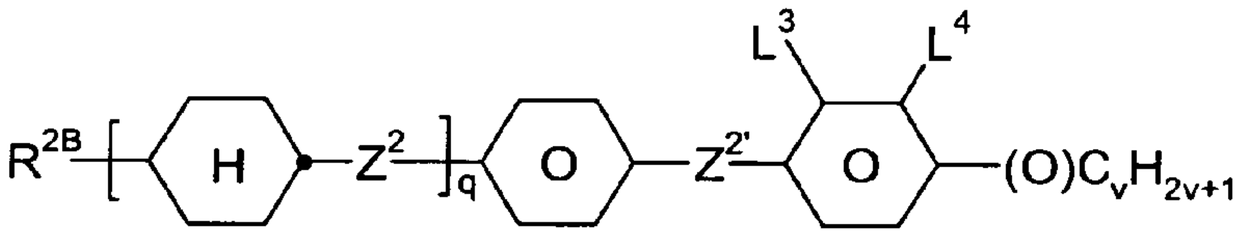
以整體混合物計，式I化合物較佳以5重量%-65重量%，較佳10重量%-45重量%之量用於液晶介質中。尤其較佳為包含25重量%-45重量%之一或多種，較佳兩種或三種式I化合物的液晶介質。

本發明之液晶介質的較佳實施例如下所示：

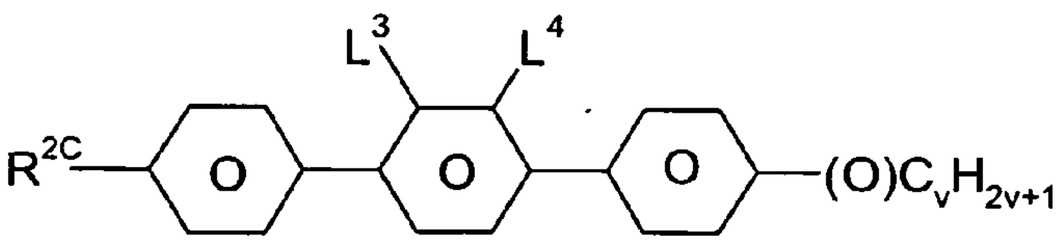
a)另外包含一或多種選自式IIA、式IIB及式IIC之化合物之群的化合物之液晶介質：



IIA

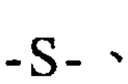


IIB



IIC，

其中：

R^{2A}、R^{2B}及R^{2C}各自彼此獨立地表示H、具有至多15個C原子之未取代、經CN或CF_3單取代或經鹵素至少單取代之烷基，其中另外，此等基團中之一或多個CH_2基團可經-O-、-S-、  、-C≡C-、$-CF_2O-$、$-OCF_2-$、-OC-O-或-O-CO-以使得O原子不彼此直接連接的方式置

換；

L^{1-4}各自彼此獨立地表示F、Cl、CF_3或CHF_2；

Z^2及$Z^{2'}$各自彼此獨立地表示單鍵、$-CH_2CH_2-$、$-CH=CH-$、$-CF_2O-$、$-OCF_2-$、$-CH_2O-$、$-OCH_2-$、$-COO-$、$-OCO-$、$-C_2F_4-$、$-CF=CF-$、$-CH=CHCH_2O-$；

p表示1或2；

q表示1或2，及

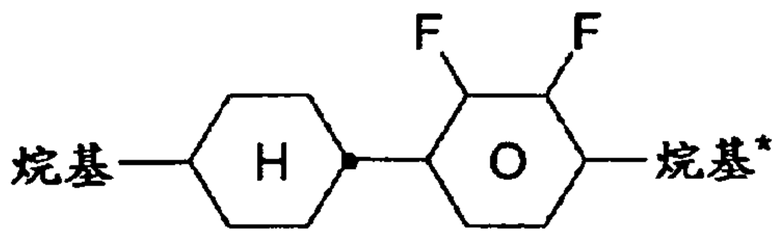
v表示1至6。

在式IIA及式IIB之化合物中，Z^2可具有相同或不同含義。在式IIB化合物中，Z^2及$Z^{2'}$可具有相同或不同含義。

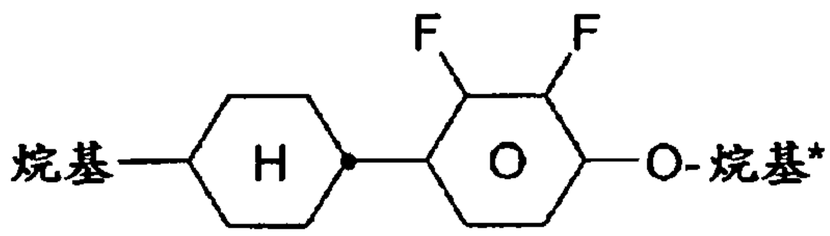
在式IIA、式IIB及式IIC之化合物中，R^{2A}、R^{2B}及R^{2C}各自較佳表示具有1-6個C原子之烷基，尤其為CH_3、C_2H_5、n-C_3H_7、n-C_4H_9、n-C_5H_{11}。

在式IIA及式IIB之化合物中，L^1、L^2、L^3及L^4較佳表示$L^1 = L^2 =$ F且$L^3 = L^4 =$ F，此外$L^1 =$ F且$L^2 =$ Cl，$L^1 =$ Cl且$L^2 =$ F，$L^3 =$ F且$L^4 =$ Cl，$L^3 =$ Cl且$L^4 =$ F。式IIA及式IIB中之Z^2及$Z^{2'}$較佳各自彼此獨立地表示單鍵，此外為$-C_2H_4-$橋。若在式IIB中，$Z^2 = -C_2H_4-$，則$Z^{2'}$較佳為單鍵，或若$Z^{2'} = -C_2H_4-$，則Z^2較佳為單鍵。在式IIA及式IIB之化合物中，(O)C_vH_{2v+1}較佳表示OC_vH_{2v+1}，此外為C_vH_{2v+1}。在式IIC化合物中，(O)C_vH_{2v+1}較佳表示C_vH_{2v+1}。在式IIC化合物中，L^3及L^4較佳各自表示F。

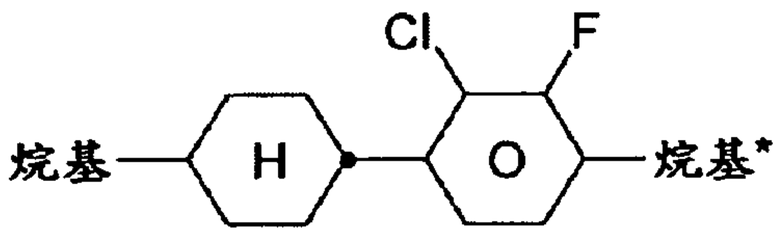
較佳的式IIA、式IIB及式IIC之化合物如下所示：



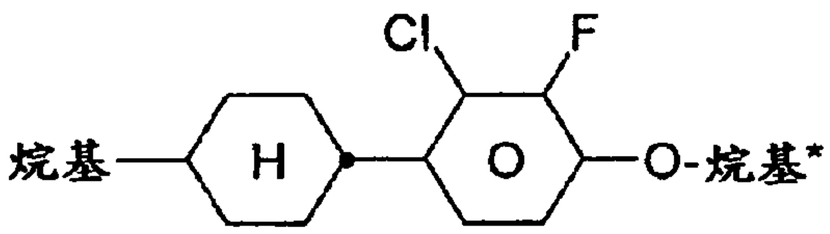
IIA-1



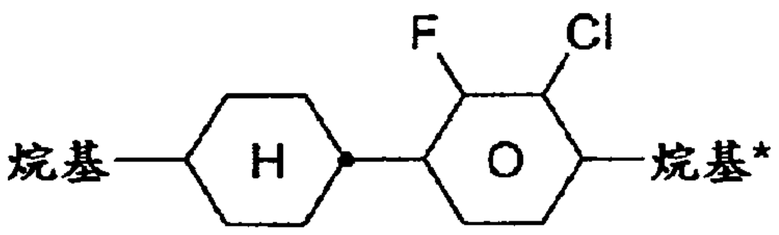
IIA-2



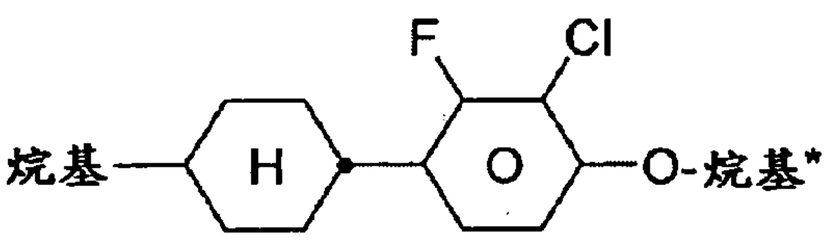
IIA-3



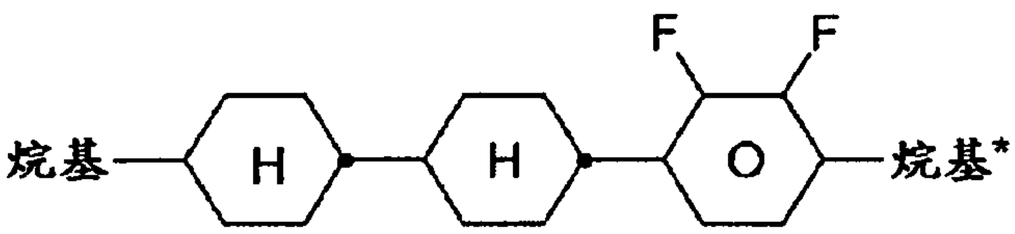
IIA-4



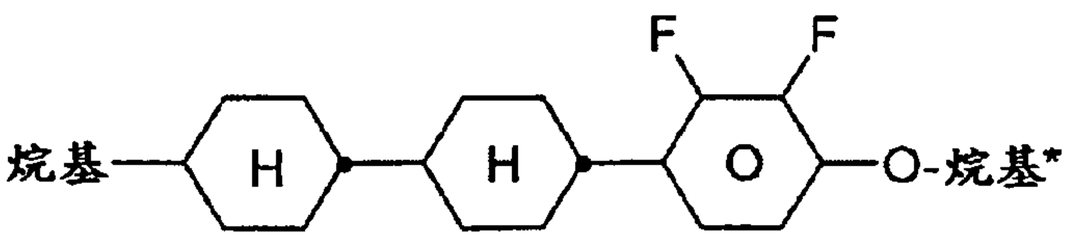
IIA-5



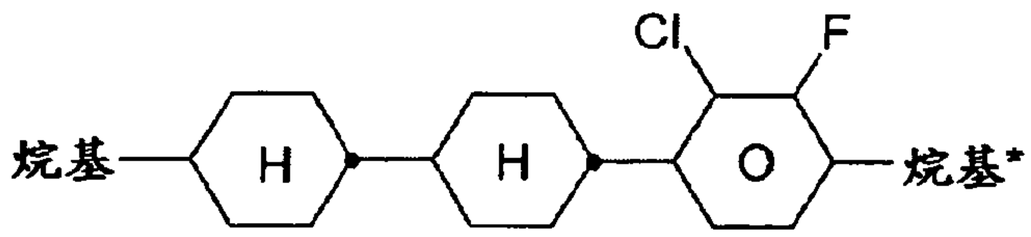
IIA-6



IIA-7



IIA-8



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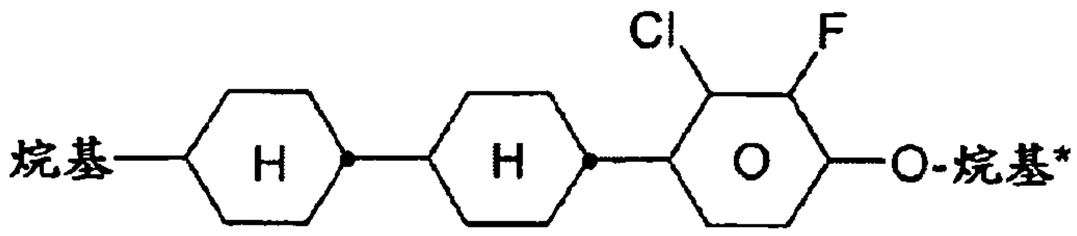
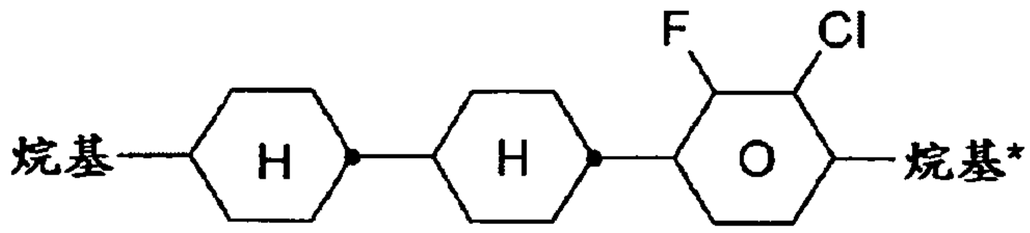
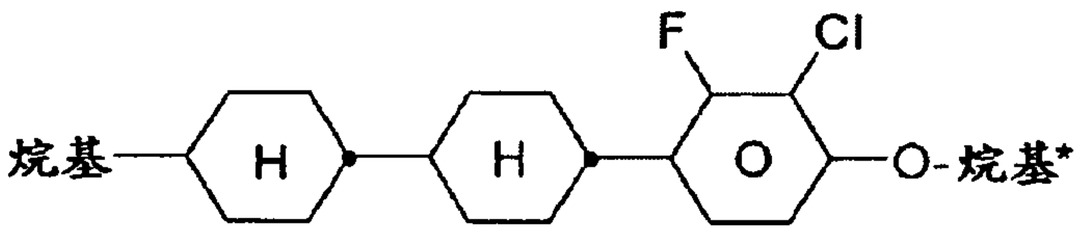


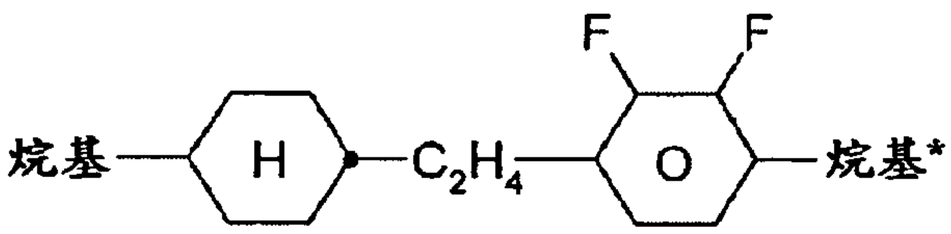
IIA-10



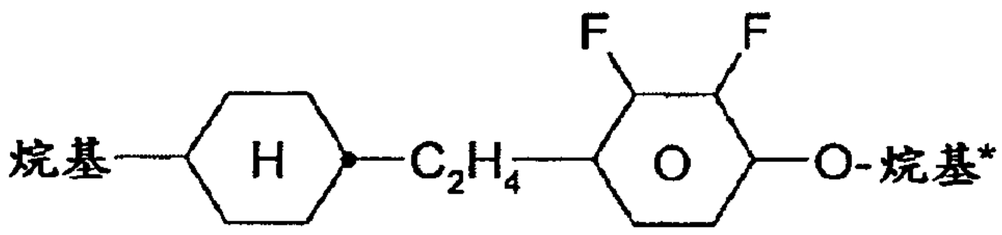
IIA-11



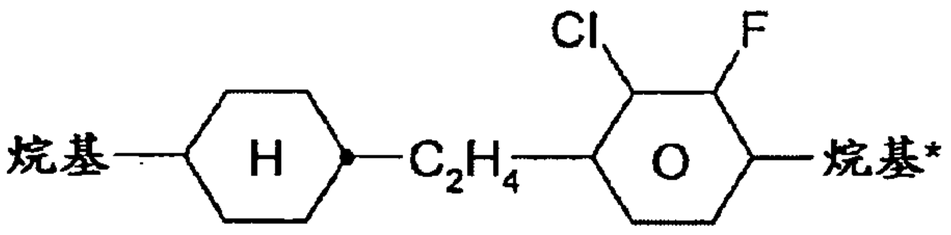
IIA-12



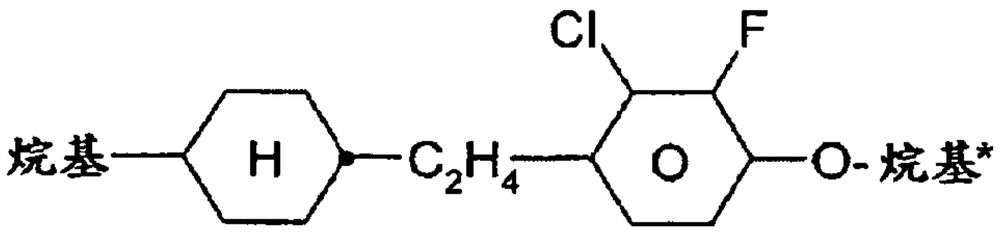
IIA-13



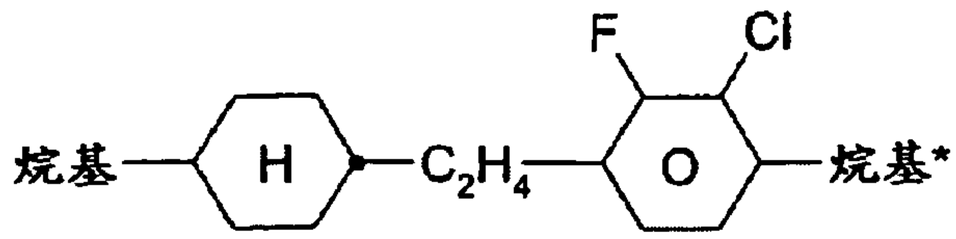
IIA-14



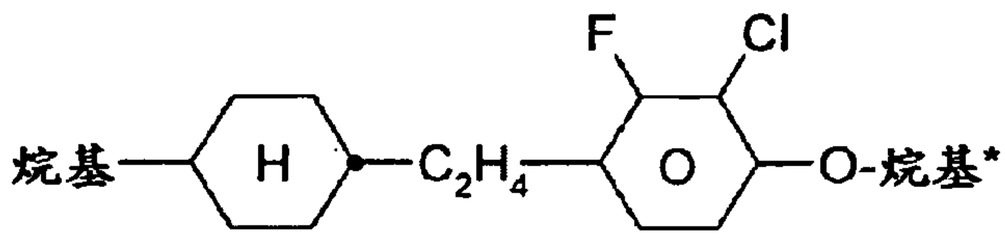
IIA-15



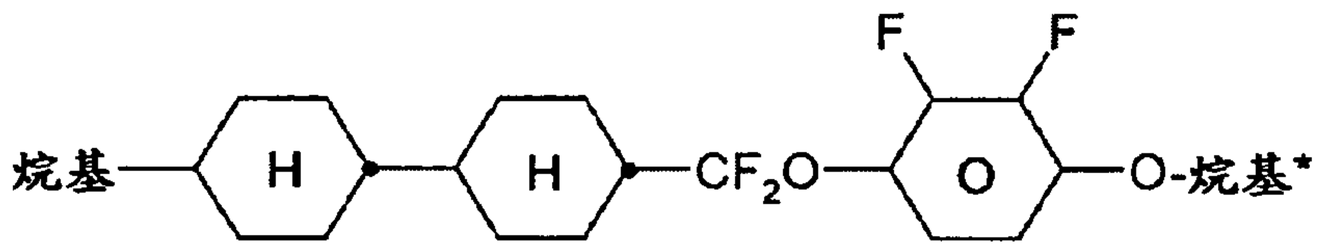
IIA-16



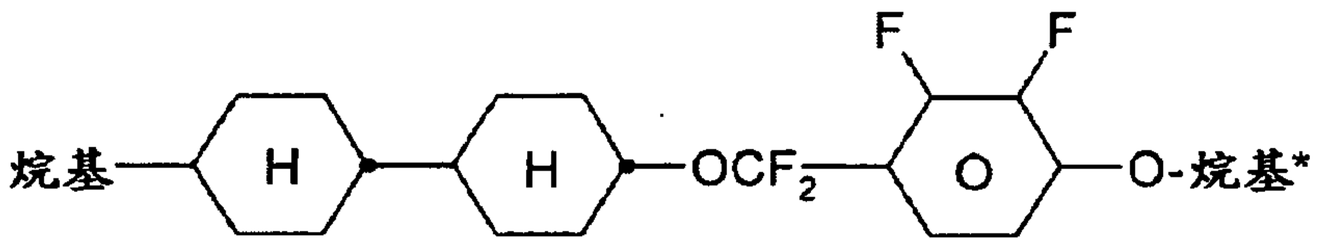
IIA-17



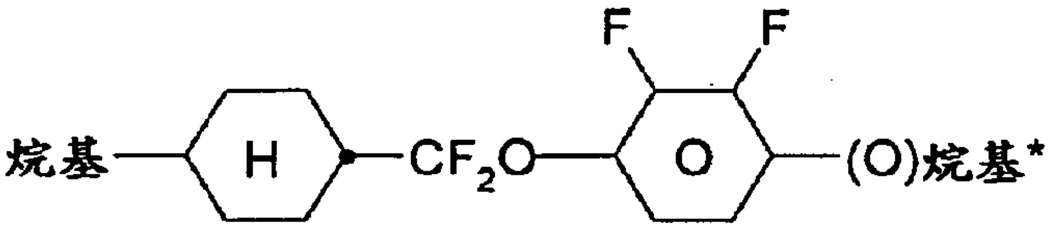
IIA-18



IIA-19



IIA-20



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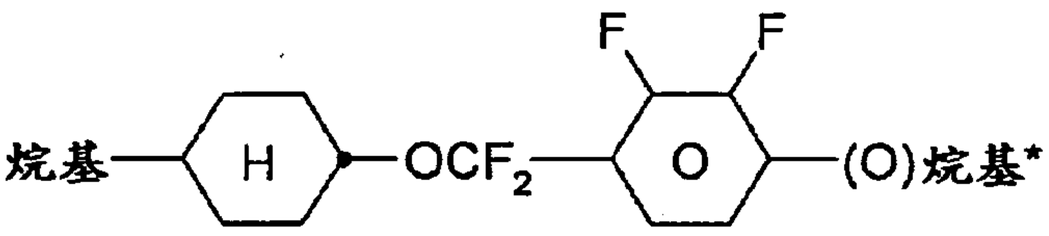

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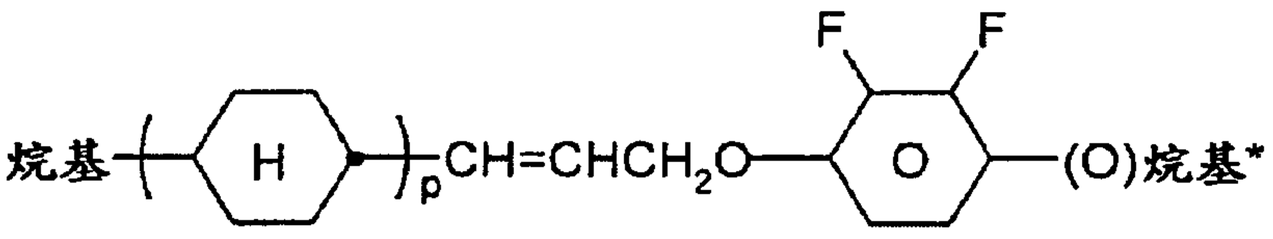

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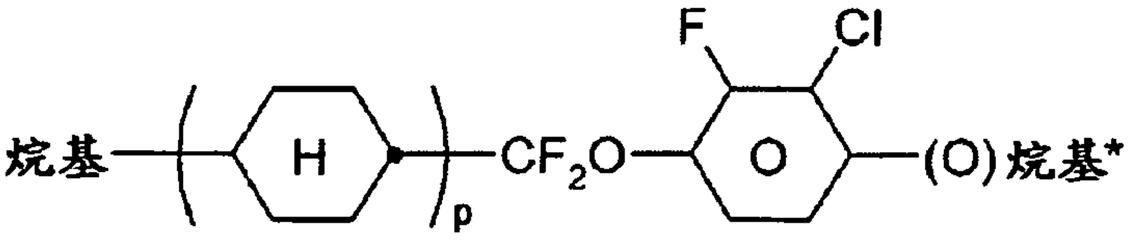
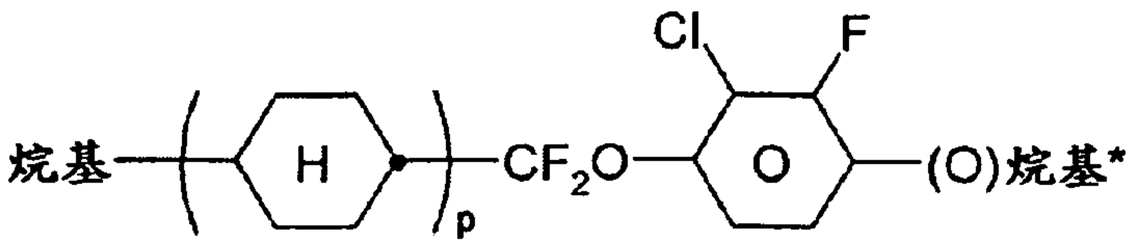
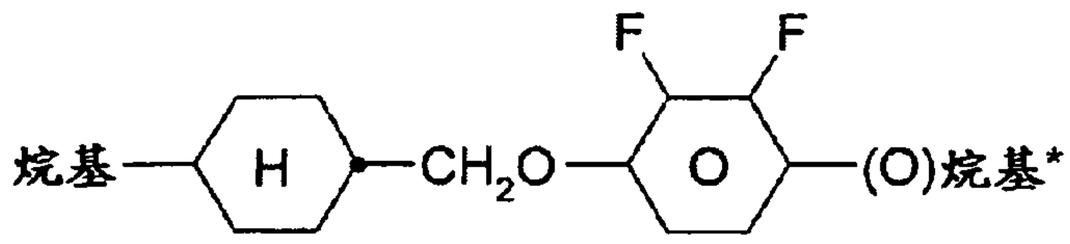


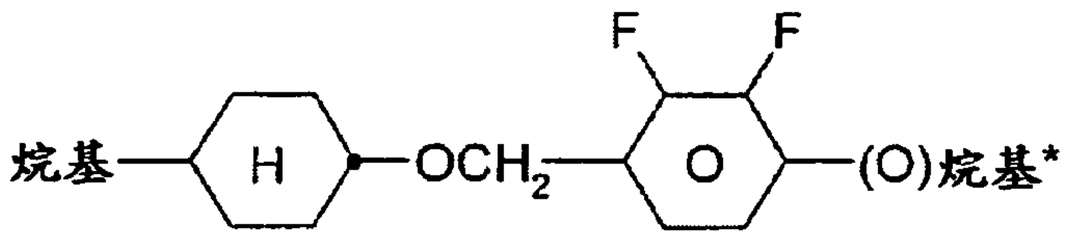
IIA-24



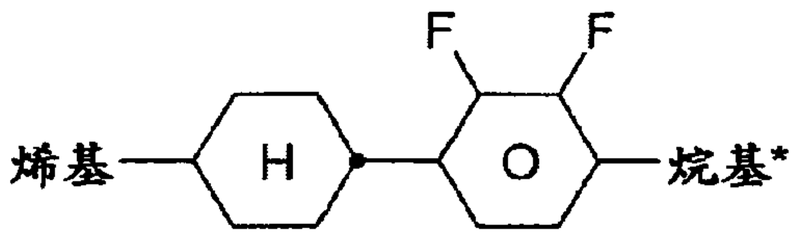
IIA-25



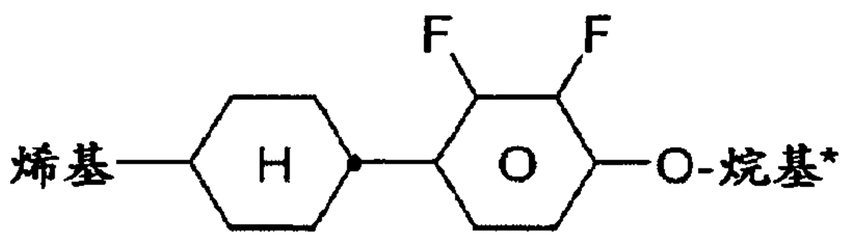
IIA-26



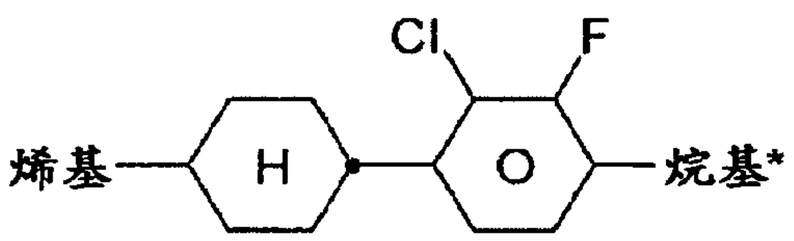
IIA-27



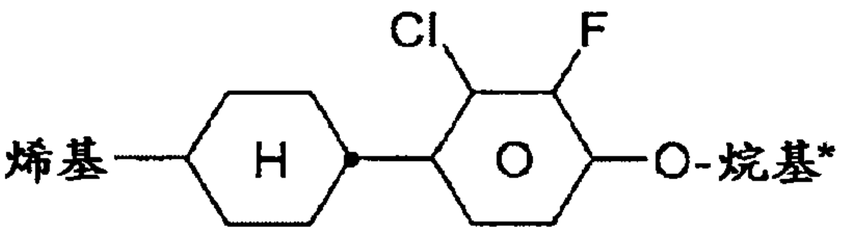
IIA-28



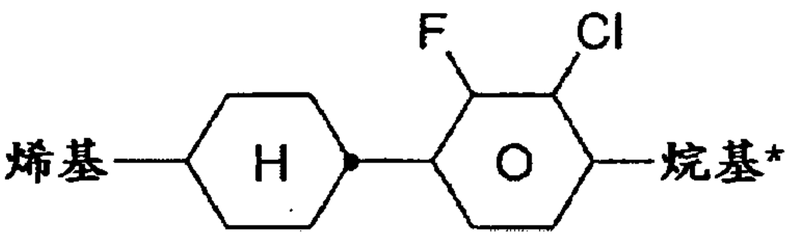
IIA-29



IIA-30



IIA-31



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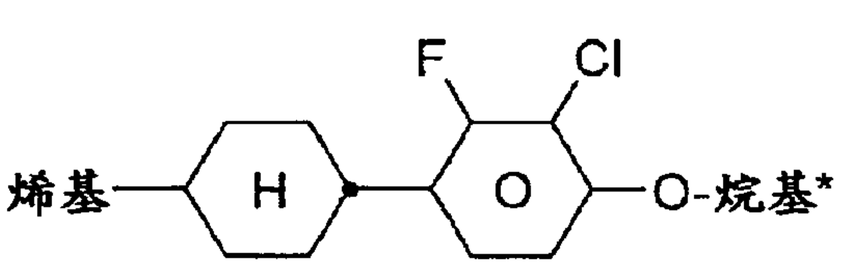

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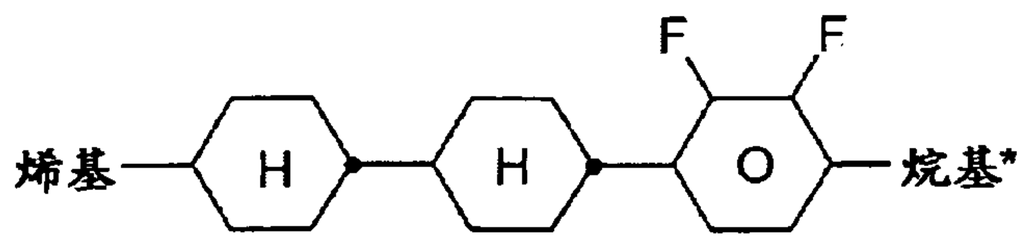
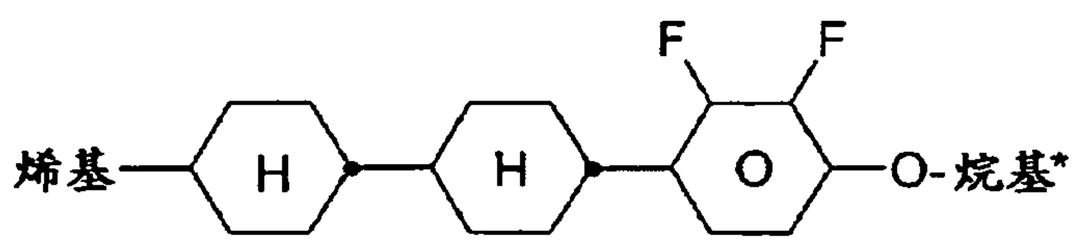
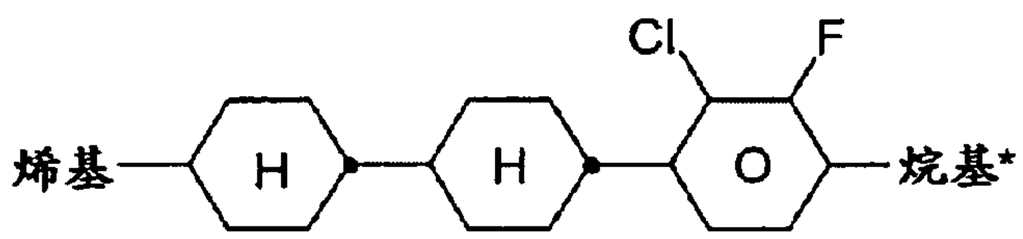


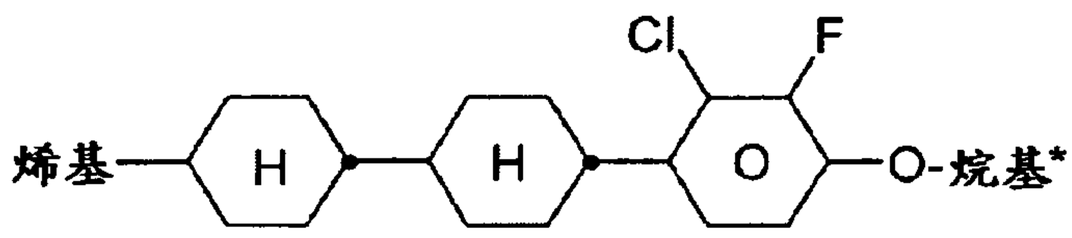
IIA-34



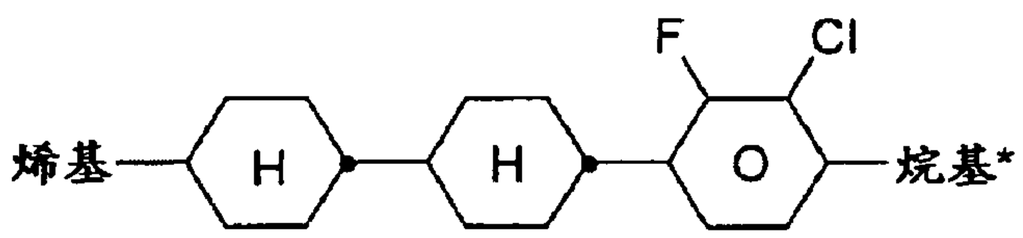
IIA-35



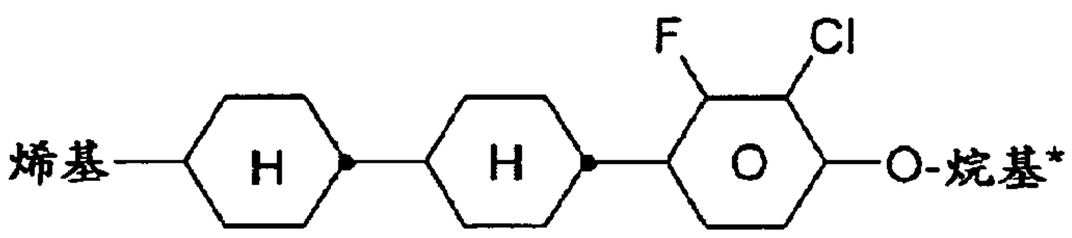
IIA-36



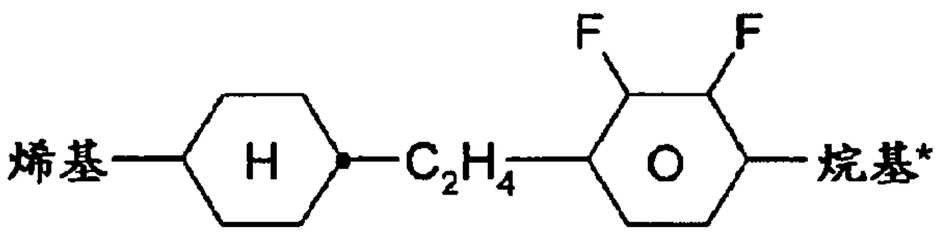
IIA-37



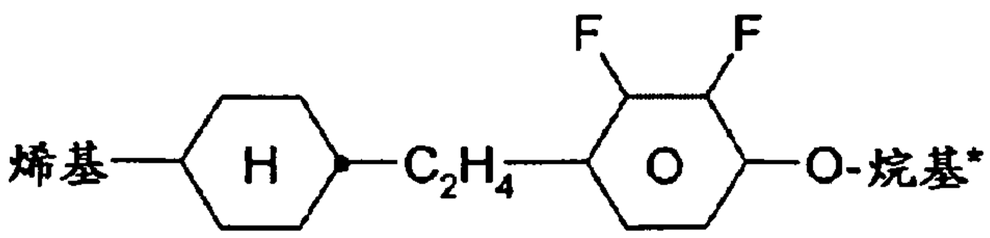
IIA-38



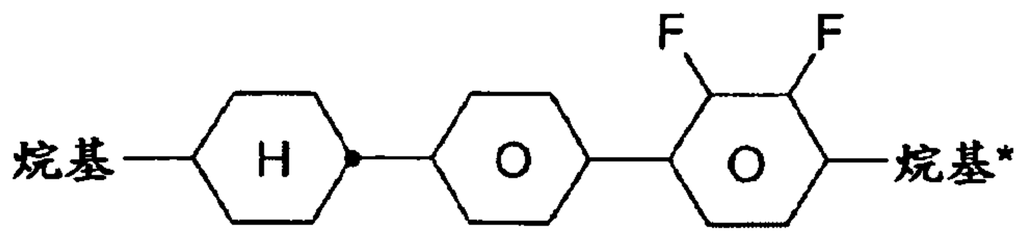
IIA-39



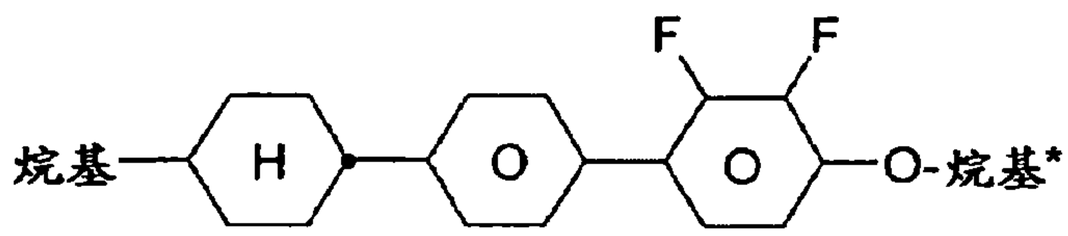
IIA-40



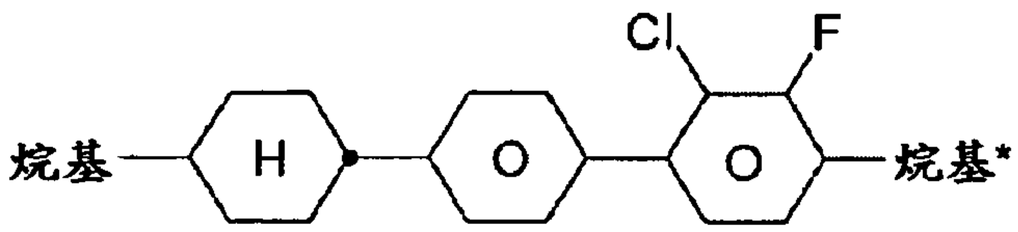
IIA-41



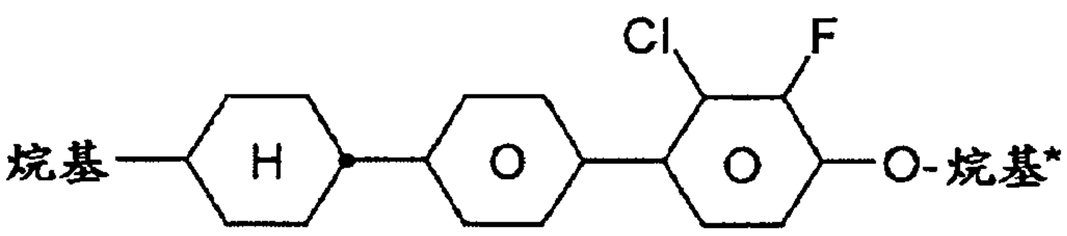
IIB-1



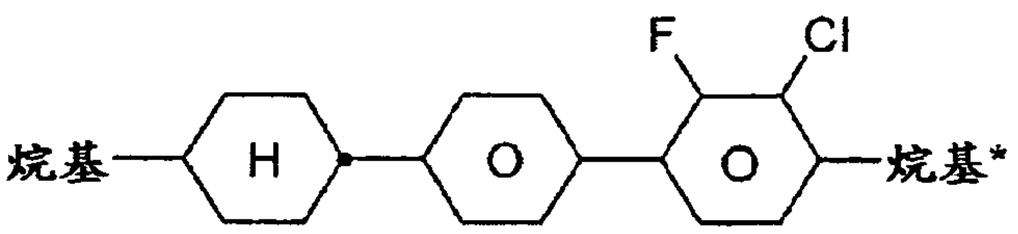
IIB-2



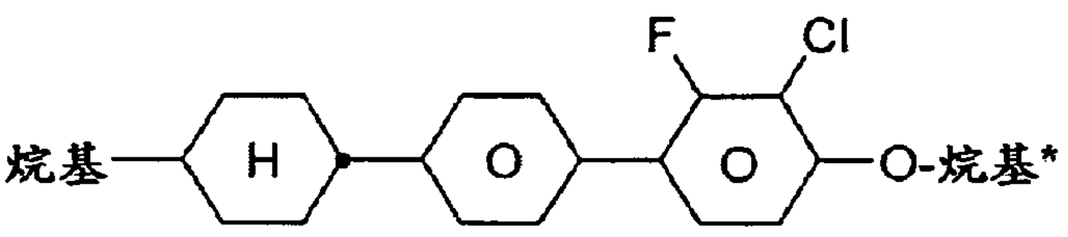
IIB-3



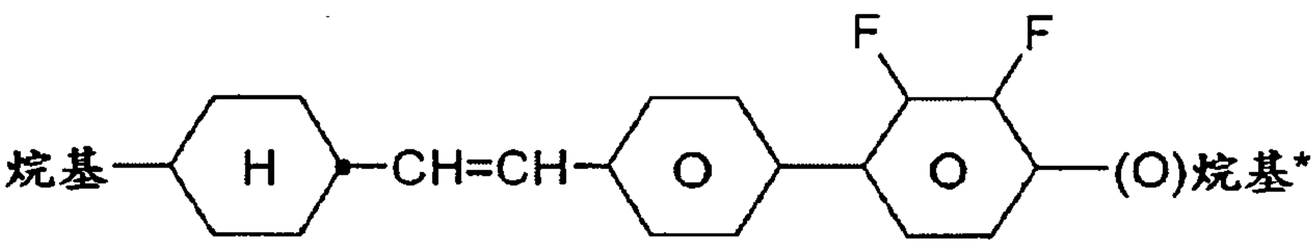
IIB-4



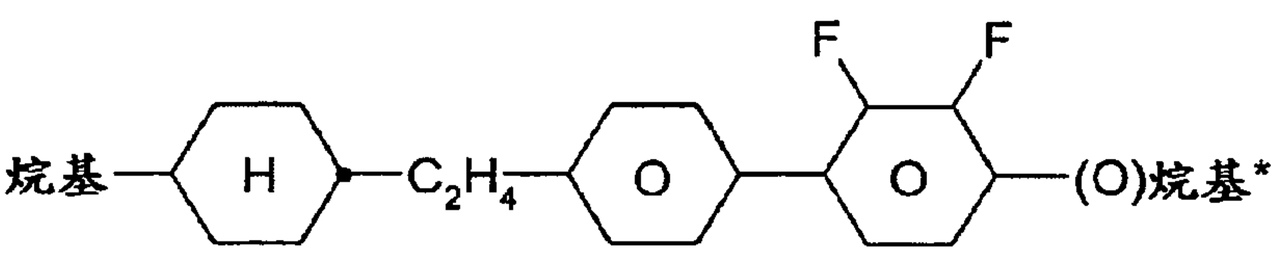
IIB-5



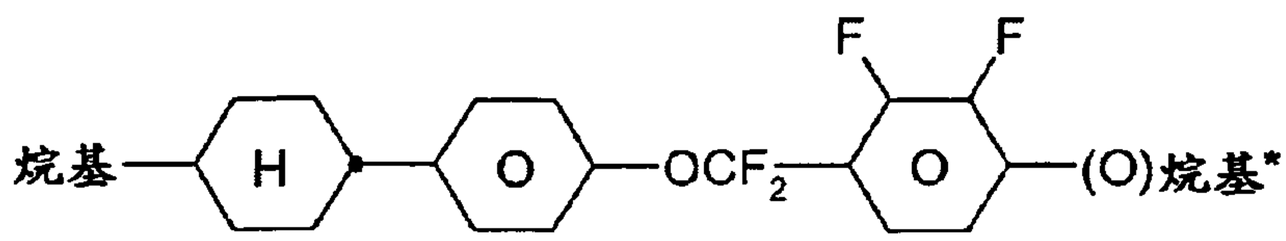
IIB-6



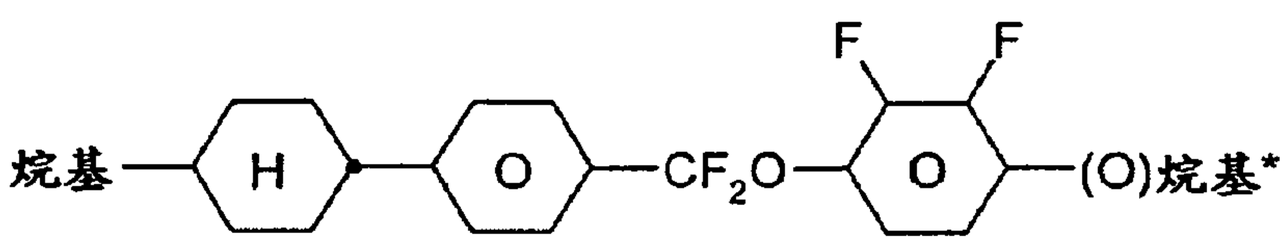
IIB-7



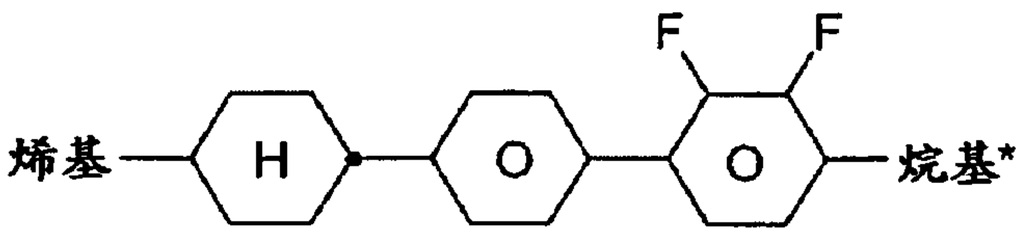
IIB-8



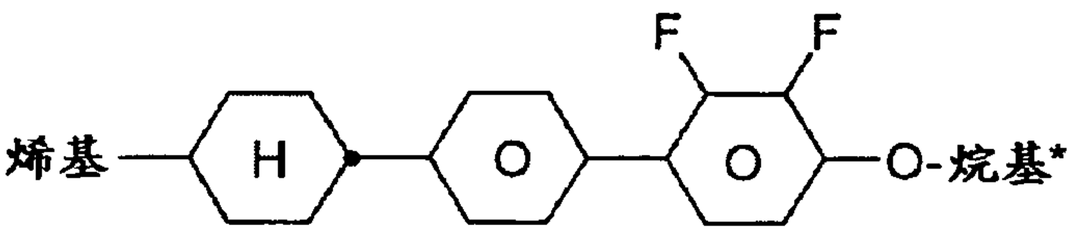
IIB-9



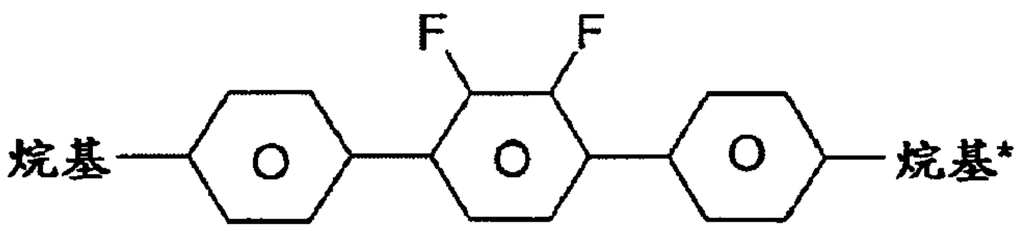
IIB-10



IIB-11



IIB-12



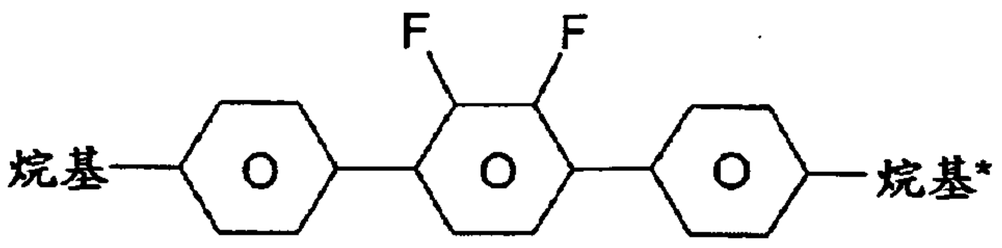
IIC-1，

其中烷基及烷基*各自彼此獨立地表示具有1至6個C原子之直鏈烷基。

尤其較佳之本發明混合物包含一或多種式IIA-2、式IIA-8、式IIA-14、式IIA-29、式IIA-35、式IIB-2、式IIB-12及式IIC-1之化合物。

式IIA及/或IIB之化合物在整體混合物中之比例較佳為至少20重量%。

尤其較佳之本發明介質包含至少一種式IIC-1化合物，

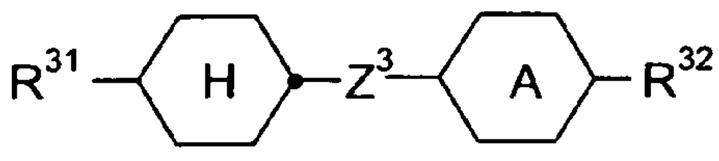


，

其中烷基及烷基*具有上文所示之含義，式IIC-1化合物之含量較

佳> 3重量%，尤其> 5重量%且尤其較佳為5重量%至25重量%。

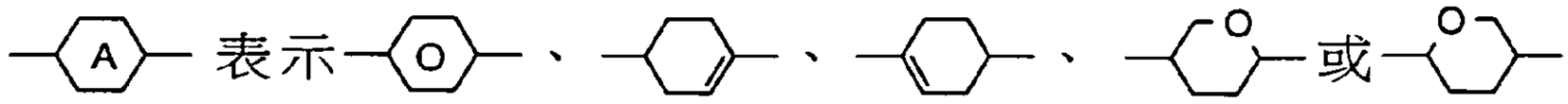
b)另外包含一或多種式III化合物之液晶介質，



III

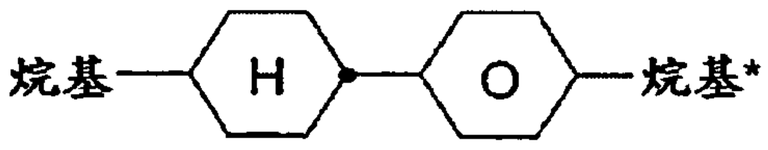
其中：

R^{31}及R^{32}各自彼此獨立地表示具有至多12個C原子之直鏈烷基、烷氧基烷基或烷氧基，及

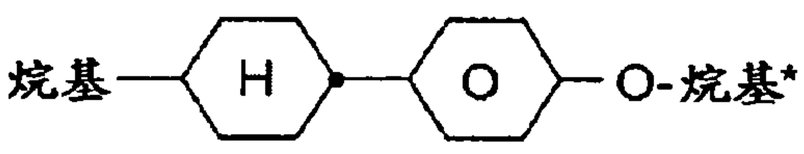


Z^3表示單鍵、$-CH_2CH_2-$、-CH=CH-、$-CF_2O-$、$-OCF_2-$、$-CH_2O-$、$-OCH_2-$、-COO-、-OCO-、$-C_2F_4-$、$-C_4H_8-$、-CF=CF-。

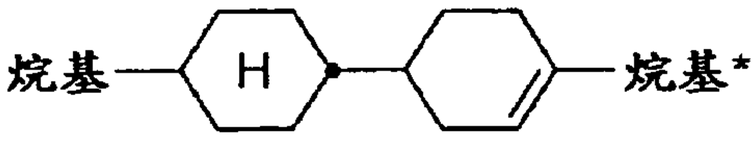
較佳之式III化合物如下所示：



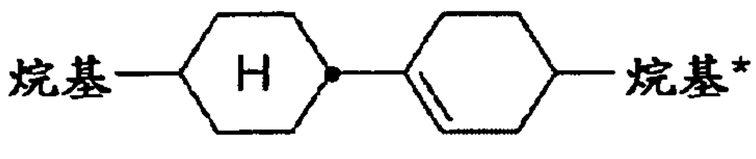
IIIa



IIIb



IIIc



IIId

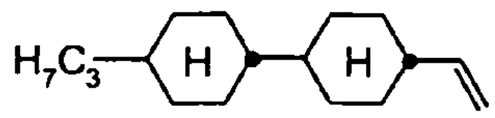
其中：

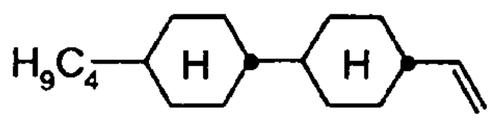
烷基及烷基*各自彼此獨立地表示具有1至6個C原子之直鏈烷基。

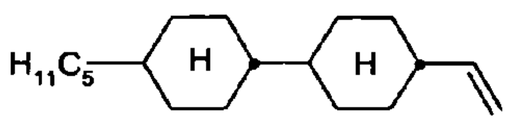
本發明之介質較佳包含至少一種式IIIa及/或式IIIb之化合物。

式III化合物在整體混合物中之比例較佳為至少5重量%。

c)另外包含下式化合物之液晶介質：

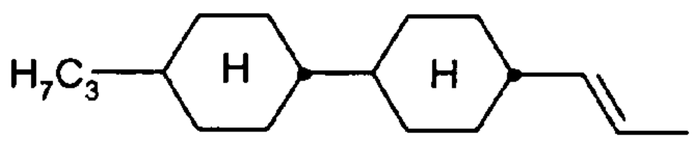

及/或


及/或

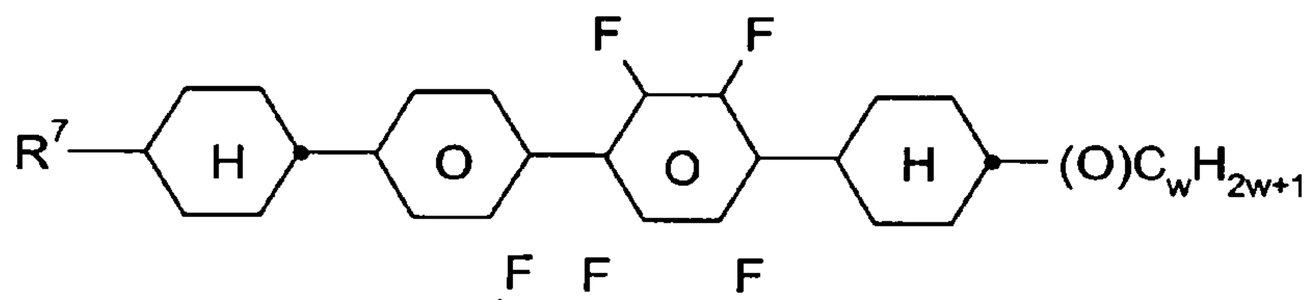

，

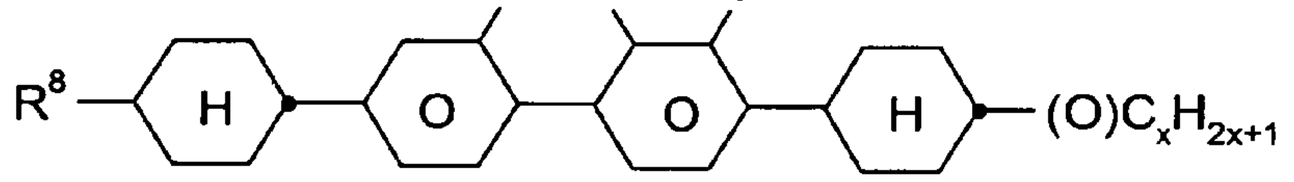
總量較佳≥ 5重量%，尤其≥ 10重量%。

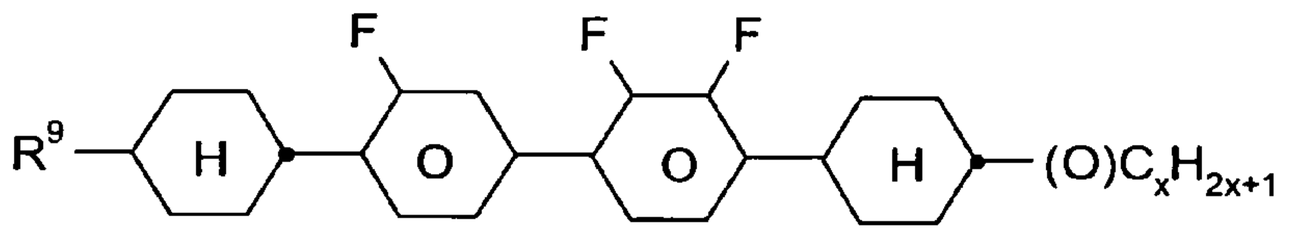
此外較佳為包含以下化合物之本發明混合物：

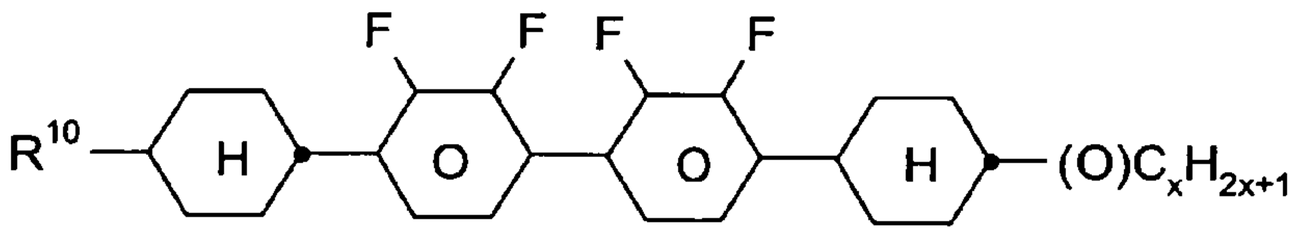

。

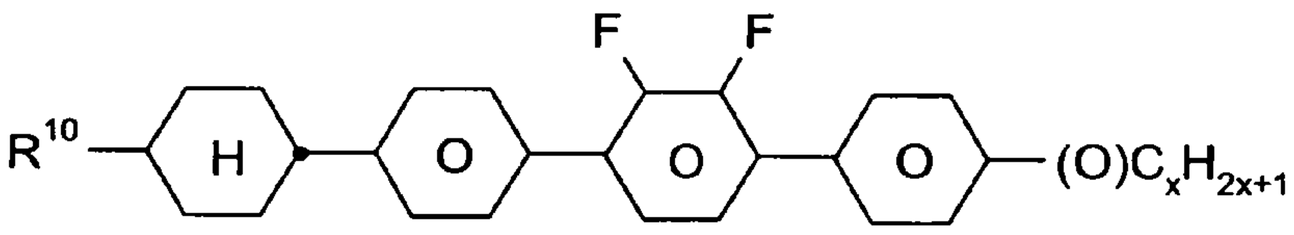
d)另外包含一或多種下式之四環化合物的液晶介質：

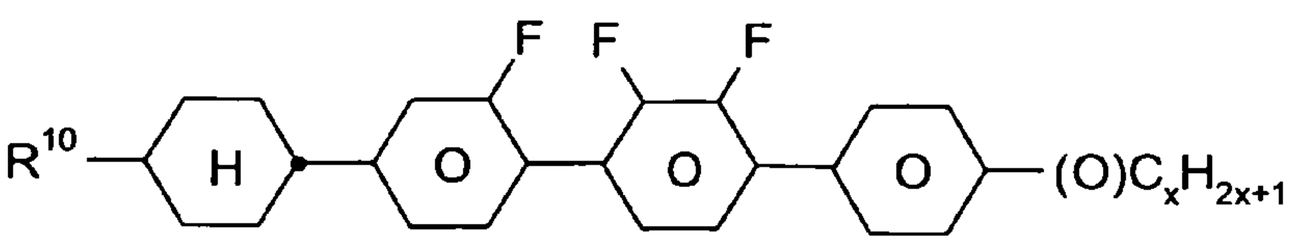

V-1

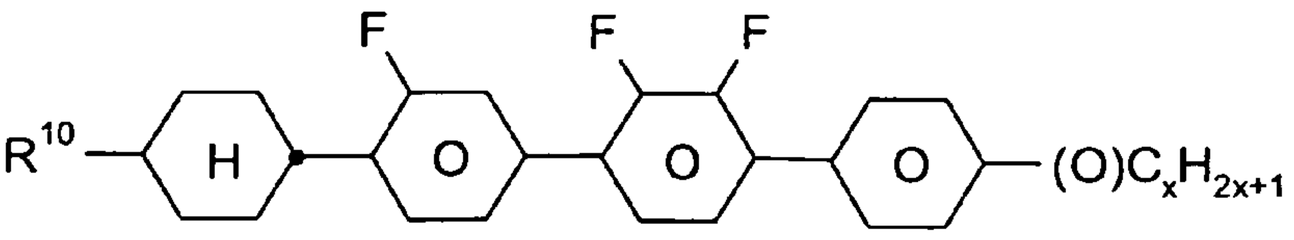

V-2

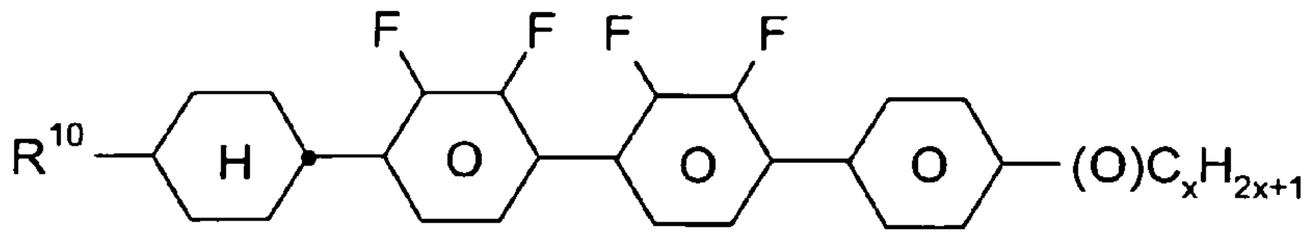

V-3


V-4

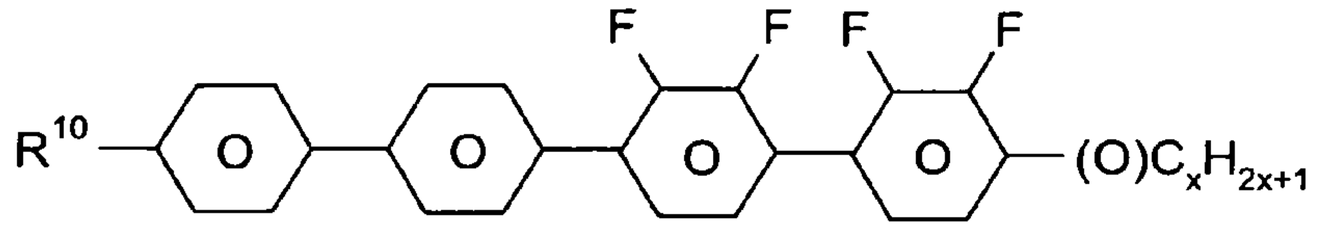

V-5


V-6


V-7



V-8



V-9

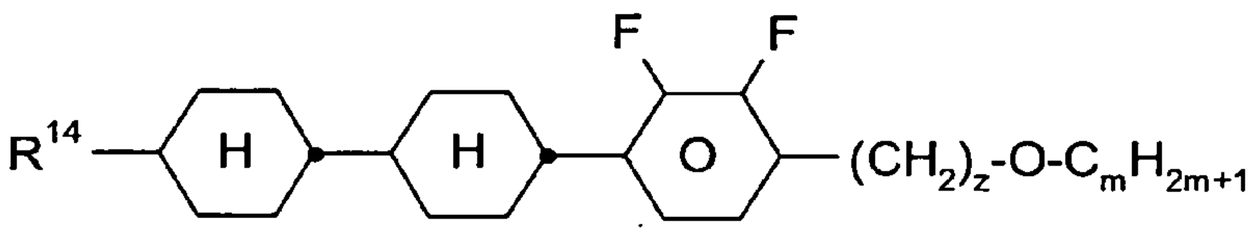
其中：

R^{7-10}各自彼此獨立地具有技術方案10中關於R^{2A}所示之含義中之一者，

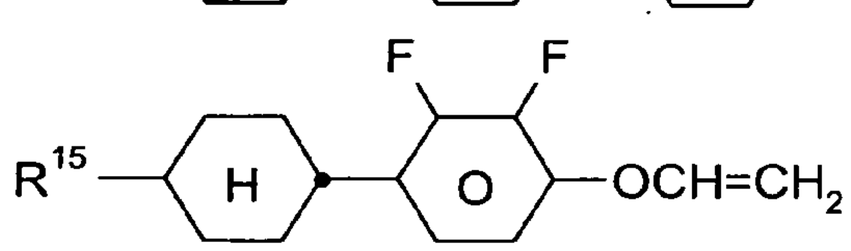
w及x各自彼此獨立地表示1至6。

尤其較佳為包含至少一種式V-9化合物之混合物。

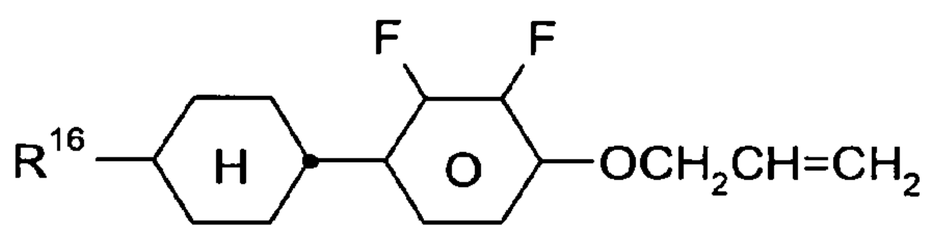
e)另外包含一或多種式Y-1至式Y-6之化合物的液晶介質，



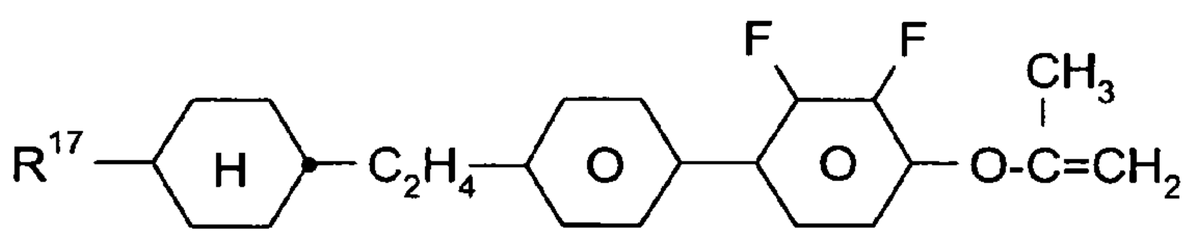
Y-1



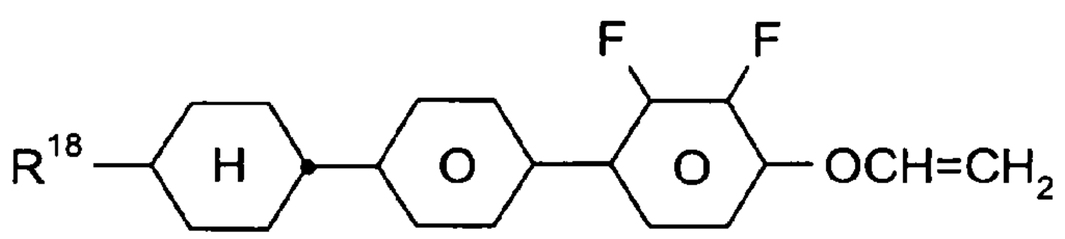
Y-2



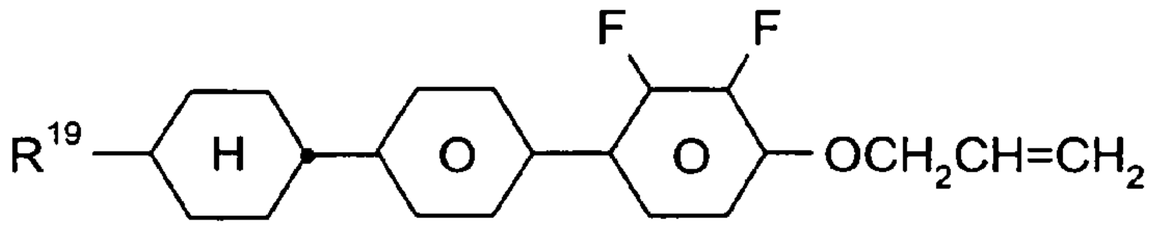
Y-3



Y-4



Y-5

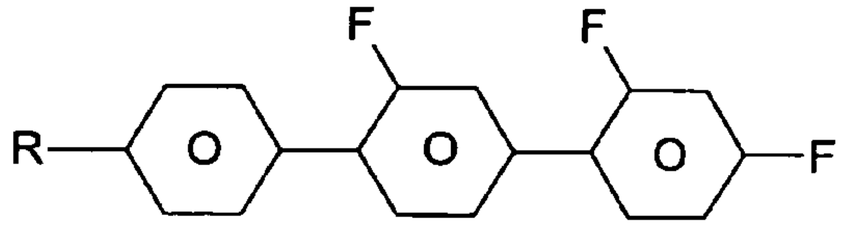


Y-6

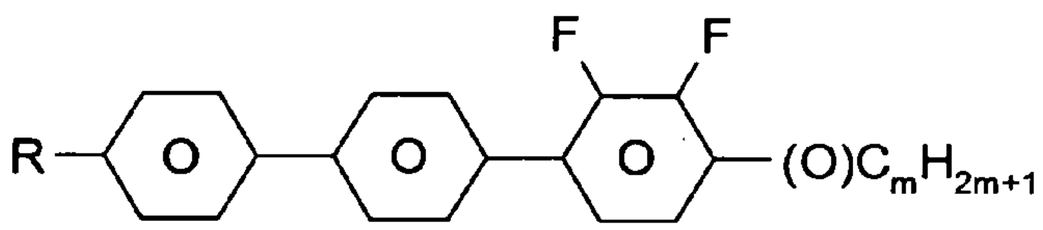
其中R^{14}-R^{19}各自彼此獨立地表示具有1-6個C原子之烷基或烷氧基；z及m各自彼此獨立地表示1-6；x表示0、1、2或3。

本發明之介質尤其較佳包含一或多種式Y-1至式Y-6之化合物，其含量較佳為≥ 5重量%。

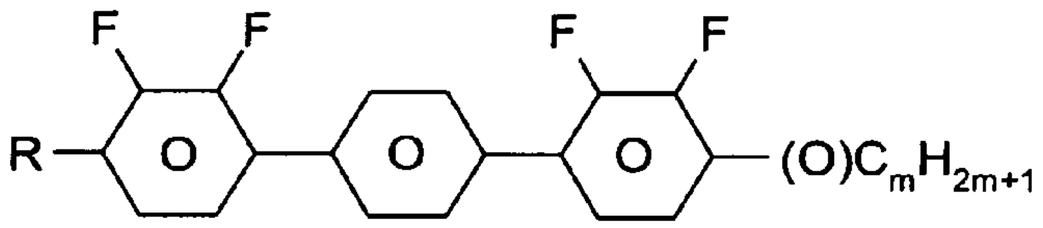
f)另外包含一或多種式T-1至式T-21之氟化聯三苯的液晶介質，



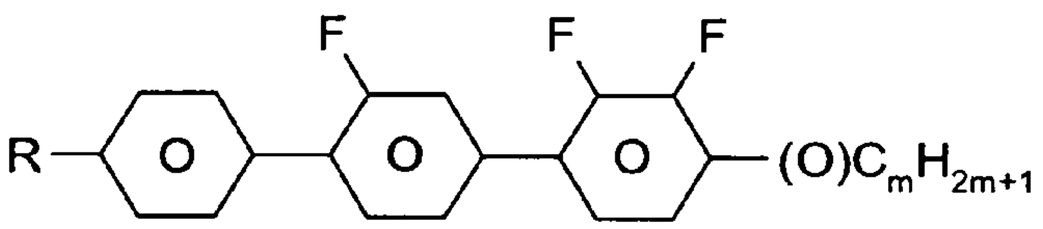
T-1



T-2



T-3



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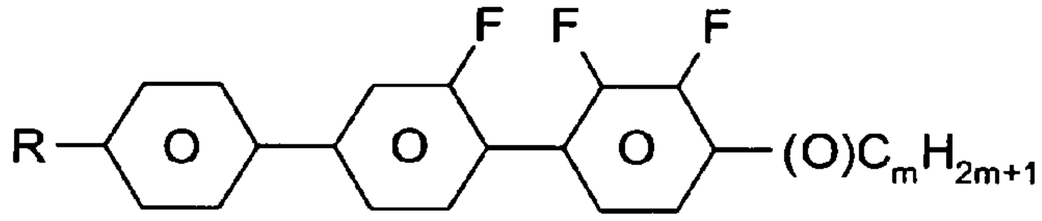

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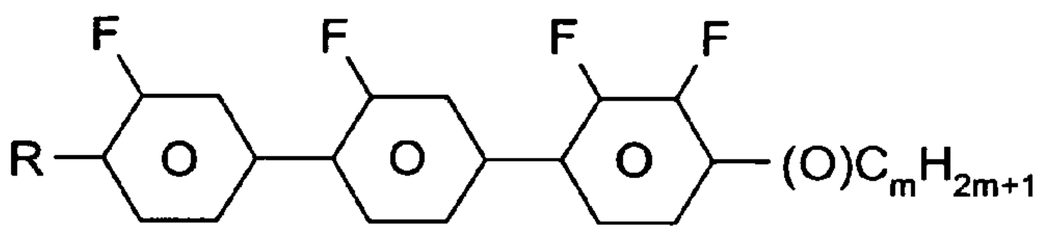

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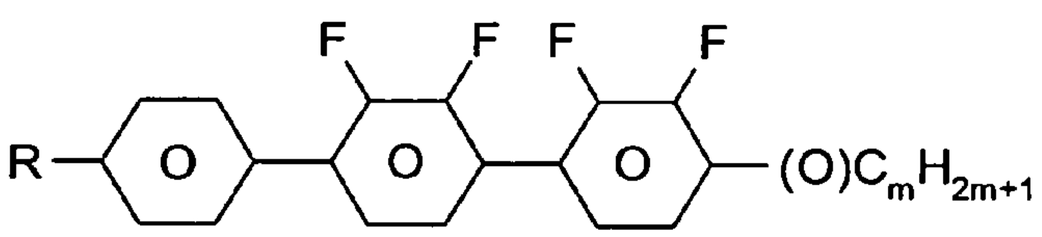
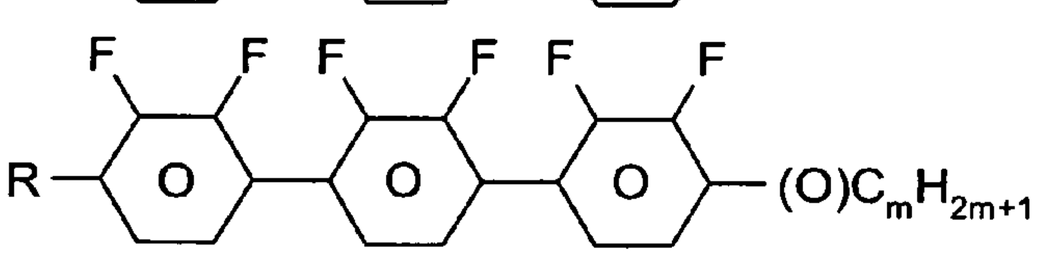
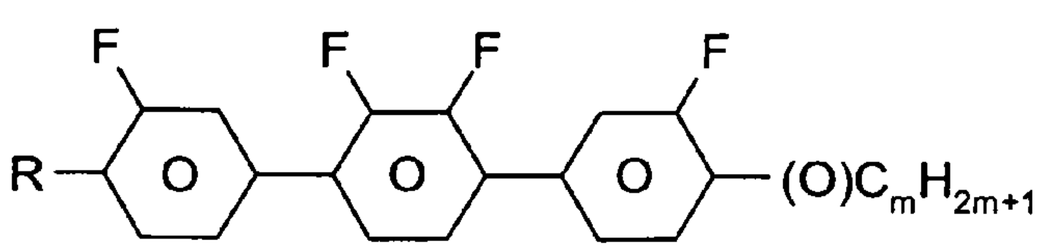


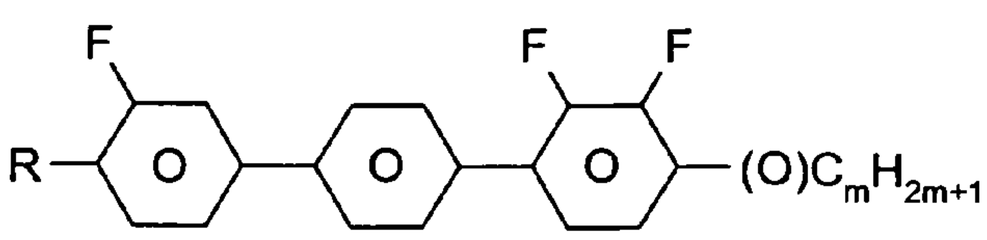
T-7



T-8



T-9



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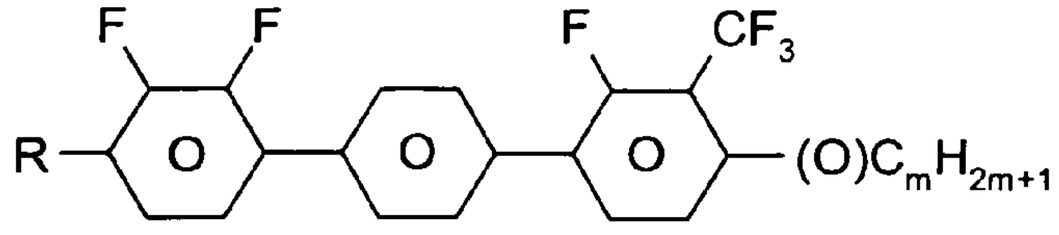

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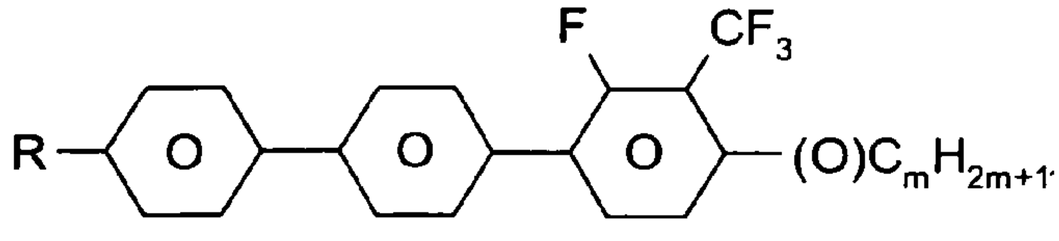

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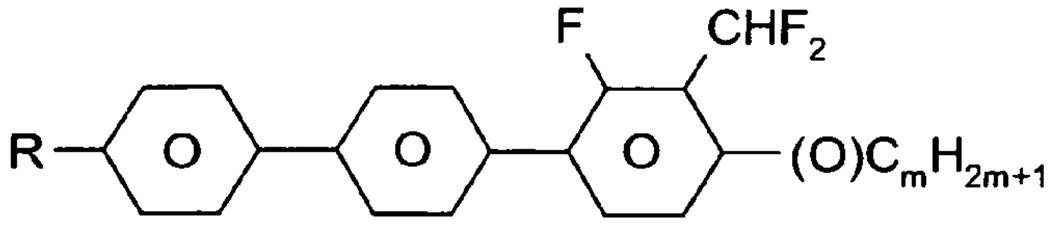

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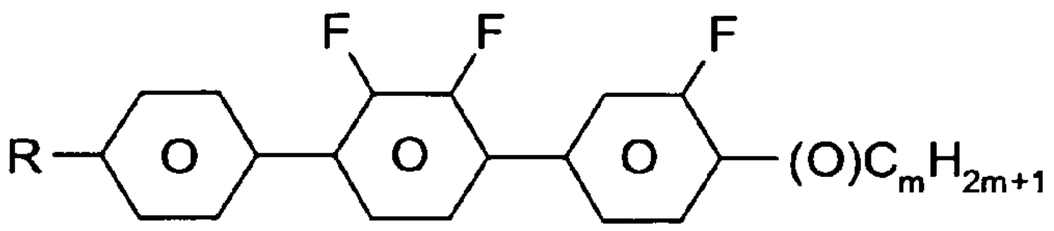

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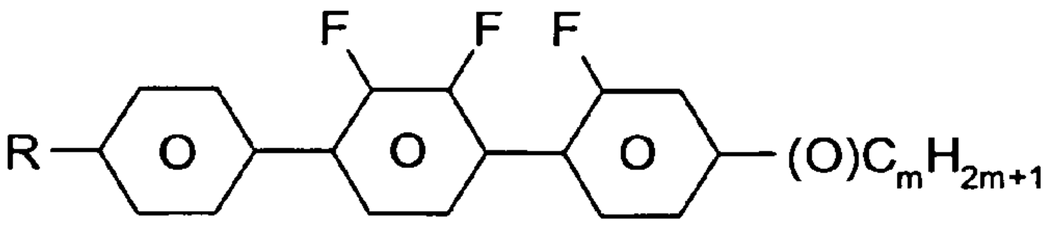

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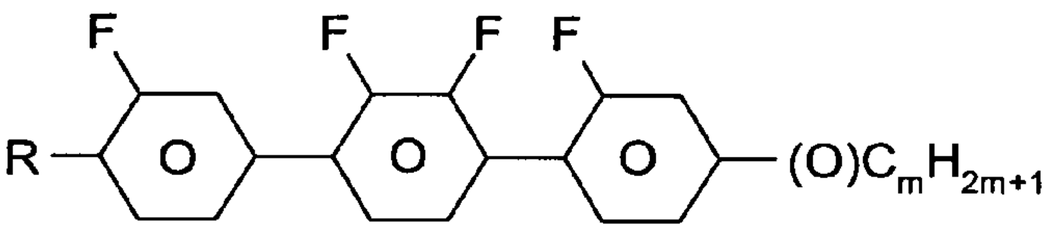
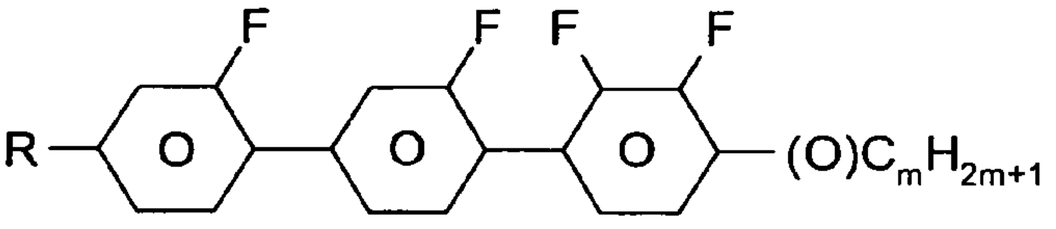
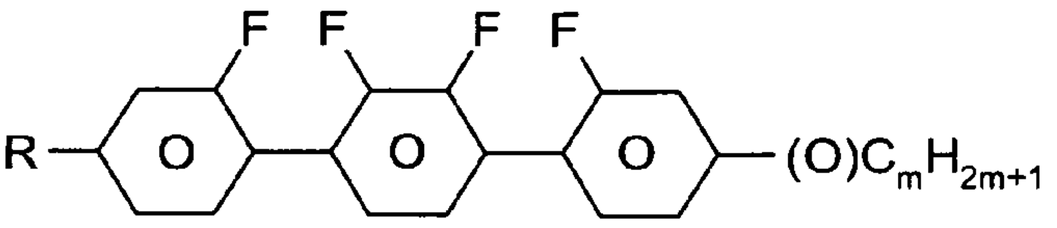


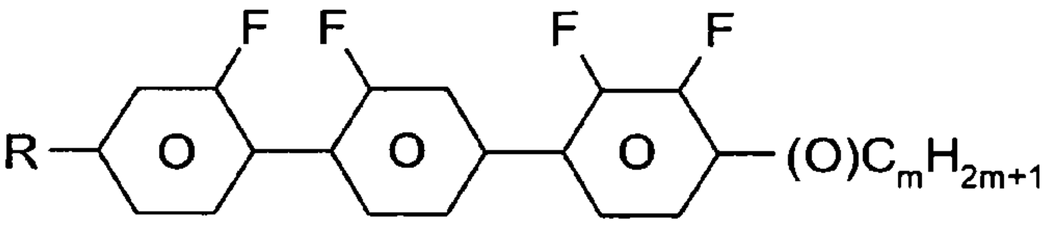
T-16



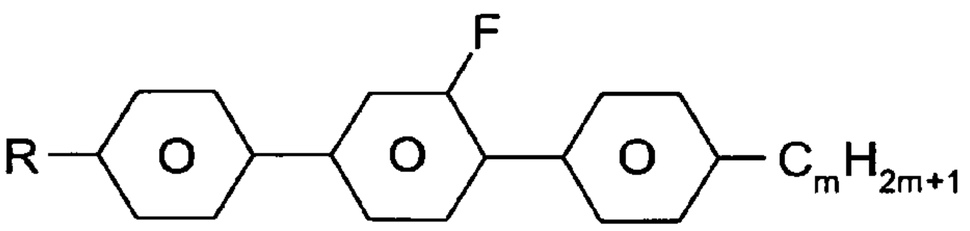
T-17



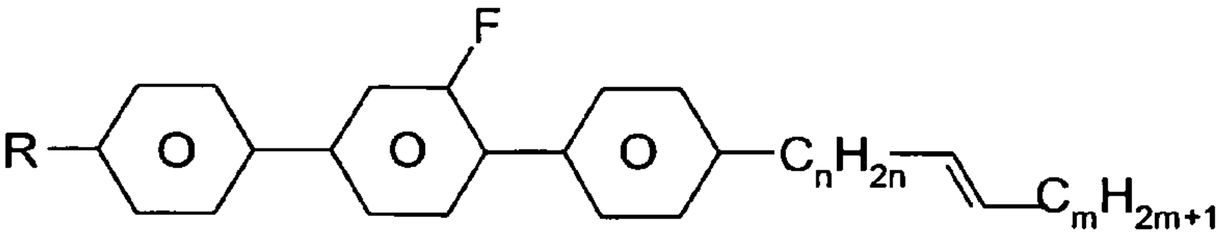
T-18



T-19



T-20



T-21

其中：

R表示具有1-7個C原子之直鏈烷基或烷氧基，且m = 0、1、2、

3、4、5或6且n表示0、1、2、3或4。

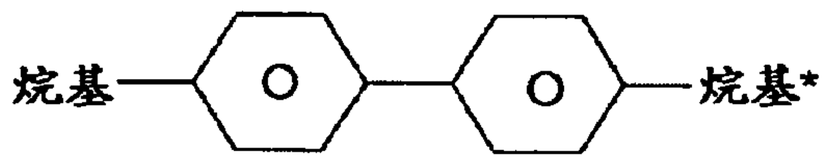
R較佳表示甲基、乙基、丙基、丁基、戊基、己基、甲氧基、乙氧基、丙氧基、丁氧基、戊氧基。

本發明之介質較佳包含式T-1至式T-21之聯三苯，其含量為2重量%-30重量%，尤其為5重量%-20重量%。

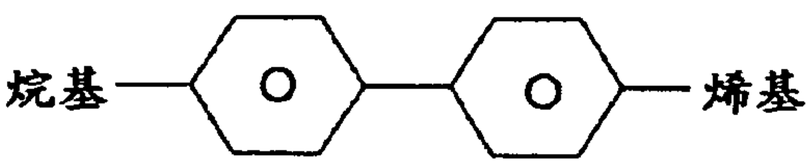
尤其較佳為式T-1、式T-2、式T-20及式T-21之化合物。在此等化合物中，R較佳表示烷基，此外為烷氧基，其各自具有1-5個C原子。在式T-20化合物中，R較佳表示烷基或烯基，尤其為烷基。在式T-21化合物中，R較佳表示烷基。

若混合物之Δn值將為≥ 0.1，則較佳將聯三苯用於本發明之混合物中。較佳混合物包含2重量%-20重量%之一或多種選自化合物T-1至化合物T-21之群的聯三苯化合物。

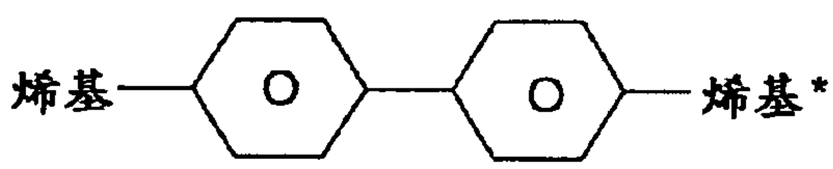
g)另外包含一或多種式B-1至式B-3之聯苯的液晶介質，



B-1



B-2



B-3

其中：

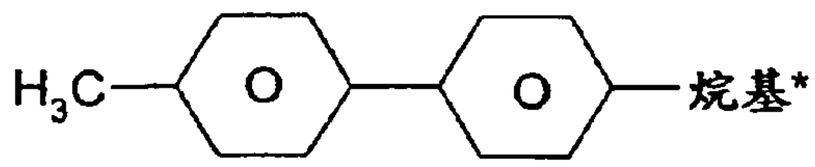
烷基及烷基*各自彼此獨立地表示具有1-6個C原子，較佳具有3-5個C原子之直鏈烷基，及

烯基及烯基*各自彼此獨立地表示具有2-6個C原子之直鏈烯基。

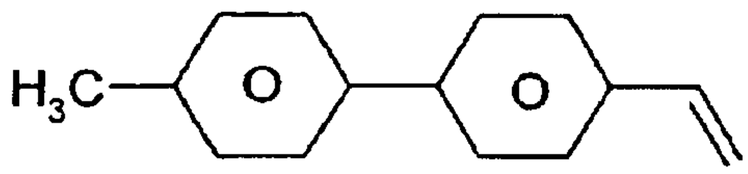
式B-1至式B-3之聯苯在整體混合物中之比例較佳為至少3重量%，尤其為≥ 5重量%。

在式B-1至式B-3之化合物中，式B-2化合物尤其較佳。

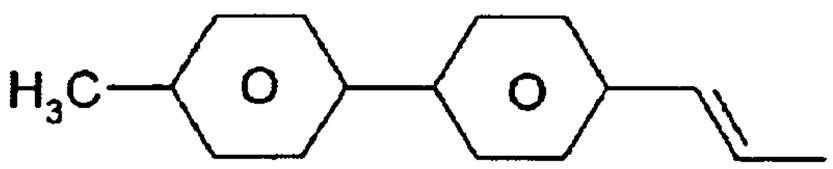
尤其較佳之聯苯為



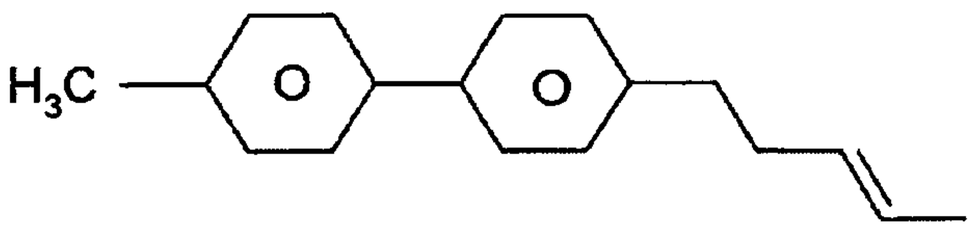
B-1a



B-2a



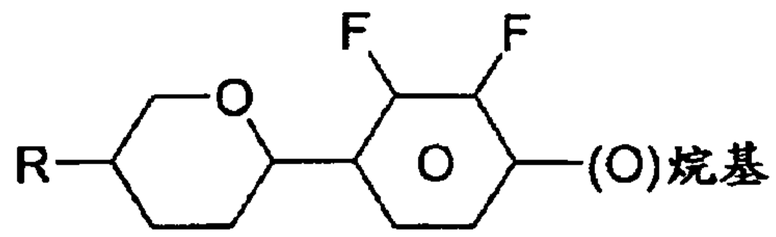
B-2b



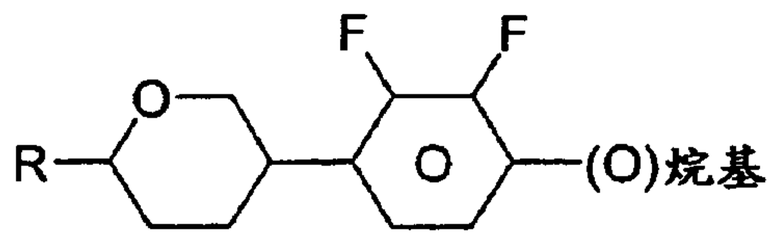
B-2c，

其中烷基*表示具有1-6個C原子之烷基。本發明之介質尤其較佳包含一或多種式B-1a及/或式B-2c之化合物。

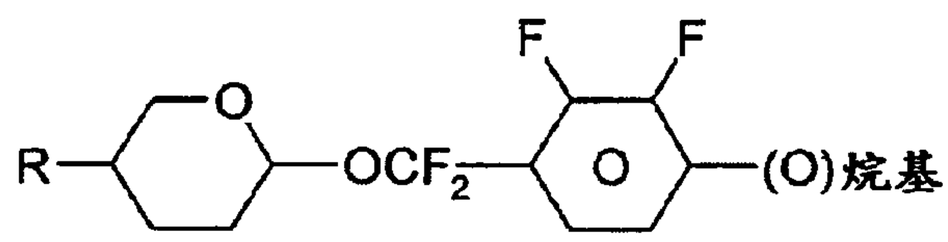
h)包含至少一種式Z-1至式Z-7之化合物的液晶介質，



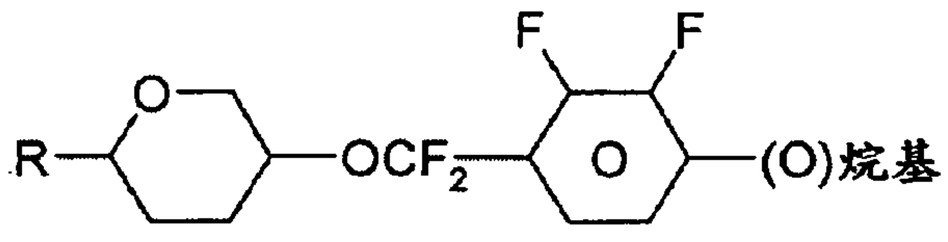
Z-1



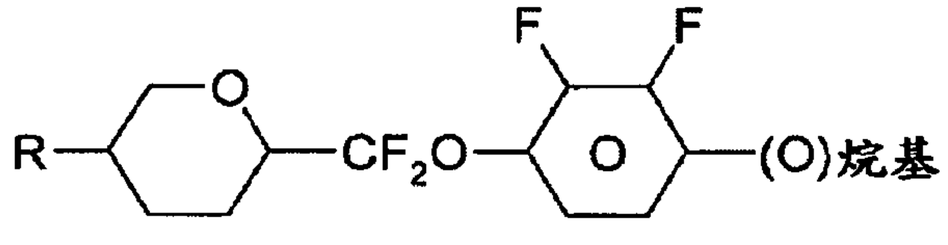
Z-2



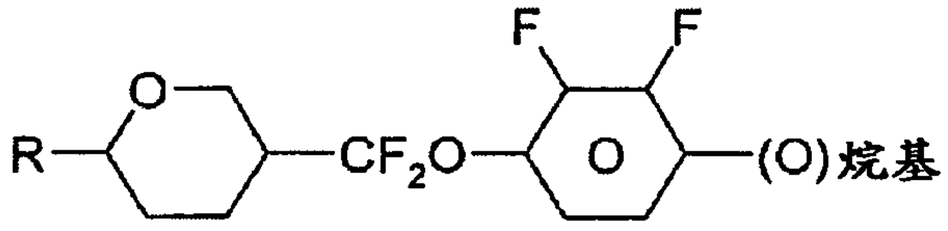
Z-3



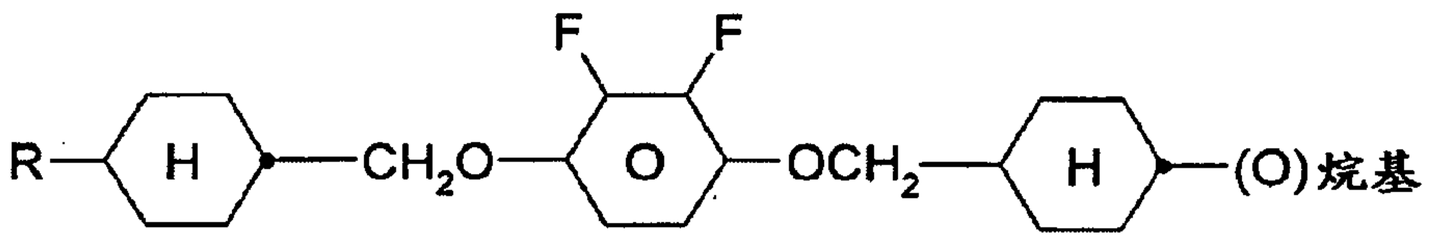
Z-4



Z-5



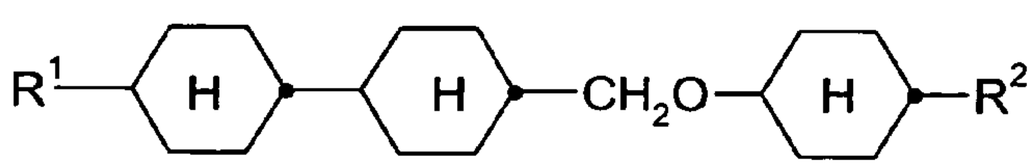
Z-6



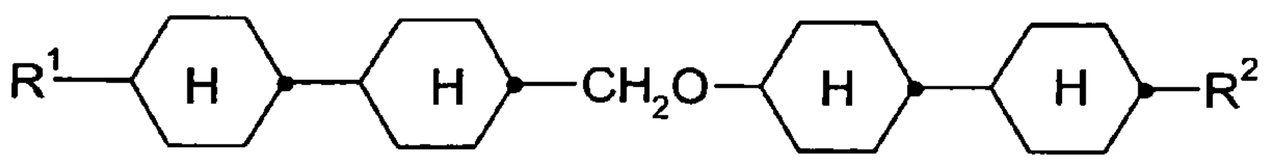
Z-7

其中R及烷基具有上文所示之含義。

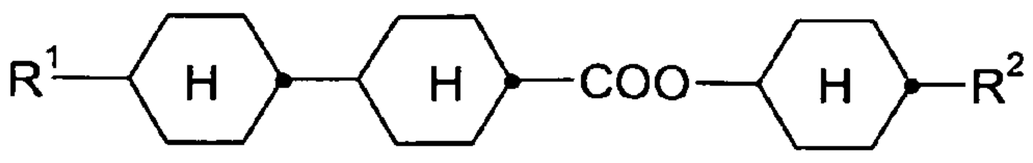
i)包含至少一種式O-1至式O-17之化合物的液晶介質，



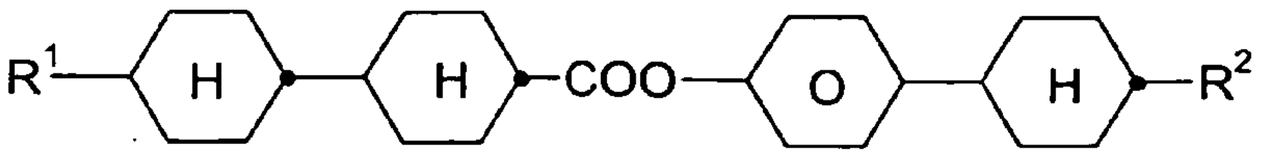
O-1



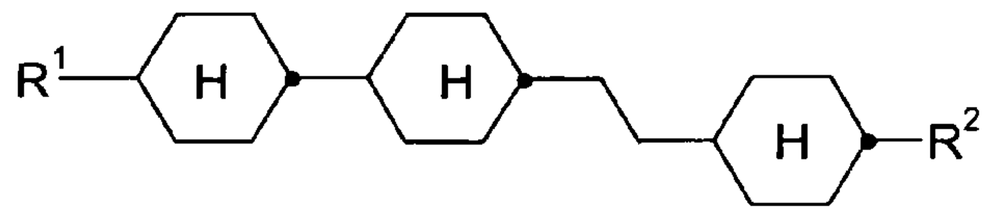
O-2



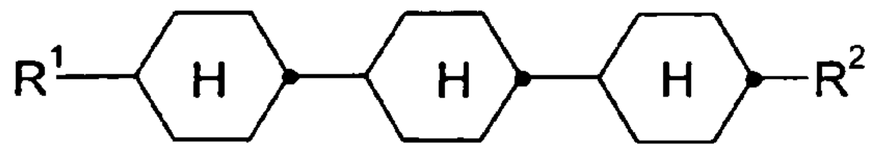
O-3



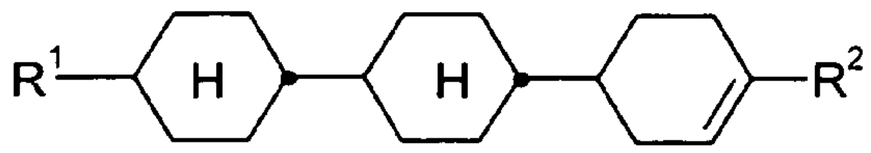
O-4



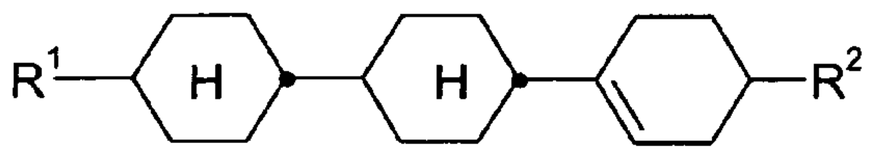
O-5



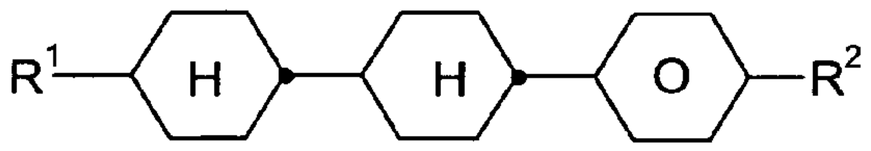
O-6



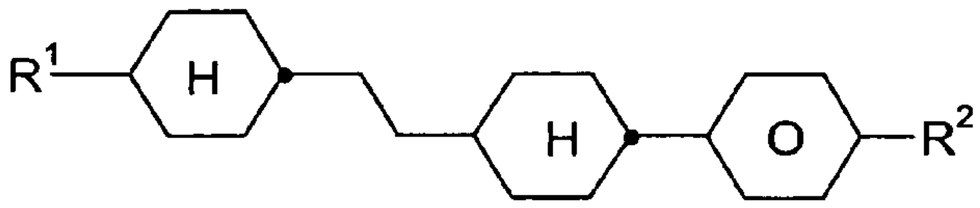
O-7



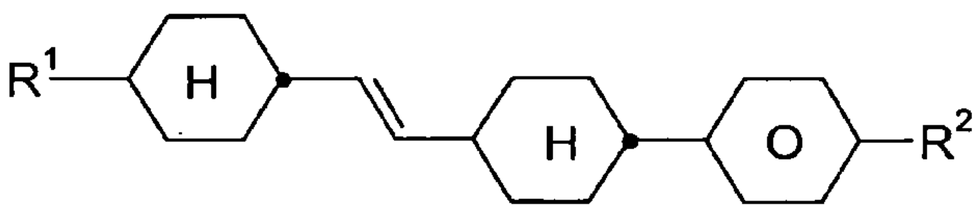
O-8



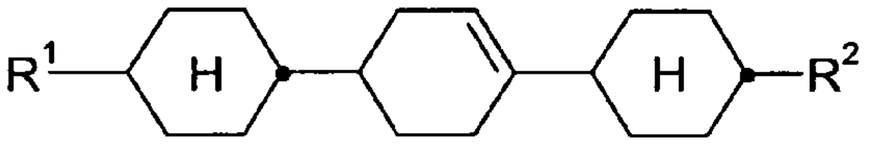
O-9



O-10



O-11



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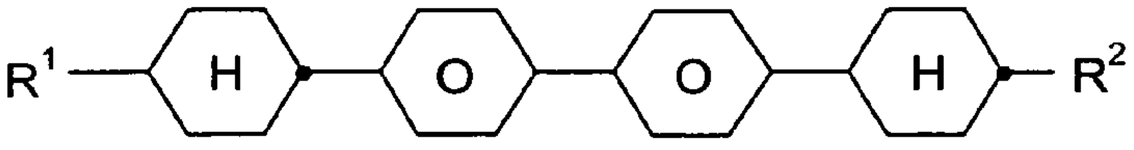
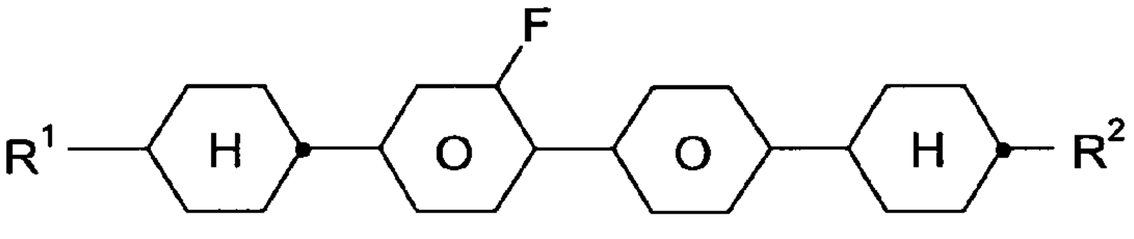
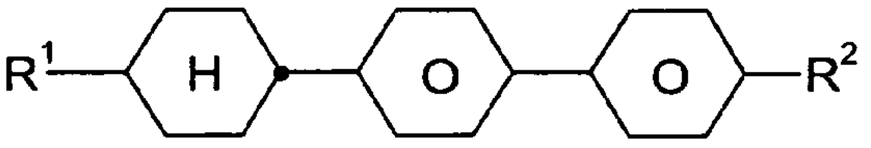


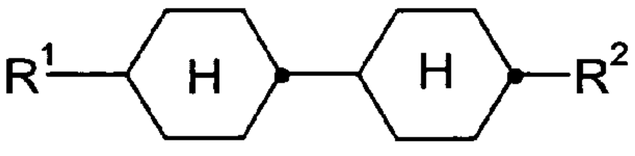
O-13



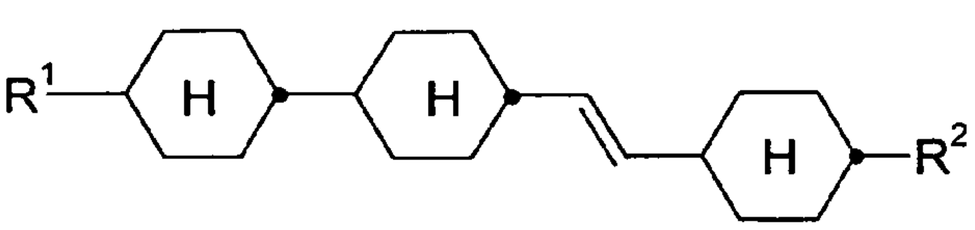
O-14



O-15



O-16



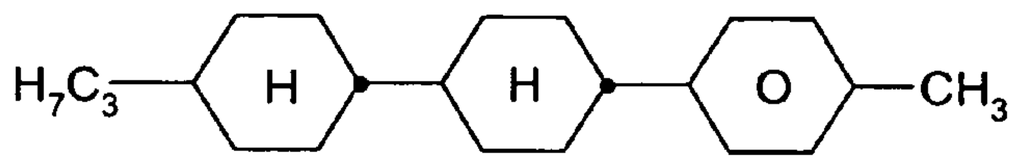
O-17

其中R^1及R^2具有關於R^{2A}所示之含義。R^1及R^2較佳各自彼此獨立地表示直鏈烷基。

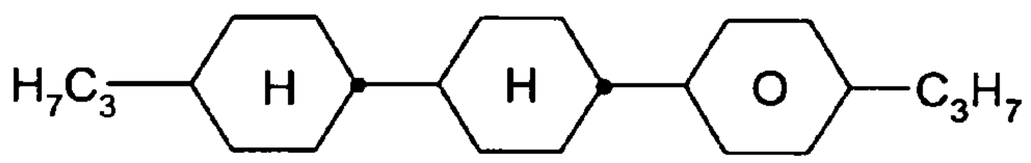
較佳介質包含一或多種式O-1、式O-3、式O-4、式O-5、式O-9、式O-13、式O-14、式O-15、式O-16及/或式O-17之化合物。

本發明之混合物尤其較佳包含一或多種式O-9、式O-15、式O-16及/或式O-17之化合物，其含量尤其為5%-30%。

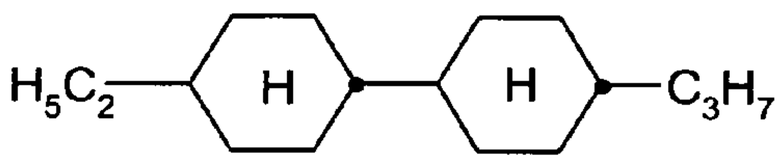
較佳的式O-15及式O-16之化合物如下所示：



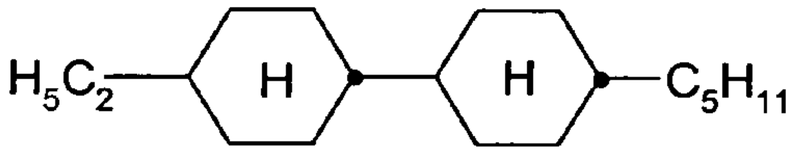
O-15a



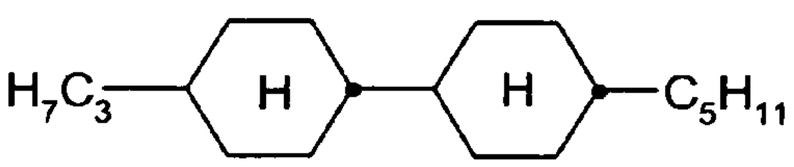
O-15b



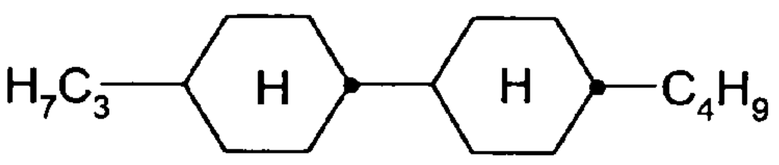
O-16a



O-16b



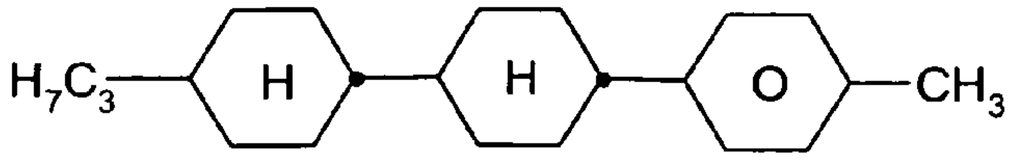
O-16c



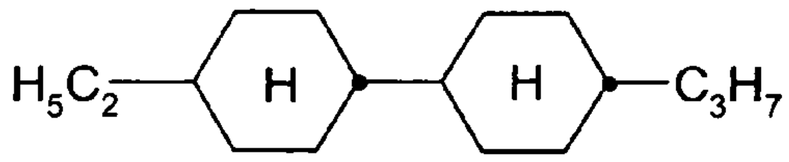
O-16d。

本發明之介質尤其較佳包含式O-15a及/或式O-15b之三環化合物以及一或多種式O-16a至O-16d之雙環化合物。式O-15a及/或式O-15b之化合物以及一或多種選自式O-16a至式O-16d之雙環化合物之化合物的總比例為5%-40%，尤其較佳為15%-35%。

尤其較佳之混合物包含化合物O-15a及O-16a：



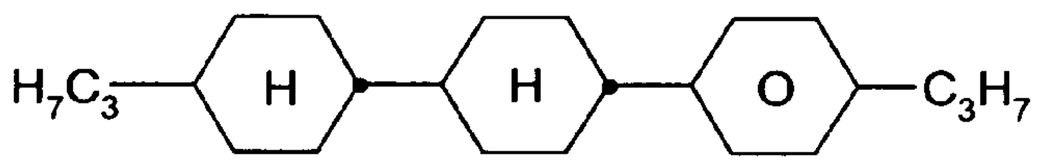
O-15a



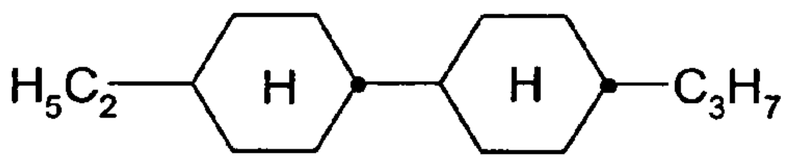
O-16a。

以整體混合物計，化合物O-15a及O-16a較佳以15%-35%、尤其較佳15%-25%且特別較佳18%-22%之濃度存在於該混合物中。

尤其較佳之混合物包含化合物O-15b及O-16a：



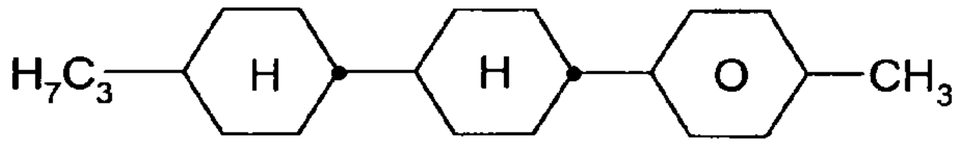
O-15b



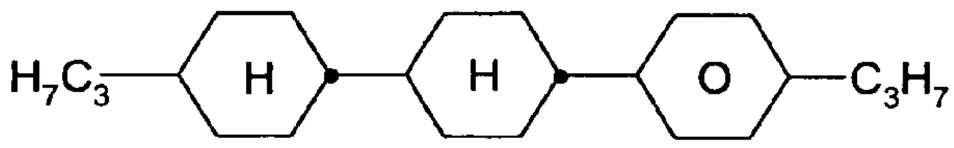
O-16a。

以整體混合物計，化合物O-15b及化合物O-16a較佳以15%-35%、尤其較佳15%-25%且特別較佳18%-22%之濃度存在於該混合物中。

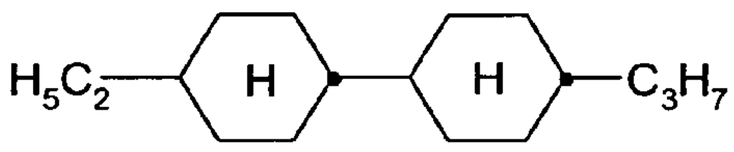
尤其較佳之混合物包含以下三種化合物：



O-15a



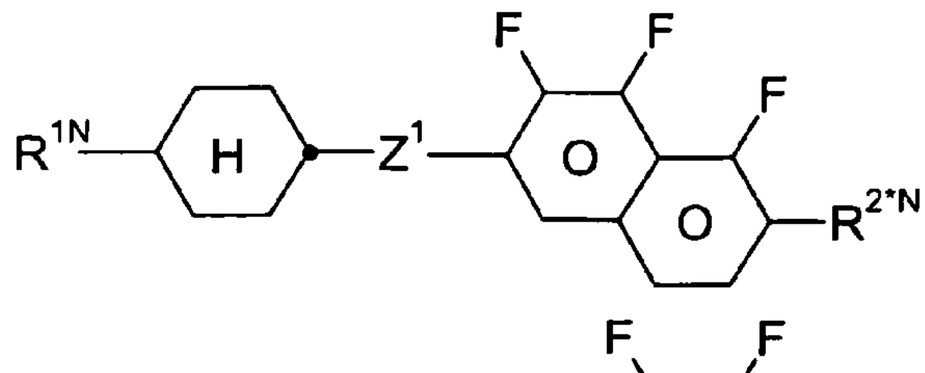
O-15b



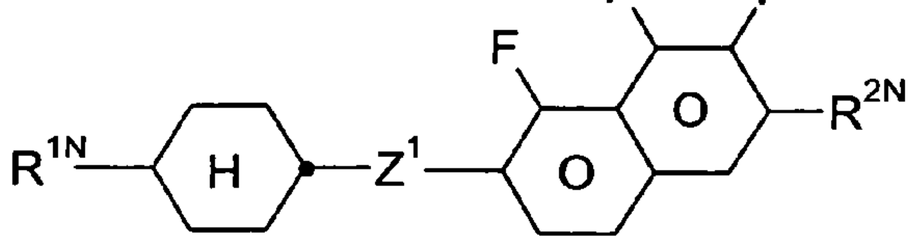
O-16a。

以整體混合物計，化合物O-15a、化合物O-15b及化合物O-16a較佳以15%-35%、尤其較佳15%-25%且特別較佳18%-22%之濃度存在於該混合物中。

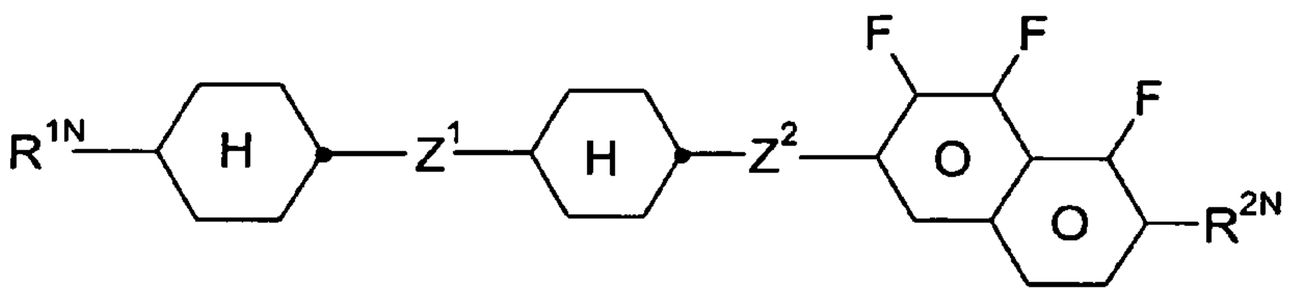
j)較佳的本發明之液晶介質包含一或多種含有四氫萘基或萘基單元之物質，諸如式N-1至式N-5之化合物，



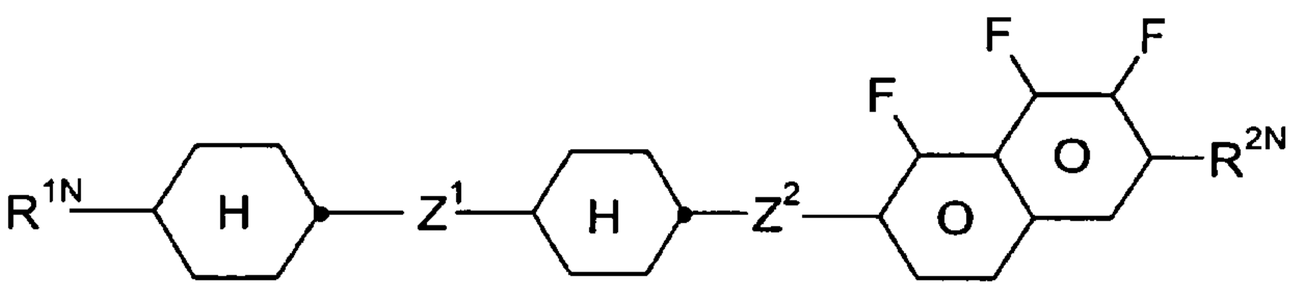
N-1



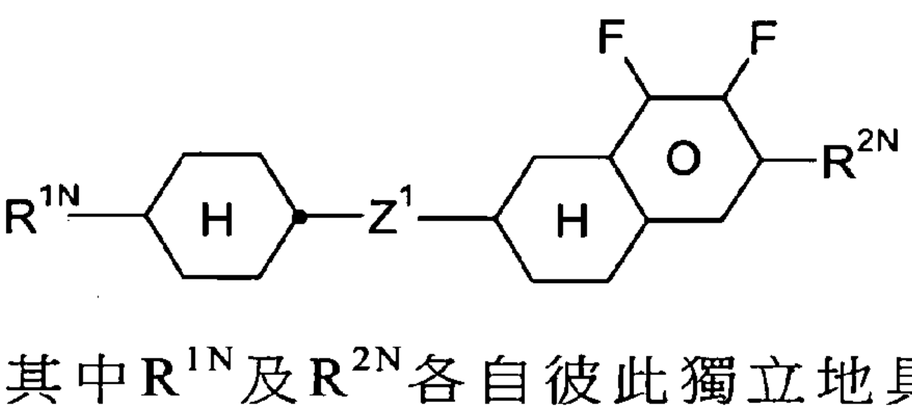
N-2



N-3



N-4

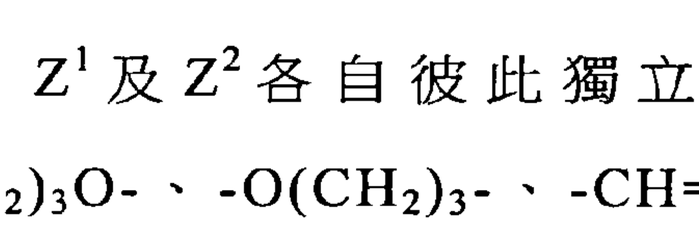


N-5

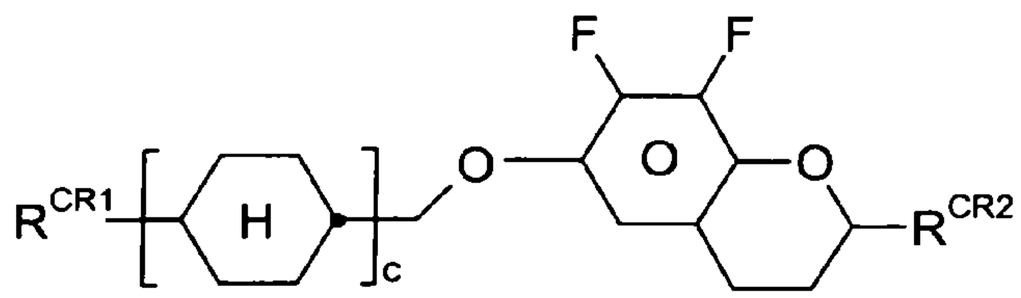
其中R^{1N}及R^{2N}各自彼此獨立地具有關於R^{2A}所示之含義，較佳表示直鏈烷基、直鏈烷氧基或直鏈烯基，及

Z^1及Z^2各自彼此獨立地表示$-C_2H_4-$、$-CH=CH-$、$-(CH_2)_4-$、$-(CH_2)_3O-$、$-O(CH_2)_3-$、$-CH=CHCH_2CH_2-$、$-CH_2CH_2CH=CH-$、$-CH_2O-$、$-OCH_2-$、$-COO-$、$-OCO-$、$-C_2F_4-$、$-CF=CF-$、$-CF=CH-$、$-CH=CF-$、$-CF_2O-$、$-OCF_2-$、$-CH_2-$或單鍵。

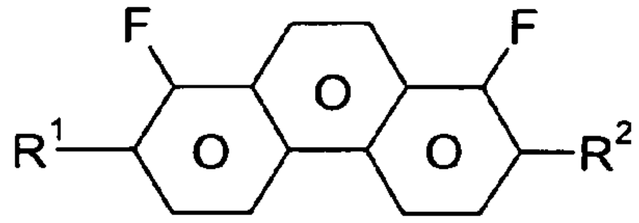
k)較佳混合物包含一或多種選自以下之群的化合物：式BC之二氟二苯并色滿化合物、式CR之色滿、式PH-1及式PH-2之氟化菲、式BF之氟化二苯并呋喃，



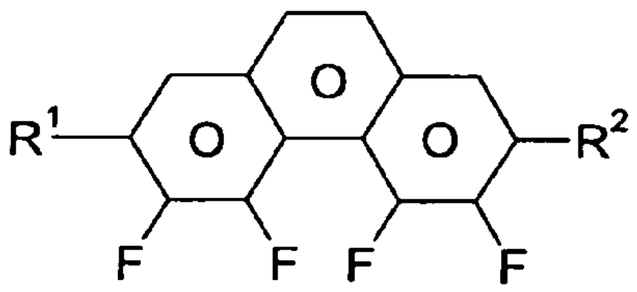
BC



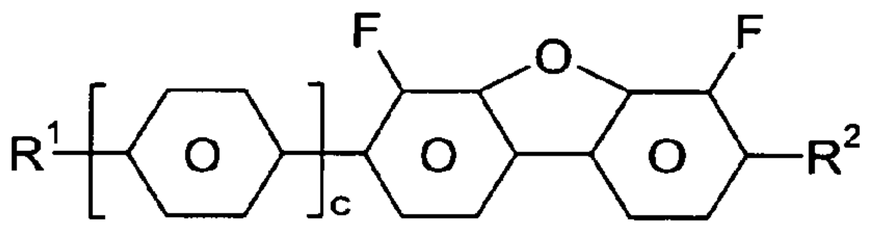
CR



PH-1



PH-2



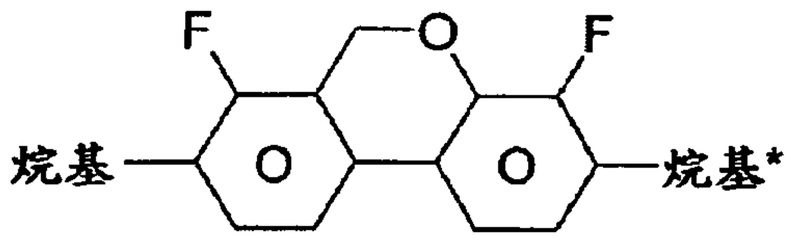
BF

其中：

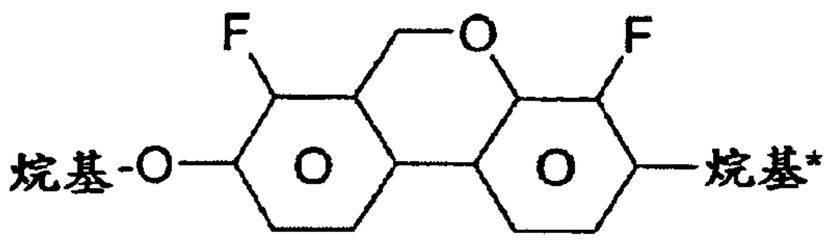
R^{B1}、R^{B2}、R^{CR1}、R^{CR2}、R^{1}、R^{2}各自彼此獨立地具有R^{2A}之含義。c為0、1或2。

本發明之混合物較佳包含式BC、式CR、式PH-1、式PH-2及/或式BF之化合物，其含量為3重量%至20重量%、尤其為3重量%至15重量%。

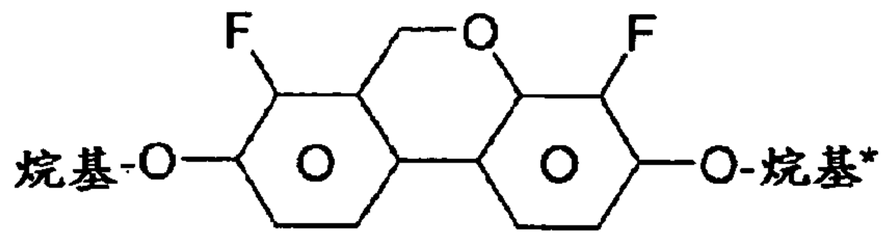
尤其較佳之式BC及式CR之化合物為化合物BC-1至化合物BC-7及化合物CR-1至化合物CR-5，



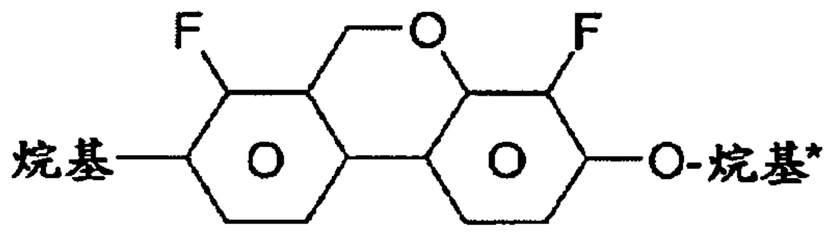
BC-1



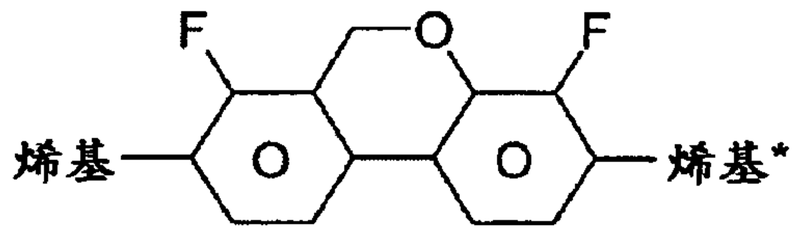
BC-2



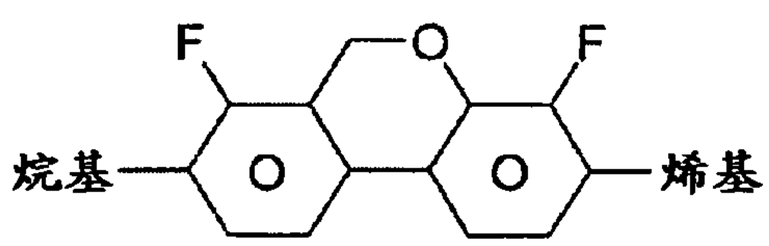
BC-3



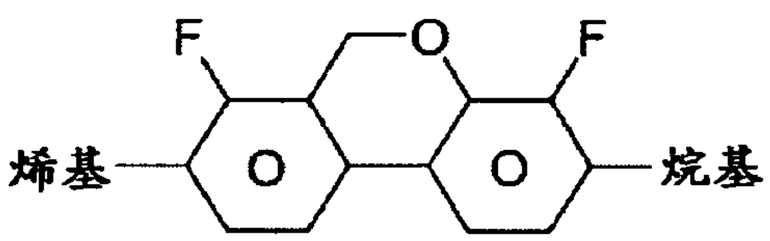
BC-4



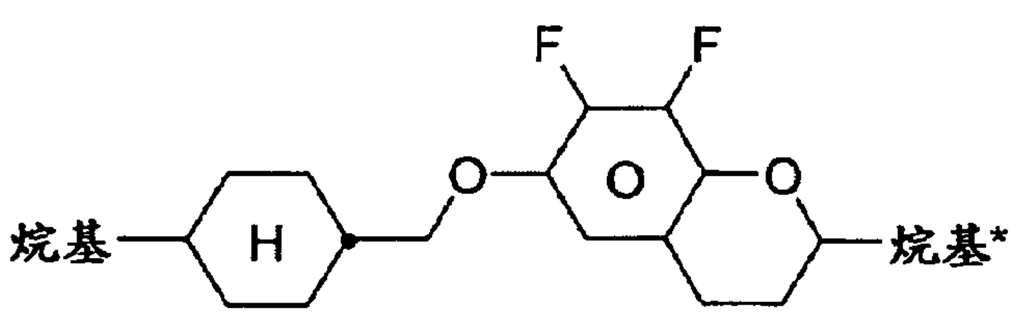
BC-5



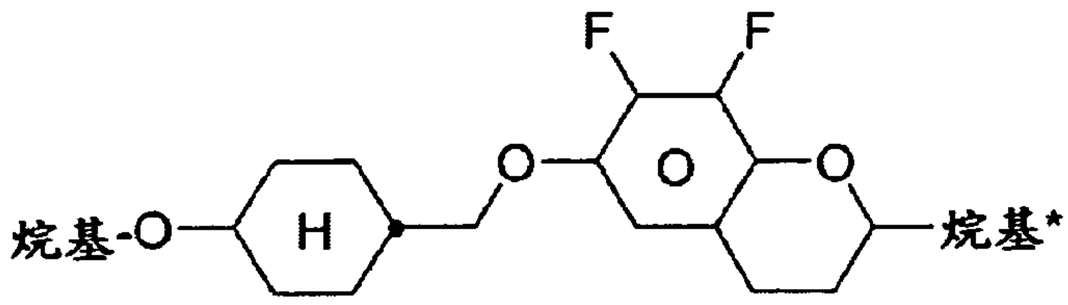
BC-6



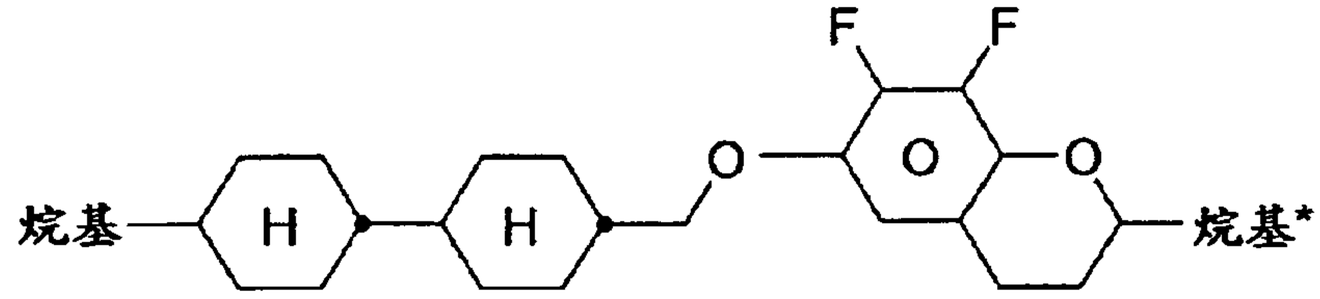
BC-7



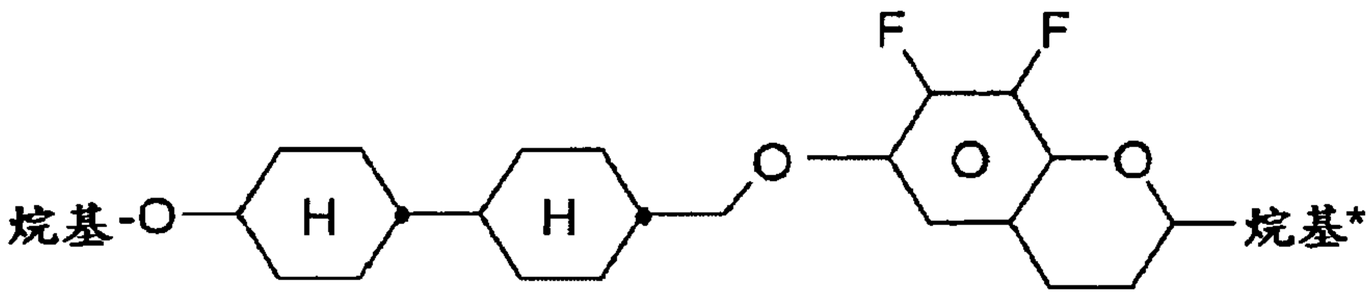
CR-1



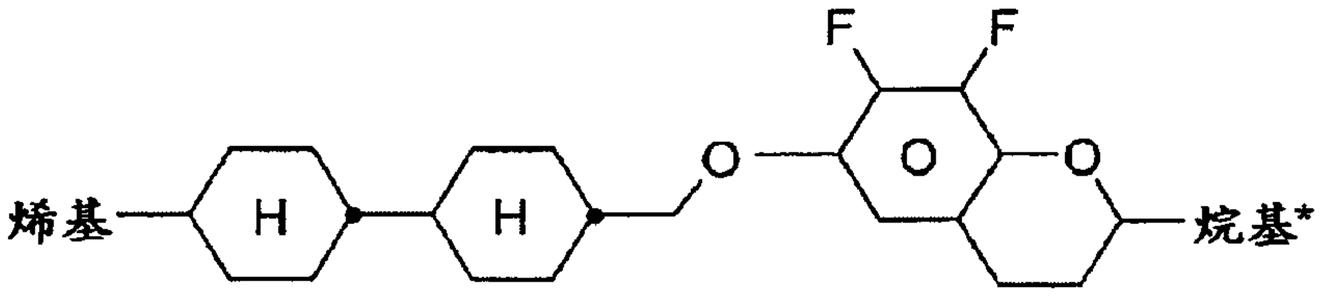
CR-2



CR-3



CR-4



CR-5

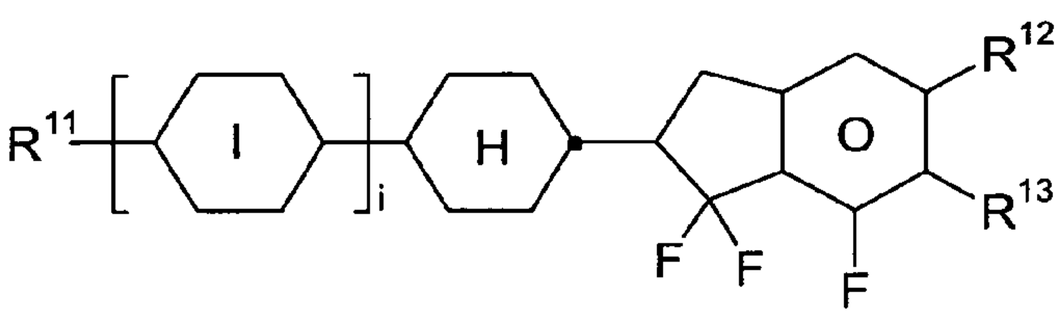
其中：

烷基及烷基*各自彼此獨立地表示具有1-6個C原子之直鏈烷基，及

烯基及烯基*各自彼此獨立地表示具有2-6個C原子之直鏈烯基。

尤其較佳為包含一種、兩種或三種式BC-2化合物之混合物。

l)較佳混合物包含一或多種式In之二氫茚化合物，

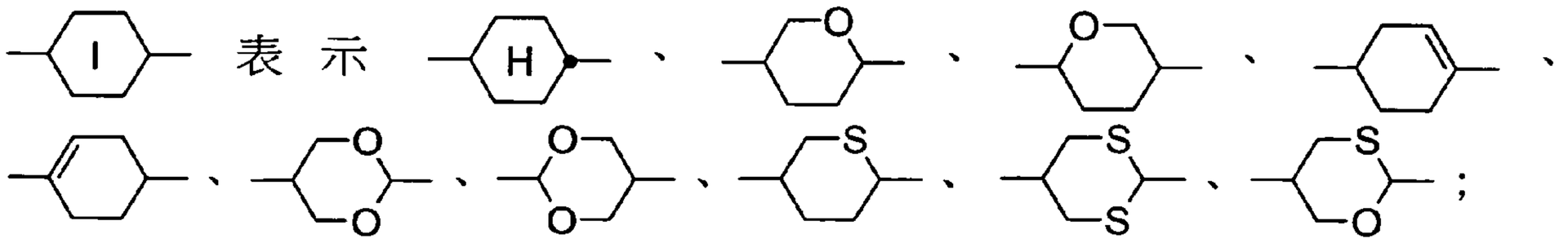


In

其中：

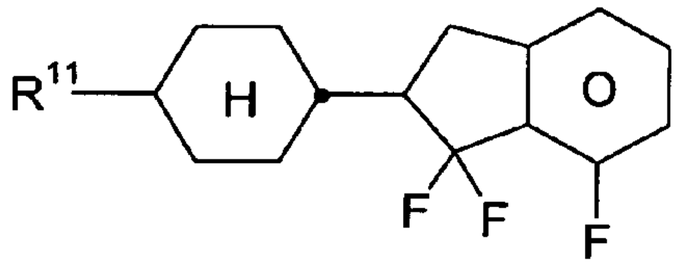
R^{11}、R^{12}、R^{13}各自彼此獨立地表示具有1-6個C原子之直鏈烷基、烷氧基、烷氧基烷基或烯基；

R^{12}及R^{13}另外表示鹵素，較佳為F；

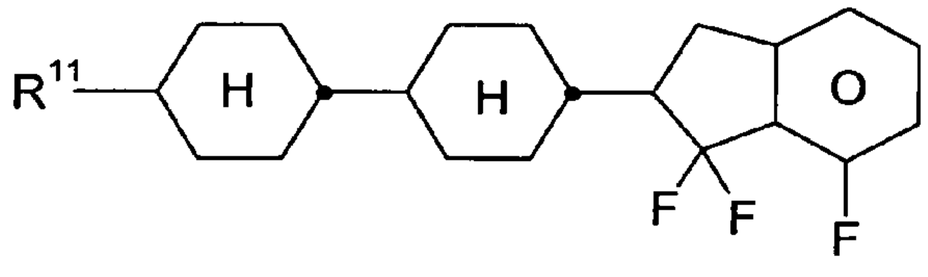


i表示0、1或2。

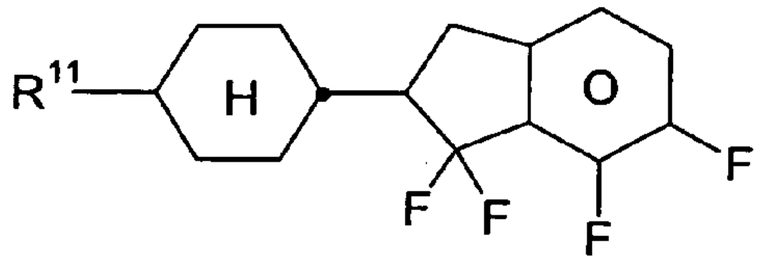
較佳之式In化合物為如下所示之式In-1至式In-16之化合物：



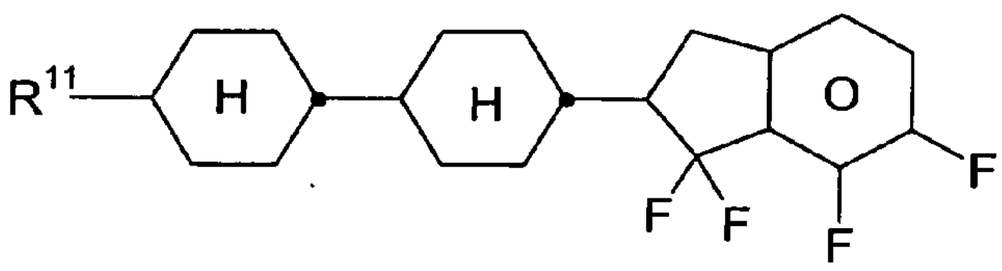
In-1



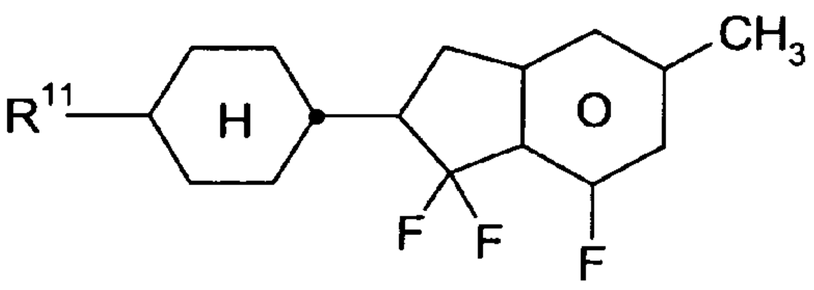
In-2



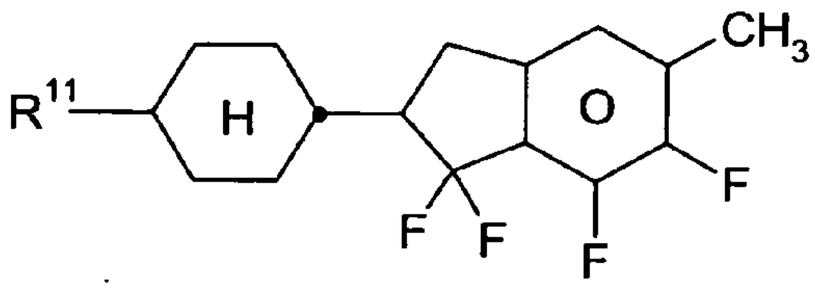
In-3



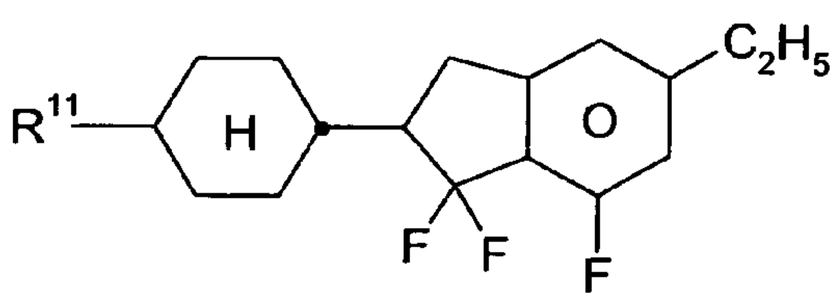
In-4



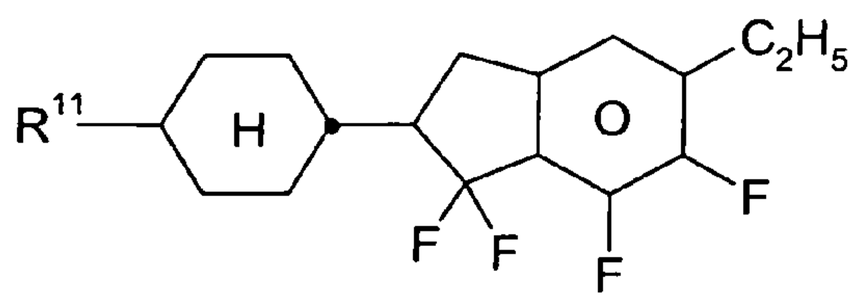
In-5



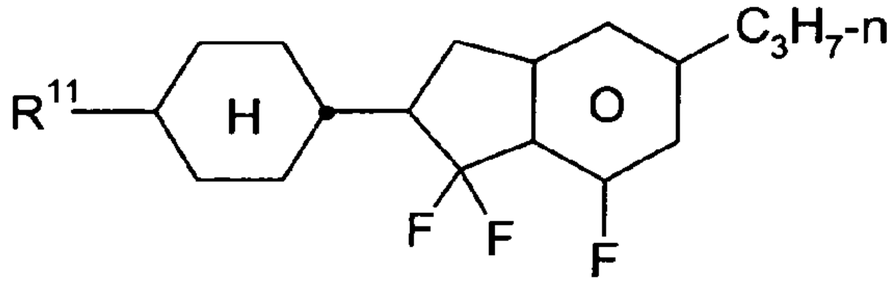
In-6



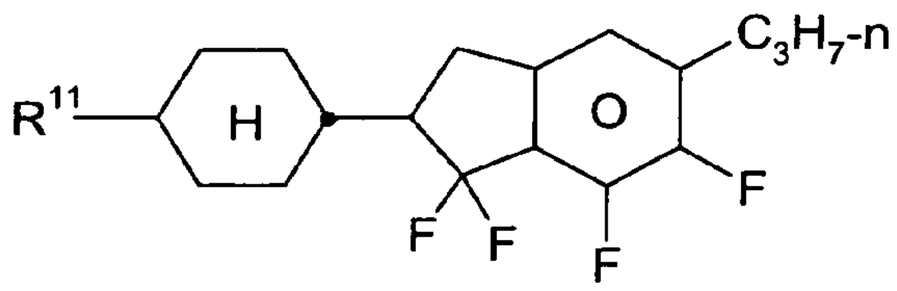
In-7



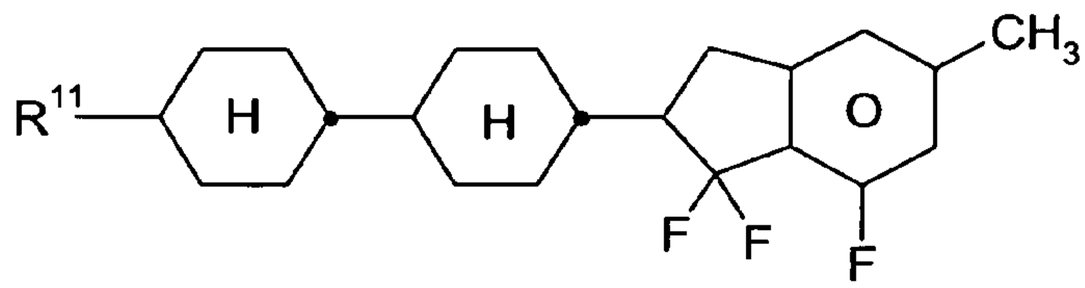
In-8



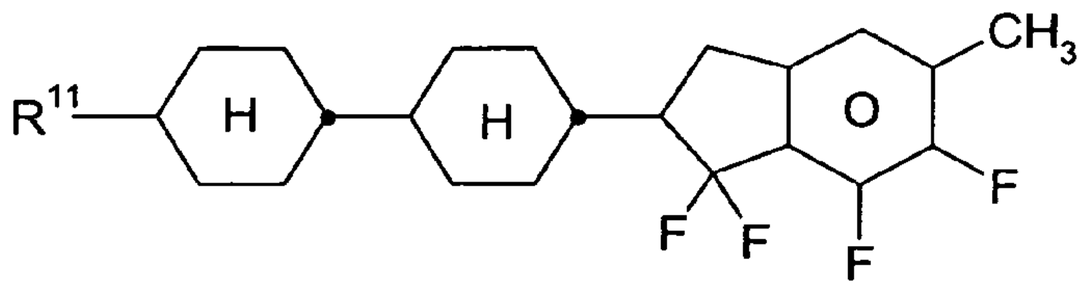
In-9



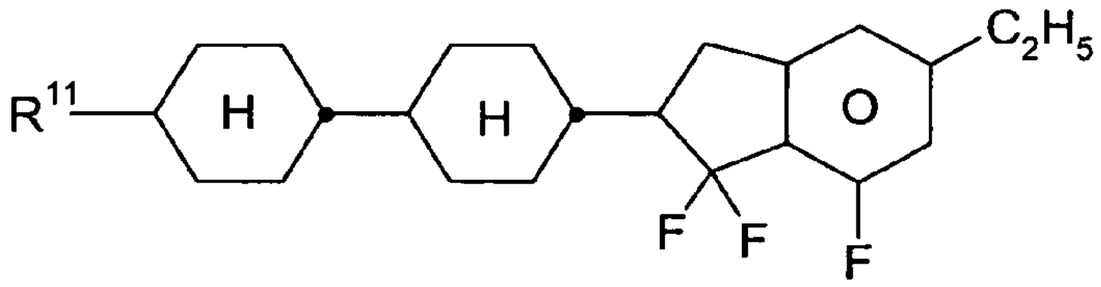
In-10



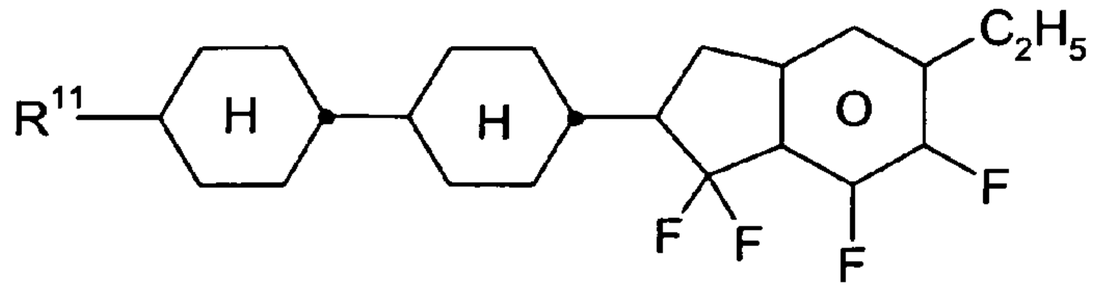
In-11



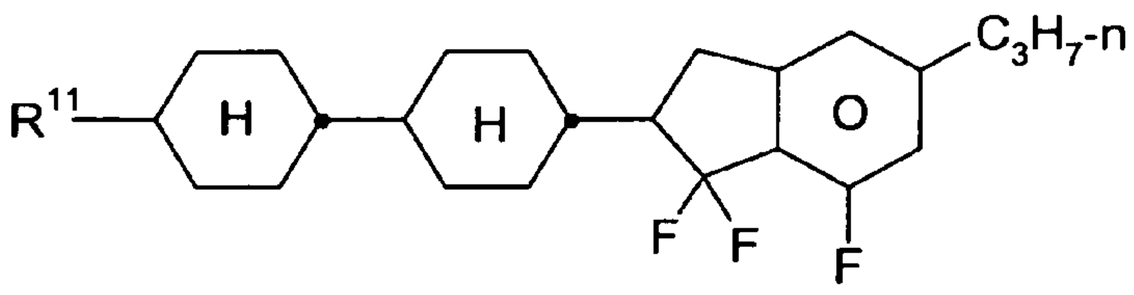
In-12



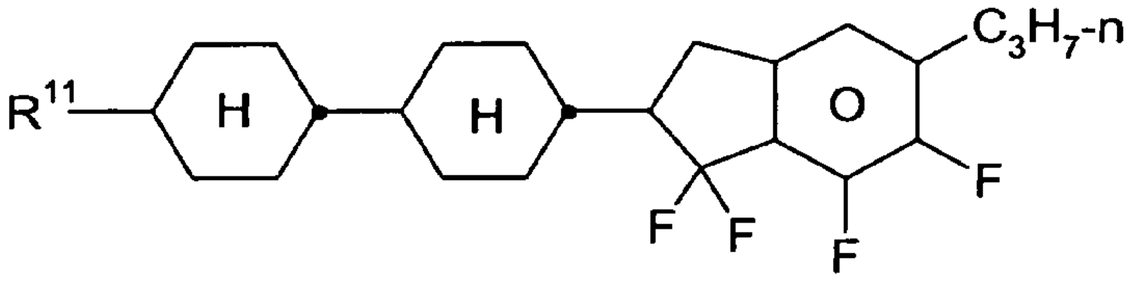
In-13



In-14



In-15

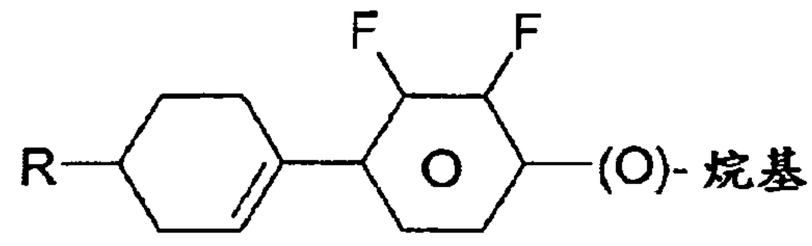


In-16。

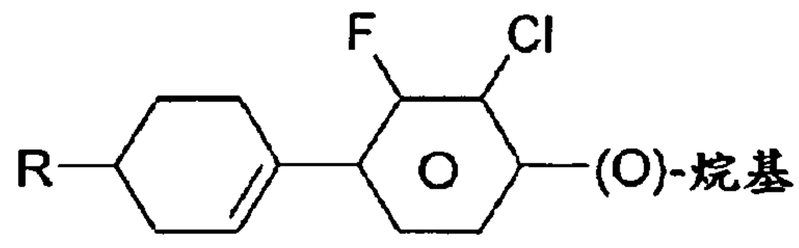
尤其較佳為式In-1、式In-2、式In-3及式In-4之化合物。

式In及子式In-1至子式In-16之化合物較佳以≥ 5重量%，尤其5重量%至30重量%且尤其較佳5重量%至25重量%之濃度用於本發明混合物中。

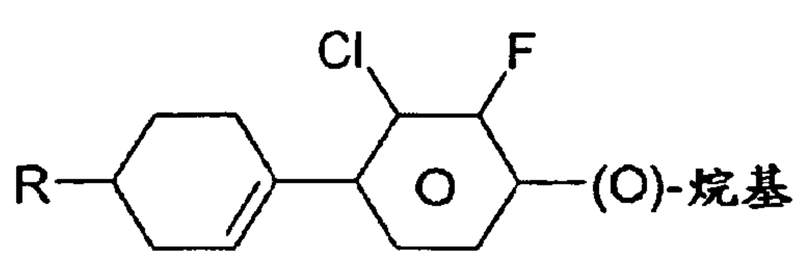
m)較佳混合物另外包含一或多種式L-1至式L-11之化合物，



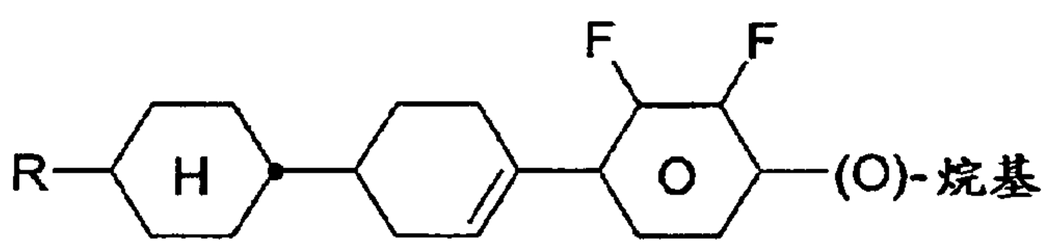
L-1



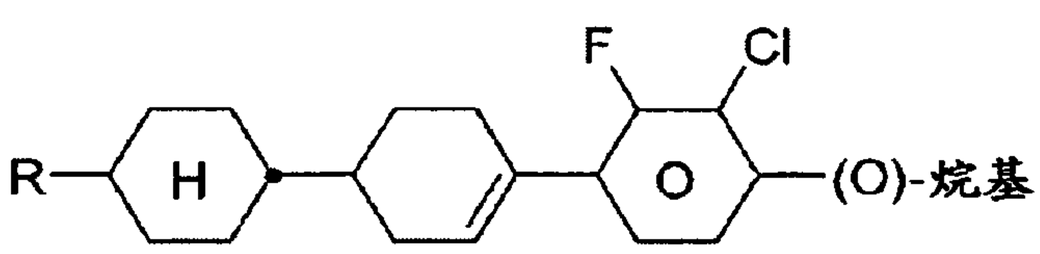
L-2



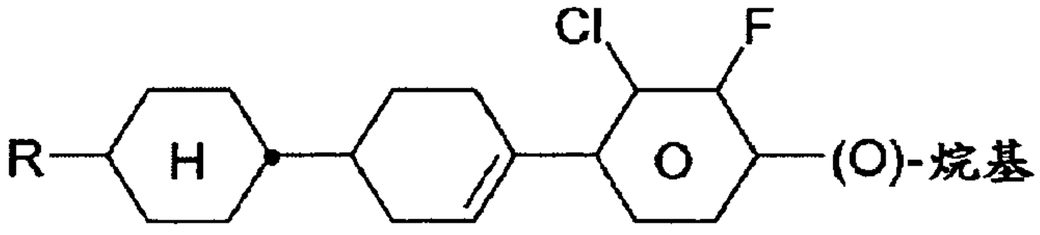
L-3



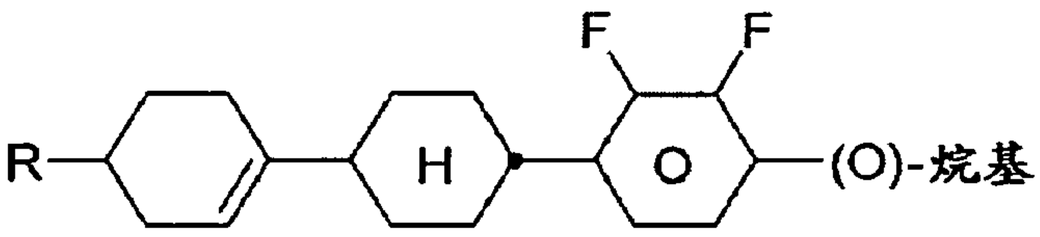
L-4



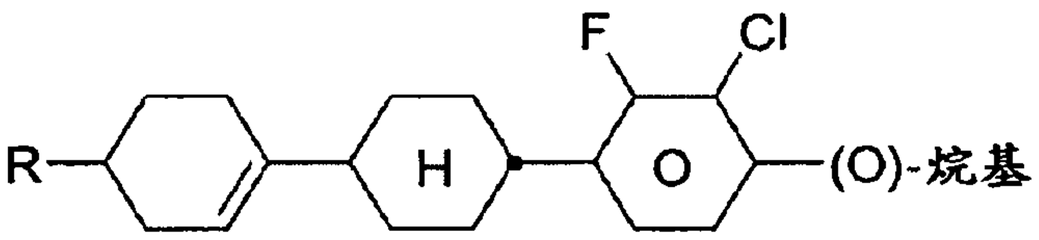
L-5



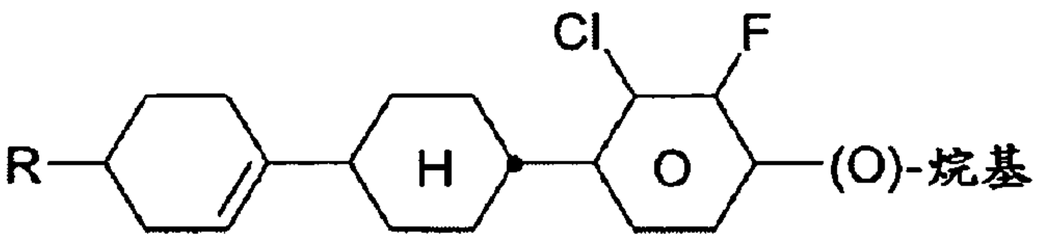
L-6



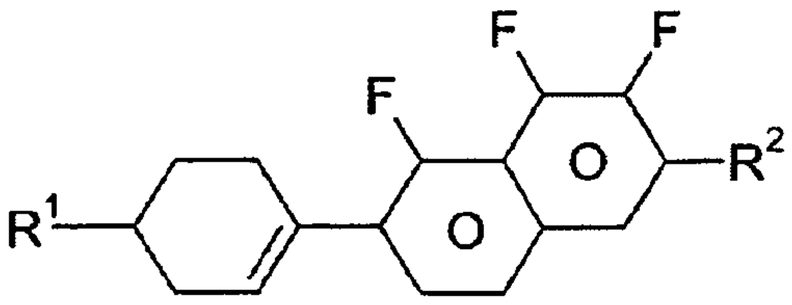
L-7



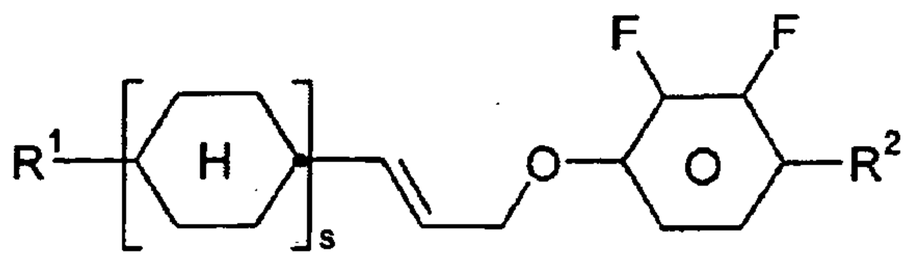
L-8



L-9



L-10



L-11，

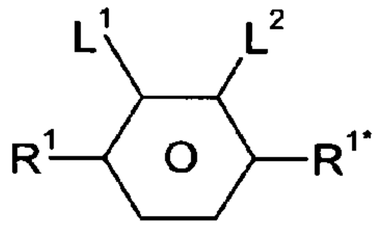
其中：

R、R^1及R^2各自彼此獨立地具有在技術方案10中關於R^{2A}所示之含義，且烷基表示具有1-6個C原子之烷基。s表示1或2。

尤其較佳為式L-1及式L-4之化合物，尤其為式L-4化合物。

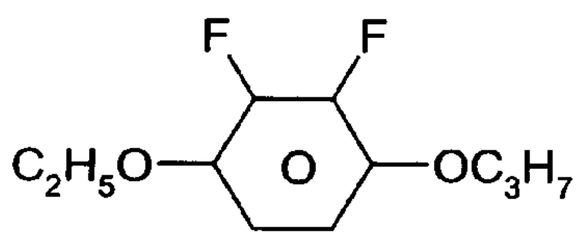
式L-1至式L-11之化合物較佳以5重量%-50重量%，尤其5重量%-40重量%且尤其較佳10重量%-40重量%之濃度使用。

n)該介質另外包含一或多種式EY化合物，

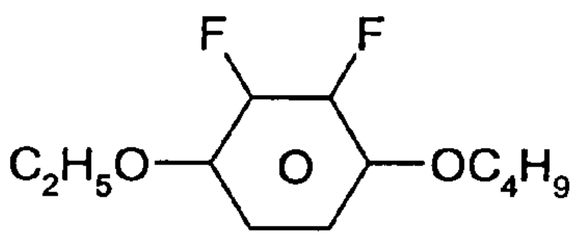


EY

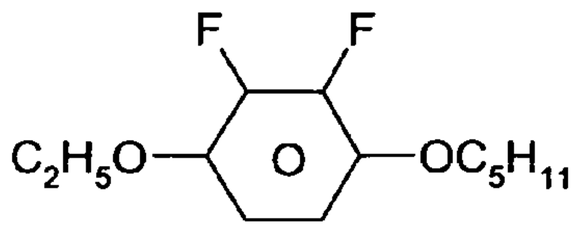
其中，R^1、R^{1*}、L^1及L^2具有式I中所示之含義。在式EY化合物中，R^1及R^{1*}較佳表示具有≥ 2個C原子之烷氧基，且L^1 = L^2 = F。尤其較佳為以下各式之化合物：



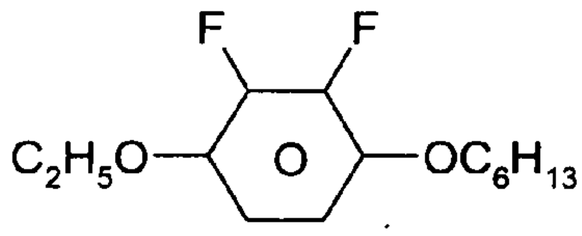
EY-1



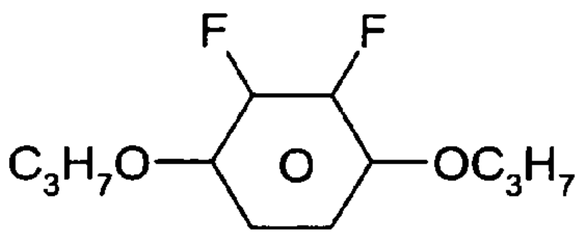
EY-2



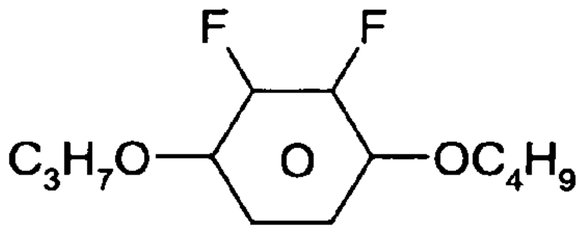
EY-3



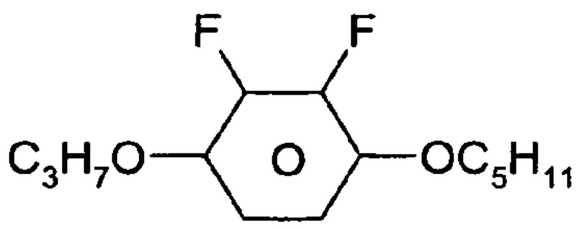
EY-4



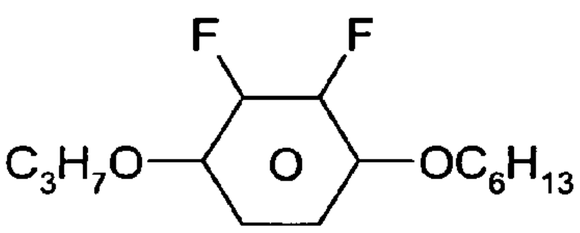
EY-5



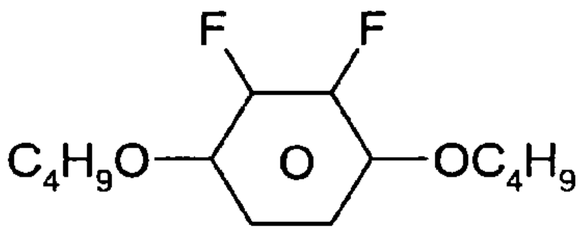
EY-6



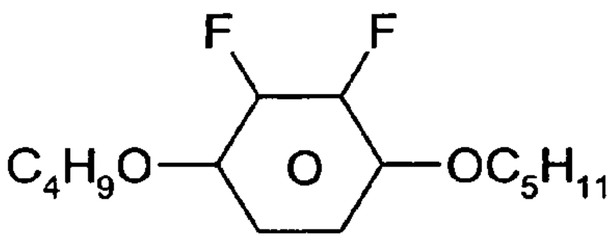
EY-7



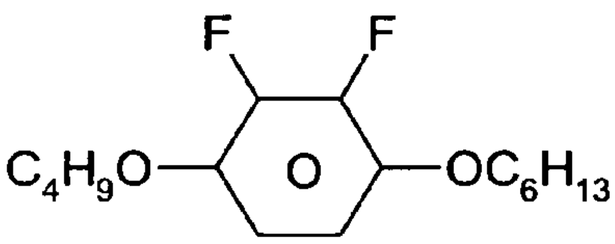
EY-8



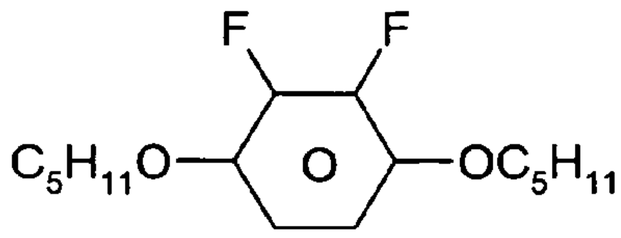
EY-9



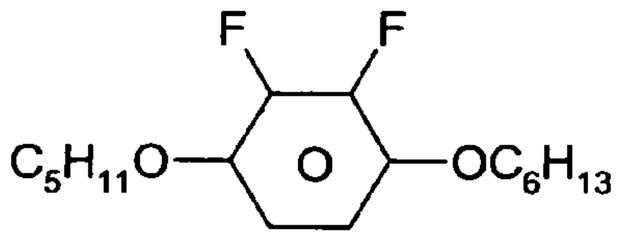
EY-10



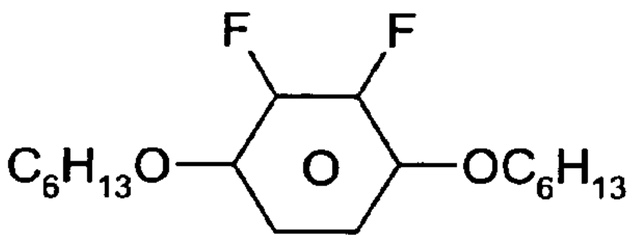
EY-11



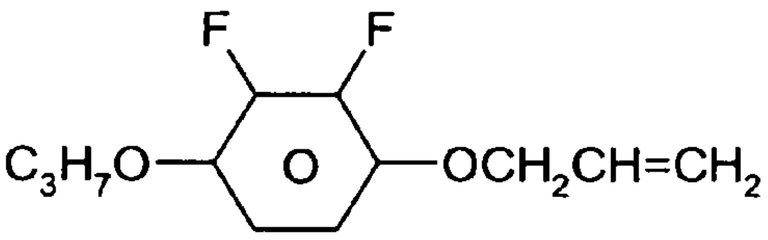
EY-12



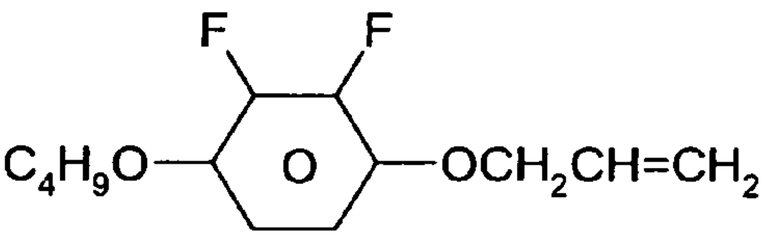
EY-13



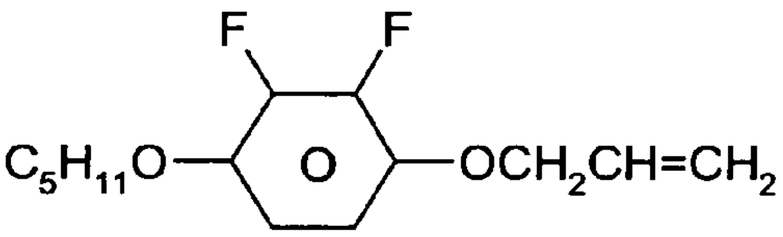
EY-14



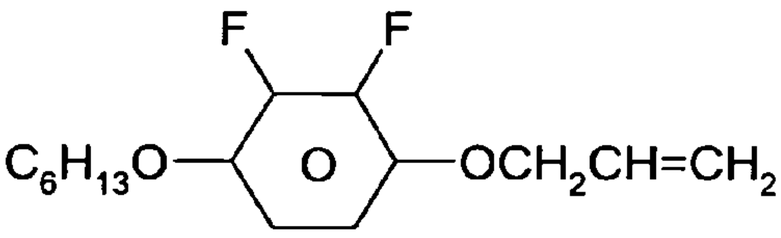
EY-15



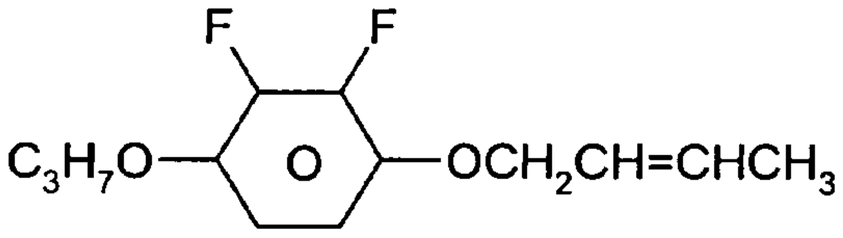
EY-16



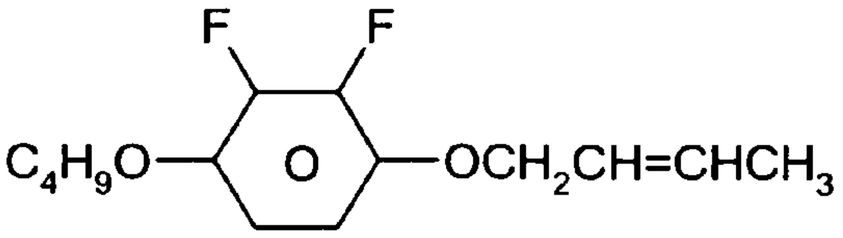
EY-17



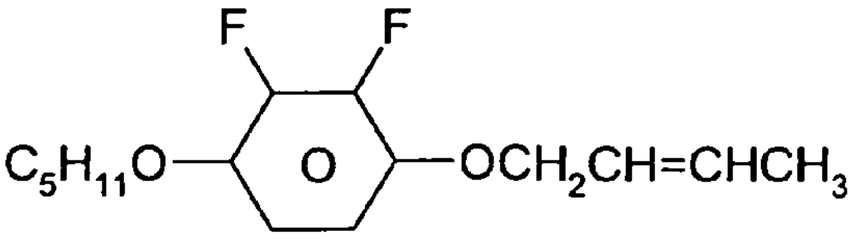
EY-18



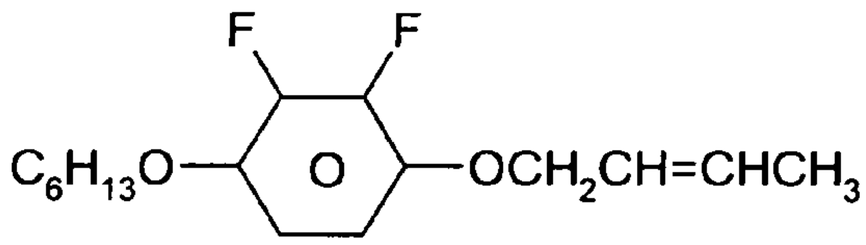
EY-19



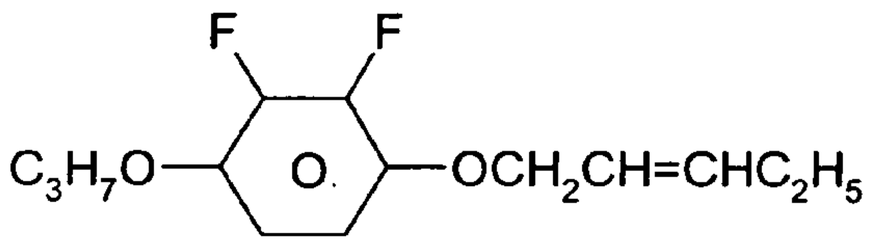
EY-20



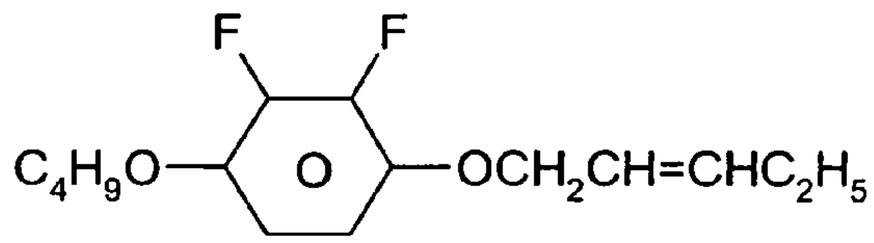
EY-21



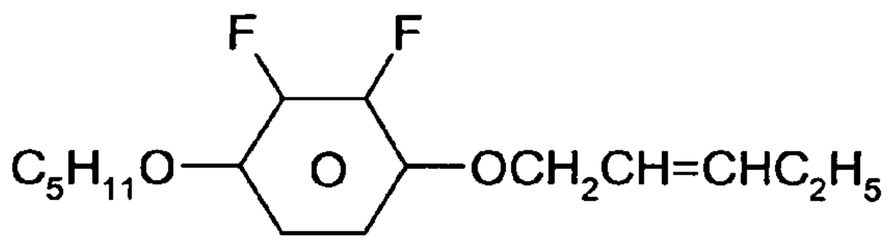
EY-22



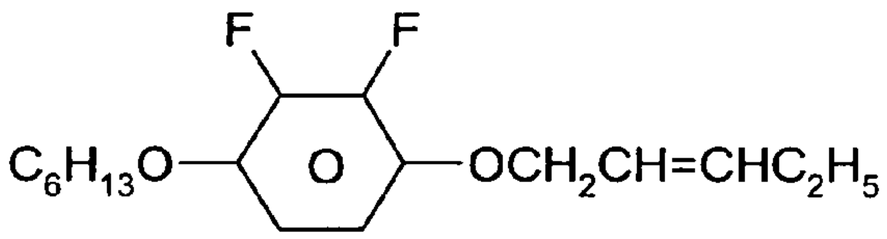
EY-23



EY-24



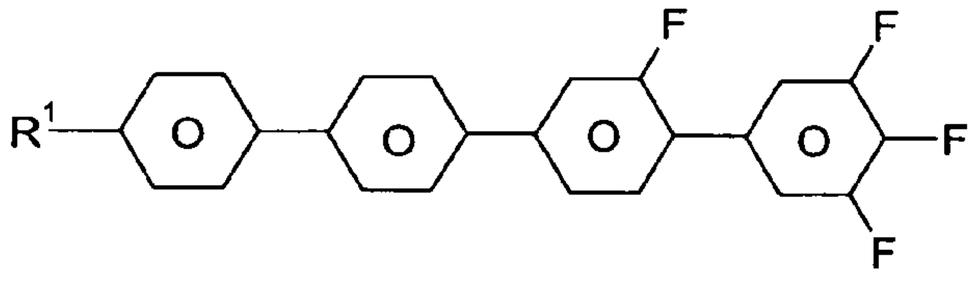
EY-25



EY-26。

以整體混合物計，式EY化合物較佳以3重量%-15重量%之量使用。

本發明之混合物較佳包含一或多種式P4化合物，



P4

其中R^1具有技術方案1中關於式I所示之含義。

式P4化合物較佳以0重量%-5重量%，尤其0重量%-2重量%之濃度存在於本發明混合物中。

尤其較佳之混合物概念如下所示(所用首字母縮寫於表A中解釋。此處，n及m各自彼此獨立地表示1-6)。

本發明之混合物較佳包含：

- 一或多種式I化合物，其中L^1 = L^2 = F且R^1 =烷基且R^{1*}=烷氧基；

- CPY-n-Om，尤其為CPY-2-O2、CPY-3-O2及/或CPY-5-O2，以整體混合物計，其濃度較佳大於5%，尤其為10%-30%；

及/或

- CY-n-Om，較佳為CY-3-O2、CY-3-O4、CY-5-O2及/或CY-5-O4，以整體混合物計，其濃度較佳大於5%，尤其為15%-50%；

及/或

- CCY-n-Om，較佳為CCY-2-O2、CCY-3-O1、CCY-3-O2、CCY-3-O3、CCY-4-O2及/或CCY-5-O2，以整體混合物計，其濃度較佳大於5%，尤其為10%-30%；

及/或

- CLY-n-Om，較佳為CLY-2-O4、CLY-3-O2及/或CLY-3-O3，以整體混合物計，其濃度較佳大於5%，尤其為10%-30%；

及/或

- CK-n-F，較佳為CK-3-F、CK-4-F及/或CK-5-F，以整體混合物計，較佳大於5%，尤其為5%-25%。

此外較佳為包含以下混合物概念之本發明混合物：

(n及m各自彼此獨立地表示1-6。)

- CPY-n-Om及CY-n-Om，以整體混合物計，其濃度較佳為10%-80%；

及/或

- CPY-n-Om及CK-n-F，以整體混合物計，其濃度較佳為10%-70%；

及/或

- CPY-n-Om及CLY-n-Om，以整體混合物計，其濃度較佳為10%-

80%；

及/或

- Y-nO-Om，以整體混合物計，其濃度較佳為8%-16%。

此外，本發明係關於一種基於ECB、VA、PS-VA、IPS、PS-IPS、FFS或PS-FFS效應且具有主動矩陣式定址之電光顯示器，其特徵在於其含有根據技術方案1至16中之一或多者之液晶介質作為介電質。

本發明液晶介質較佳具有≤ -20℃至≥ 70℃、尤其較佳≤ -30℃至≥ 80℃、極尤其較佳≤ -40℃至≥ 90℃之向列相。

此處之表述「具有向列相」意謂一方面在相應溫度下於低溫下觀測不到近晶相及結晶，且另一方面在受熱後向列相仍未出現清澈。低溫下之研究係在相應溫度下於流動黏度計中進行且藉由在具有對應於電光用途之層厚度的測試單元中儲存至少100小時來檢查。若在-20℃之溫度下於相應測試單元中之儲存穩定性為1000小時或1000小時以上，則稱該介質在此溫度下穩定。在-30℃及-40℃之溫度下，對應時間分別為500小時及250小時。在高溫下，清澈點係藉由習知方法在毛細管中量測。

液晶混合物較佳具有至少60 K之向列相範圍及在20℃下至多30 $mm^2 \cdot s^{-1}$之流動黏度ν_{20}。

液晶混合物中雙折射Δn值通常在0.07與0.16之間，較佳在0.08與0.12之間。

本發明之液晶混合物的Δε為-0.5至-8.0，尤其為-2.5至-6.0，其中Δε表示介電各向異性。20℃下之旋轉黏度γ_1較佳為≤ 165 mPa·s，尤其為≤ 140 mPa·s。

本發明之液晶介質具有相對較低的臨限電壓值(V_0)。其較佳在1.7 V至3.0 V範圍內，尤其較佳為≤ 2.5 V且極尤其較佳為≤ 2.3 V。

對於本發明，除非另外明確地指示，否則術語「臨限電壓」係關於電容臨限值(V_0)，亦稱為Freedericks臨限值。

此外，根據本發明之液晶介質在液晶單元中具有高電壓保持率值。

一般而言，具有低定址電壓或臨限電壓之液晶介質與具有較高定址電壓或臨限電壓之液晶介質相比展現較低的電壓保持率，反之亦然。

對於本發明，術語「介電正性化合物」表示$\Delta\varepsilon > 1.5$之化合物，術語「介電中性化合物」表示$-1.5 \leq \Delta\varepsilon \leq 1.5$之化合物，且術語「介電負性化合物」表示$\Delta\varepsilon < -1.5$之化合物。此處化合物之介電各向異性藉由在液晶主體中溶解10%該等化合物且在各情況下具有20 μm之層厚度的至少一個測試單元中在1 kHz下在垂直及平行表面配向下測定所得混合物的電容來測定。測量電壓通常為0.5 V至1.0 V，但始終低於所研究之各別液晶混合物的電容臨限值。

本發明所示之所有溫度值以℃表示。

本發明混合物適用於所有VA-TFT應用，諸如VAN、MVA、(S)-PVA、ASV、PSA(聚合物持續型VA)及PS-VA(聚合物穩定型VA)。此外，其適用於具有負性$\Delta\varepsilon$之共平面切換型(in-plane switching；IPS)及邊緣場切換型(fringe field switching；FFS)應用。

本發明顯示器中之向列液晶混合物通常包含兩種組分，即組分A及組分B，該等組分本身由一或多種個別化合物組成。

組分A具有顯著負性介電各向異性且賦予向列相以≤ -0.5之介電各向異性。除一或多種式I化合物之外，其較佳包含式IIA、式IIB及/或式IIC之化合物，此外包含式III化合物。

組分A之比例較佳介於45%與100%之間，尤其介於60%與100%之間。

對於組分A，較佳選擇Δε值≤ -0.8的一種(或多種)個別化合物。此值必須愈負，A在整體混合物中之比例愈小。

組分B表明具有顯著向列原基性(nematogeneity)且在20℃下流動黏度不大於30 $mm^2 \cdot s^{-1}$，較佳不大於25 $mm^2 \cdot s^{-1}$。

組分B中之尤其較佳個別化合物為在20℃下流動黏度不大於18 $mm^2 \cdot s^{-1}$，較佳不大於12 $mm^2 \cdot s^{-1}$之極低黏度向列液晶。

組分B為單變性或互變性向列，不具有近晶相且能夠防止在低至極低溫度下液晶混合物中近晶相之發生。舉例而言，若各種高向列原基性材料添加至近晶液晶混合物中，則可經由達成之對近晶相之抑制程度獲得媲美此等材料之向列原基性。

混合物亦可視情況包含組分C，該組分包含具有Δε ≥ 1.5介電各向異性之化合物。以整體混合物計，此等所謂的正性化合物一般以≤20重量%之量存在於負性介電各向異性混合物中。

熟習此項技術者自文獻獲知眾多適合材料。尤其較佳為式III化合物。

此外，此等液晶相亦可包含18種以上組分，較佳為18至25種組分。

除一或多種式I化合物之外，該等相較佳包含4至15種、尤其5至12種且尤其較佳小於10種式IIA、式IIB及/或式IIC之化合物及視情況存在之式III化合物。

除式I化合物及式IIA、式IIB及/或式IIC之化合物及視情況存在之式III化合物外，其他成分亦可例如以佔整體混合物至多45%、但較佳至多35%、尤其至多10%之量存在。

其他成分較佳選自以下類別之向列或向列原基物質，尤其已知物質：氧偶氮苯、亞苄基苯胺、聯苯、聯三苯、苯甲酸苯酯或苯甲酸環己酯、環己烷甲酸苯酯或環己烷甲酸環己酯、苯基環己烷、環己基

聯苯、環己基環己烷、環己基萘、1,4-雙環己基聯苯或環己基嘧啶、苯基二噁烷或環己基二噁烷、視情況鹵化之芪、苄基苯基醚、二苯乙炔及經取代之肉桂酸酯。

適合作為此類型之液晶相之成分的最重要化合物的特徵為式IV：

R^{20}-L-G-E-R^{21}　　IV

其中L及E各自表示來自由以下形成之群的碳環或雜環系統：1,4-二取代苯及環己烷環、4,4'-二取代聯苯、苯基環己烷及環己基環己烷系統、2,5-二取代嘧啶及1,3-二噁烷環、2,6-二取代萘、二氫化萘及四氫化萘、喹唑啉及四氫喹唑啉；

G表示　-CH=CH-　-N(O)=N-

-CH=CQ-　-CH=N(O)-

-C≡C-　-CH_2-CH_2-

-CO-O-　-CH_2-O-

-CO-S-　-CH_2-S-

-CH=N-　-COO-Phe-COO-

-CF_2O-　-CF=CF-

-OCF_2-　-OCH_2-

-$(CH_2)_4$-　-$(CH_2)_3$O-

或C-C單鍵，Q表示鹵素(較佳為氯)或-CN，且R^{20}及R^{21}各自表示具有至多18個(較佳至多8個)碳原子之烷基、烯基、烷氧基、烷氧基烷基或烷氧基羰氧基，或此等基團中之一者替代地表示CN、NC、NO_2、NCS、CF_3、SF_5、OCF_3、F、Cl或Br。

在大多數此等化合物中，R^{20}及R^{21}彼此不同，此等基團中之一者通常為烷基或烷氧基。所建議取代基之其他變體亦為常用的。許多此

等物質或其混合物為市售的。所有此等物質可藉由自文獻獲知之方法製備。

對於熟習此項技術者不言而喻，本發明之VA、IPS或FFS混合物亦可包含例如H、N、O、Cl及F已由相應同位素置換之化合物。

另外可聚合化合物，即所謂的反應性液晶原基(reactive mesogen；RM)(例如如U.S. 6,861,107中所揭示)以混合物計可以較佳0.12重量%-5重量%、尤其較佳0.2重量%-2重量%之濃度添加至本發明混合物中。此等混合物可視情況亦包含引發劑，如例如U.S. 6,781,665中所述。引發劑(例如來自BASF之Irganox-1076)較佳以0-1%之量添加至包含可聚合化合物之混合物中。此類混合物可用於所謂的聚合物穩定型VA模式(PS-VA)或聚合物持續型VA (polymer sustained VA；PSA)，其中反應性液晶原基之聚合預期在液晶混合物中發生。此之先決條件為液晶混合物本身不包含任何可聚合組分。

在本發明之一較佳實施例中，可聚合化合物係選自式M化合物

R^a-A^1-$(Z^1$-$A^2)_m$-R^b　　M

其中個別基團具有以下含義：

R^a及R^b各自彼此獨立地表示P、P-Sp-、H、鹵素、SF_5、NO_2、碳基或烴基，其中R^a及R^b中之至少一者表示或含有P或P-Sp-基團；

P在每次出現時相同或不同地表示可聚合基團；

Sp在每次出現時相同或不同地表示間隔基團或單鍵；

A^1及A^2各自彼此獨立地表示芳族基、雜芳基、脂環基或雜環基，較佳具有4至25個環原子，其亦可含有稠環且其亦可經L單取代或多取代；

L表示P-Sp-、H、OH、CH_2OH、鹵素、SF_5、NO_2、碳基或烴基；

Z^1在每次出現時相同或不同地表示-O-、-S-、-CO-、-CO-O-、-

OCO-、-O-CO-O-、-OCH_2-、-CH_2O-、-SCH_2-、-CH_2S-、-CF_2O-、-OCF_2-、-CF_2S-、-SCF_2-、-$(CH_2)_{n1}$-、-CF_2CH_2-、-CH_2CF_2-、-$(CF_2)_{n1}$-、-CH=CH-、-CF=CF-、-C≡C-、-CH=CH-COO-、-OCO-CH=CH-、CR^0R^{00}或單鍵；

R^0及R^{00}各自彼此獨立地表示H或具有1至12個C原子之烷基；

m表示0、1、2、3或4；

n1表示1、2、3或4。

式M之尤其較佳化合物為彼等化合物，其中

R^a及R^b各自彼此獨立地表示P、P-Sp-、H、F、Cl、Br、I、-CN、-NO_2、-NCO、-NCS、-OCN、-SCN、SF_5或具有1至25個C原子之直鏈或分支鏈烷基，其中另外，一或多個不相鄰CH_2基團可各自彼此獨立地經-C(R^0)=C(R^{00})-、-C≡C-、-N(R^{00})-、-O-、-S-、-CO-、-CO-O-、-O-CO-、-O-CO-O-以使得O及/或S原子不彼此直接連接之方式置換，且其中另外，一或多個H原子可經F、Cl、Br、I、CN、P或P-Sp-置換，其中基團R^a及R^b中之至少一者表示或含有基團P或P-Sp-；

A^1及A^2各自彼此獨立地表示1,4-伸苯基、萘-1,4-二基、萘-2,6-二基、菲-2,7-二基、蒽-2,7-二基、茀-2,7-二基、2-側氧基-2H-吃烯-3,6-二基、2-側氧基-2H-吃烯-3,7-二基、4-側氧基-4H-吃烯-2,6-二基、4-側氧基-4H-吃烯-3,6-二基、4-側氧基-4H-吃烯-3,7-二基(俗名為香豆素或黃酮)(其中另外，此等基團中之一或多個CH基團可經N置換)、環己烷-1,4-二基(其中另外，一或多個不相鄰CH_2基團可經O及/或S置換)、1,4-伸環己烯基、雙環[1.1.1]戊烷-1,3-二基、雙環[2.2.2]辛烷-1,4-二基、螺[3.3]庚烷-2,6-二基、哌啶-1,4-二基、十氫化萘-2,6-二基、1,2,3,4-四氫化萘-2,6-二基、二氫茚-2,5-二基或八氫-4,7-甲橋二氫茚-2,5-二基，其中所有此等基團可未經取代或經L單取代或多取代；

L表示P、P-Sp-、OH、CH_2OH、F、Cl、Br、I、-CN、-NO_2、-

NCO、-NCS、-OCN、-SCN、-C(=O)N(R^x)$_2$、-C(=O)Y^1、-C(=O)R^x、-N(R^x)$_2$、視情況經取代之矽烷基、具有6至20個C原子之視情況經取代之芳基、或具有1至25個C原子之直鏈或分支鏈烷基、烷氧基、烷基羰基、烷氧基羰基、烷基羰氧基或烷氧基羰氧基，其中另外，一或多個H原子可經F、Cl、P或P-Sp-置換；

P表示可聚合基團；

Y^1表示鹵素；

R^x表示P、P-Sp-、H、鹵素、具有1至25個C原子之直鏈、分支鏈或環狀烷基，其中另外，一或多個不相鄰CH_2基團可經-O-、-S-、-CO-、-CO-O-、-O-CO-、-O-CO-O-以使得O及/或S原子彼此不直接連接之方式置換，且其中另外，一或多個H原子可經F、Cl、P或P-Sp-、具有6至40個C原子之視情況經取代之芳基或芳氧基、或具有2至40個C原子之視情況經取代之雜芳基或雜芳氧基置換；

其他較佳之式M化合物為選自以下子群中之一或多者之化合物：

- m為2或3；

- m為2；

- R^a及R^b表示相同或不同之基團P-Sp-；

- R^a及R^b表示相同或不同之基團P-Sp-，其中一或多個基團Sp表示單鍵；

- m為2或3，且R^a及R^b表示相同基團P-Sp-；

- 基團R^a及R^b中之一者表示P-Sp-，且另一者表示不可聚合基團，較佳為具有1至25個C原子之直鏈或分支鏈烷基，其中此外，一或多個不相鄰CH_2基團可各自彼此獨立地經-C(R^{00})=C(R^{000})-、-C≡C-、-N(R^{00})-、-O-、-S-、-CO-、-CO-O-、-O-CO-或-O-CO-O-以使得O及/或S原子不直接彼此連接之方式置換，且其中此外，一或多個H原子可經F、Cl、Br、I或CN置換；

- 一或多個基團Sp表示單鍵；

- 一或多個基團Sp表示$-(CH_2)_{p1}-$、$-(CH_2)_{p1}-O-$、$-(CH_2)_{p1}-OCO-$或$-(CH_2)_{p1}-OCOO-$，其中p1表示1至12之整數，且r1表示1至8之整數；

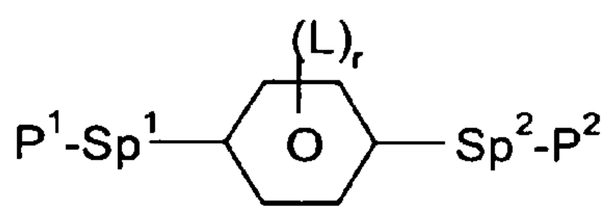
- L不表示及/或不含有可聚合基團；

- A^1及A^2彼此獨立地表示1,4-伸苯基或萘-2,6-二基，其中另外，此等基團中之一或多個CH基團可經N置換且其可另外經單氟化或多氟化；

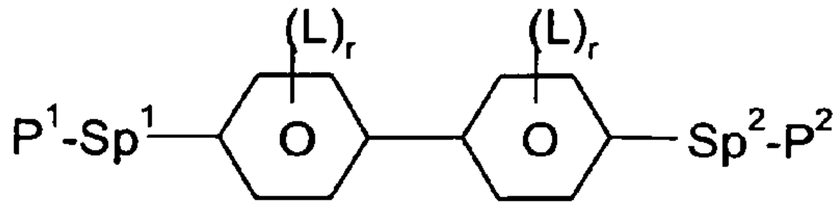
- Z^1係選自由以下組成之群：-O-、-CO-O-、-OCO-、$-OCH_2-$、$-CH_2O-$、$-CF_2O-$、$-OCF_2-$、$-CH_2CH_2-$、-CH=CH-、-CF=CF-、-CH=CF-、-CF=CH-、-C≡C-及單鍵；

- L為不可聚合基團，較佳選自由以下組成之群：F、Cl、-CN、具有1至25個C原子之直鏈及分支鏈烷基，其中另外，一或多個不相鄰CH_2基團可各自彼此獨立地經$-C(R^{00})=C(R^{000})-$、-C≡C-、$-N(R^{00})-$、-O-、-S-、-CO-、-CO-O-、-O-CO-或-O-CO-O-以使得O及/或S原子不彼此直接連接之方式置換，且其中另外，一或多個H原子可經F、Cl、Br、I或CN置換。

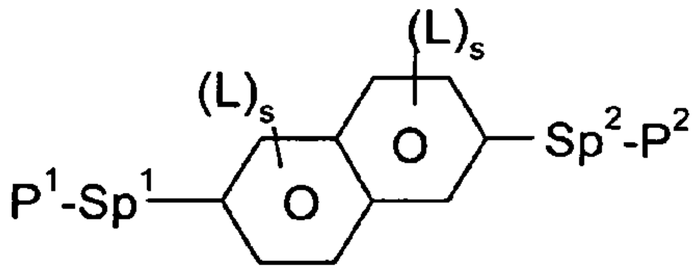
用於製造用於PS-VA、PS-IPS及PS-FFS應用之本發明之LC混合物的適合且較佳的共聚單體係選自例如以下各式：



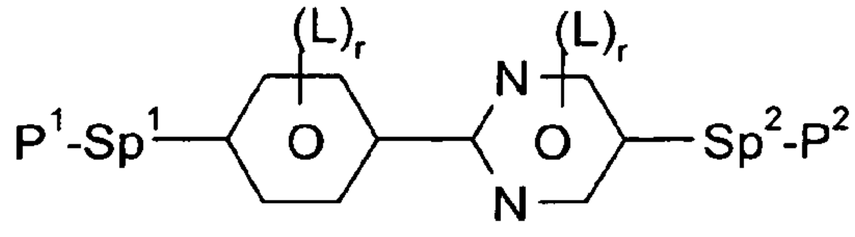
M1



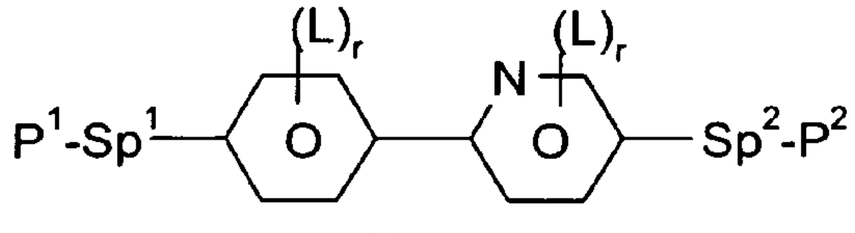
M2



M3



M4



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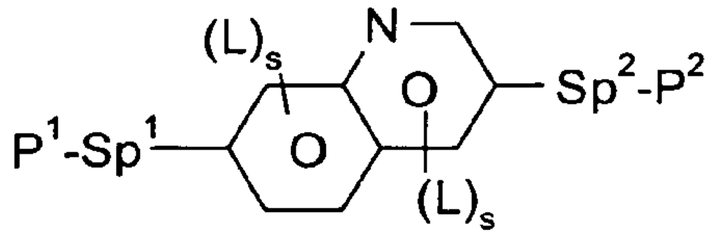

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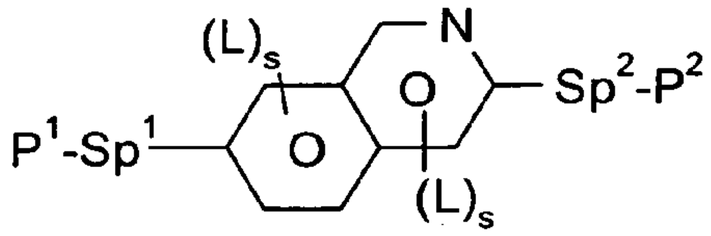

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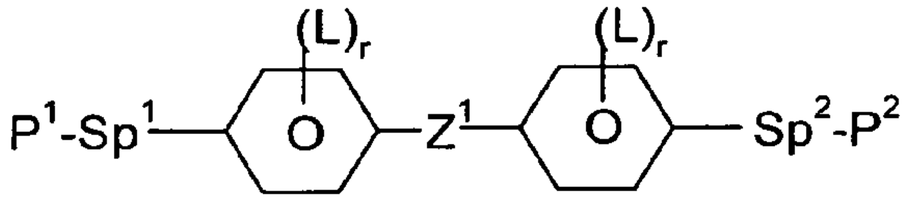

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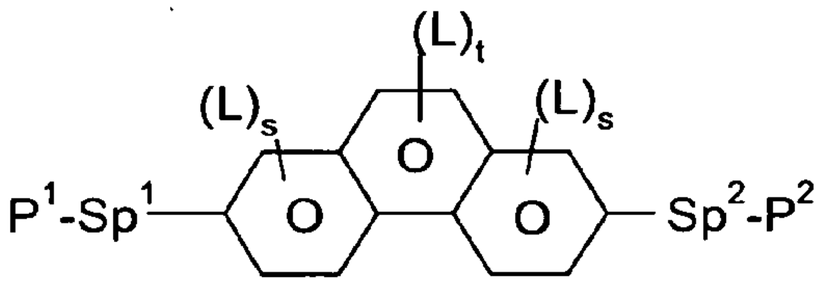

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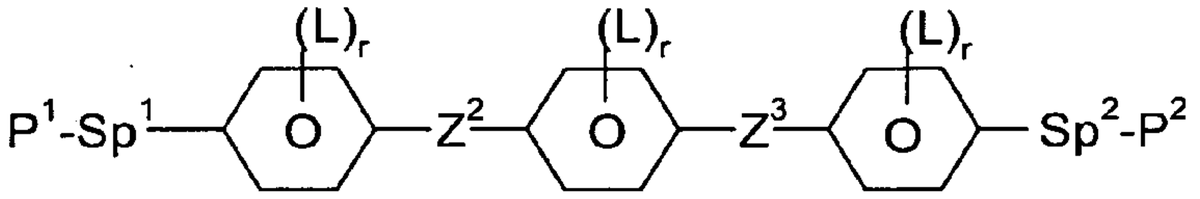

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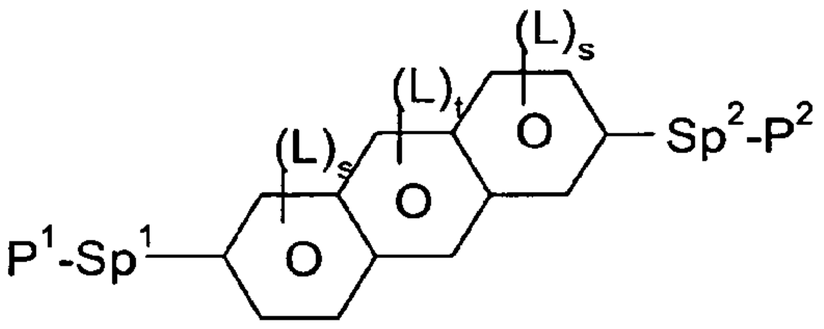

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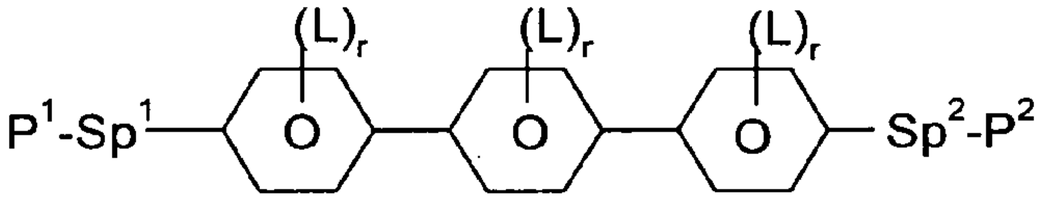

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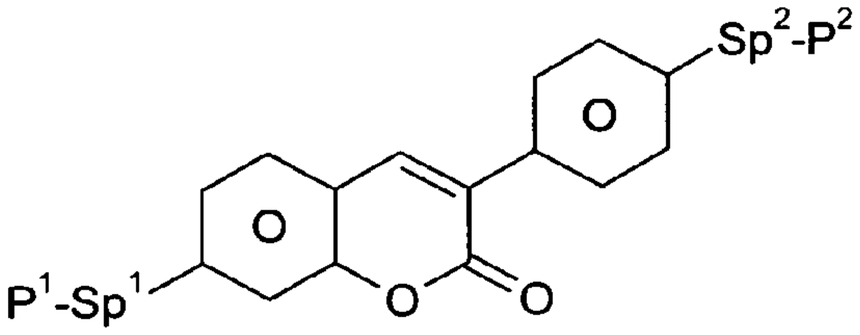

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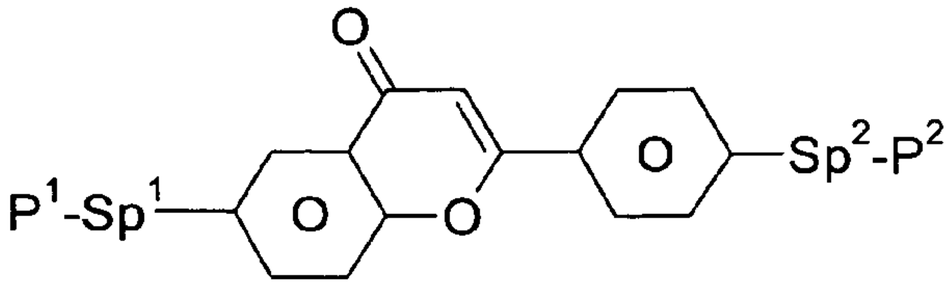

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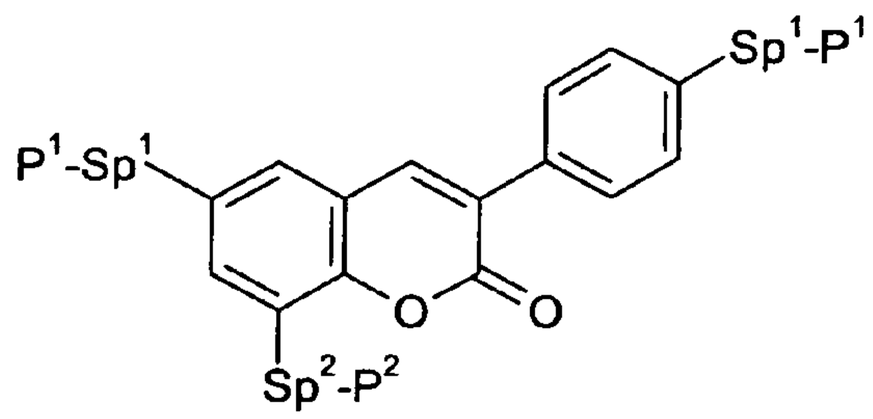

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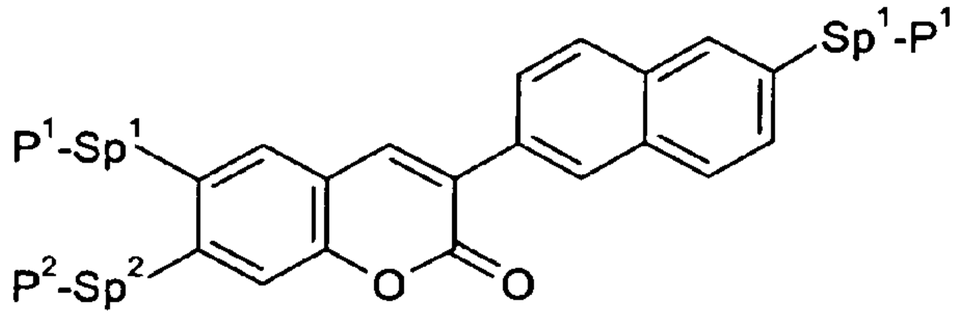

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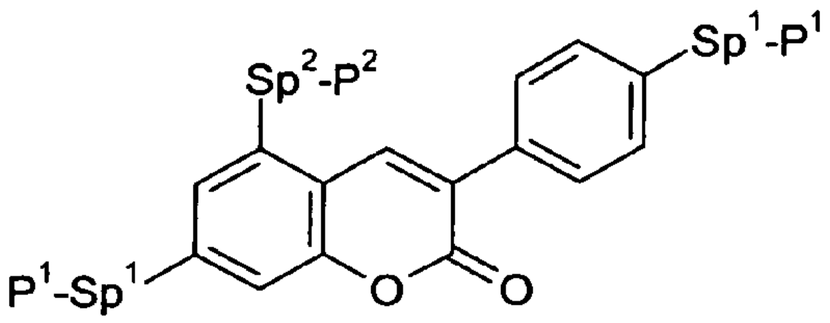

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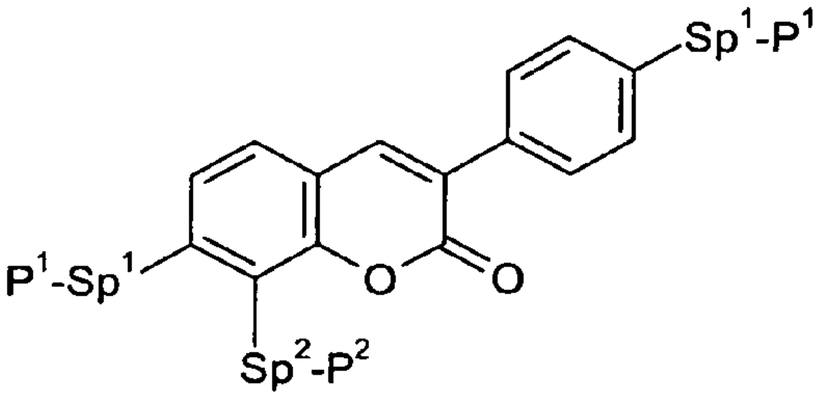

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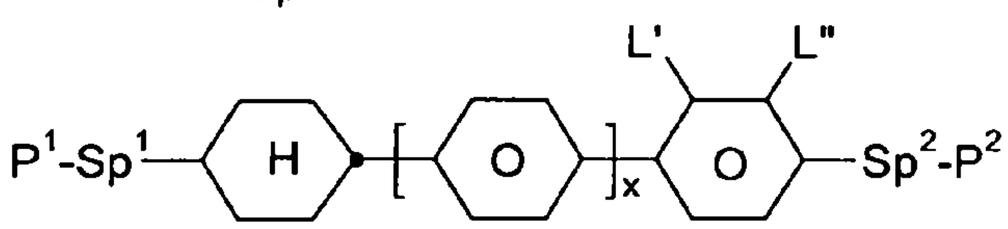

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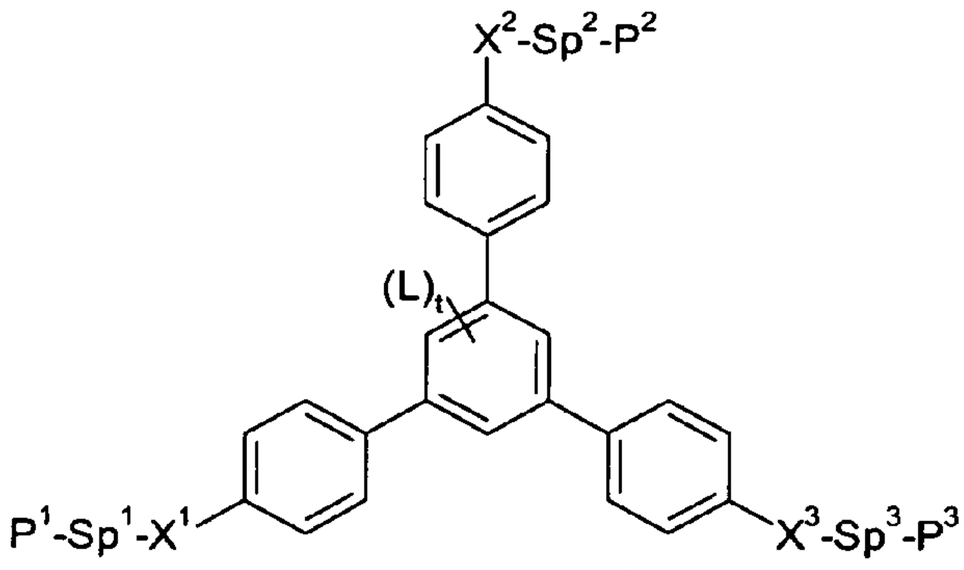

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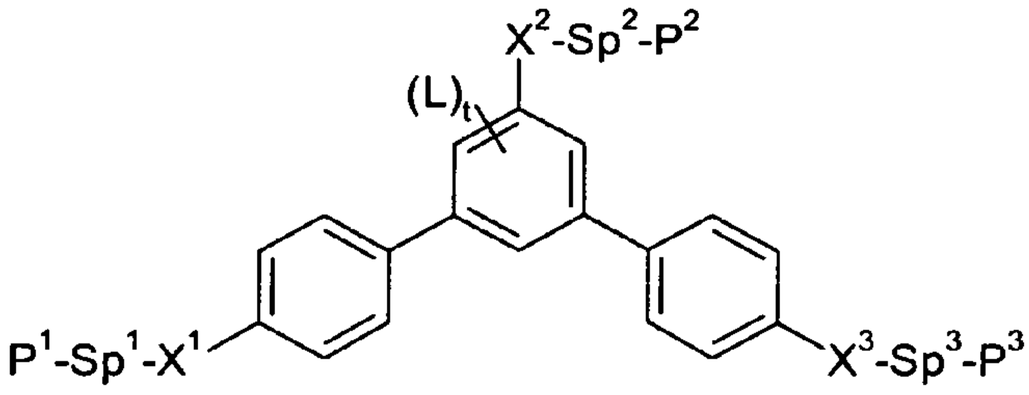

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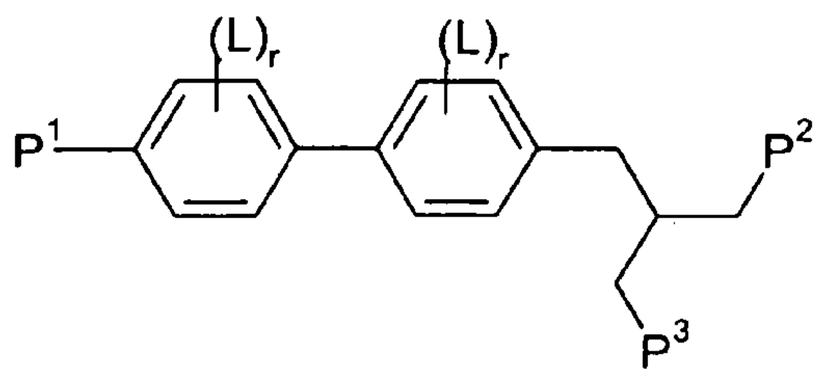

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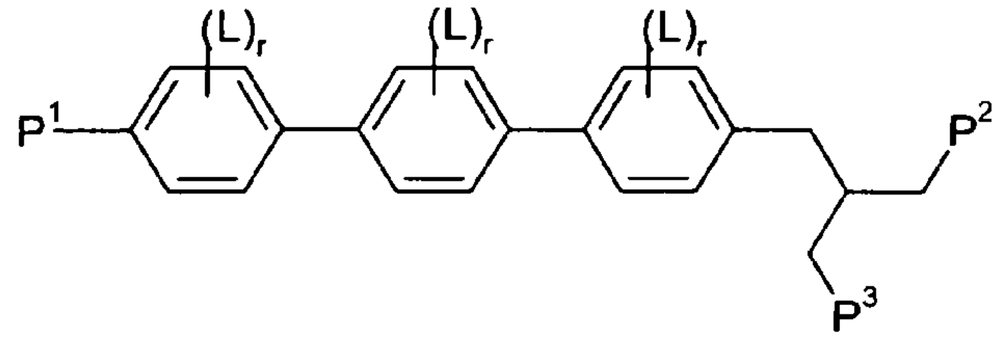

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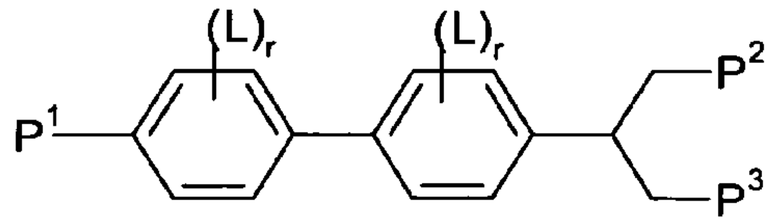

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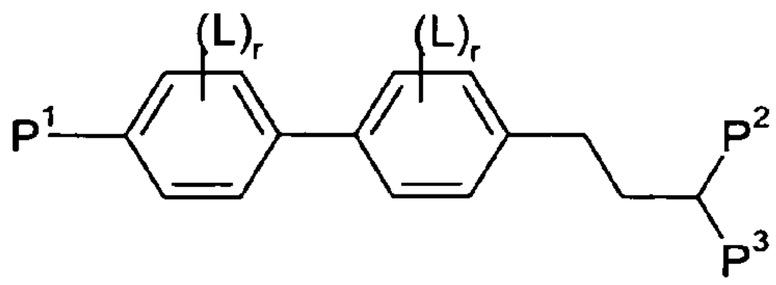

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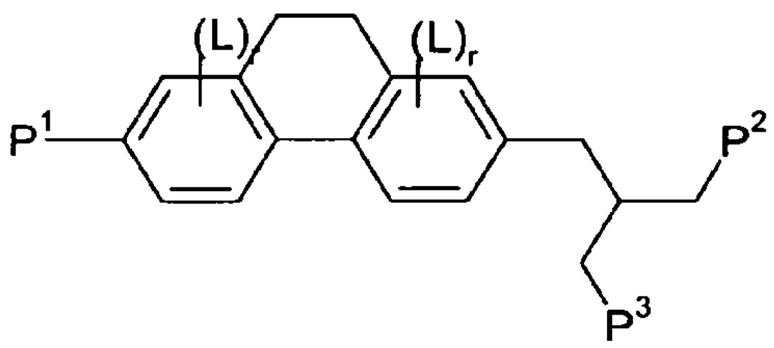

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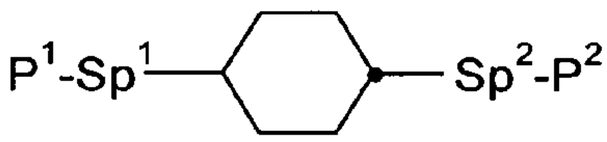

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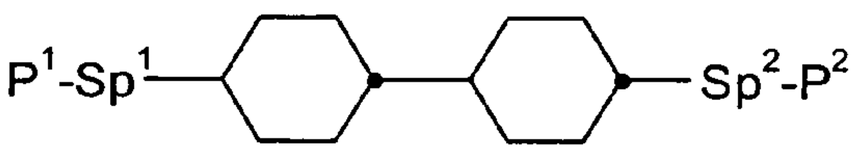

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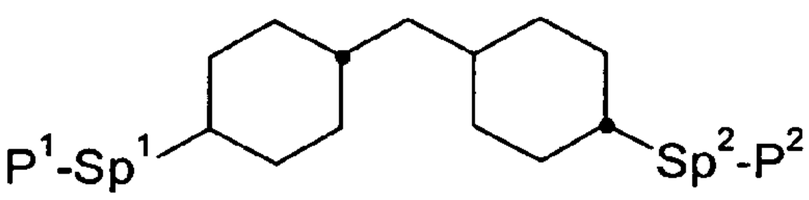

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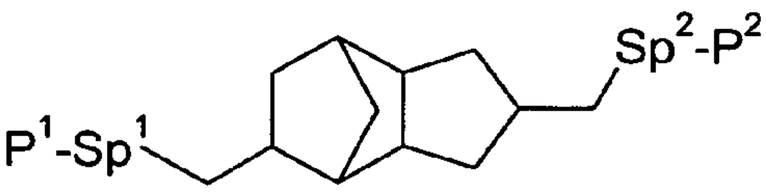

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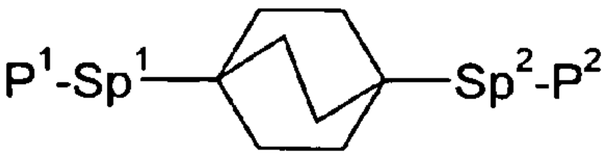

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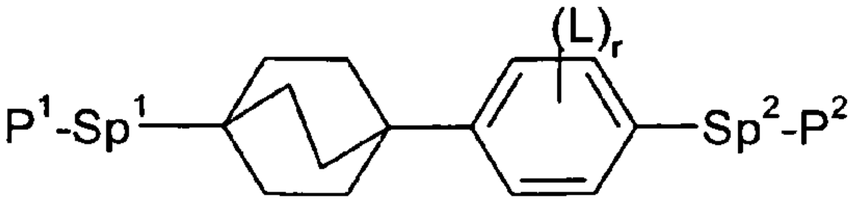

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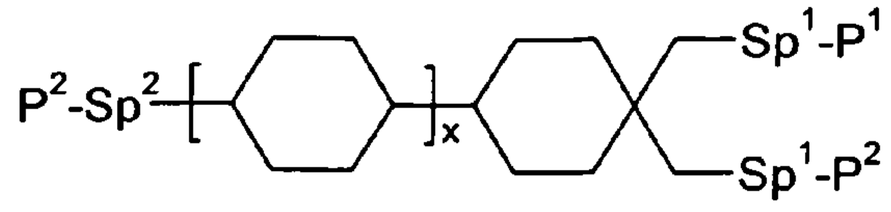

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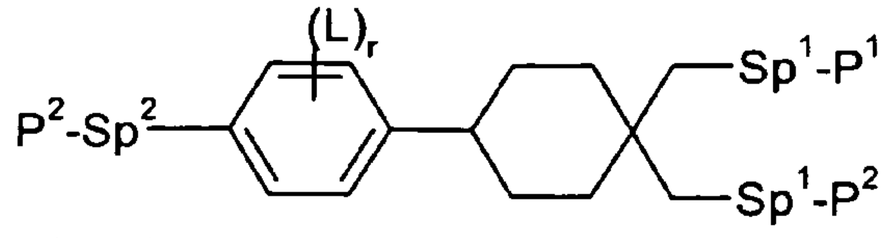

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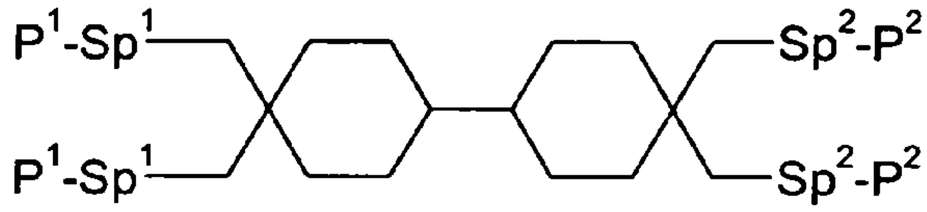

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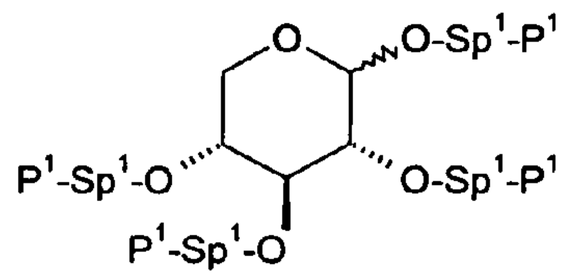

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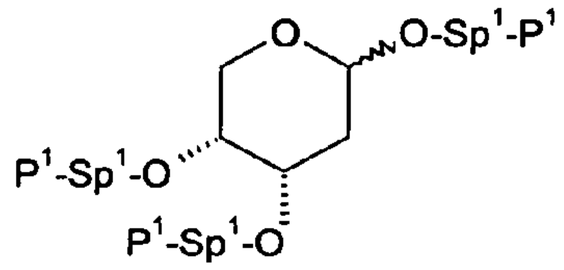

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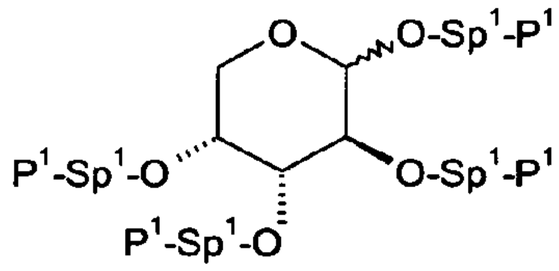

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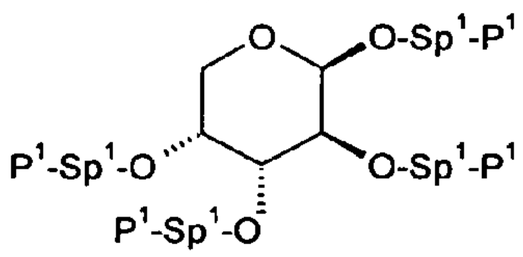

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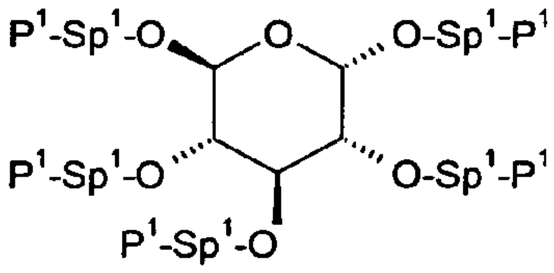


M40

其中個別基團具有以下含義：

P^1、P^2及P^3各自相同或不同地表示可聚合基團，較佳具有上下文關於P所示之含義中之一者，尤其較佳為丙烯酸酯、甲基丙烯酸酯、氟化丙烯酸酯、氧雜環丁烷、乙烯氧基或環氧基；

Sp^1、Sp^2及Sp^3各自彼此獨立地表示單鍵或間隔基團，較佳具有上下文關於Sp^a所示之含義中之一者，且尤其較佳為$-(CH_2)_{p1}-$、$-(CH_2)_{p1}-O-$、$-(CH_2)_{p1}-CO-O-$或$-(CH_2)_{p1}-O-CO-O-$，其中p1為1至12之整

數，且其中在最後提及之基團中經由O原子連接至相鄰環，其中基團P^1-Sp^1-、P^2-Sp^2-及P^3-Sp^3-中之一或多者亦可表示R^{aa}，其條件為所存在之基團P^1-Sp^1-、P^2-Sp^2-及P^3-Sp^3-中之一或多者不表示R^{aa}；

R^{aa}表示H、F、Cl、CN或具有1至25個C原子之直鏈或分支鏈烷基，其中另外，一或多個不相鄰CH_2基團可各自彼此獨立地經$C(R^0)=C(R^{00})$-、-C≡C-、$-N(R^0)$-、-O-、-S-、-CO-、-CO-O-、-O-CO-、-O-CO-O-以使得O及/或S原子不彼此直接連接的方式置換，且其中另外，一或多個H原子可經F、Cl、CN或P^1-Sp^1-置換，尤其較佳為具有1至12個C原子之直鏈或分支鏈，視情況經單氟化或多氟化之烷基、烷氧基、烯基、炔基、烷基羰基、烷氧基羰基或烷基羰基氧基(其中烯基及炔基具有至少兩個C原子，且分支鏈基團具有至少三個C原子)；

R^0、R^{00}各自彼此獨立且在每次出現時相同或不同地表示H或具有1至12個C原子之烷基；

R^y及R^z各自彼此獨立地表示H、F、CH_3或CF_3；

X^1、X^2及X^3各自彼此獨立地表示-CO-O-、-O-CO-或單鍵；

Z^1表示-O-、-CO-、$-C(R^yR^z)$-或$-CF_2CF_2$-；

Z^2及Z^3各自彼此獨立地表示-CO-O-、-O-CO-、$-CH_2O$-、$-OCH_2$-、$-CF_2O$-、$-OCF_2$-或$-(CH_2)_n$-，其中n為2、3或4；

L在每次出現時相同或不同地表示F、Cl、CN、SCN、SF_5或具有1至12個C原子的直鏈或分支鏈的視情況經單氟化或多氟化之烷基、烷氧基、烯基、炔基、烷基羰基、烷氧基羰基、烷基羰基氧基或烷氧基羰基氧基，較佳為F；

L'及L"各自彼此獨立地表示H、F或Cl；

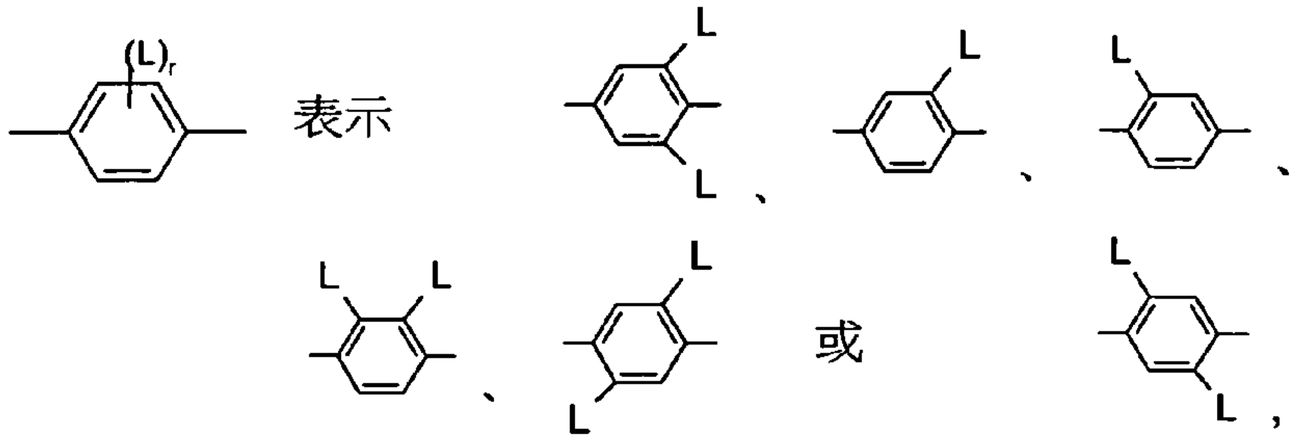
r表示0、1、2、3或4；

s表示0、1、2或3；

t表示0、1或2；

x表示0或1。

在一較佳實施例中，在式M1至式M34之化合物中，



其中L在每次出現時相同或不同地具有所示含義中之一者，且尤其表示F、Cl、CN、NO_2、CH_3、C_2H_5、$C(CH_3)_3$、$CH(CH_3)_2$、$CH_2CH(CH_3)C_2H_5$、OCH_3、OC_2H_5、$COCH_3$、COC_2H_5、$COOCH_3$、$COOC_2H_5$、CF_3、OCF_3、$OCHF_2$、OC_2F_5或P-Sp-，較佳為F、Cl、CN、CH_3、C_2H_5、OCH_3、$COCH_3$、OCF_3或P-Sp-，最佳為F、Cl、CH_3、OCH_3、$COCH_3$或OCF_3，尤其為F或CH_3。

在本發明之一進一步較佳實施例中，可聚合化合物為選自式II*之對掌性或光學活性化合物(對掌性RM)：

$$(R^*-(A^1-Z^1)_m)_k-Q \qquad II^*$$

其中A^1、Z^1及m在每次出現時相同或不同地具有在式M中所示含義中之一者；

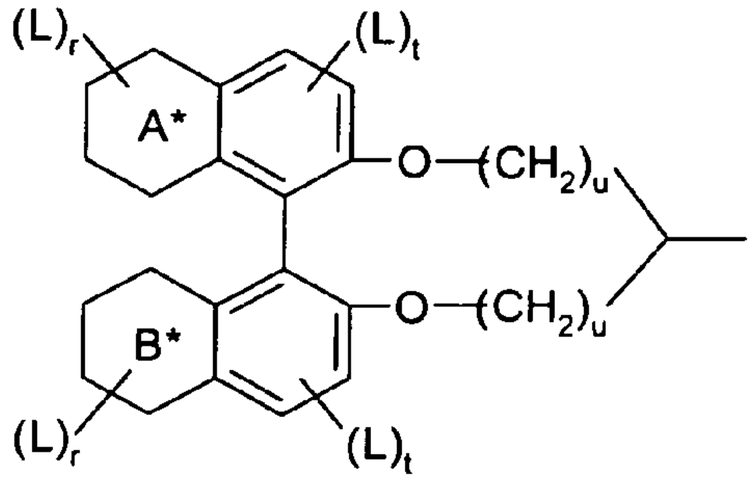
R*在每次出現時相同或不同地具有式M中關於R^a所示之含義中之一者，其中R*可為對掌性或非對掌性的；

Q表示k價對掌性基團，其視情況經如式M中所定義之L單取代或多取代；

k為1、2、3、4、5或6；

其中該等化合物含有至少一個基團R*或L，其表示或含有如上文所定義之基團P或P-Sp-。

尤其較佳之式II*化合物含有式III*之單價基團Q，



I

II*

其中L及r在每次出現時相同或不同地具有上文所示之含義；

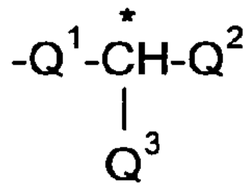
A*及B*各自彼此獨立地表示稠合苯、環己烷或環己烯；

t在每次出現時相同或不同地表示0、1或2，及

u在每次出現時相同或不同地表示0、1或2。

尤其較佳為式III*之基團，其中u表示1。

其他較佳之式II*化合物含有式IV*之單價基團Q或一或多個基團R*，



I

V*

其中：

Q^1表示具有1至9個C原子之伸烷基或伸烷氧基，或單鍵；

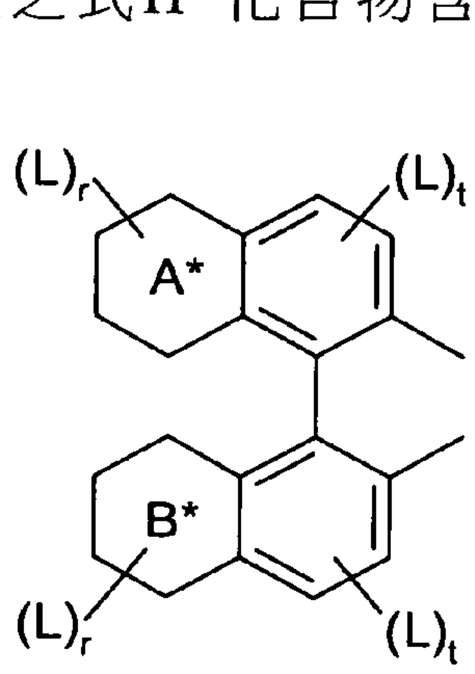
Q^2表示具有1至10個C原子之視情況經氟化之烷基或烷氧基，其中此外，一或兩個不相鄰CH_2基團可經-O-、-S-、-CH=CH-、-CO-、-OCO-、-COO-、-O-COO-、-S-CO-、-CO-S-或-C≡C-以使得O及/或S原子不彼此直接連接之方式置換；

Q^3表示F、Cl、CN或如關於Q^2所定義但不同於Q^2之烷基或烷氧基。

較佳之式IV*基團為例如2-丁基(=1-甲基丙基)、2-甲基丁基、2-

甲基戊基、3-甲基戊基、2-乙基己基、2-丙基戊基，尤其為2-甲基丁基、2-甲基丁氧基、2-甲基戊氧基、3-甲基戊氧基、2-乙基己氧基、1-甲基己氧基、2-辛氧基、2-氧雜-3-甲基丁基、3-氧雜-4-甲基戊基、4-甲基己基、2-己基、2-辛基、2-壬基、2-癸基、2-十二烷基、6-甲氧基辛氧基、6-甲基辛氧基、6-甲基辛醯氧基、5-甲基庚氧基羰基、2-甲基丁醯氧基、3-甲基戊醯氧基、4-甲基己醯氧基、2-氯丙醯氧基、2-氯-3-甲基丁醯氧基、2-氯-4-甲基戊醯氧基、2-氯-3-甲基戊醯氧基、2-甲基-3-氧雜戊基、2-甲基-3-氧雜己基、1-甲氧基丙基-2-氧基、1-乙氧基丙基-2-氧基、1-丙氧基丙基-2-氧基、1-丁氧基丙基-2-氧基、2-氟辛氧基、2-氟癸氧基、1,1,1-三氟-2-辛氧基、1,1,1-三氟-2-辛基、2-氟甲基辛氧基。

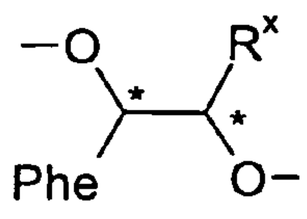
其他較佳之式II*化合物含有式V*之二價基團Q，



V*

其中L、r、t、A*及B*具有上文所示之含義。

其他較佳之式II*化合物含有選自以下各式之二價基團Q：



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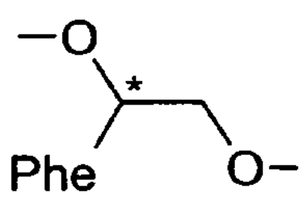

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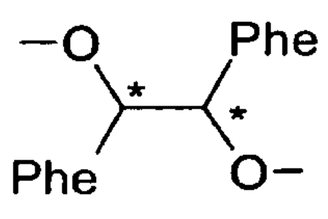

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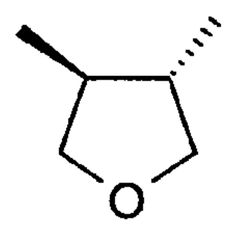

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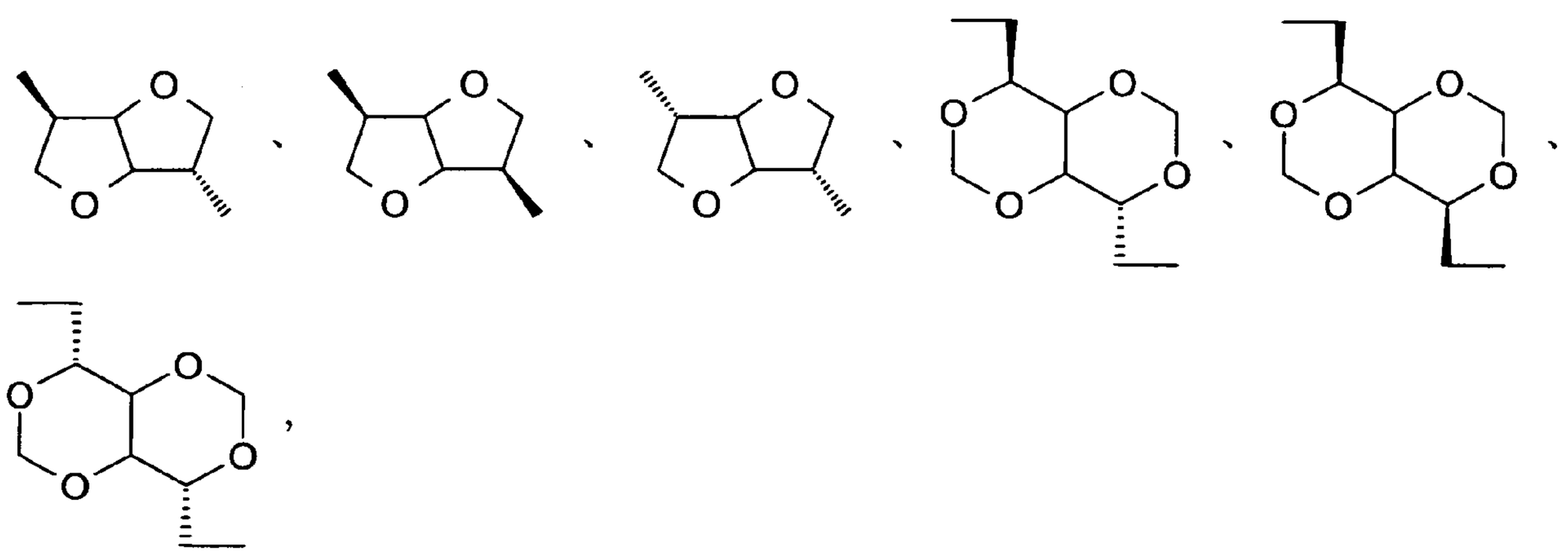


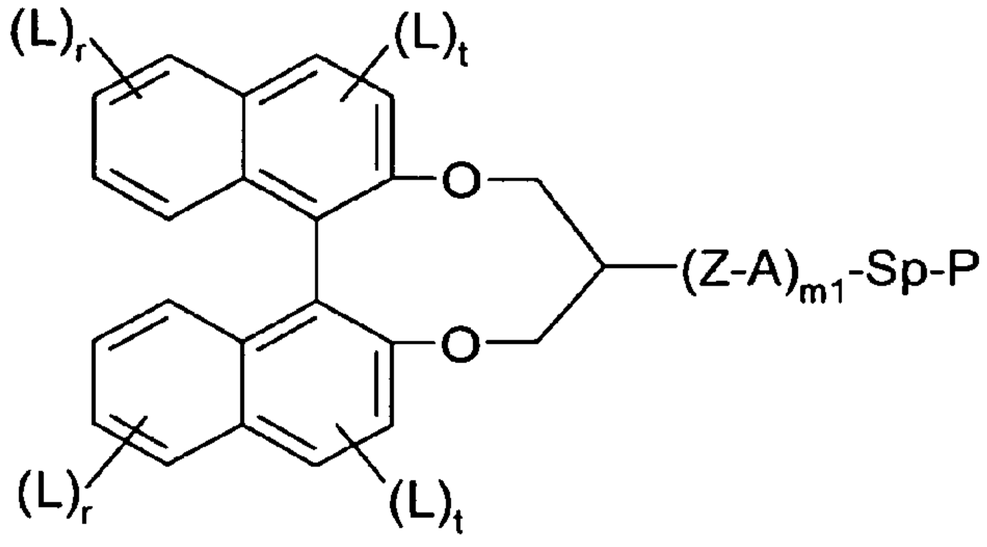
其中Phe表示視情況經L單取代或多取代之苯基，且R^x表示F或具有1至4個C原子之視情況經氟化之烷基。

適合的對掌性RM描述於例如GB 2 314 839 A、US 6,511,719、US 7,223,450、WO 02/34739 A1、US 7,041,345、US 7,060,331或US 7,318,950中。適合的含有聯萘基之RM描述於例如US 6,818,261、US 6,916,940、US 7,318,950及US 7,223,450中。

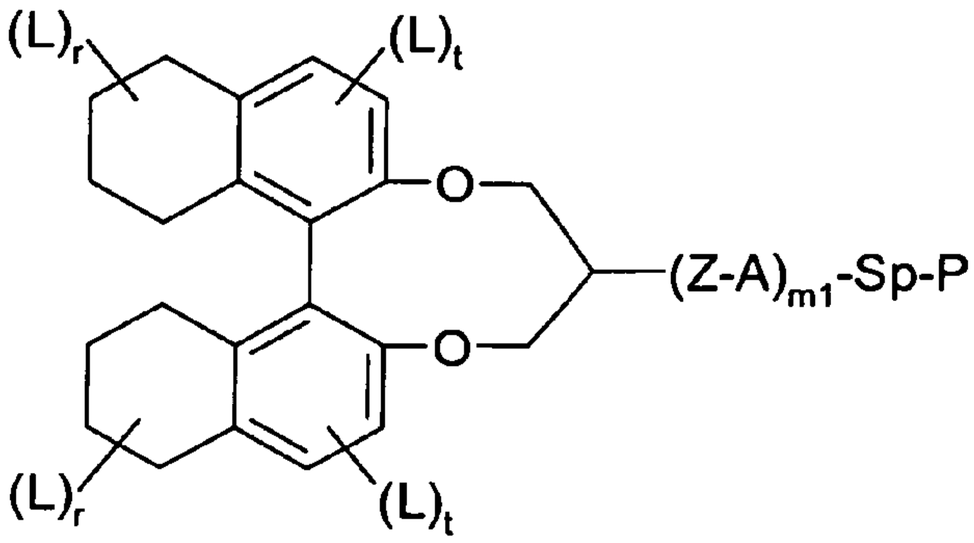
上下文所示之對掌性結構要素及含有該等對掌性結構要素之可聚合及聚合化合物可以光學活性形式，亦即以純對映異構體形式或以兩種對映異構體之任何所需混合物形式，或替代地以外消旋體形式使用。較佳使用外消旋體。使用外消旋體相較於使用純對映異構體具有一些優勢，諸如顯著較低之合成複雜性及較低之材料成本。

式II*化合物較佳以外消旋體形式存在於LC介質中。

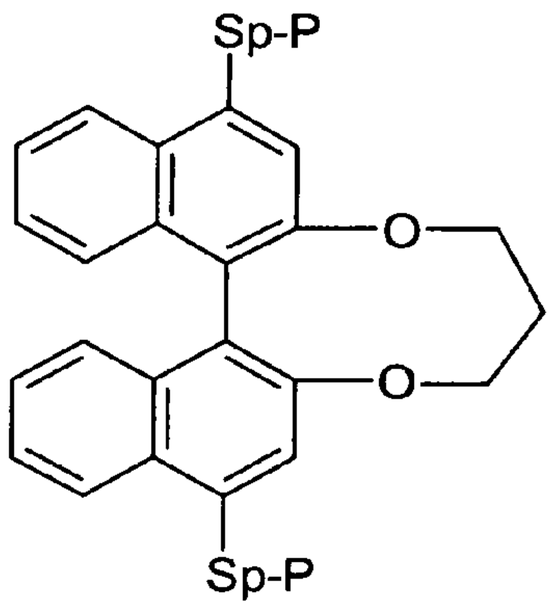
尤其較佳之式II*化合物係選自以下各子式：



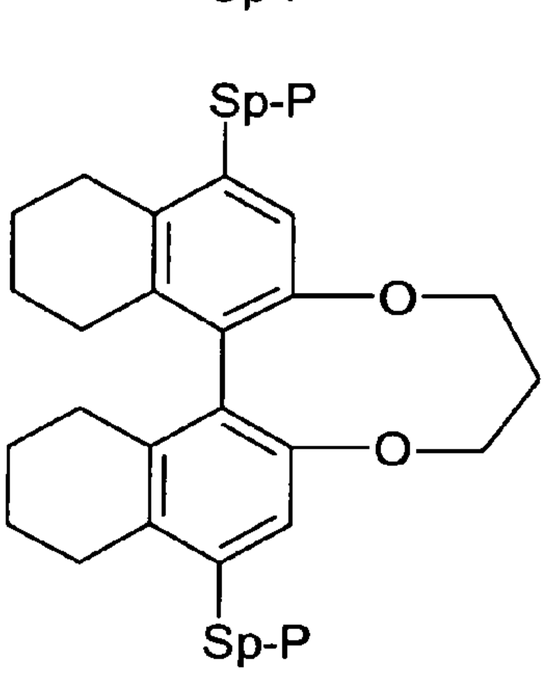
II*1



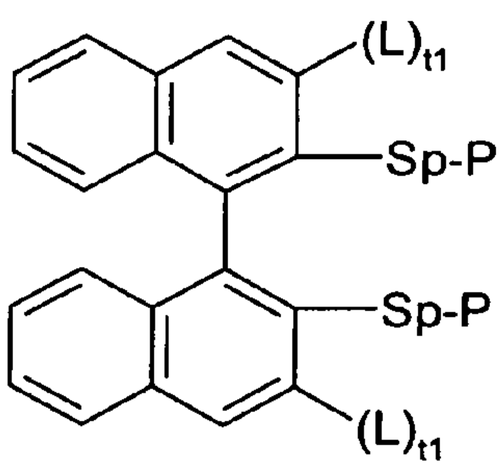
II*2



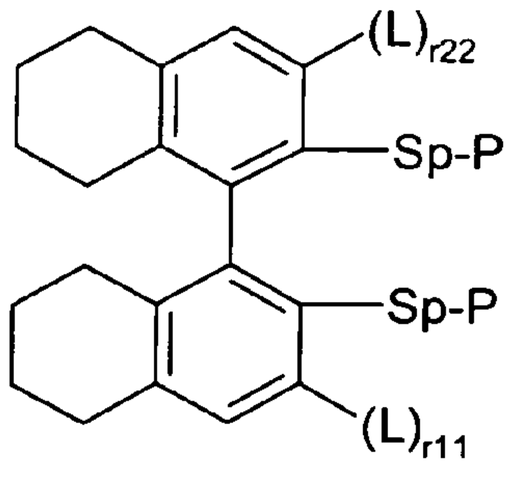
II*3



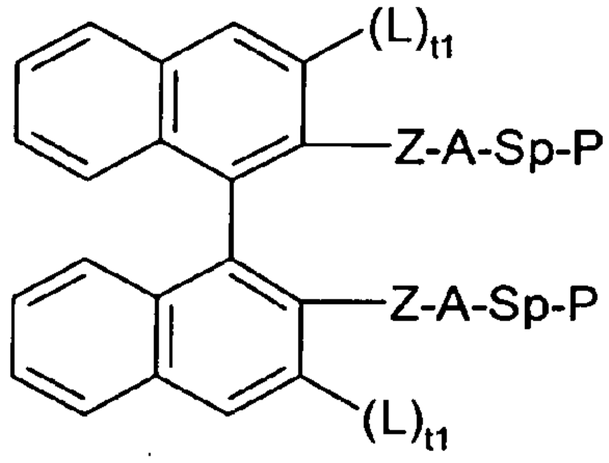
II*4



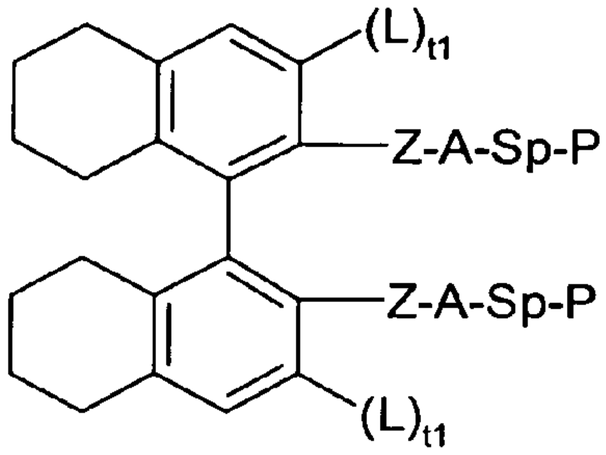
II*5



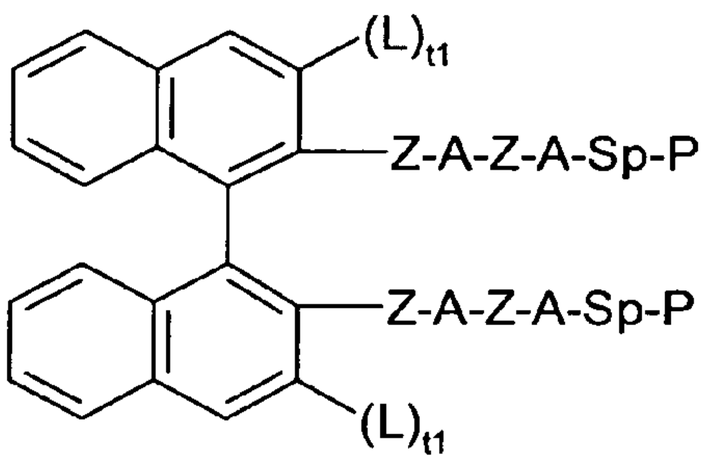
II*6



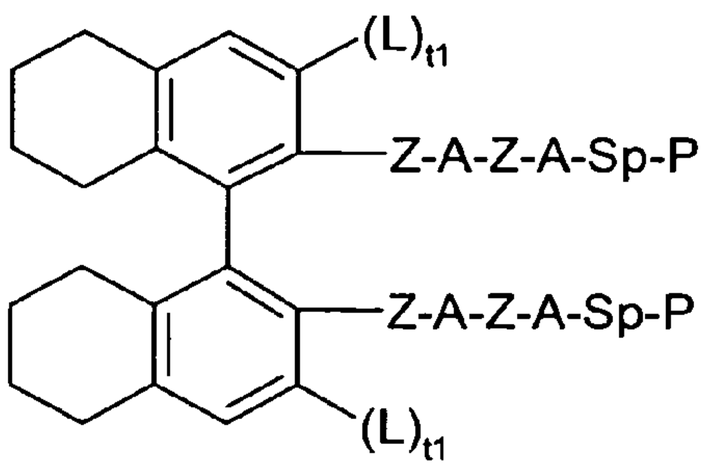
II*7



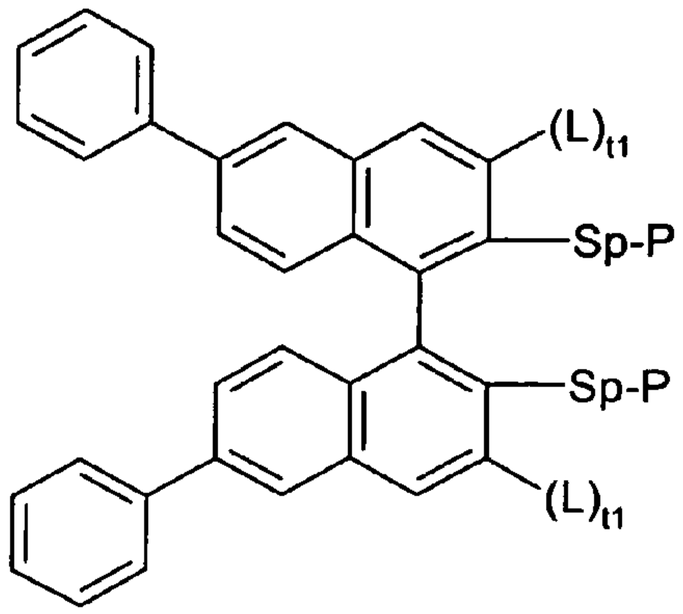
II*8



II*9



II*10



II*11

其中L、P、Sp、m、r及t具有上文所示之含義，Z及A在每次出現時相同或不同地具有分別關於Z^1及A^1所示之含義中之一者，且t1在每次出現時相同或不同地表示0或1。

術語「碳基」表示含有至少一個碳原子之單價或多價有機基團，其中此有機基團不含其他原子(諸如-C≡C-)或視情況含有一或多個其他原子，諸如N、O、S、P、Si、Se、As、Te或Ge(例如羰基等)。術語「烴基」表示另外含有一或多個H原子及視情況存在之一或多個雜原子(諸如N、O、S、P、Si、Se、As、Te或Ge)之碳基。

「鹵素」表示F、Cl、Br或I。

碳基或烴基可為飽和或不飽和基團。不飽和基團為例如芳基、烯基或炔基。具有3個以上C原子之碳基或烴基可為直鏈、分支鏈及/或環狀的且亦可含有螺鍵或縮合環。

術語「烷基」、「芳基」、「雜芳基」等亦包括多價基團，例如伸烷基、伸芳基、伸雜芳基等。

術語「芳基」表示芳族碳基或由此衍生之基團。術語「雜芳基」表示含有一或多個雜原子之如上文所定義之「芳基」。

較佳碳基及烴基為具有1至40個、較佳1至25個、尤其較佳1至18個C原子之視情況經取代之烷基、烯基、炔基、烷氧基、烷基羰基、烷氧基羰基、烷基羰氧基及烷氧基羰氧基；具有6至40個、較佳6至25個C原子之視情況經取代之芳基或芳氧基；或具有6至40個、較佳6至

25個C原子之視情況經取代之烷基芳基、芳基烷基、烷基芳氧基、芳基烷氧基、芳基羰基、芳氧基羰基、芳基羰氧基及芳氧基羰氧基。

其他較佳碳基及烴基為C_1-C_{40}烷基、C_2-C_{40}烯基、C_2-C_{40}炔基、C_3-C_{40}烯丙基、C_4-C_{40}烷基二烯基、C_4-C_{40}多烯基、C_6-C_{40}芳基、C_6-C_{40}烷基芳基、C_6-C_{40}芳基烷基、C_6-C_{40}烷基芳氧基、C_6-C_{40}芳基烷氧基、C_2-C_{40}雜芳基、C_4-C_{40}環烷基、C_4-C_{40}環烯基等。尤其較佳為C_1-C_{22}烷基、C_2-C_{22}烯基、C_2-C_{22}炔基、C_3-C_{22}烯丙基、C_4-C_{22}烷基二烯基、C_6-C_{12}芳基、C_6-C_{20}芳基烷基及C_2-C_{20}雜芳基。

其他較佳碳基及烴基為具有1至40個、較佳1至25個C原子之直鏈、分支鏈或環狀烷基，其未經取代或經F、Cl、Br、I或CN單取代或多取代且其中一或多個不相鄰CH_2基團可各自彼此獨立地經-$C(R^x)=C(R^x)$-、-C≡C-、-$N(R^x)$-、-O-、-S-、-CO-、-CO-O-、-O-CO-、-O-CO-O-以使得O及/或S原子不彼此直接連接之方式置換。

R^x較佳表示H、鹵素、具有1至25個C原子之直鏈、分支鏈或環狀烷基鏈，其中另外，一或多個不相鄰C原子可經-O-、-S-、-CO-、-CO-O-、-O-CO-、-O-CO-O-置換且其中一或多個H原子可經氟、具有6至40個C原子之視情況經取代之芳基或芳氧基、或具有2至40個C原子之視情況經取代之雜芳基或雜芳氧基置換。

較佳烷氧基為例如甲氧基、乙氧基、2-甲氧基乙氧基、正丙氧基、異丙氧基、正丁氧基、異丁氧基、第二丁氧基、第三丁氧基、2-甲基丁氧基、正戊氧基、正己氧基、正庚氧基、正辛氧基、正壬氧基、正癸氧基、正十一烷氧基、正十二烷氧基等。

較佳烷基為例如甲基、乙基、正丙基、異丙基、正丁基、異丁基、第二丁基、第三丁基、2-甲基丁基、正戊基、第二戊基、環戊基、正己基、環己基、2-乙基己基、正庚基、環庚基、正辛基、環辛基、正壬基、正癸基、正十一烷基、正十二烷基、十二烷基、三氟甲

基、全氟正丁基、2,2,2-三氟乙基、全氟辛基、全氟己基等。

較佳烯基為例如乙烯基、丙烯基、丁烯基、戊烯基、環戊烯基、己烯基、環己烯基、庚烯基、環庚烯基、辛烯基、環辛烯基等。

較佳炔基為例如乙炔基、丙炔基、丁炔基、戊炔基、己炔基、辛炔基等。

較佳烷氧基為例如甲氧基、乙氧基、2-甲氧基乙氧基、正丙氧基、異丙氧基、正丁氧基、異丁氧基、第二丁氧基、第三丁氧基、2-甲基丁氧基、正戊氧基、正己氧基、正庚氧基、正辛氧基、正壬氧基、正癸氧基、正十一烷氧基、正十二烷氧基等。

較佳胺基為例如二甲胺基、甲胺基、甲基苯基胺基、苯基胺基等。

芳基及雜芳基可為單環或多環基團，亦即其可含有一個環(諸如苯基)或兩個或兩個以上環，該等環亦可稠合(諸如萘基)或共價鍵結(諸如聯苯)，或含有稠環與鍵聯環之組合。雜芳基含有一或多個較佳選自O、N、S及Se之雜原子。

尤其較佳為具有6至25個C原子之單環、雙環或三環芳基及具有2至25個C原子之單環、雙環或三環雜芳基，其視情況含有稠環且視情況經取代。此外較佳為5員、6員或7員芳基及雜芳基，其中另外，一或多個CH基團可經N、S或O以使得O原子及/或S原子不彼此直接連接的方式置換。

較佳芳基為例如苯基、聯苯、聯三苯、1,1':3',1''-聯三苯-2'-基、萘基、蒽、聯萘、菲、芘、二氫芘、䓛、苝、并四苯、并五苯、苯并芘、茀、茚、茚并茀、螺二茀等。

較佳雜芳基為例如5員環，諸如吡咯、吡唑、咪唑、1,2,3-三唑、1,2,4-三唑、四唑、呋喃、噻吩、硒吩、噁唑、異噁唑、1,2-噻唑、1,3-噻唑、1,2,3-噁二唑、1,2,4-噁二唑、1,2,5-噁二唑、1,3,4-噁二

唑、1,2,3-噻二唑、1,2,4-噻二唑、1,2,5-噻二唑、1,3,4-噻二唑；6員環，諸如吡啶、噠嗪、嘧啶、吡嗪、1,3,5-三嗪、1,2,4-三嗪、1,2,3-三嗪、1,2,4,5-四嗪、1,2,3,4-四嗪、1,2,3,5-四嗪；或縮合基團，諸如吲哚、異吲哚、吲哚嗪、吲唑、苯并咪唑、苯并三唑、嘌呤、萘并咪唑(naphthimidazole)、菲并咪唑(phenanthrimidazole)、吡啶并咪唑(pyridimidazole)、吡嗪并咪唑(pyrazinimidazole)、喹喔啉并咪唑(quinoxalinimidazole)、苯并噁唑、萘并噁唑(naphthoxazole)、蒽并二唑(anthroxazole)、菲并二唑(phenanthroxazole)、異噁唑、苯并噻唑、苯并呋喃、異苯并呋喃、二苯并呋喃、喹啉、異喹啉、喋啶、苯并-5,6-喹啉、苯并-6,7-喹啉、苯并-7,8-喹啉、苯并異喹啉、吖啶、啡噻嗪、啡噁嗪、苯并噠嗪、苯并嘧啶、喹喔啉、吩嗪、嗪啶、氮雜咔唑、苯并咔啉、啡啶、啡啉、噻吩并[2,3b]噻吩、噻吩并[3,2b]噻吩、二噻吩并噻吩、異苯并噻吩、二苯并噻吩、苯并噻二唑噻吩(benzothiadiazothiophene)，或此等基團之組合。雜芳基亦可經烷基、烷氧基、硫烷基、氟、氟烷基或其他芳基或雜芳基取代。

(非芳族)脂環基及雜環基涵蓋飽和環，亦即僅含有單鍵之環，且亦涵蓋部分不飽和環，亦即亦可含有多重鍵之環。雜環含有一或多個較佳選自Si、O、N、S及Se之雜原子。

(非芳族)脂環基及雜環基可為單環，亦即僅含一個環(諸如環己烷)；或多環，亦即含有複數個環(諸如十氫化萘或二環辛烷)。尤其較佳為飽和基團。此外，較佳為具有3至25個C原子之單環、雙環或三環基團，其視情況含有稠環且視情況經取代。此外較佳為5員、6員、7員或8員碳環基，其中另外，一或多個C原子可經Si置換及/或一或多個CH基團可經N置換及/或一或多個不相鄰CH_2基團可經-O-及/或-S-置換。

較佳脂環基及雜環基為例如5員基團，諸如環戊烷、四氫呋喃、

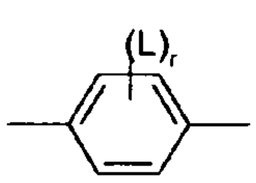
四氫硫代呋喃、吡咯啶；6員基團，諸如環己烷、矽烷、環己烯、四氫哌喃、四氫硫代哌喃、1,3-二噁烷、1,3-二噻吅、哌啶；7員基團，諸如環庚烷；及稠合基團，諸如四氫化萘、十氫化萘、二氫茚、雙環[1.1.1]戊烷-1,3-二基、雙環[2.2.2]辛烷-1,4-二基、螺[3.3]庚烷-2,6-二基、八氫-4,7-甲橋二氫茚-2,5-二基。

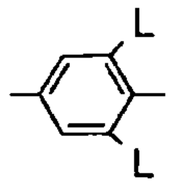
較佳取代基為例如促進溶解之基團，諸如烷基或烷氧基；拉電子基團，諸如氟、硝基或腈；或用於提高聚合物之玻璃轉移溫度(Tg)之取代基，尤其龐大基團，諸如，第三丁基或視情況經取代之芳基。

在上下文中亦稱作「L」之較佳取代基為例如F、Cl、Br、I、-CN、$-NO_2$、-NCO、-NCS、-OCN、-SCN、$-C(=O)N(R^x)_2$、$-C(=O)Y^1$、$-C(=O)R^x$、$-N(R^x)_2$，其中R^x具有上文所示之含義，且Y^1表示鹵素、具有6至40個、較佳6至20個C原子之視情況經取代之矽烷基或芳基、及具有1至25個C原子之直鏈或分支鏈烷基、烷氧基、烷基羰基、烷氧基羰基、烷基羰氧基或烷氧基羰氧基，其中一或多個H原子可視情況經F或Cl置換。

「經取代之矽烷基或芳基」較佳意謂經鹵素、-CN、R^0、$-OR^0$、$-CO-R^0$、$-CO-O-R^0$、$-O-CO-R^0$或$-O-CO-O-R^0$取代，其中R^0具有上文所示之含義。

尤其較佳之取代基L為例如F、Cl、CN、NO_2、CH_3、C_2H_5、OCH_3、OC_2H_5、$COCH_3$、COC_2H_5、$COOCH_3$、$COOC_2H_5$、CF_3、OCF_3、$OCHF_2$、OC_2F_5，此外為苯基。



較佳為


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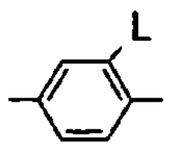

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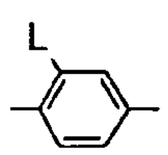

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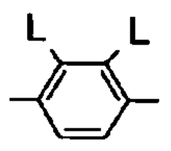


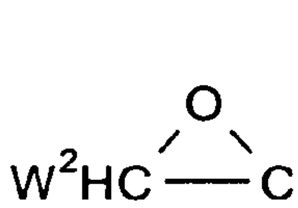
，

其中L具有上文所示之含義中之一者。

可聚合基團P為適合於聚合反應(諸如自由基或離子鏈式聚合、加

成聚合或聚縮合)或聚合物類似反應(例如加成或縮合於聚合物主鏈上)之基團。尤其較佳為用於鏈式聚合之基團，尤其為含有C=C雙鍵或-C≡C-參鍵之基團，及適用於開環聚合之基團，諸如氧雜環丁烷或環氧基。

較佳基團P係選自$CH_2=CW^1-COO-$、$CH_2=CW^1-CO-$、



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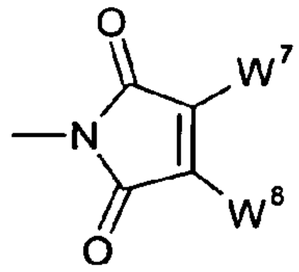

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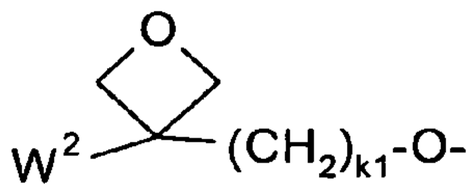
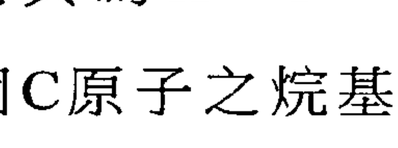


、$CH_2=CW^2-(O)_{k3}-$、$CW^1=CH-CO-(O)_{k3}-$、$CW^1=CH-CO-NH-$、$CH_2=CW^1-CO-NH-$、$CH_3-CH=CH-O-$、$(CH_2=CH)_2CH-OCO-$、$(CH_2=CH-CH_2)_2CH-OCO-$、$(CH_2=CH)_2CH-O-$、$(CH_2=CH-CH_2)_2N-$、$(CH_2=CH-CH_2)_2N-CO-$、$HO-CW^2W^3-$、$HS-CW^2W^3-$、HW^2N-、$HO-CW^2W^3-NH-$、$CH_2=CW^1-CO-NH-$、$CH_2=CH-(COO)_{k1}-Phe-(O)_{k2}-$、$CH_2=CH-(CO)_{k1}-Phe-(O)_{k2}-$、$Phe-CH=CH-$、$HOOC-$、$OCN-$及$W^4W^5W^6Si-$，其中$W^1$表示H、F、Cl、CN、$CF_3$、苯基或具有1至5個C原子之烷基，尤其為H、F、Cl或CH_3；W^2及W^3各自彼此獨立地表示H或具有1至5個C原子之烷基，尤其為H、甲基、乙基或正丙基；W^4、W^5及W^6各自彼此獨立地表示Cl、具有1至5個C原子之氧雜烷基或氧雜羰基烷基；且W^7及W^8各自彼此獨立地表示H、Cl或具有1至5個C原子之烷基；Phe表示1,4-伸苯基，其視情況經一或多個如上文所定義之不同於P-Sp-之基團L取代；k_1、k_2及k_3各自彼此獨立地表示0或1；k_3較佳表示1。

尤其較佳之基團P為$CH_2=CW^1-COO-$，尤其為$CH_2=CH-COO-$、$CH_2=C(CH_3)-COO-$及$CH_2=CF-COO-$，此外為$CH_2=CH-O-$、$(CH_2=CH)_2CH-OCO-$、$(CH_2=CH)_2CH-O-$、



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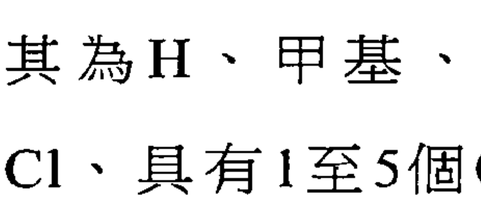


。

極尤其較佳的基團P為乙烯氧基、丙烯酸酯、甲基丙烯酸酯、氟化丙烯酸酯、氯化丙烯酸酯、氧雜環丁烷及環氧基，尤其為丙烯酸酯及甲基丙烯酸酯。

較佳間隔基團Sp係選自式Sp'-X'，使得基團P-Sp-對應於式P-Sp'-X'-，其中

Sp'表示具有1至20個、較佳1至12個C原子之伸烷基，其視情況經F、Cl、Br、I或CN單取代或多取代，且其中另外，一或多個不相鄰CH_2基團可各自彼此獨立地經-O-、-S-、-NH-、-NR^0-、-$SiR^{00}R^{000}$-、-CO-、-COO-、-OCO-、-OCO-O-、-S-CO-、-CO-S-、-NR^{00}-CO-O-、-O-CO-NR^{00}-、-NR^{00}-CO-NR^{00}-、-CH=CH-或-C≡C-以使得O及/或S原子不彼此直接連接的方式置換；

X'表示-O-、-S-、-CO-、-COO-、-OCO-、-O-COO-、-CO-NR^{00}-、-NR^{00}-CO-、-NR^{00}-CO-NR^{00}-、-OCH_2-、-CH_2O-、-SCH_2-、-CH_2S-、-CF_2O-、-OCF_2-、-CF_2S-、-SCF_2-、-CF_2CH_2-、-CH_2CF_2-、-CF_2CF_2-、-CH=N-、-N=CH-、-N=N-、-CH=CR^0-、-CY^2=CY^3-、-C≡C-、-CH=CH-COO-、-OCO-CH=CH-或單鍵；

R^{00}及R^{000}各自彼此獨立地表示H或具有1至12個C原子之烷基，及

Y^2及Y^3各自彼此獨立地表示H、F、Cl或CN。

X'較佳為-O-、-S-、-CO-、-COO-、-OCO-、-O-COO-、-CO-NR^0-、-NR^0-CO-、-NR^0-CO-NR^0-或單鍵。

典型間隔基團Sp'為例如-$(CH_2)_{p1}$-、-$(CH_2CH_2O)_{q1}$-CH_2CH_2-、-CH_2CH_2-S-CH_2CH_2-、-CH_2CH_2-NH-CH_2CH_2-或-$(SiR^{00}R^{000}$-O$)_{p1}$-，其中p1為自1至12之整數，q1為1至3之整數，且R^{00}及R^{000}具有上文所示之含義。

尤其較佳之基團-X'-Sp'-為-$(CH_2)_{p1}$-、-O-$(CH_2)_{p1}$-、-OCO-$(CH_2)_{p1}$-、-OCOO-$(CH_2)_{p1}$-。

尤其較佳之基團Sp'為例如在各種情況下均為直鏈的伸乙基、伸丙基、伸丁基、伸戊基、伸己基、伸庚基、伸辛基、伸壬基、伸癸基、伸十一烷基、伸十二烷基、伸十八烷基、伸乙基氧基伸乙基、亞甲基氧基伸丁基、伸乙基硫基伸乙基、伸乙基-N-甲基亞胺基伸乙基、1-甲基伸烷基、伸乙烯基、伸丙烯基及伸丁烯基。

在本發明之另一較佳實施例中，P-Sp-表示含有兩個或兩個以上可聚合基團之基團(多官能可聚合基團)。此類型之適合基團及含有其之可聚合化合物及其製備描述於例如US 7,060,200 B1或US 2006/0172090 A1中。尤其較佳為選自以下各式之多官能可聚合基團P-Sp-：

-X-烷基-CHP^1-CH_2-CH_2P^2	M*a
-X-烷基-$C(CH_2P^1)(CH_2P^2)$-CH_2P^3	M*b
-X-烷基-CHP^1CHP^2-CH_2P^3	M*c
-X-烷基-$C(CH_2P^1)(CH_2P^2)$-$C_{aa}H_{2aa+1}$	M*d
-X-烷基-CHP^1-CH_2P^2	M*e
-X-烷基-CHP^1P^2	M*f
-X-烷基-CP^1P^2-$C_{aa}H_{2aa+1}$	M*g
-X-烷基-$C(CH_2P^1)(CH_2P^2)$-CH_2OCH_2-$C(CH_2P^3)(CH_2P^4)CH_2P^5$	M*h
-X-烷基-$CH((CH_2)_{aa}P^1)((CH_2)_{bb}P^2)$	M*i
-X-烷基-CHP^1CHP^2-$C_{aa}H_{2aa+1}$	M*k
-X'-烷基-$C(CH_3)(CH_2P^1)(CH_2P^2)$	M*m

其中：

烷基表示單鍵或具有1至12個C原子之直鏈或分支鏈伸烷基，其中一或多個不相鄰CH_2基團可各自彼此獨立地經-$C(R^{00})$=$C(R^{000})$-、-C≡C-、-$N(R^{00})$-、-O-、-S-、-CO-、-CO-O-、-O-CO-、-O-CO-O-以使

得O及/或S原子不彼此直接連接之方式置換，且其中另外，一或多個H原子可經F、Cl或CN置換，其中R^{00}及R^{000}具有上文所示之含義；

aa及bb各自彼此獨立地表示0、1、2、3、4、5或6；

X具有關於X'所示之含義中之一者，及

P^{1-5}各自彼此獨立地具有關於P所示之含義中之一者。

可聚合化合物及RM可與熟習此項技術者已知及有機化學標準著作中，諸如Houben-Weyl, Methoden der organischen Chemie [Methods of Organic Chemistry], Thieme-Verlag, Stuttgart中描述的方法類似地製備。在上下文中所引用之文獻中提供其他合成方法。在最簡單之情況下，例如藉由使用含有基團P之相應酸、酸衍生物或鹵化化合物，諸如(甲基)丙烯醯氯或(甲基)丙烯酸，在脫水試劑(諸如二環己基碳化二亞胺(dicyclohexylcarbodiimide；DCC)存在下，使2,6-二羥基萘或4,4'-二羥基聯苯酯化或醚化來進行該等RM之合成。

本發明之LC混合物及LC介質原則上適用於任何類型之PS或PSA顯示器，尤其是基於具有負性介電各向異性之LC介質之彼等顯示器，尤其較佳用於PSA-VA、PSA-IPS或PS-FFS顯示器。然而，熟習此項技術者亦能在無發明性步驟下在不同於以上所提及之顯示器的其他PS或PSA型顯示器中使用適合之本發明之LC混合物及LC介質，例如經由其基本結構或經由所用個別組件(諸如基板、配向層、電極、定址元件、背光、偏振器、濾色器、補償膜等)之性質、配置或結構。

極尤其適合之可聚合化合物列於表D中。

若本發明之液晶介質包含至少一種可聚合化合物，則其以0.1重量%至10重量%，較佳0.2重量%至4.0重量%，尤其較佳0.2重量%至2.0重量%之量存在於介質中。

本發明之混合物可進一步包含習知添加劑，諸如穩定劑、抗氧

化劑、UV吸收劑、奈米粒子、微粒等。本發明LC混合物之適合且較佳之添加劑提供於表C中。

本發明之液晶顯示器的結構對應於常見幾何形狀，例如EP-A 0 240 379中所描述。

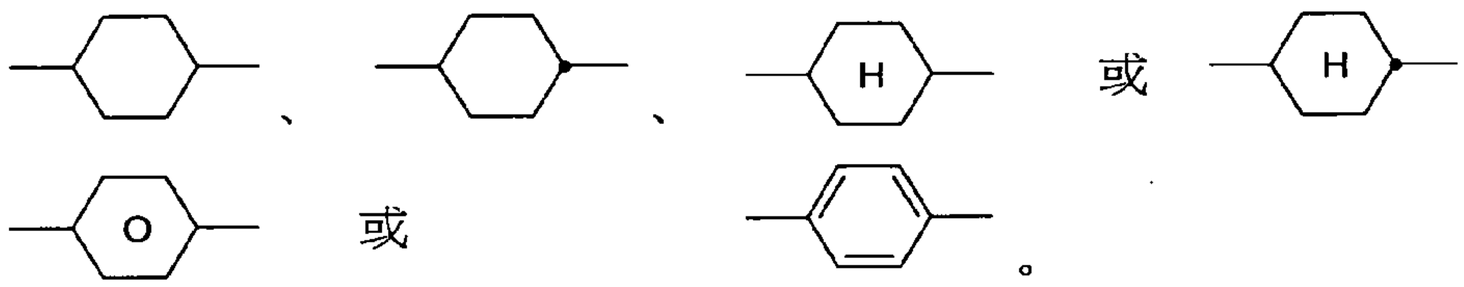
【圖式簡單說明】

無

【實施方式】

以下實例意欲解釋本發明而不對其加以限制。在上下文中，百分比數據表示重量百分比；所有溫度皆以攝氏度來指示。

在整篇專利申請案中，1,4-伸環己基環及1,4-伸苯基環描述如下：



或 或 。

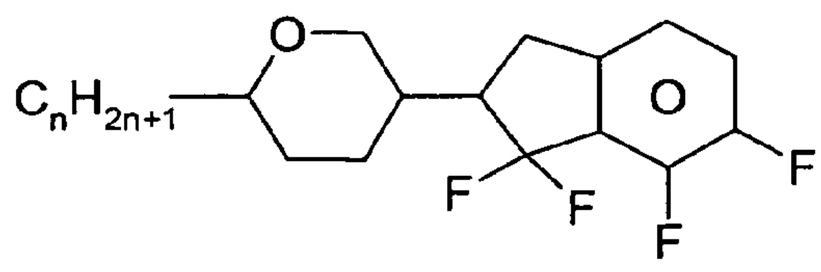
除式IIA及/或IIB及/或IIC之化合物、一或多種式I化合物之外，本發明之混合物較佳包含一或多種來自如下所示之表A的化合物。

表A

使用以下縮寫：

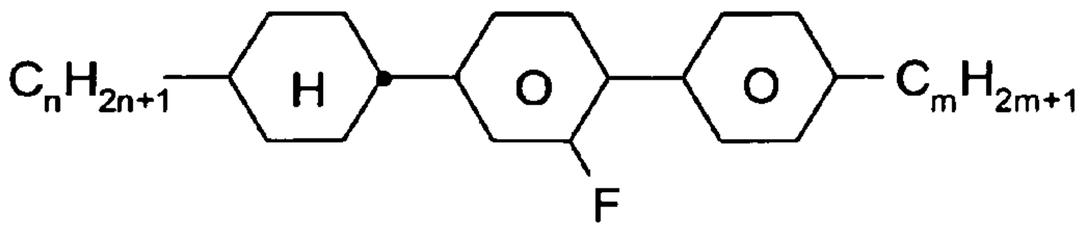
(n、m、m'、z：各自彼此獨立地為1、2、3、4、5或6；

(O)C_mH_{2m+1}意謂OC_mH_{2m+1}或C_mH_{2m+1})

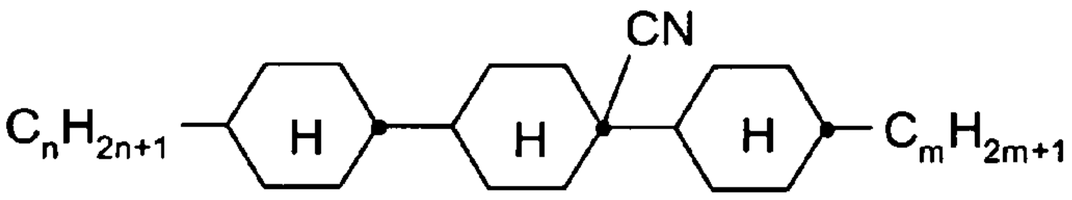


AIK-n-F

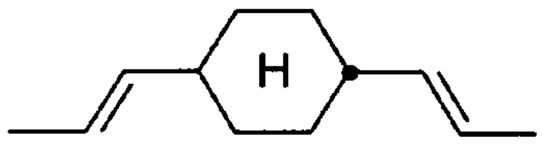
BCH-nm



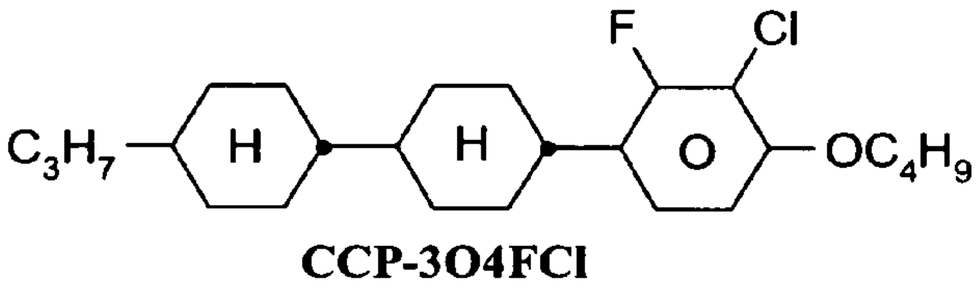
BCH-nmF



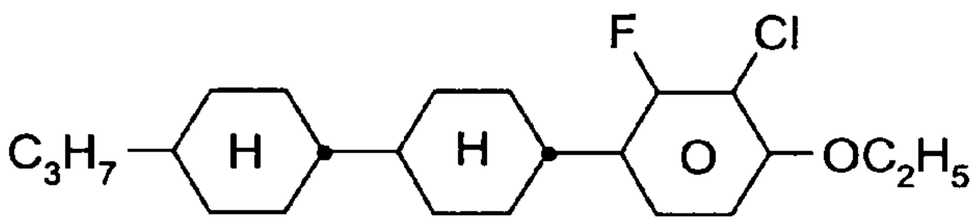
BCN-nm



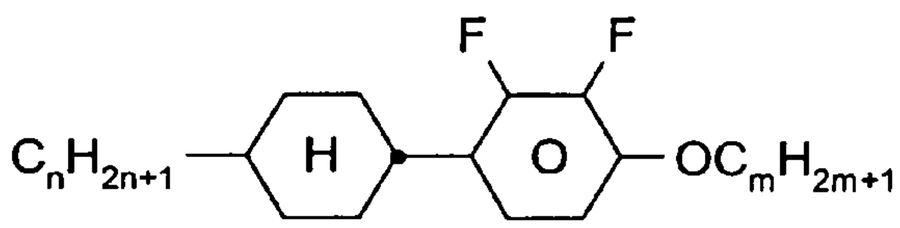
C-1V-V1



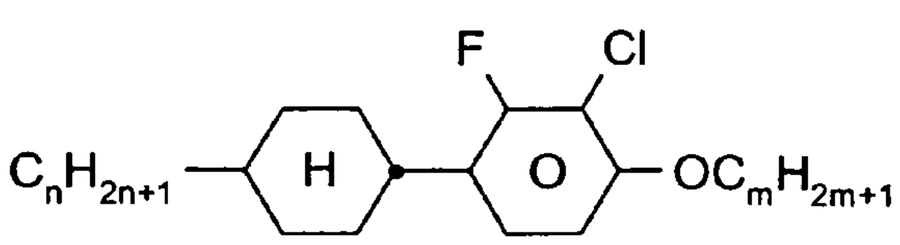
CCP-3O4FCl



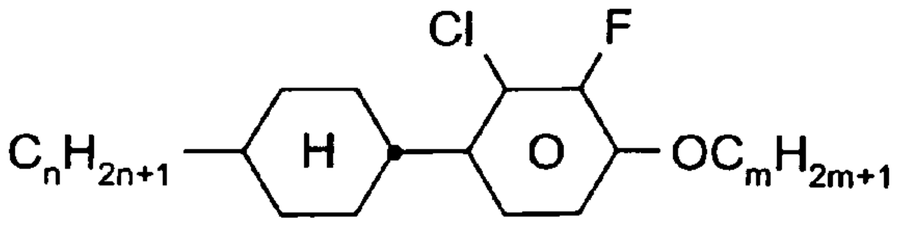
CCP-3O2FCl



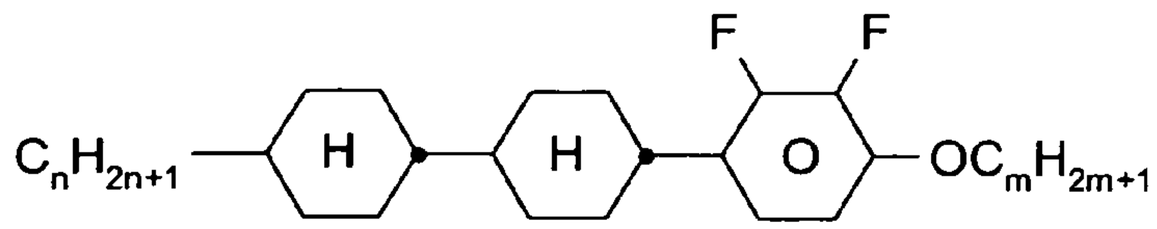
CY-n-Om



CY(F，Cl)-n-Om



CY(Cl，F)-n-Om



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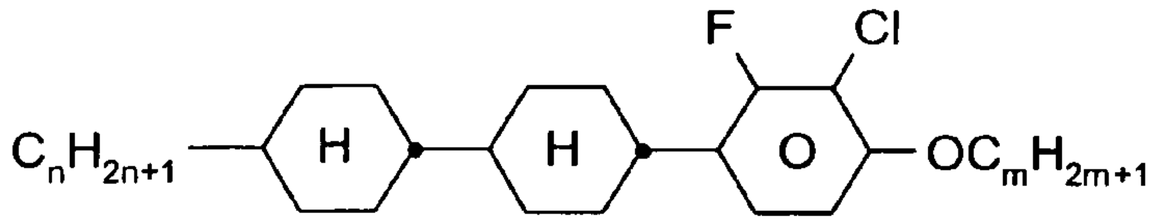

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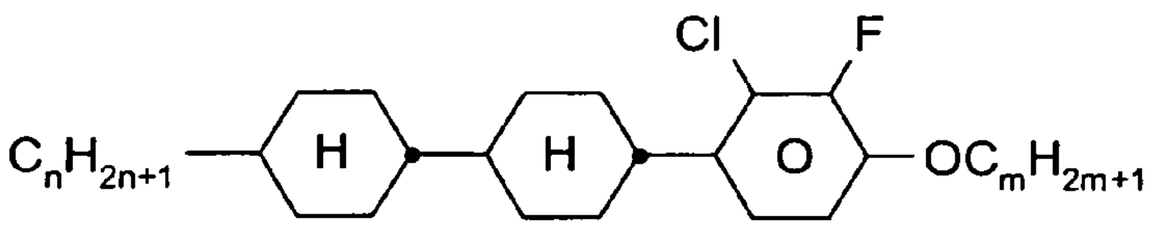

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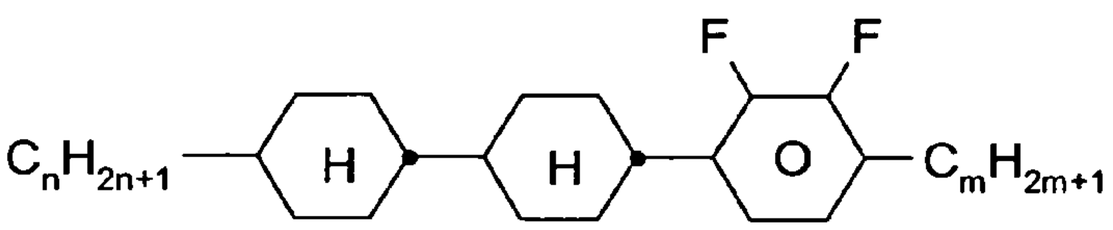

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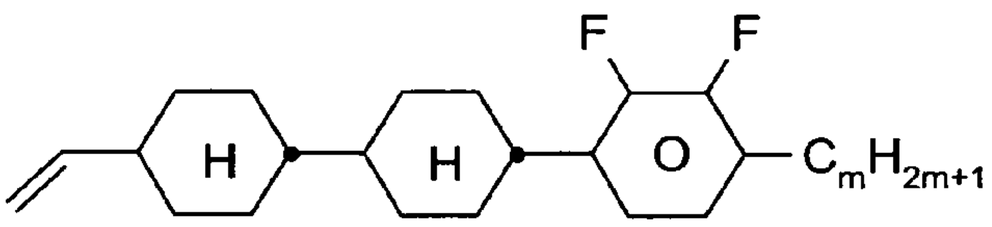

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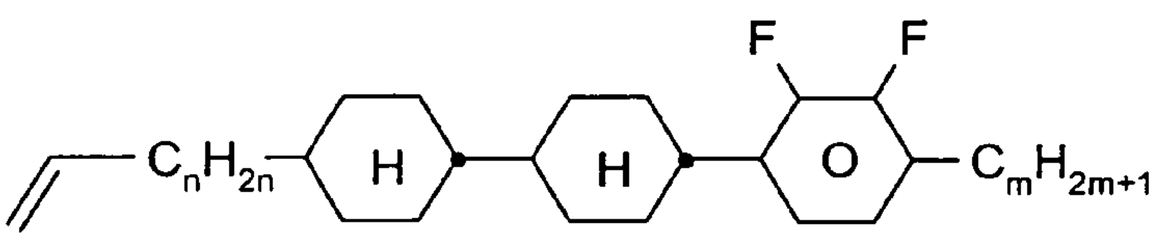

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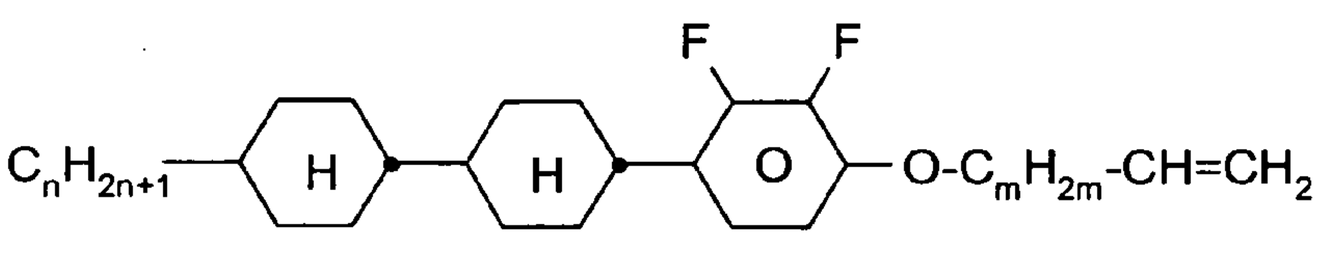

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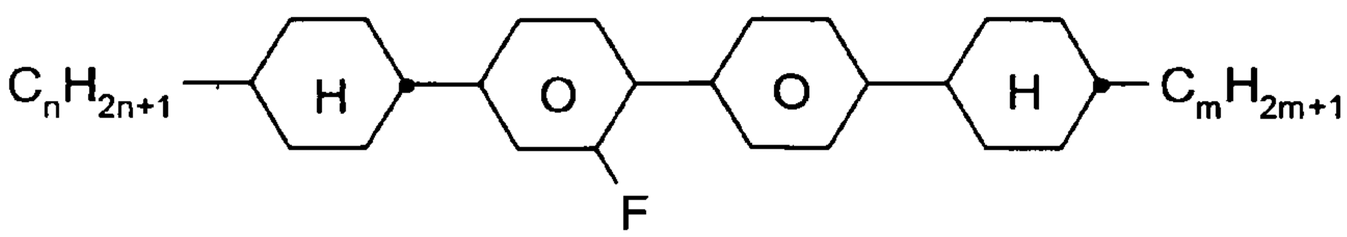

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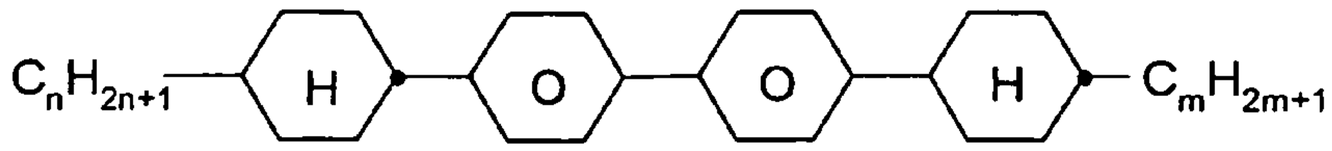

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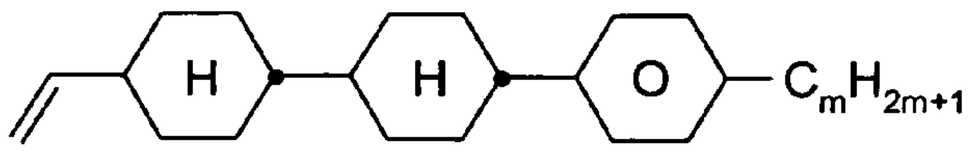

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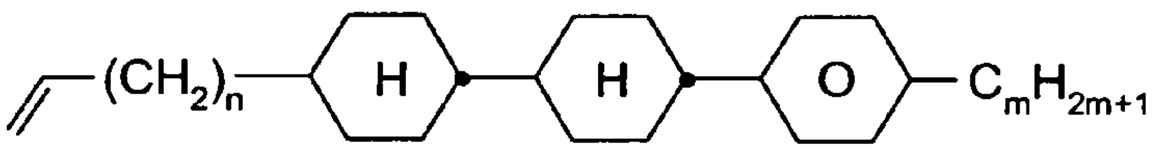

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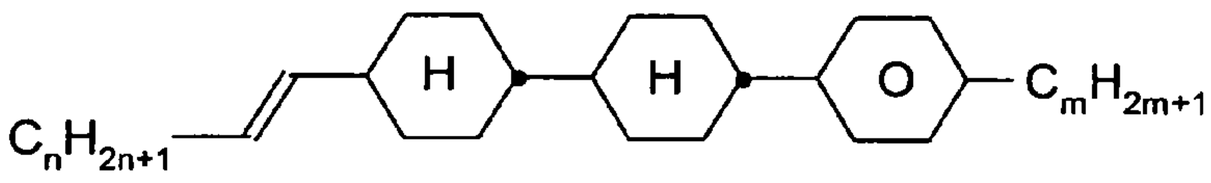

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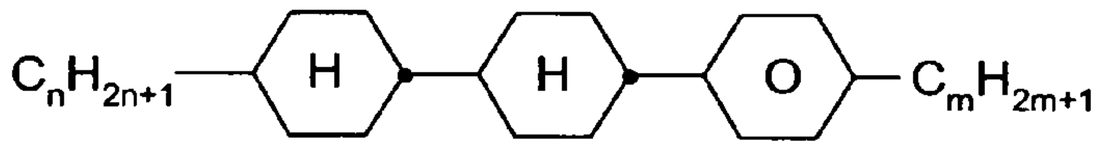

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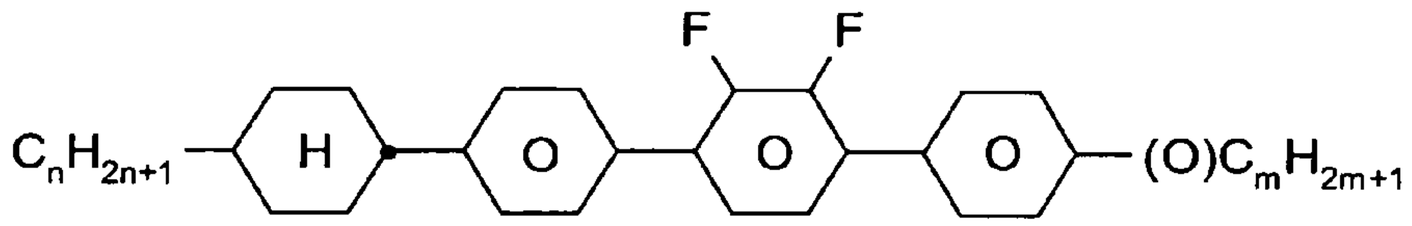

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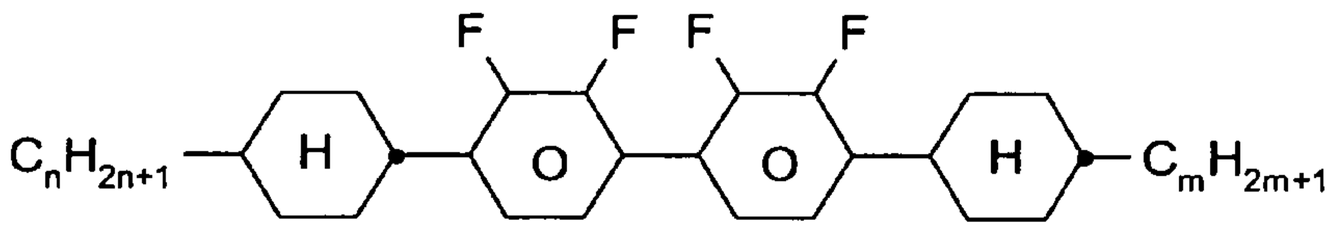

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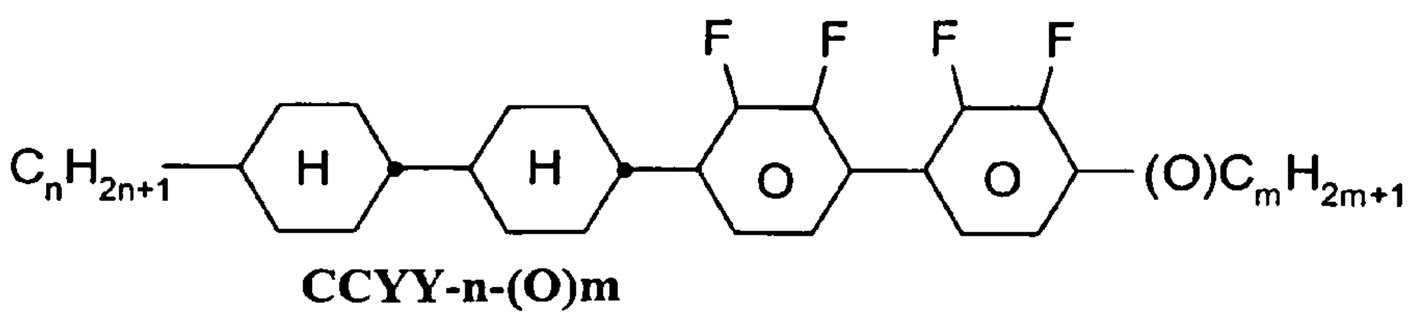

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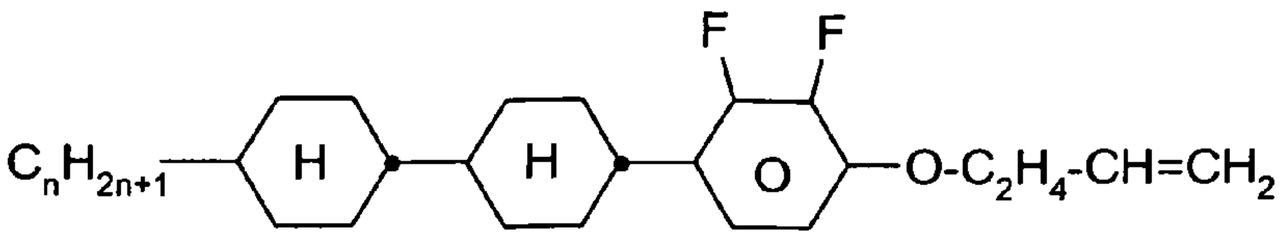

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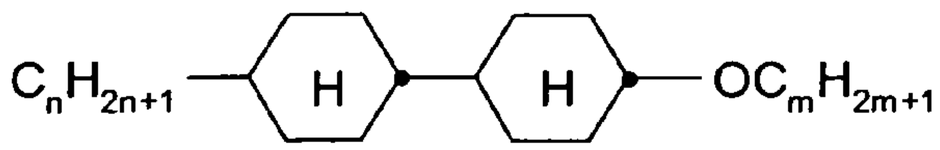

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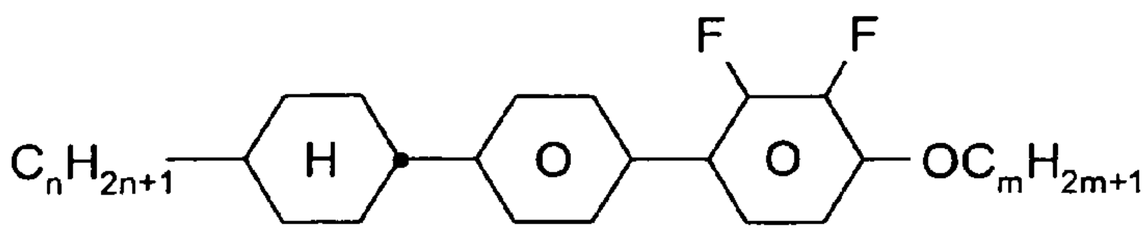

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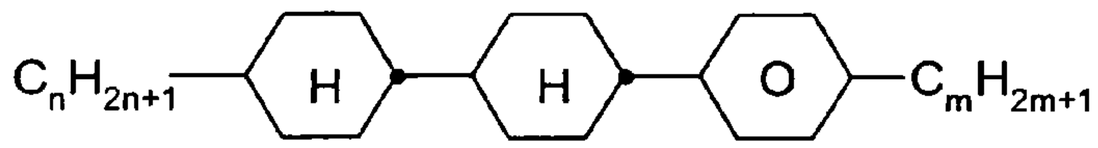

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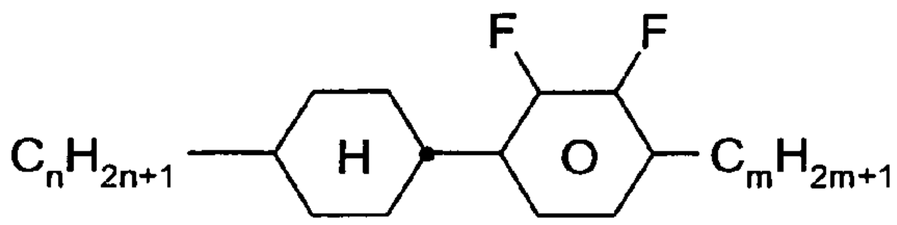

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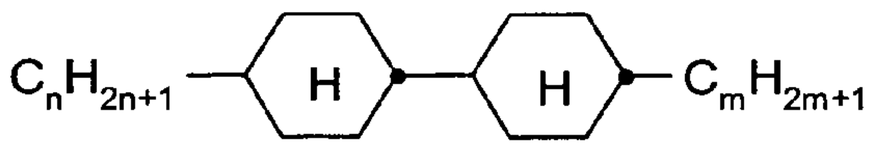

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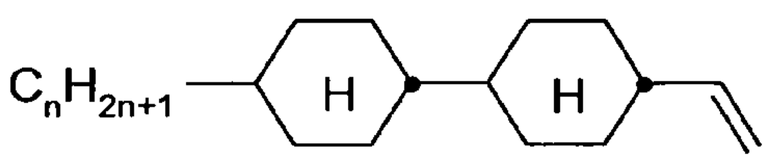

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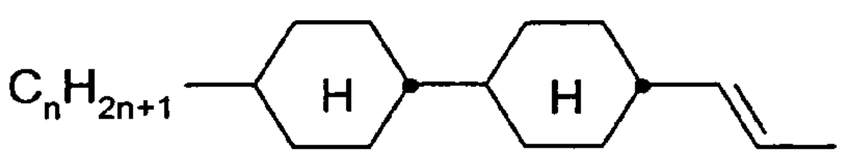

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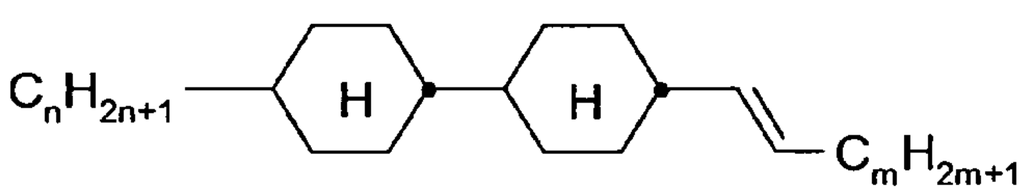

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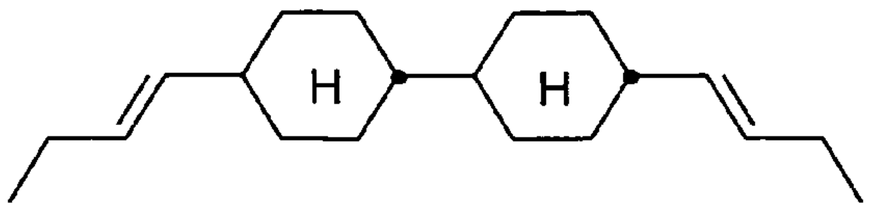

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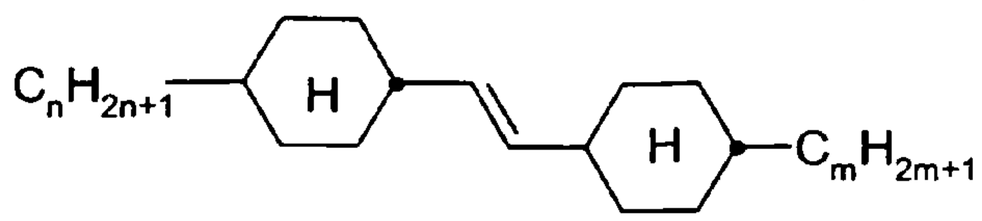

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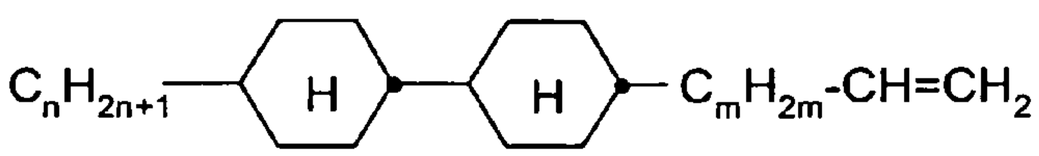

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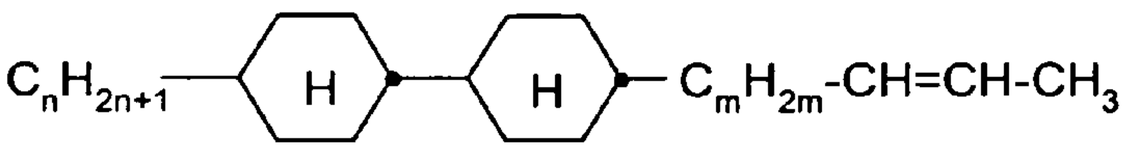

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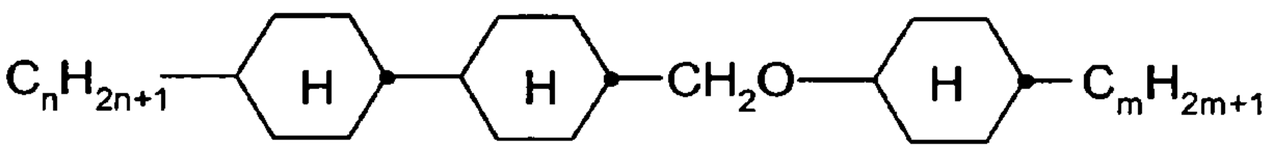

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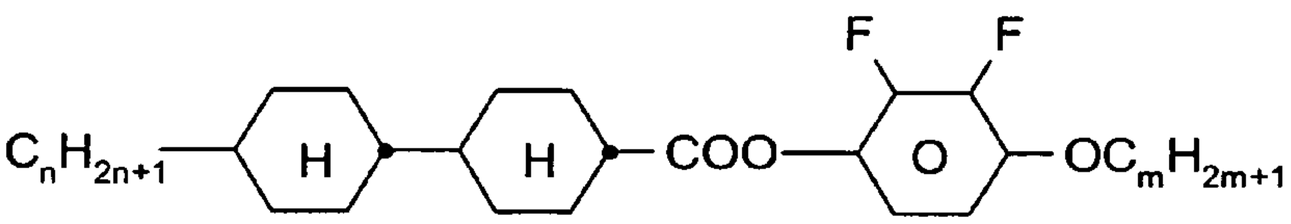

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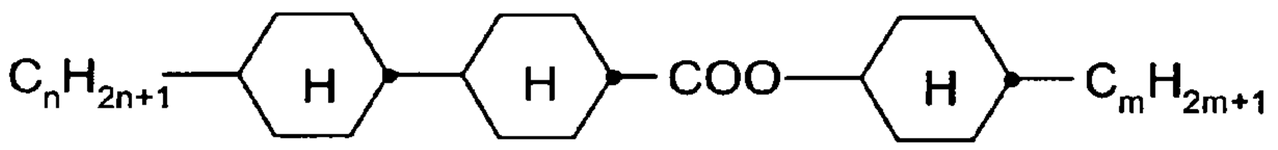

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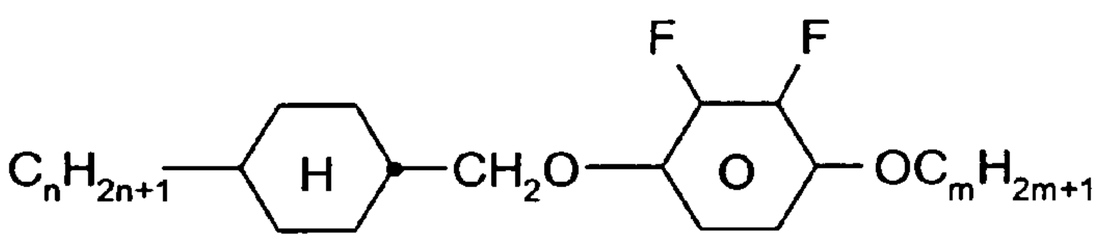

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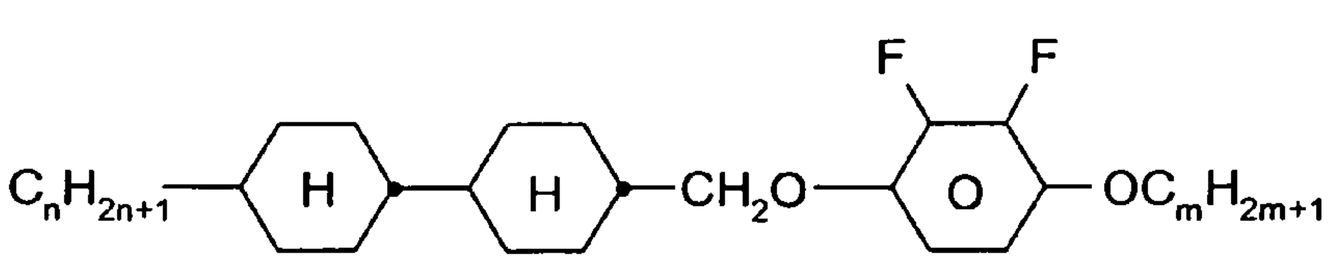

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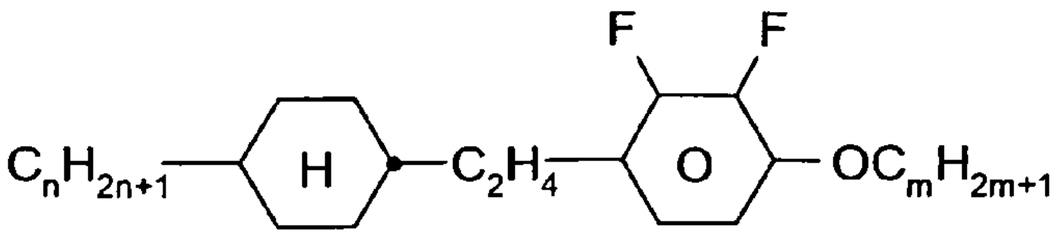

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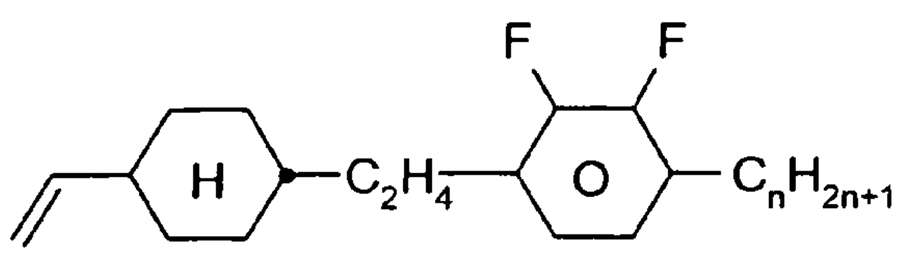

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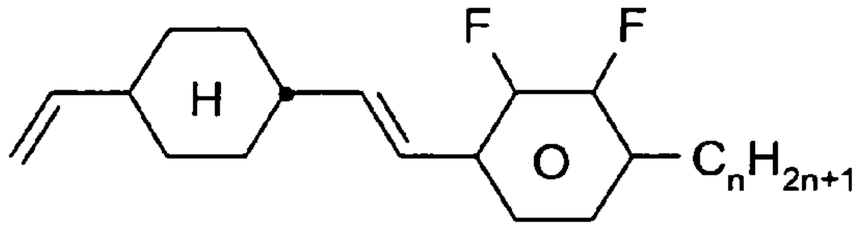

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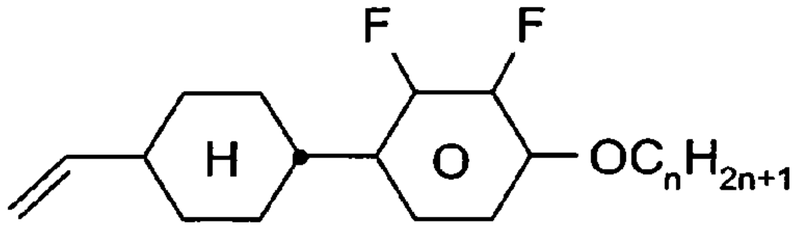

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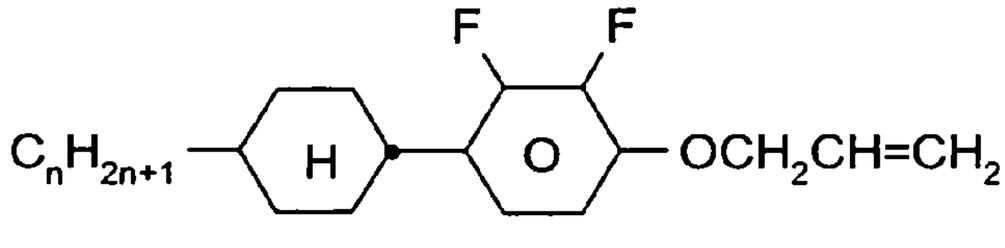

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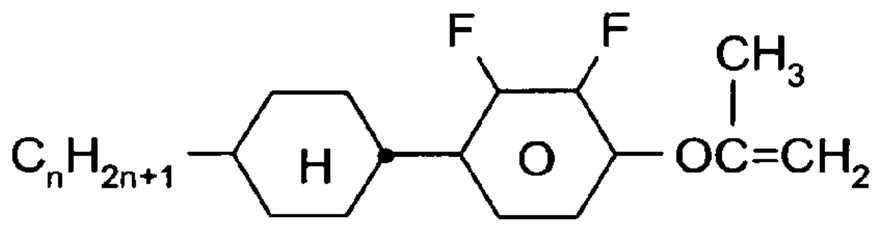

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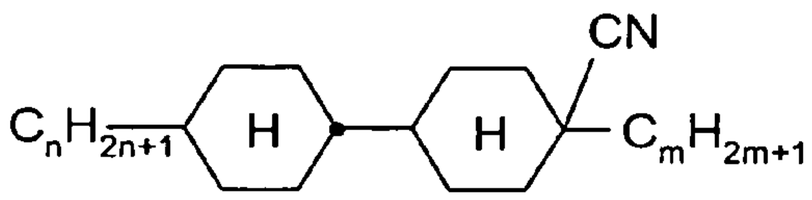

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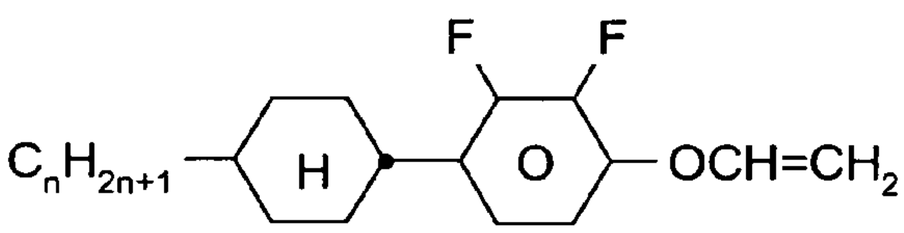

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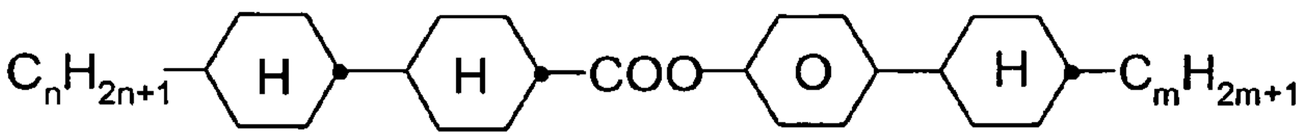

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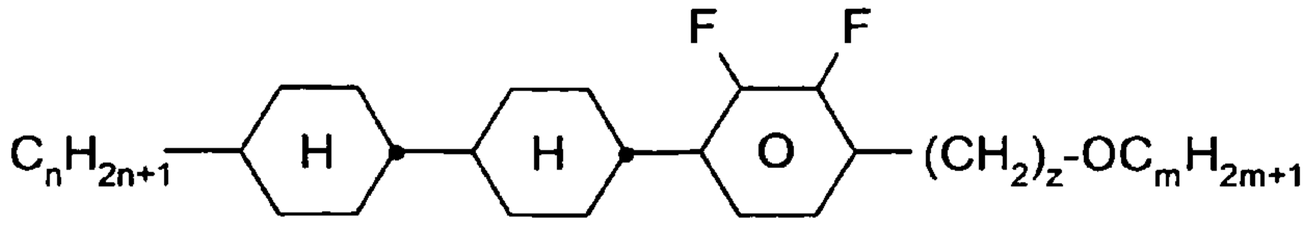

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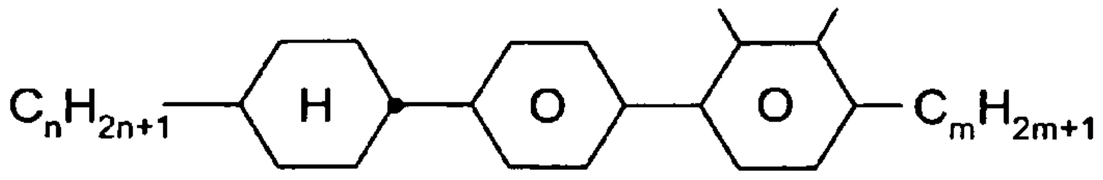

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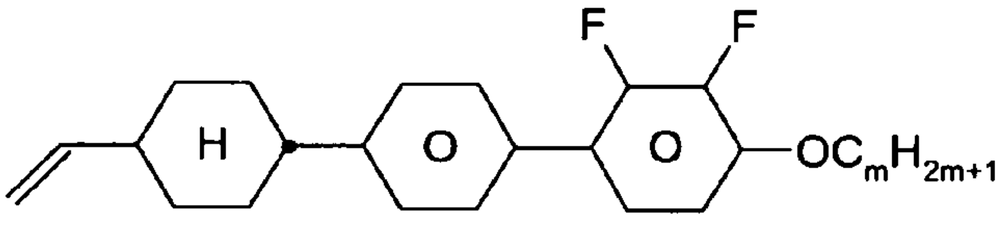

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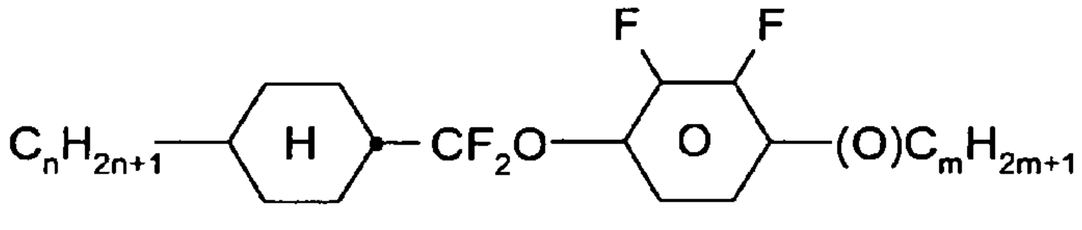

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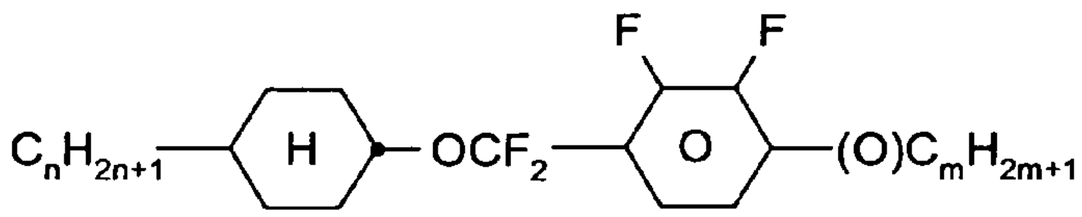

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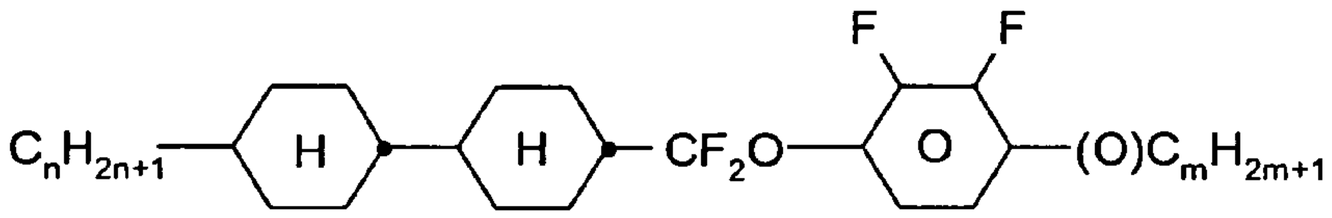

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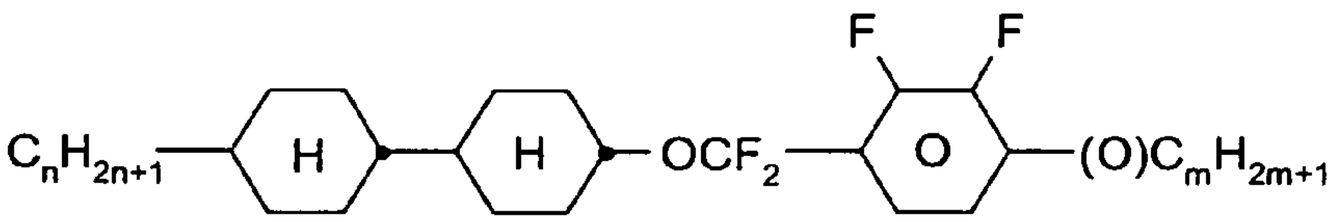

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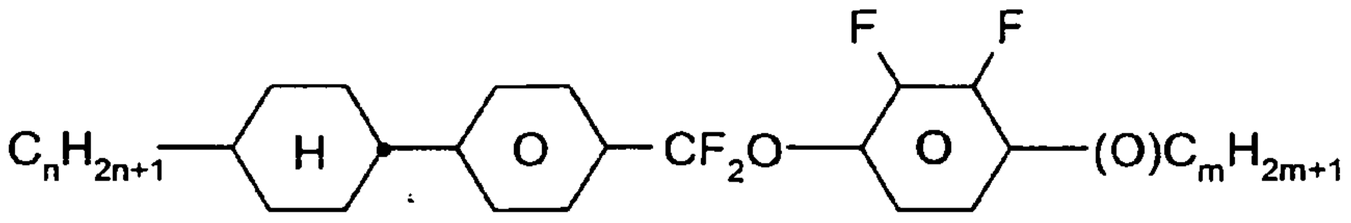

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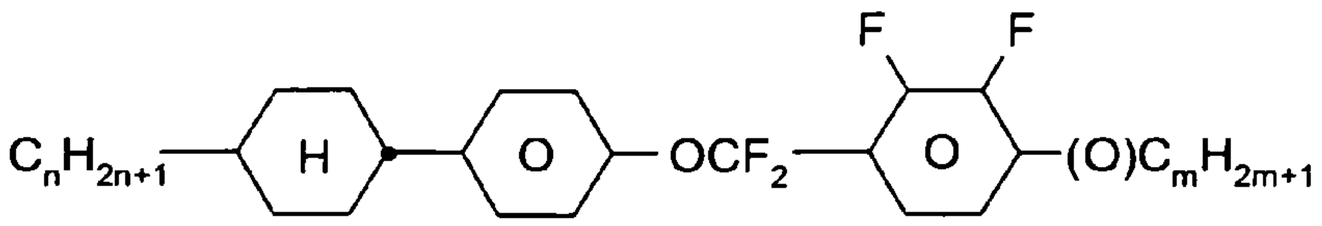

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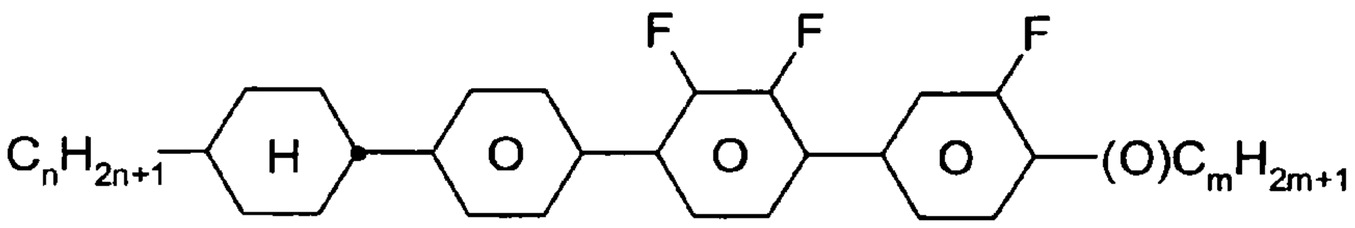

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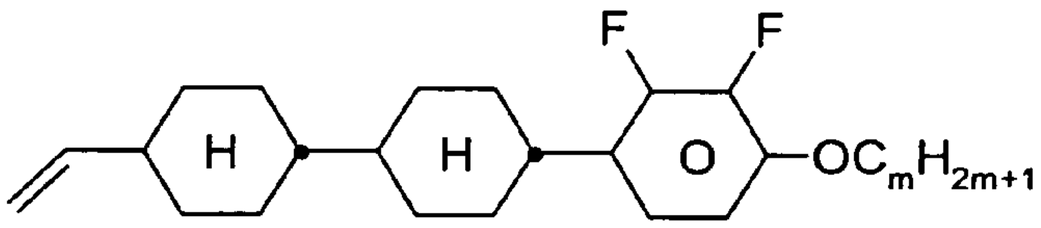

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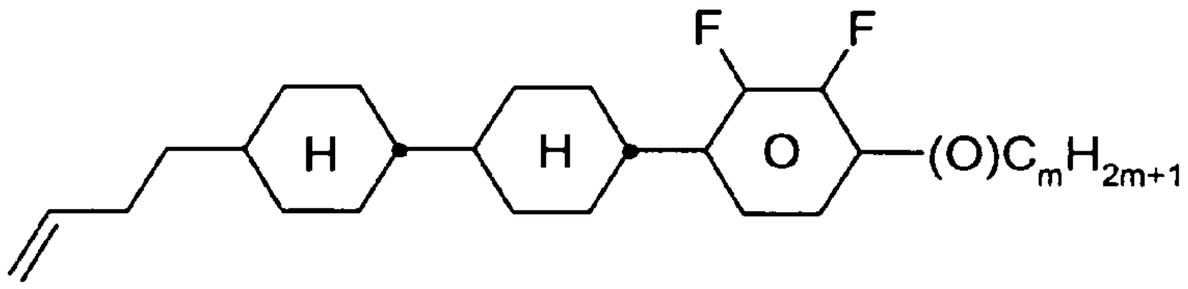

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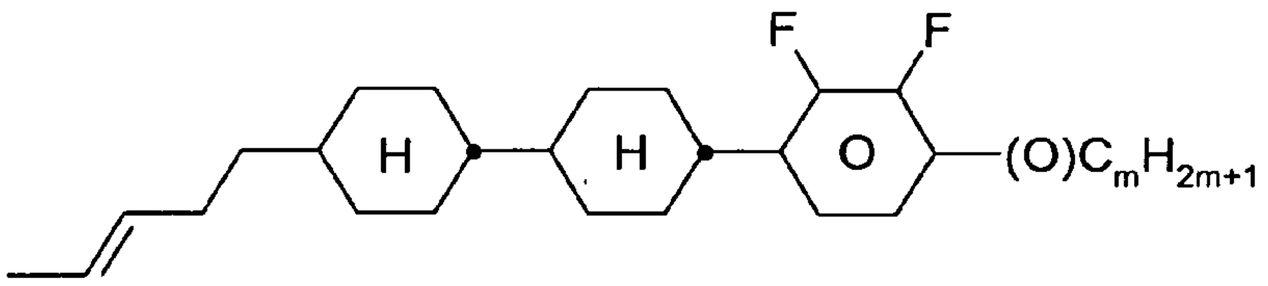

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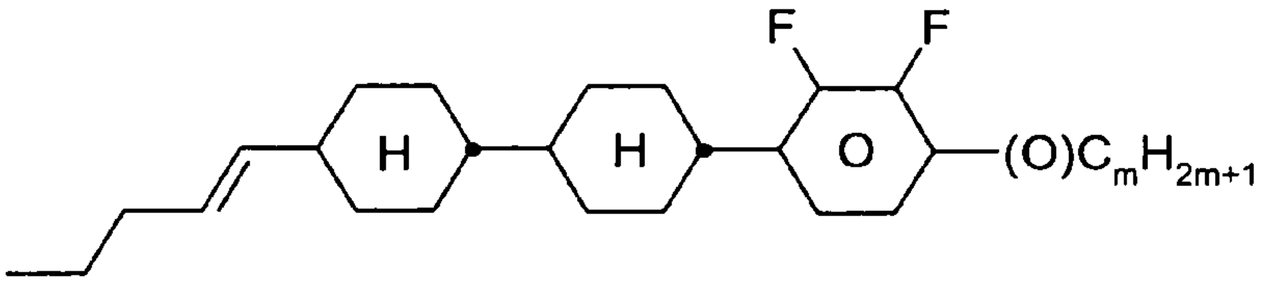

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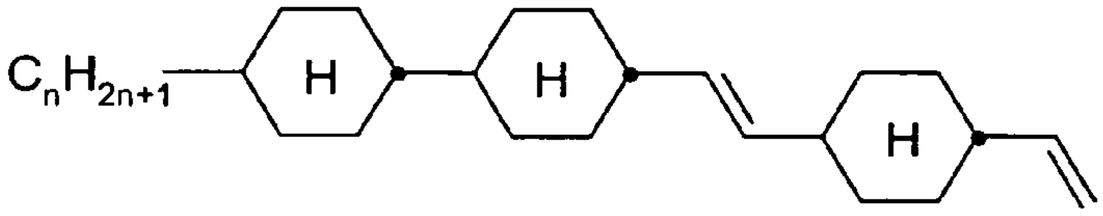

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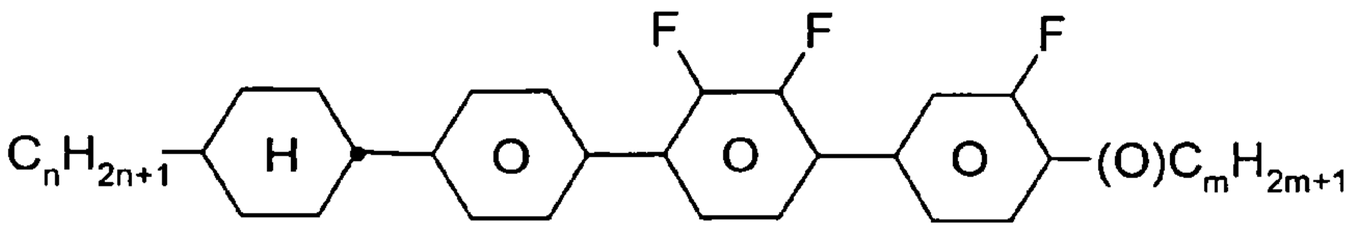

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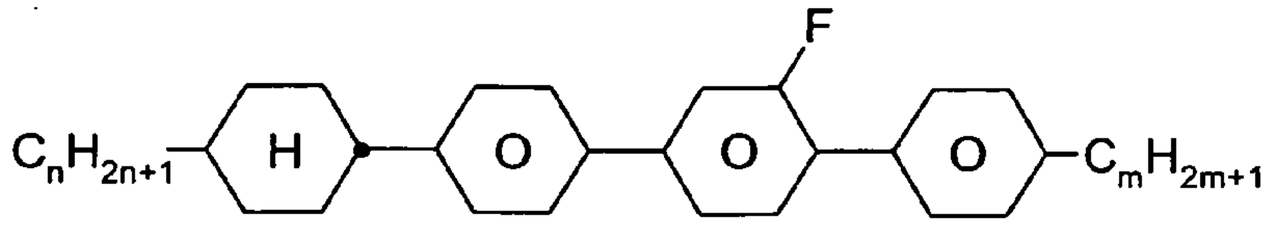

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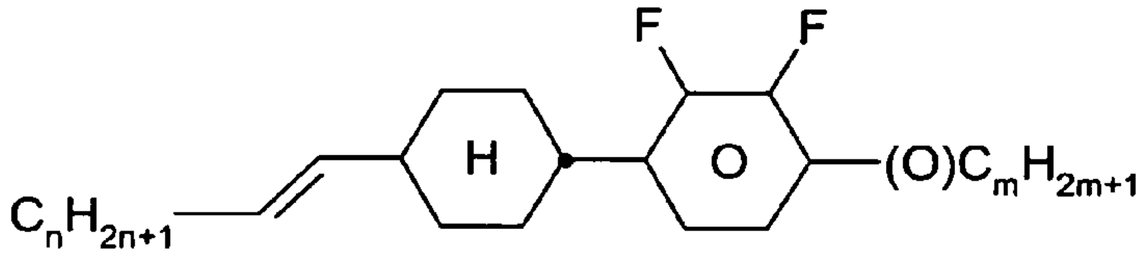

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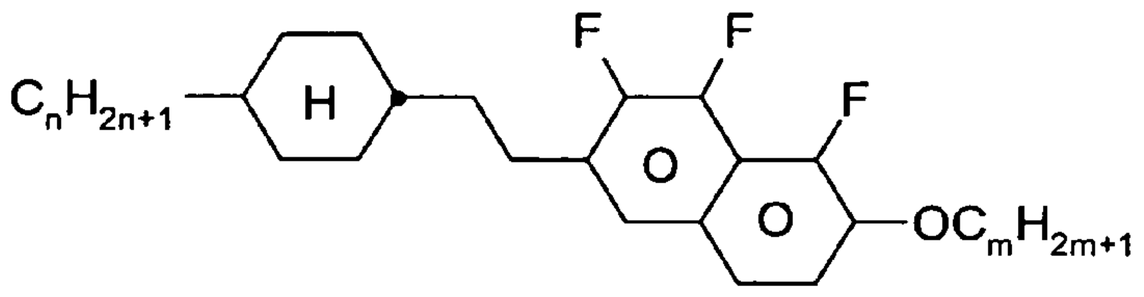

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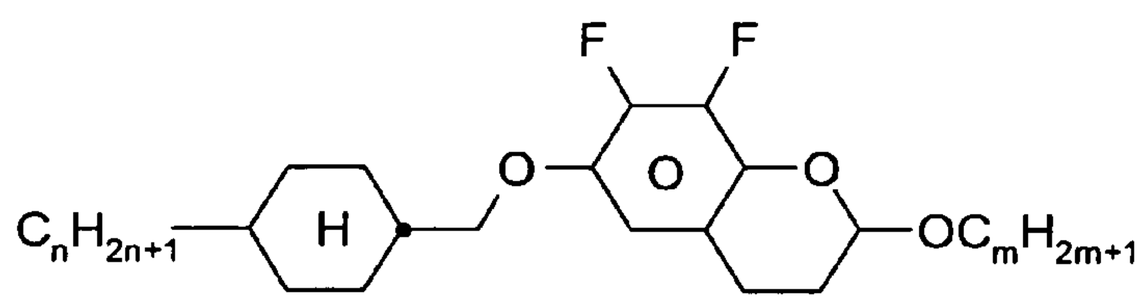

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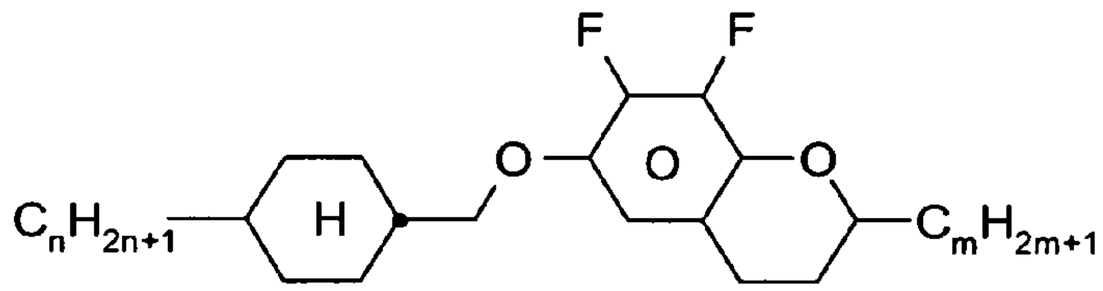

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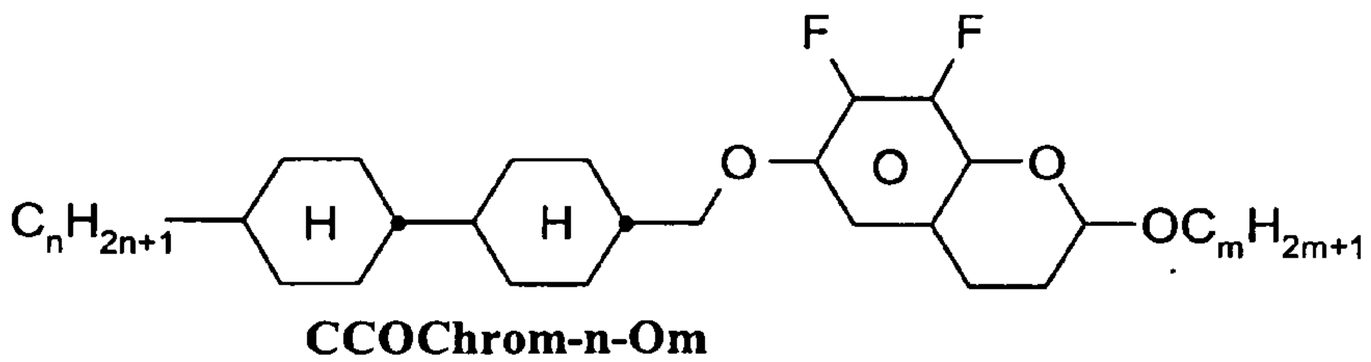

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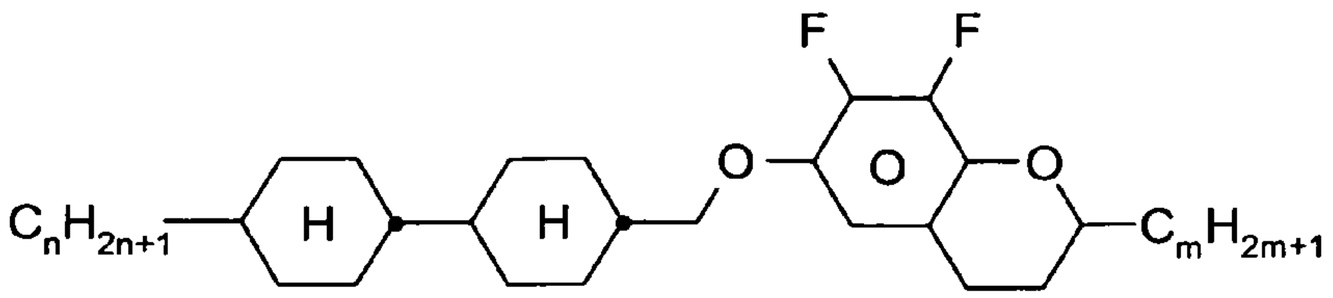

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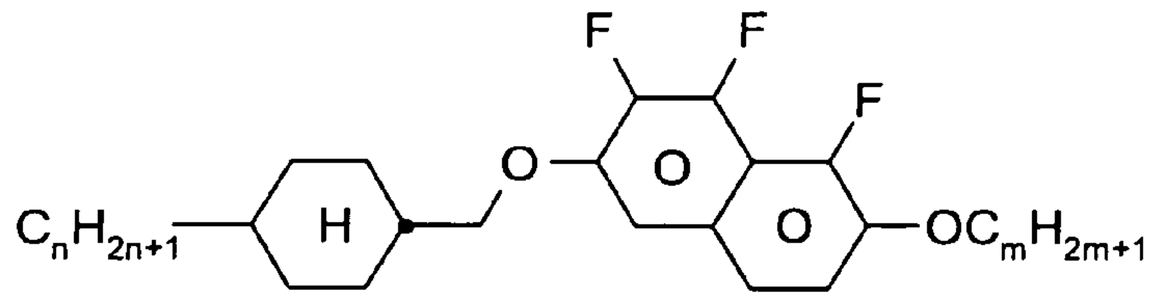

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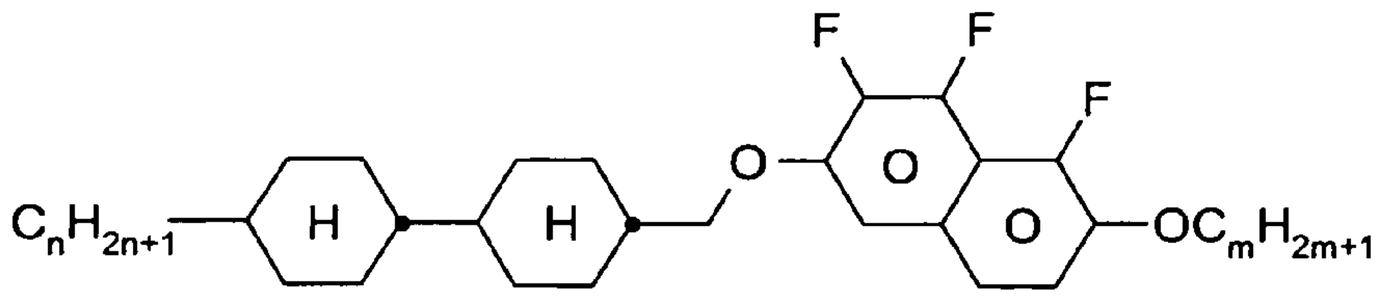

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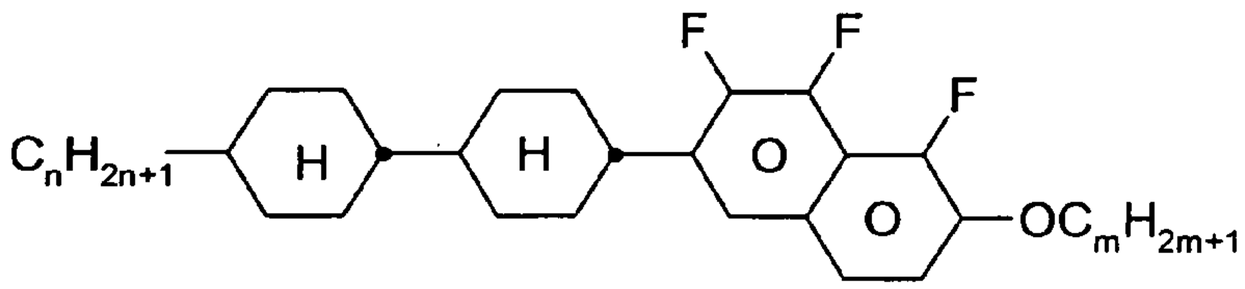

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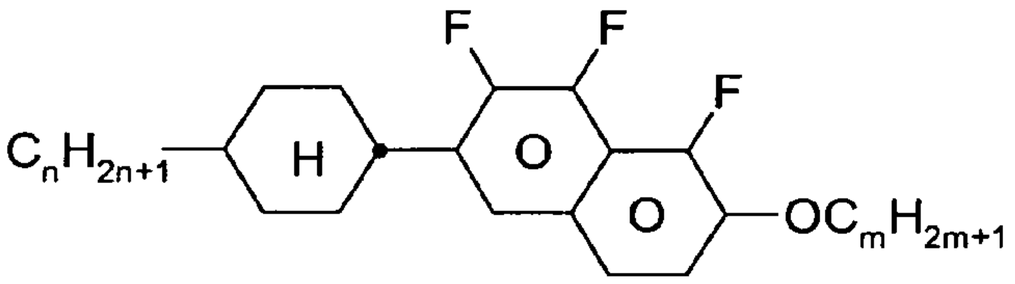

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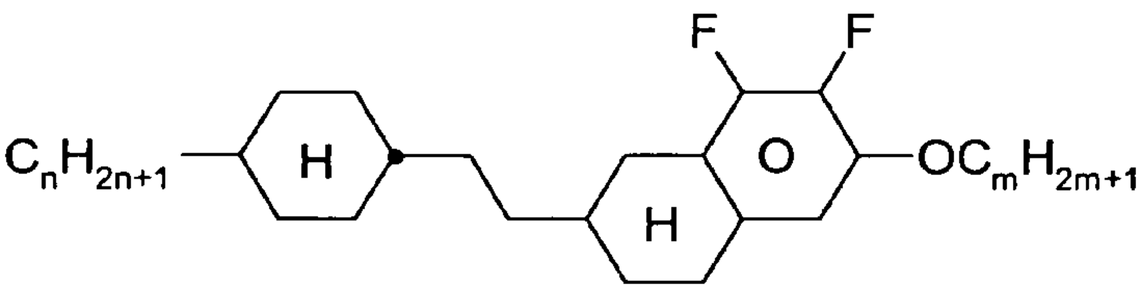

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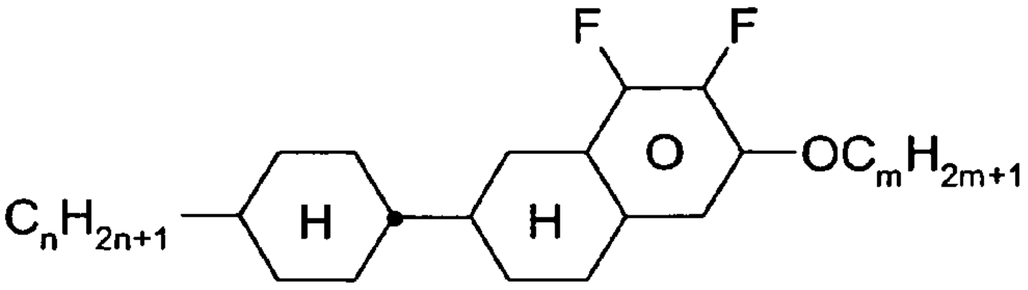

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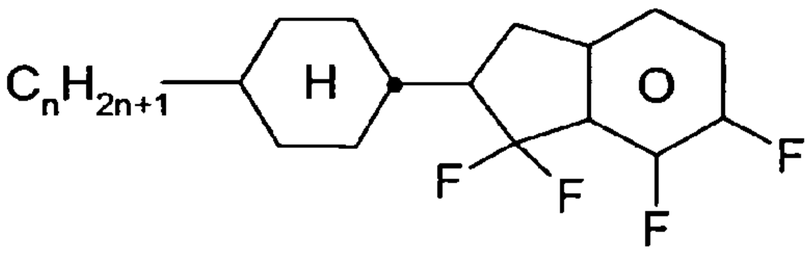

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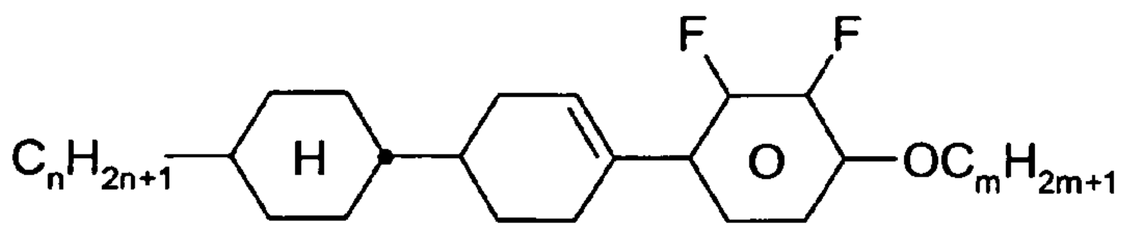

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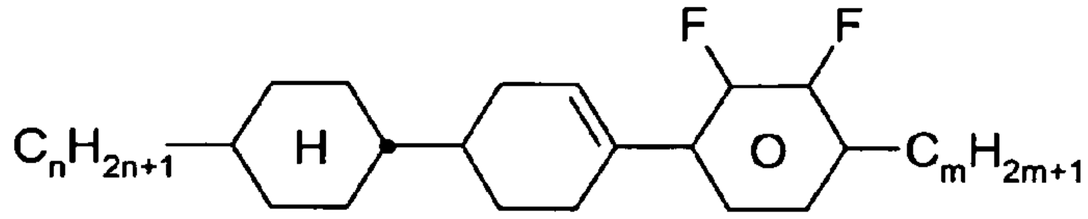

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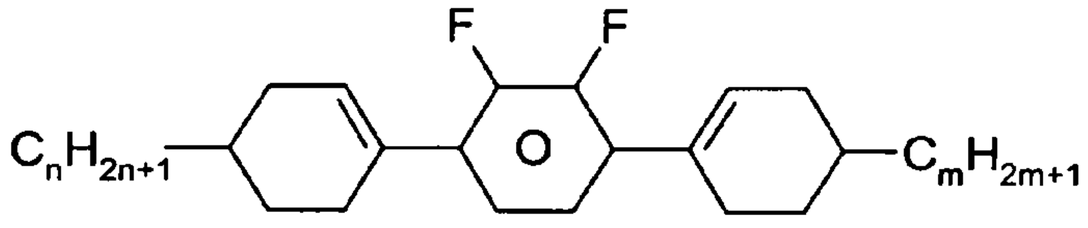

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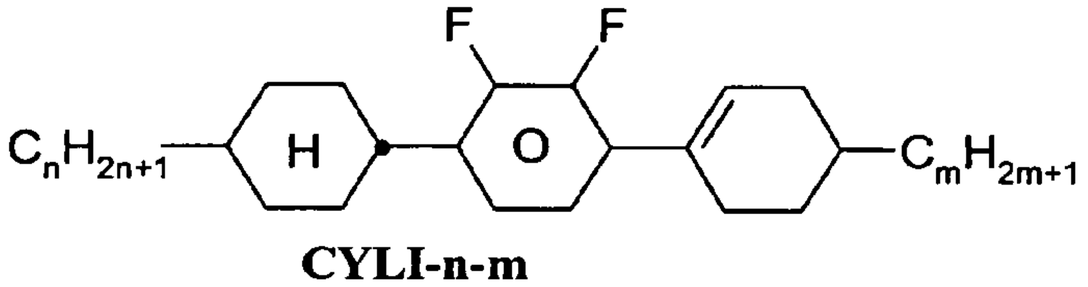

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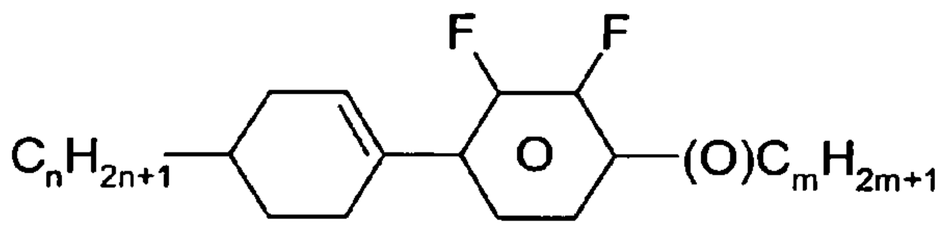

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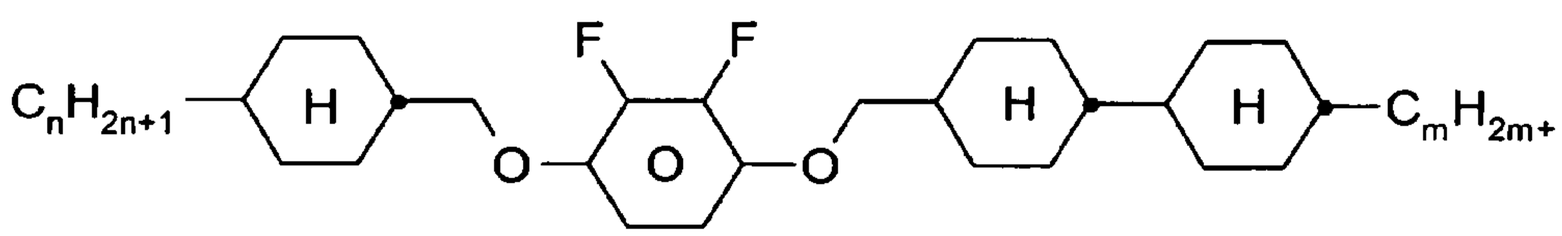

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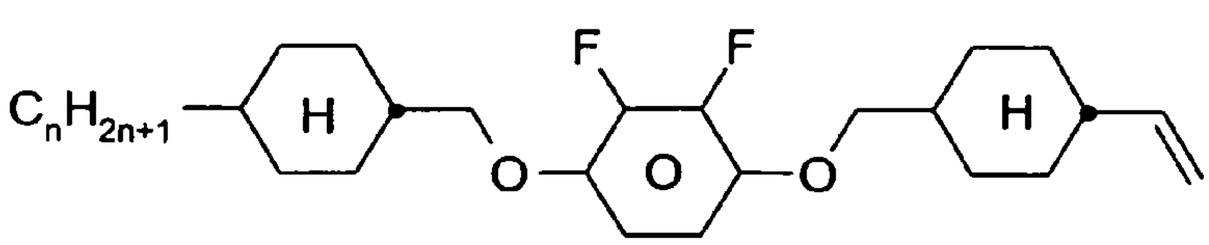

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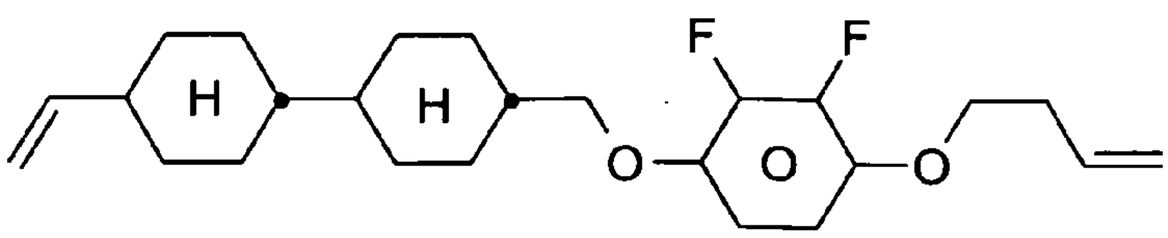

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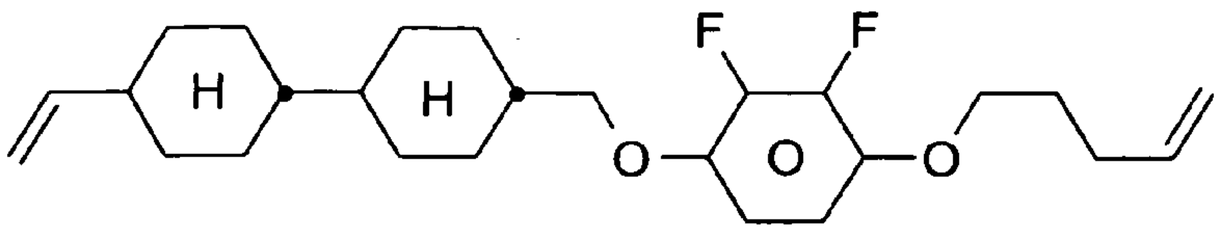

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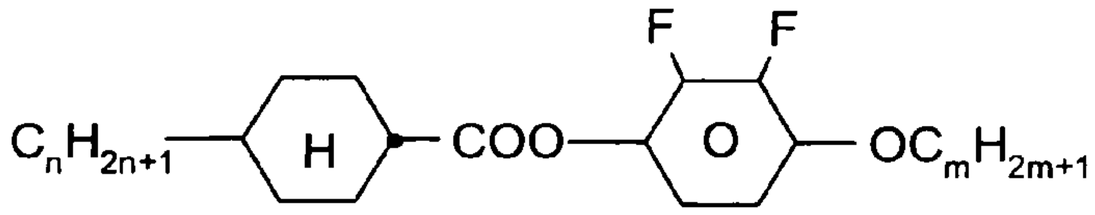

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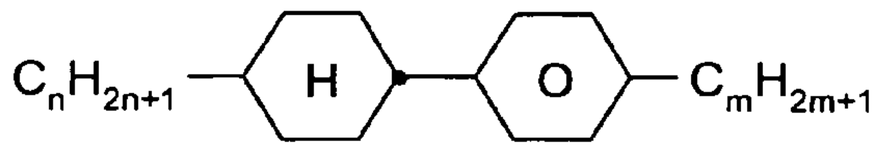

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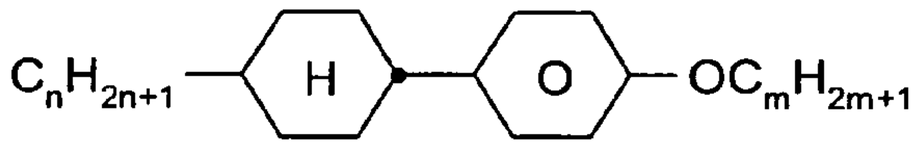

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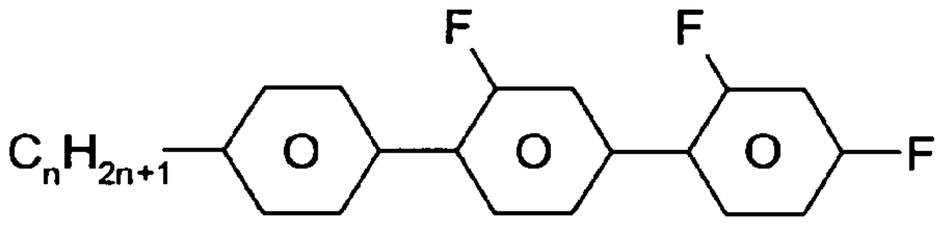

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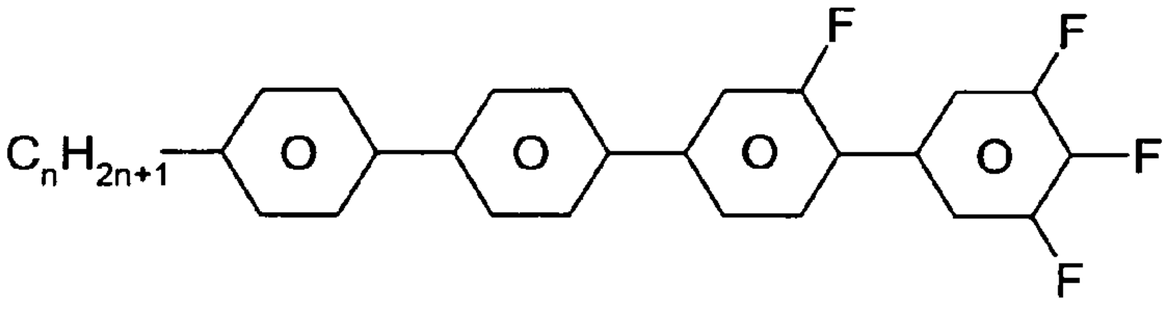

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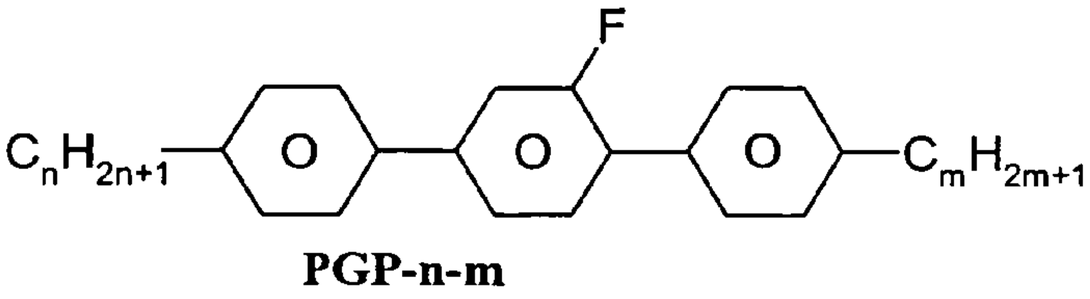

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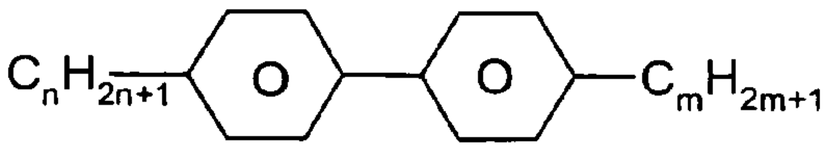

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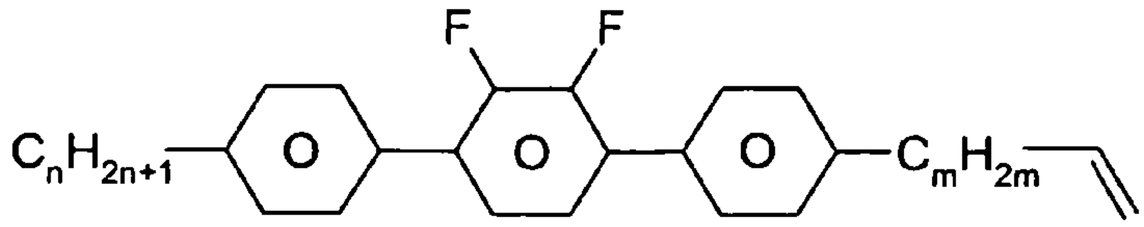

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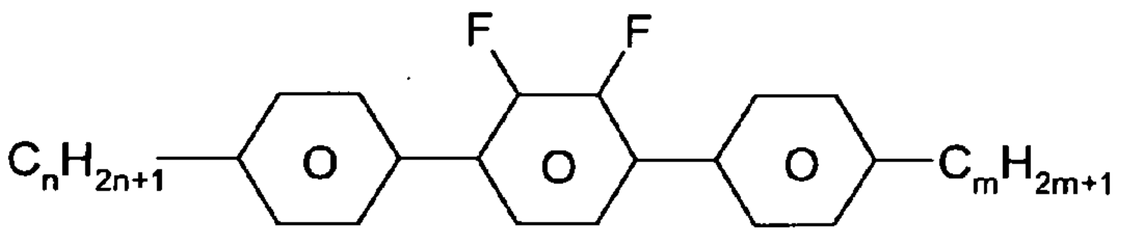

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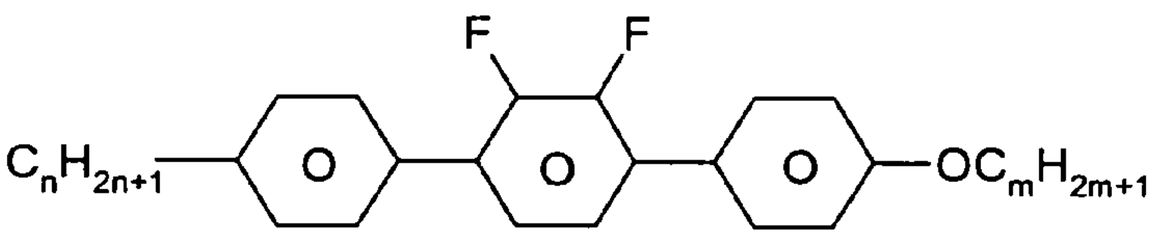

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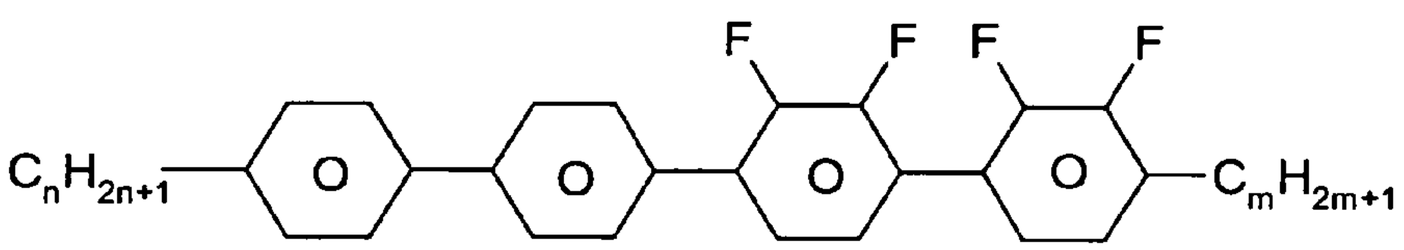

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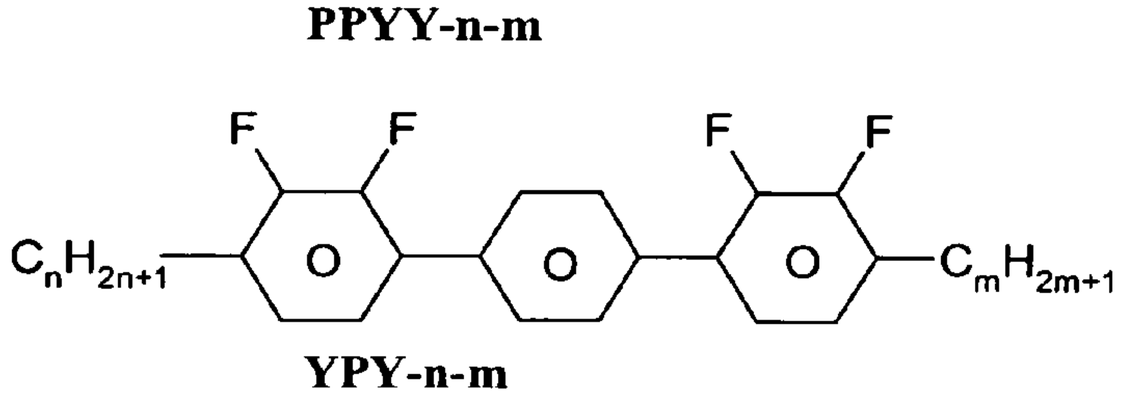

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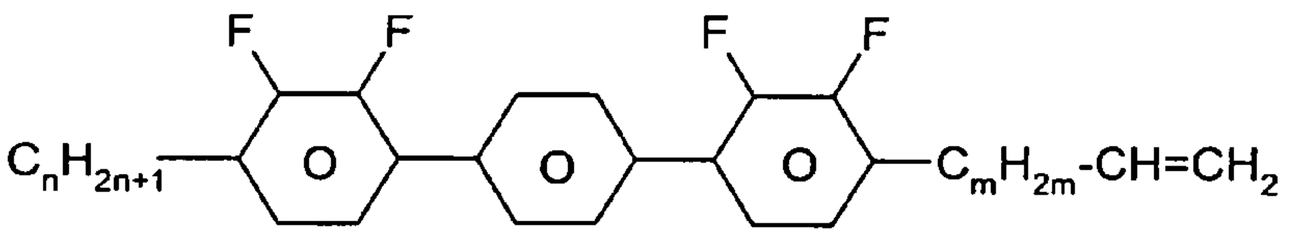

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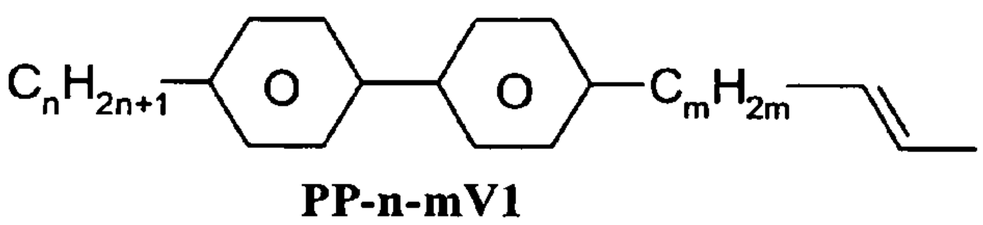

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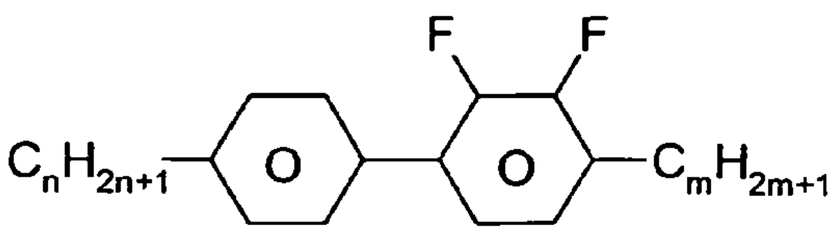

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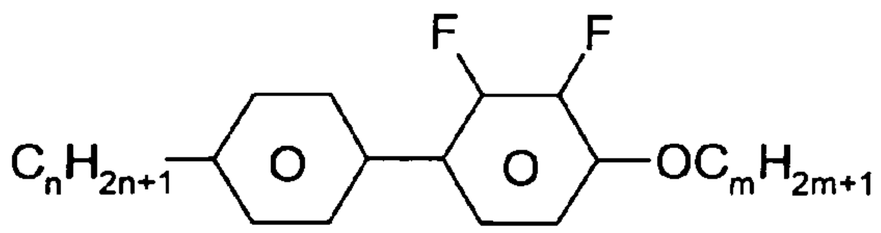

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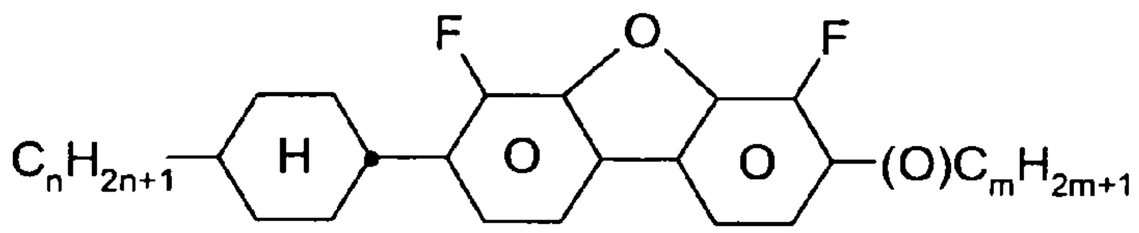

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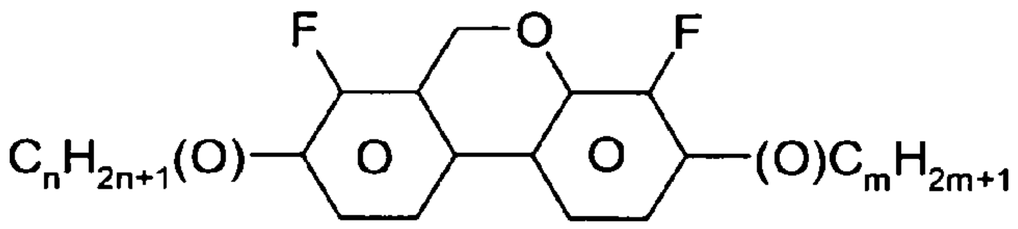

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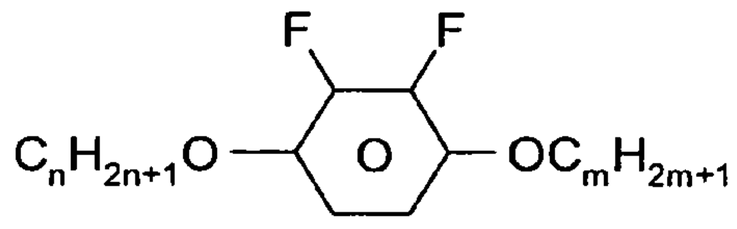

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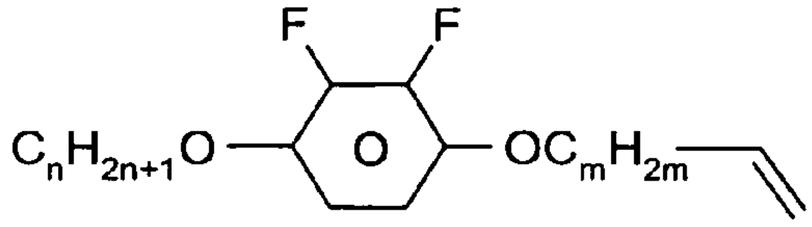

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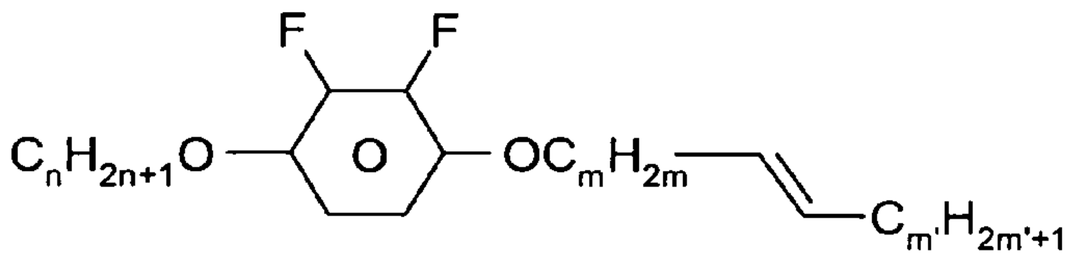


Y-nO-OmVm'

可根據本發明使用之液晶混合物係以本身習知之方式製備。一般而言，宜在高溫下，將以較少量使用之所需量之組分溶於構成主要成分之組分中。亦可能混合組分於有機溶劑中(例如丙酮、氯仿或甲醇中)之溶液，且在充分混合後例如藉由蒸餾再次移除溶劑。

藉助於適合的添加劑，本發明之液晶相可以使得其可用於迄今已揭示之任何類型的例如ECB、VAN、IPS、GH或ASM-VA LCD顯示

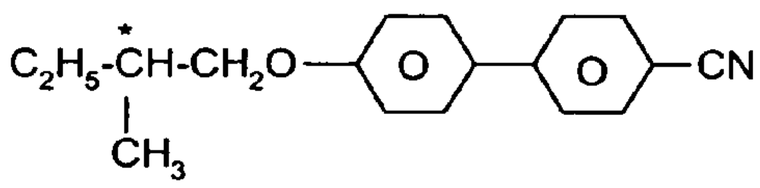
器中的方式加以改質。

介電質亦可包含為熟習此項技術者所知及文獻中描述之其他添加劑，諸如UV吸收劑、抗氧化劑、奈米顆粒及自由基清除劑。舉例而言，可添加0%-15%之多色染料、穩定劑或對掌性摻雜劑。適用於本發明混合物之穩定劑尤其為表B中所列之穩定劑。

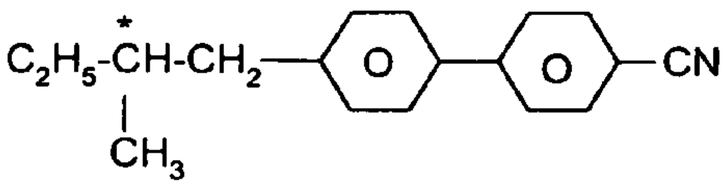
舉例而言，可添加0-15%之多色染料，此外可添加導電鹽，較佳4-已氧基苯甲酸乙基二甲基十二烷基銨、四苯基氫硼化四丁基銨或冠醚之複鹽(參考例如Haller等人，Mol. Cryst. Liq. Cryst.第**24**卷，第249-258頁(1973))以改良傳導性或可添加物質以改變向列相之介電各向異性、黏度及/或配向。此類型之物質描述於例如DE-A 22 09 127、DE-A 22 40 864、DE-A 23 21 632、DE-A 23 38 281、DE-A 24 50 088、DE-A 26 37 430及DE-A 28 53 728中。

表B顯示可添加至本發明混合物中之可能摻雜劑。若混合物包含摻雜劑，則其以0.01重量%-4重量%，較佳0.1重量%-1.0重量%之量使用。

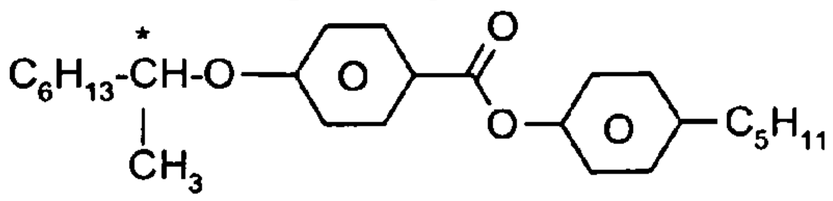
表B



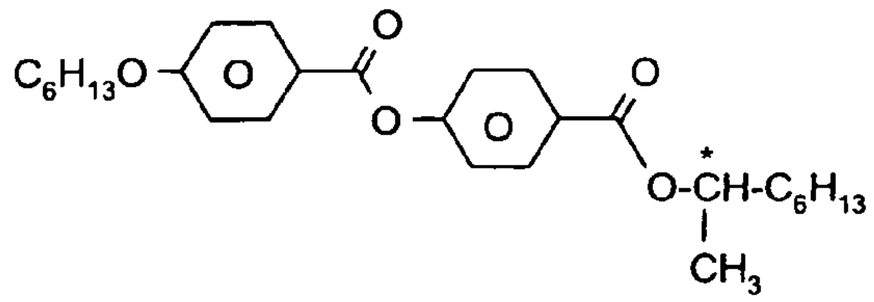
C 15



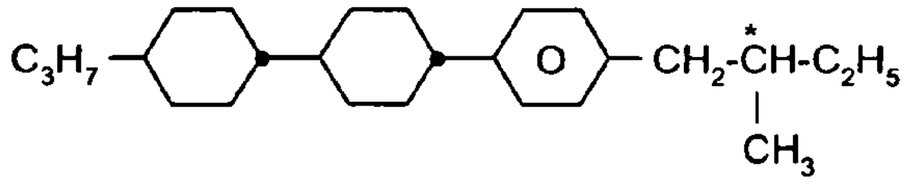
CB 15



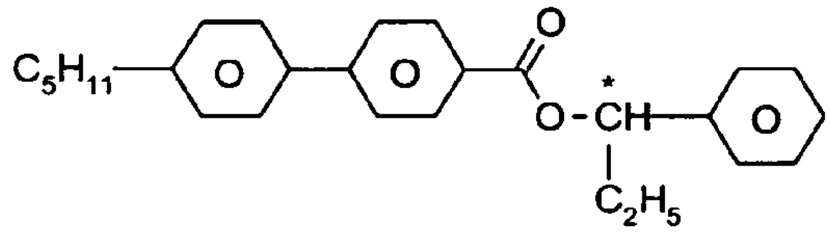
CM 21



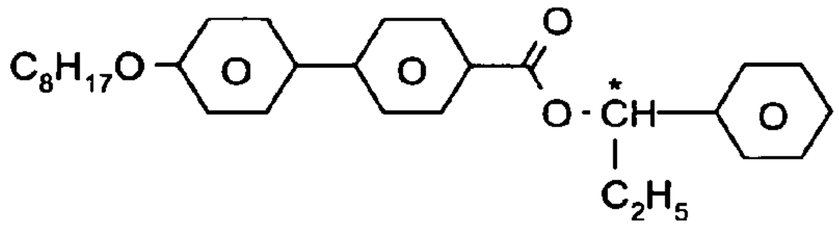
R/S-811



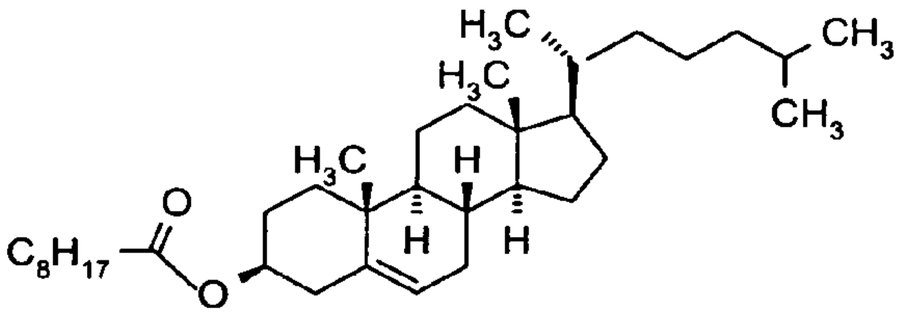
CM 44



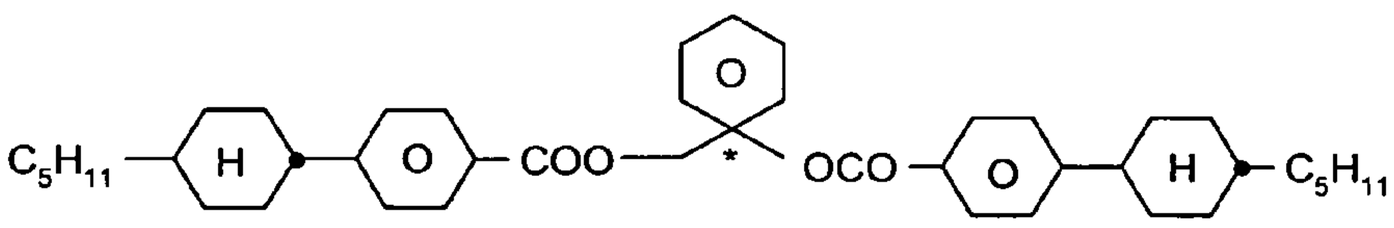
CM 45



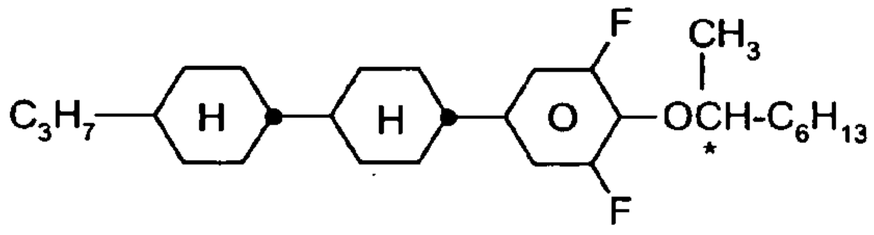
CM 47



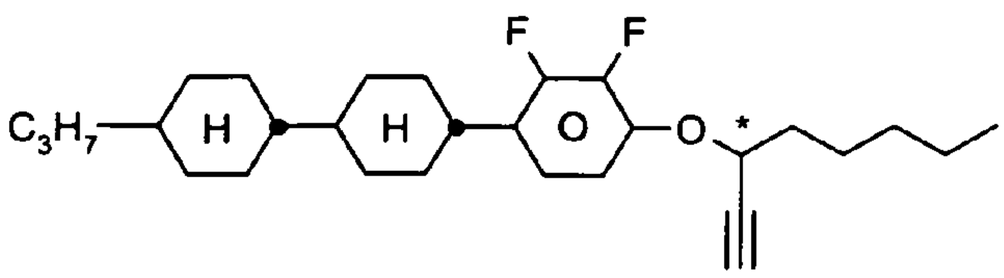
CN



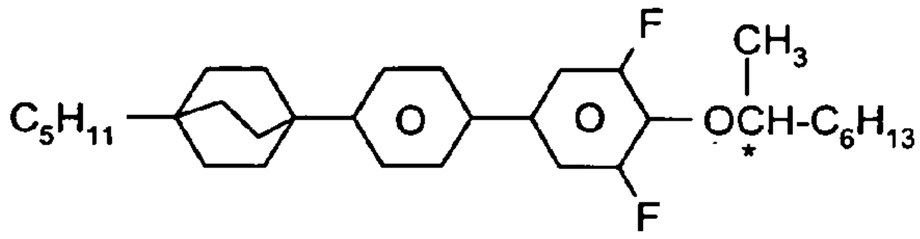
R/S-1011



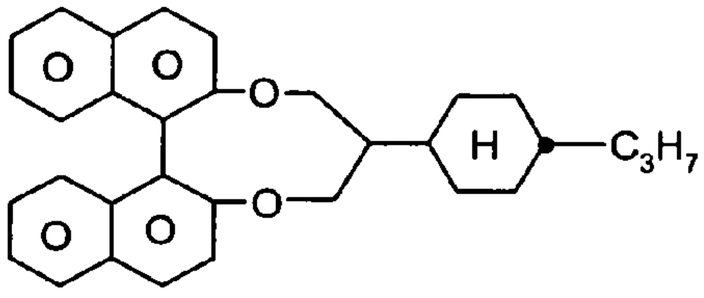
R/S-2011



R/S-3011



R/S-4011

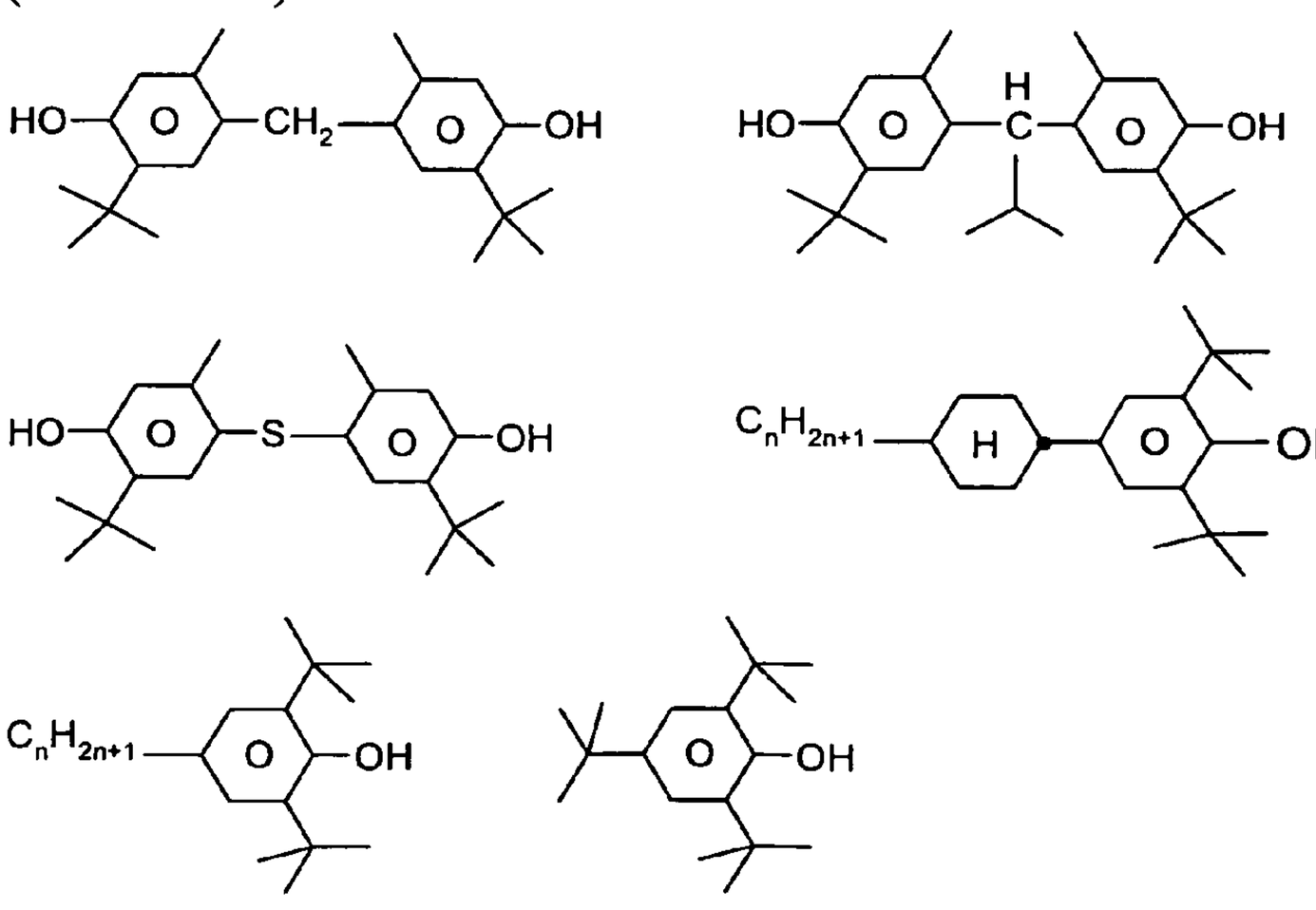


R/S-5011

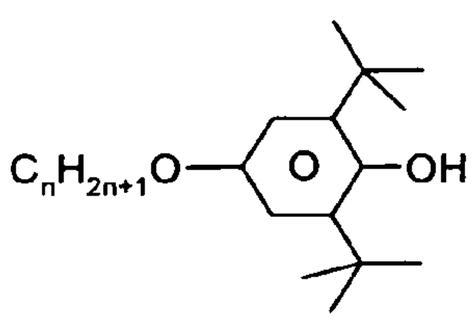
以混合物之總量計，可以至多10重量%，較佳0.01重量%至6重量%，尤其0.1重量%至3重量%之量添加至例如本發明混合物中之穩定劑如下表C所示。較佳穩定劑尤其為BHT衍生物，例如2,6-二第三丁基-4-烷基酚及Tinuvin 770。

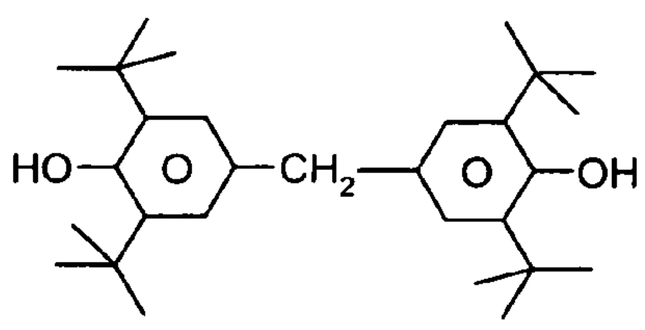
表C

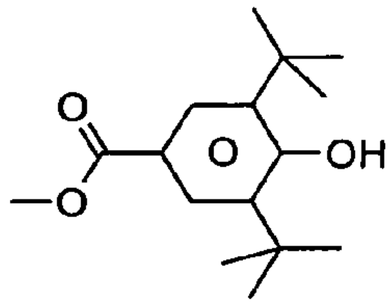
(n = 1-12)

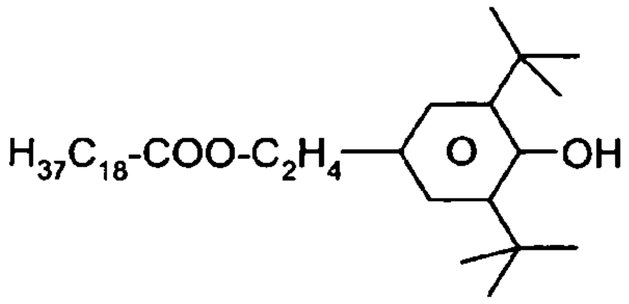


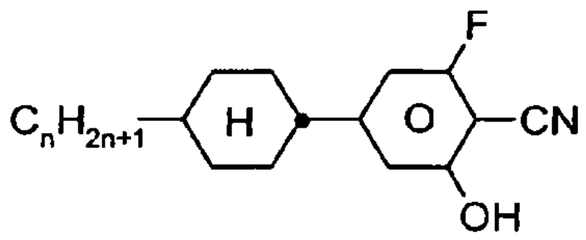
n = 1、2、3、4、5、6或7

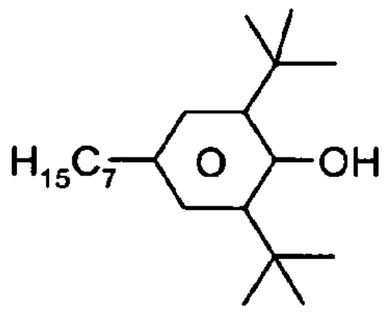


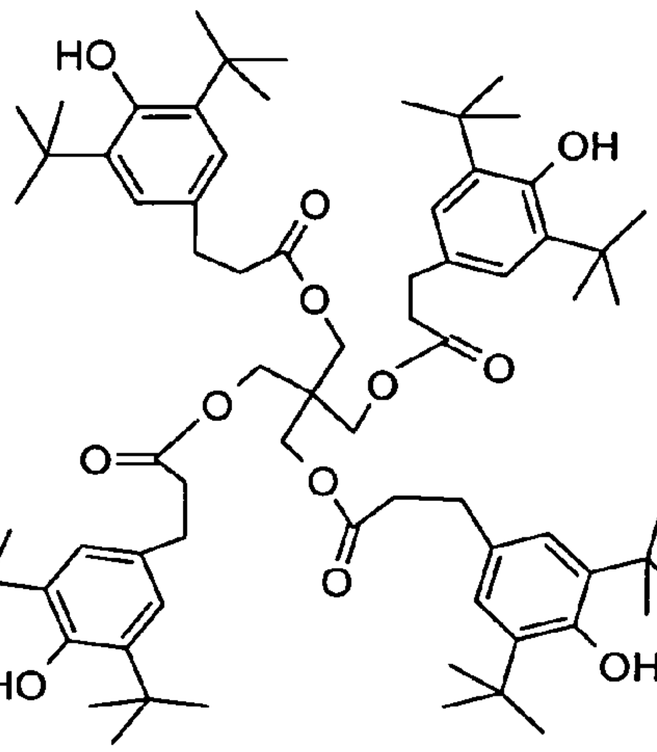


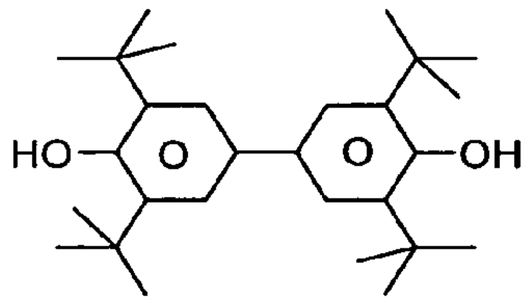


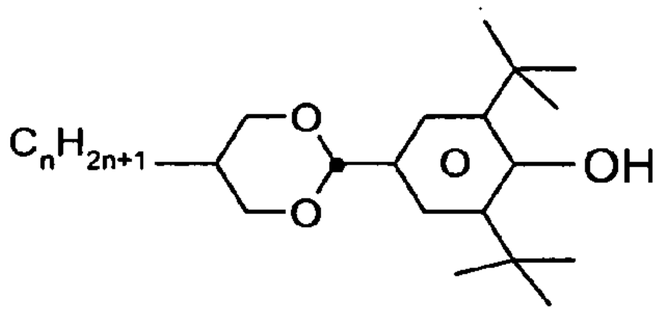




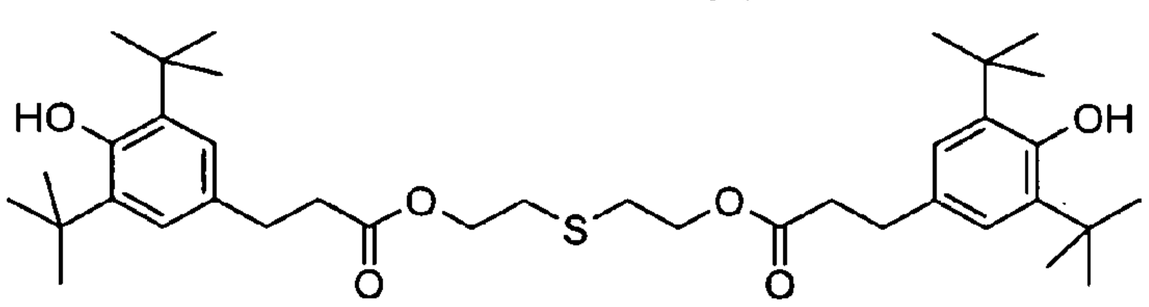


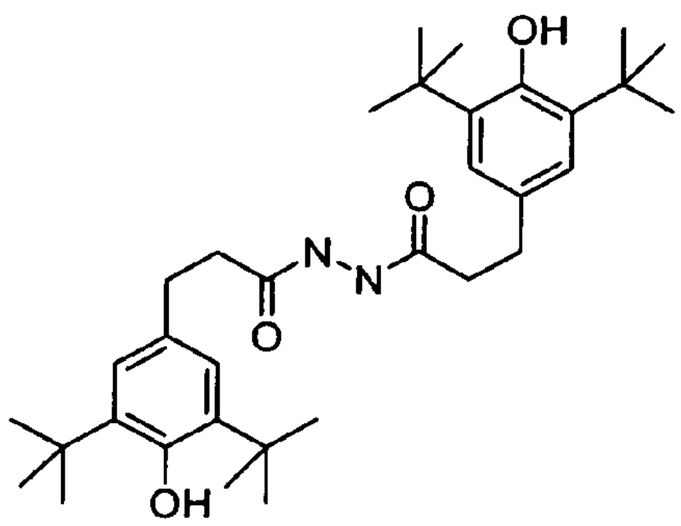


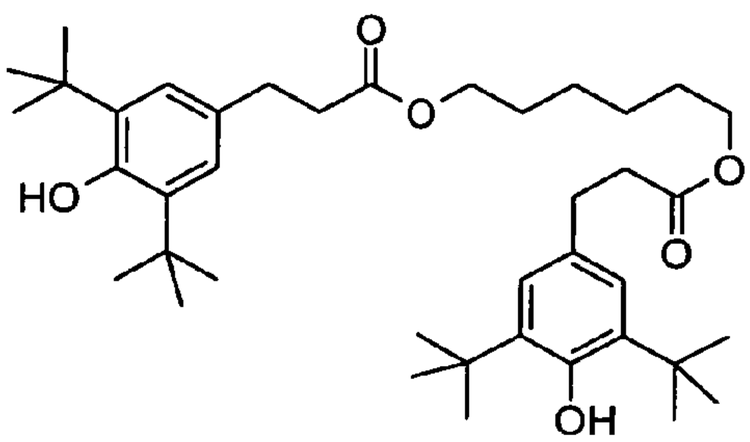


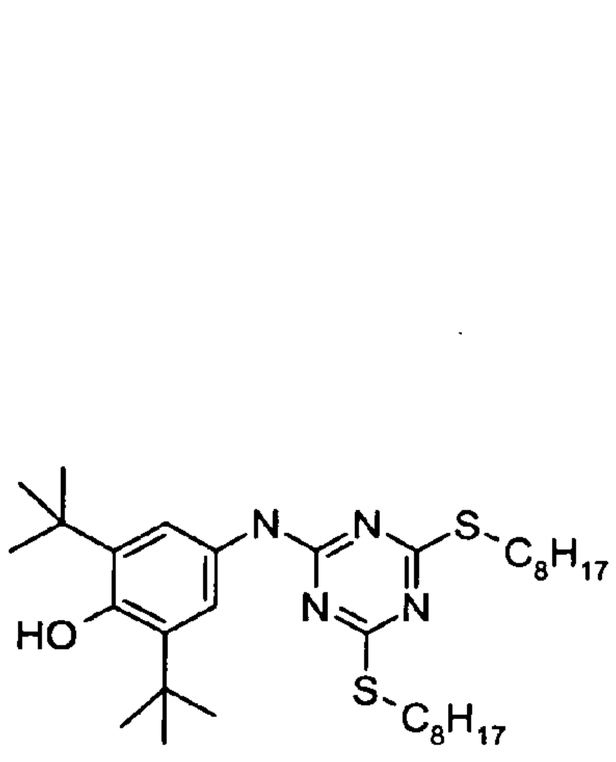


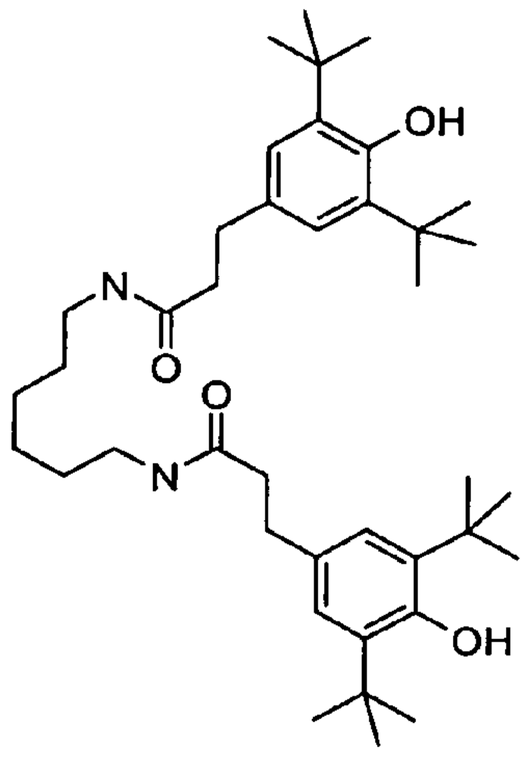
n = 1、2、3、4、5、6或7

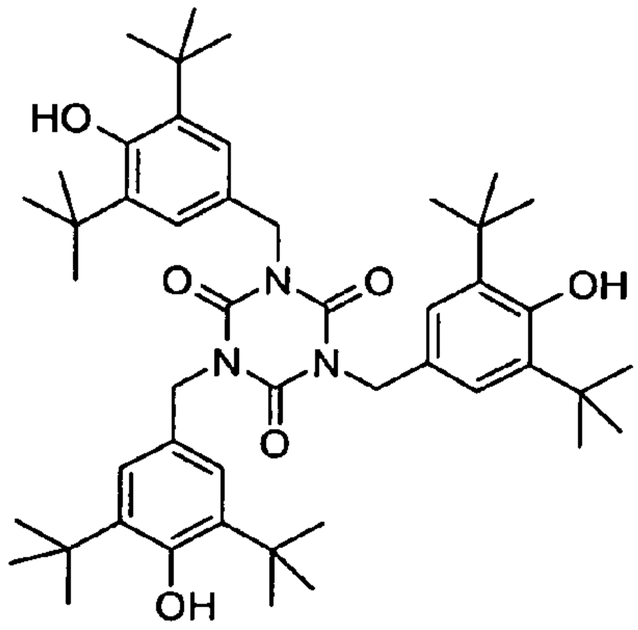


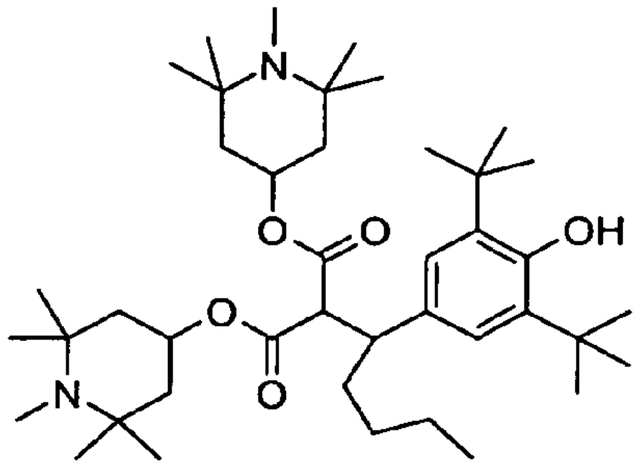


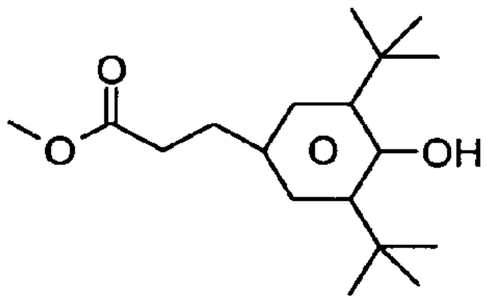


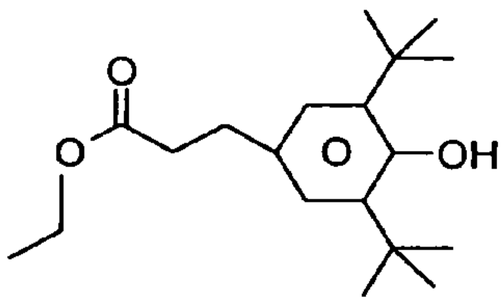


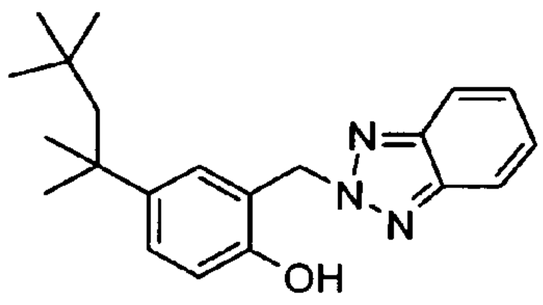


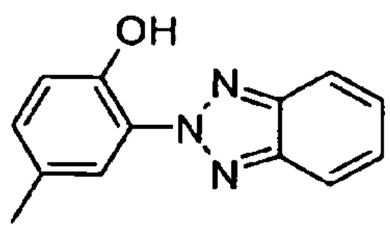


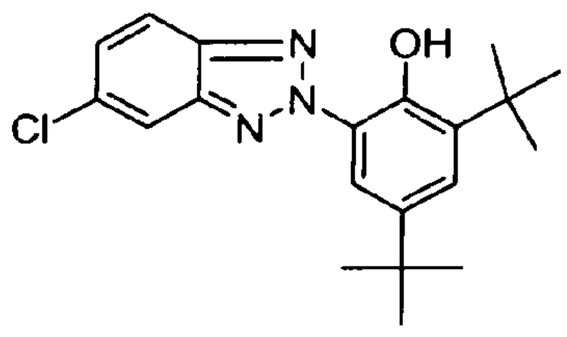


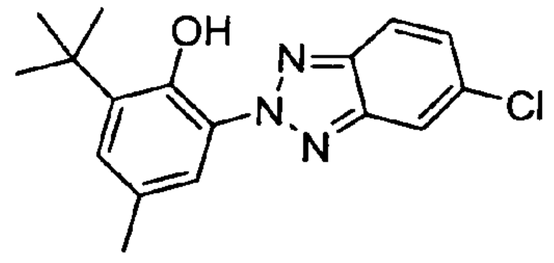


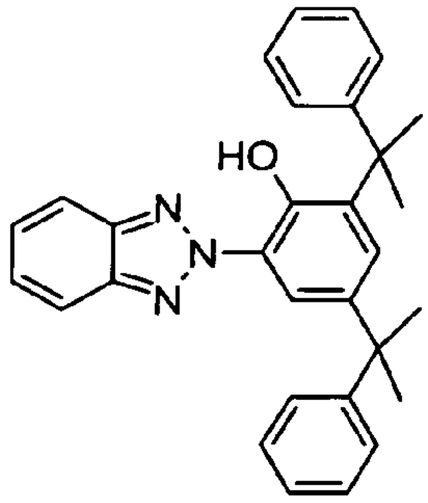


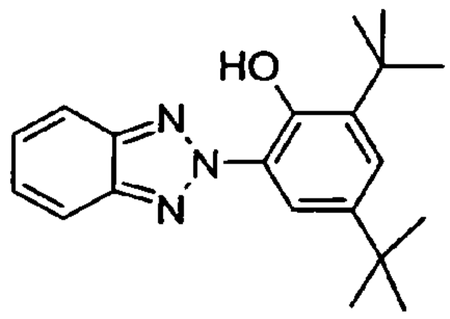


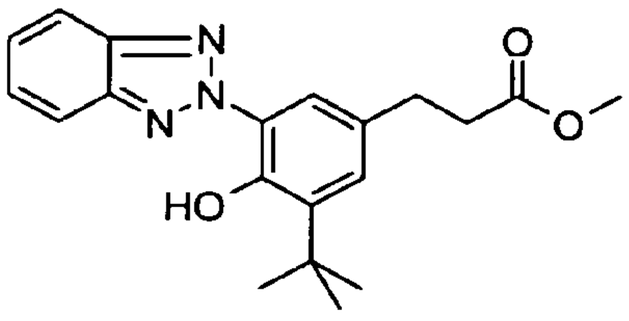


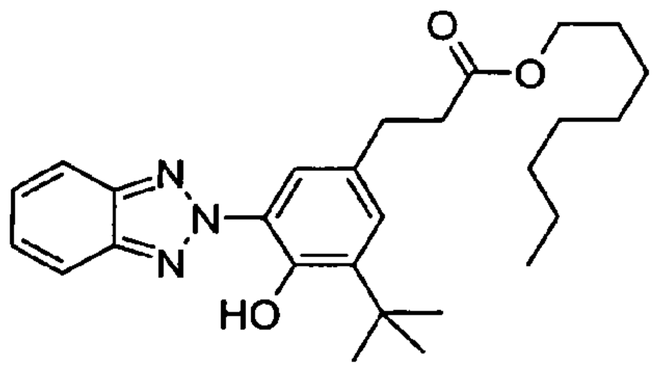


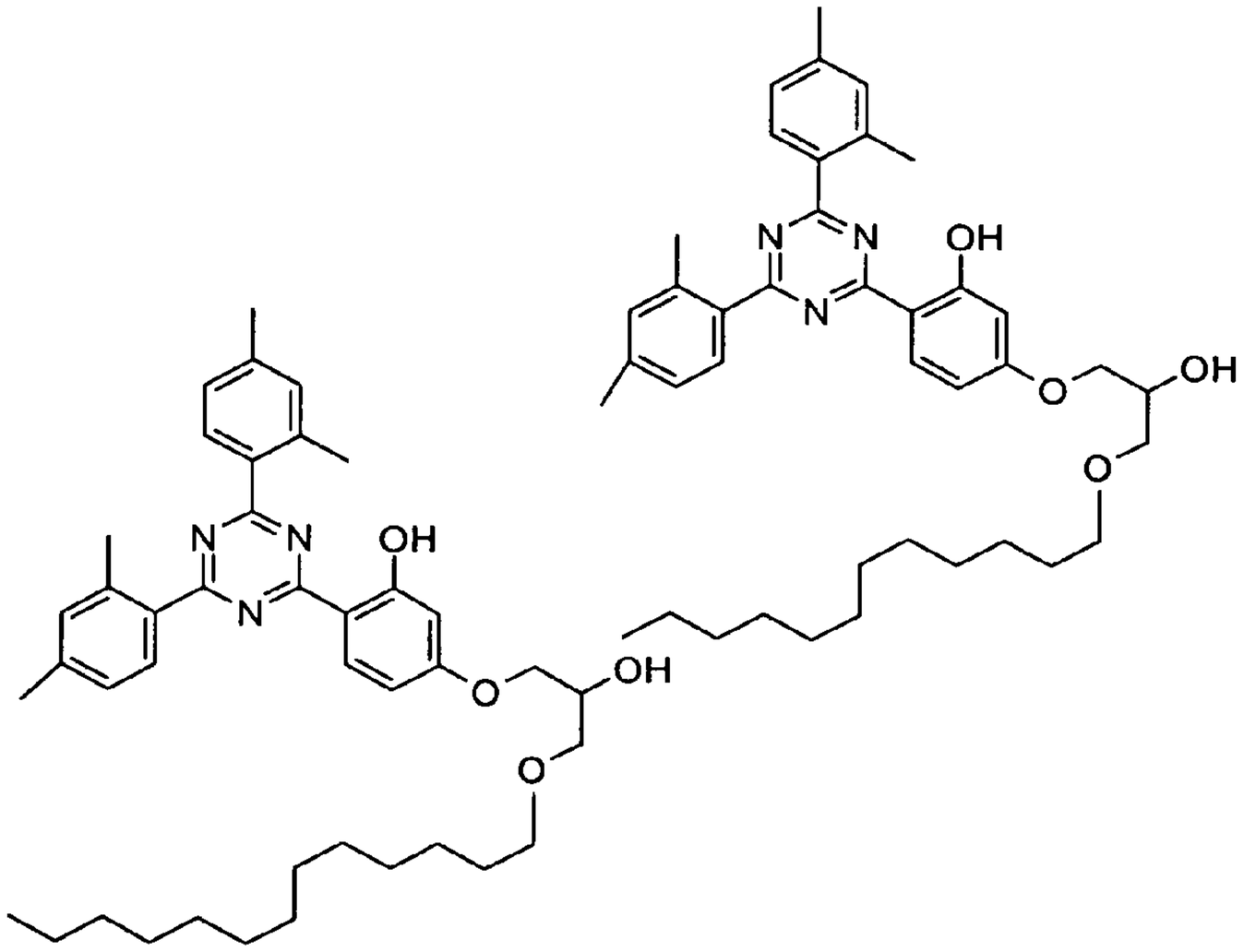


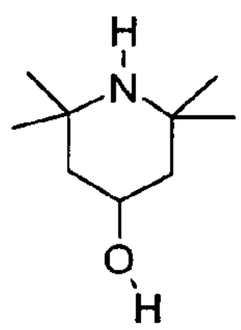


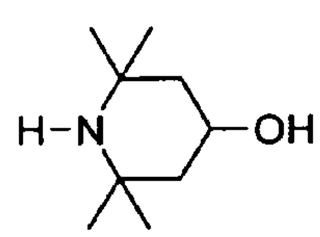


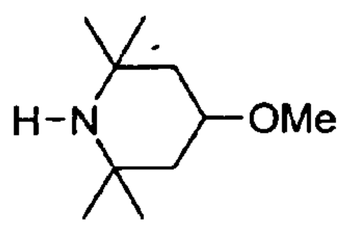


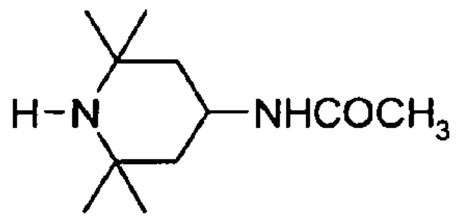


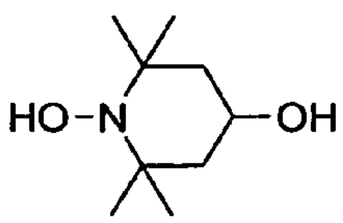


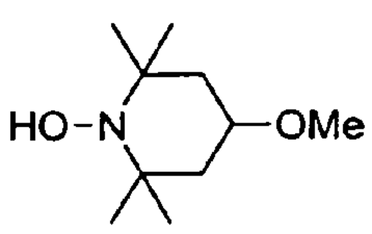


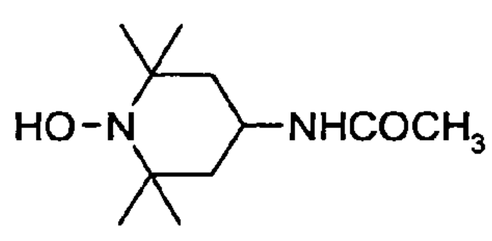


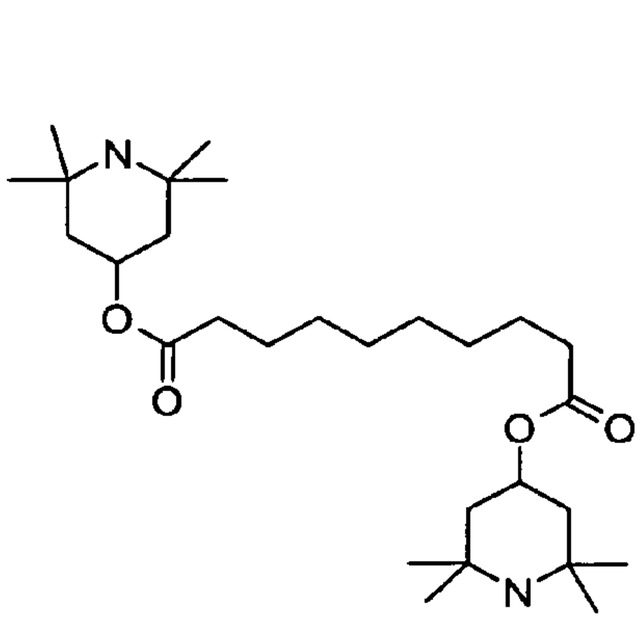


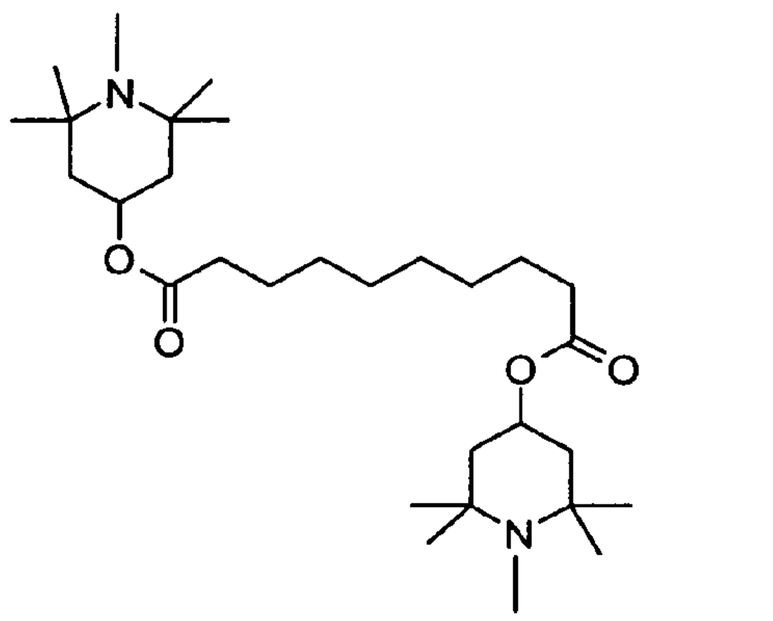


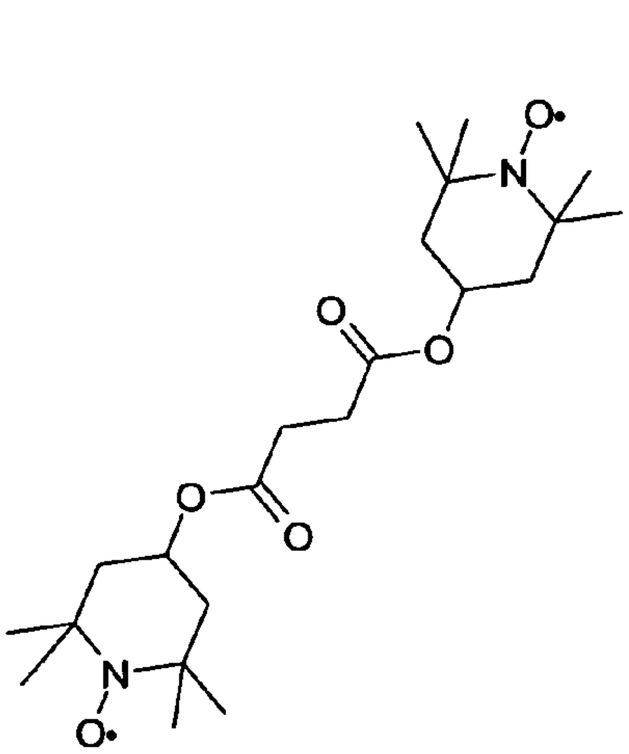


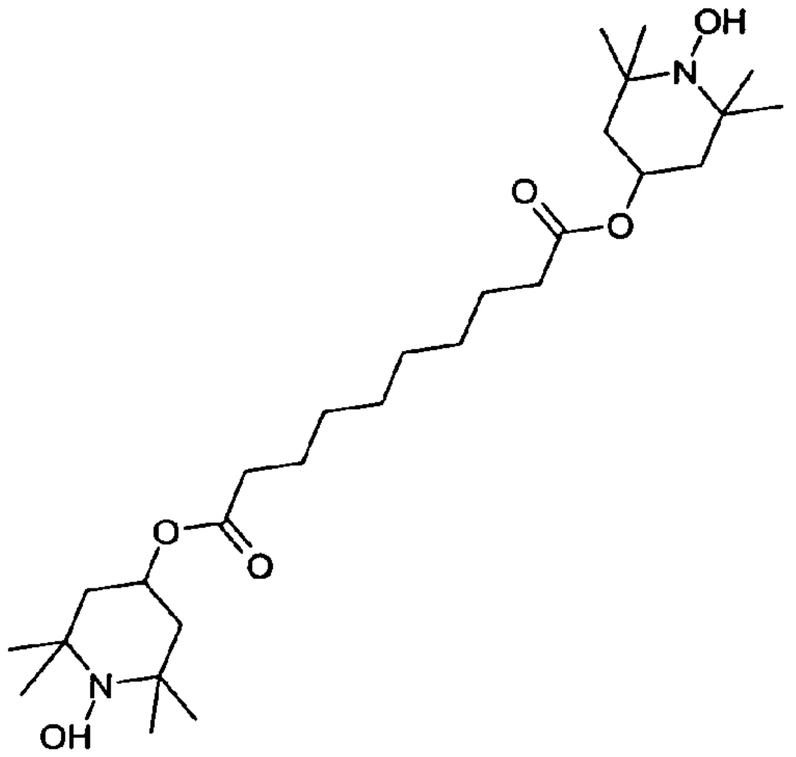








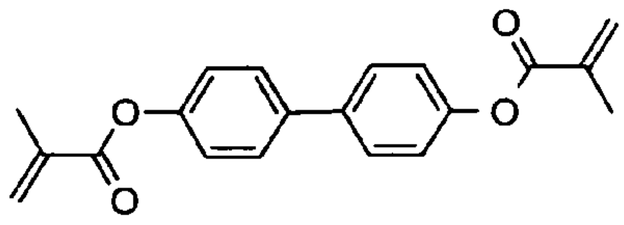




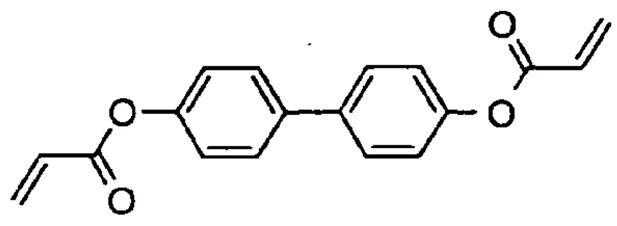
適用於本發明混合物中，較佳適用於PSA、PS-VA、PS-IPS及PS-FFS應用中之可聚合化合物(反應性液晶原基)如下表D中所示：

表D

表D顯示可較佳作為可聚合化合物(反應性液晶原基化合物)用於LC介質中，較佳用於根據本發明之PS-VA、PSA、PS-IPS或PS-FFS應用中之例示性化合物。



RM-1



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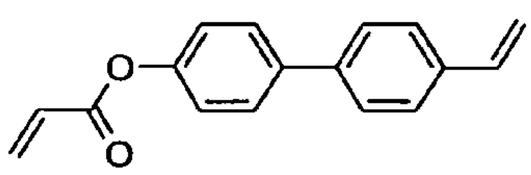

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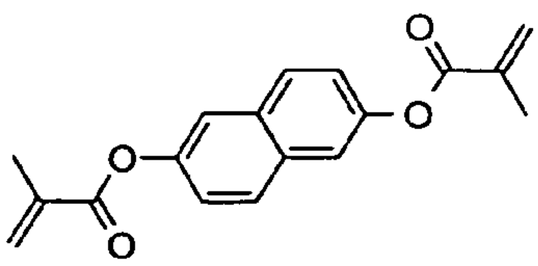

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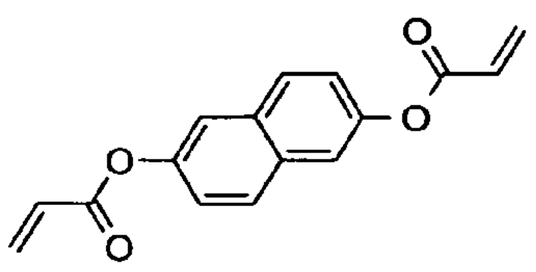

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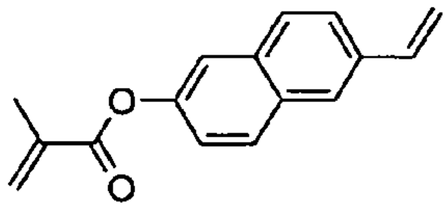

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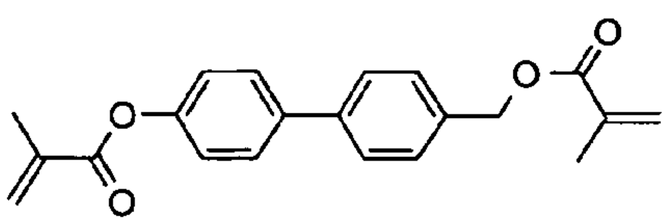

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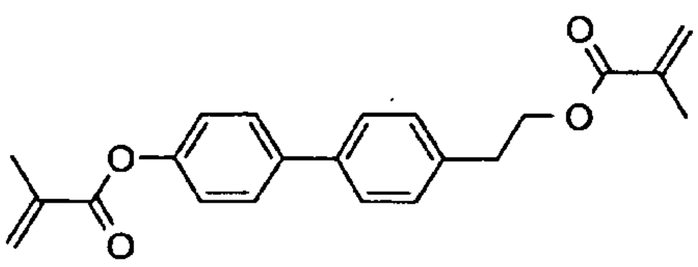

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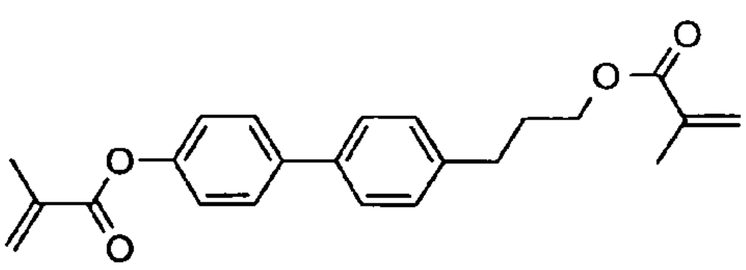

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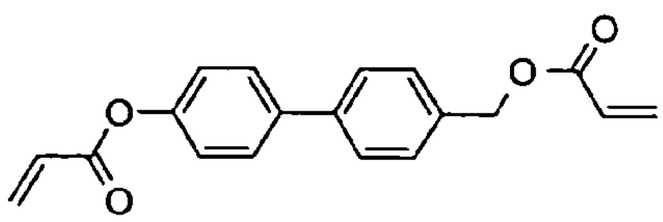

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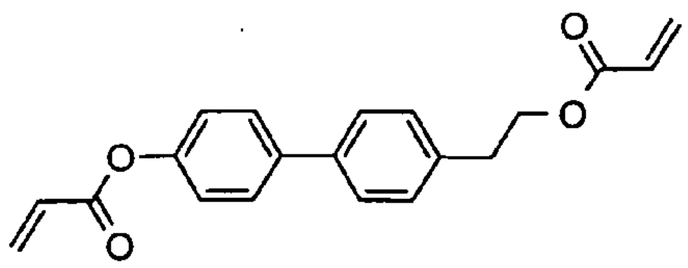

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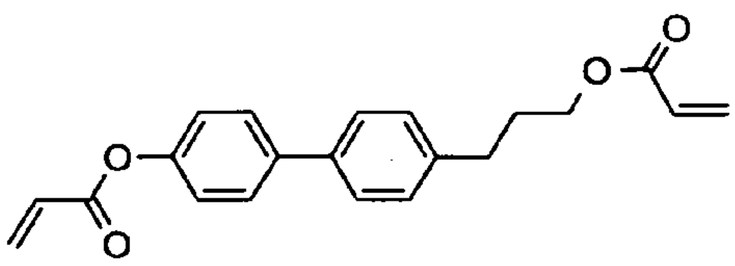

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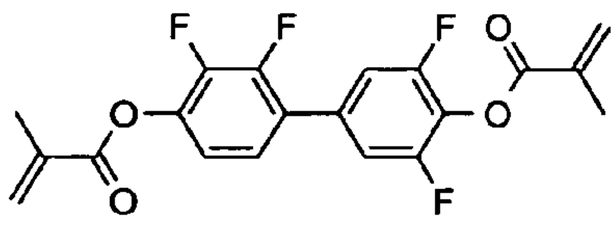

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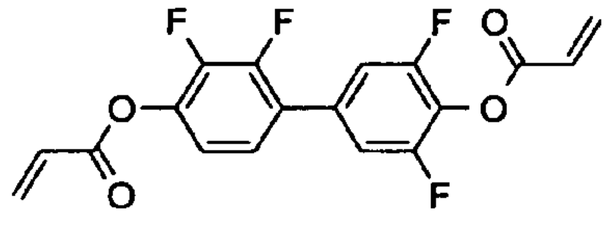

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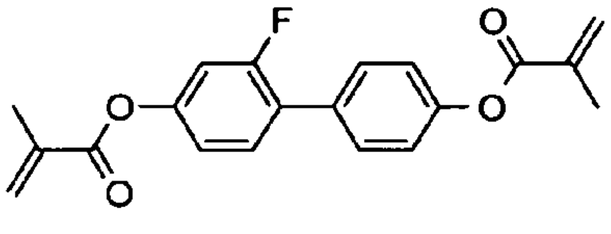

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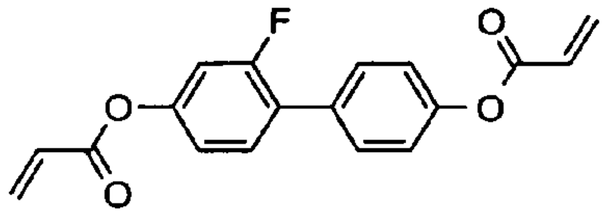

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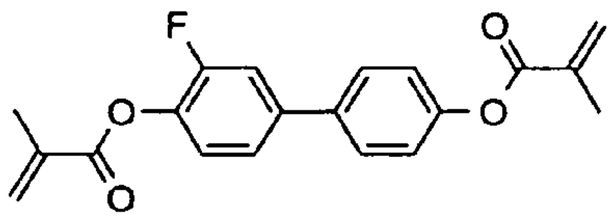

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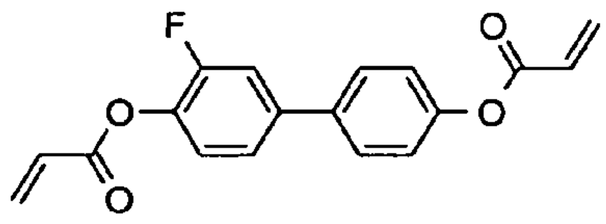

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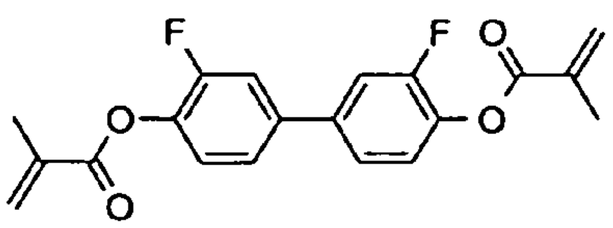

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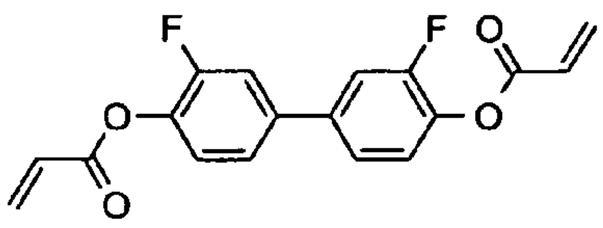

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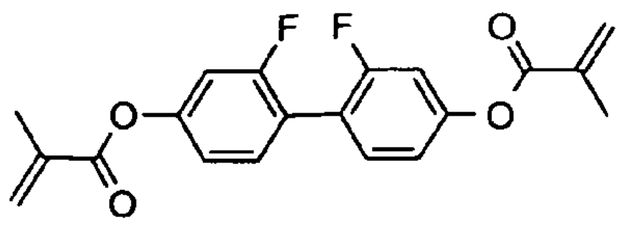

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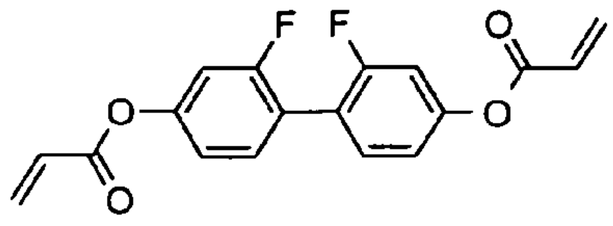

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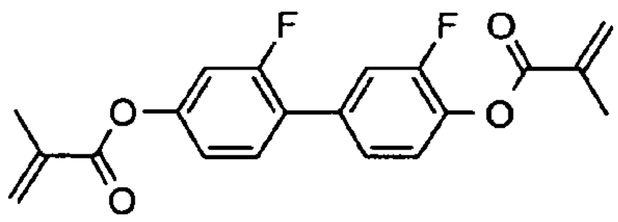

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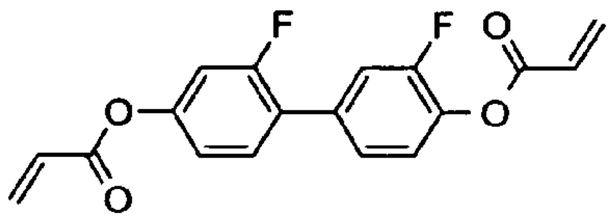

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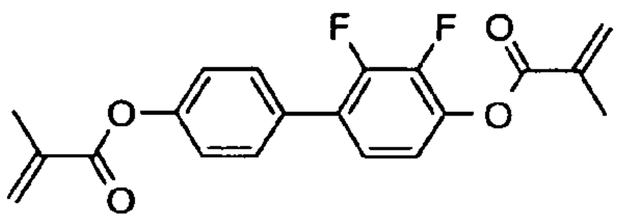

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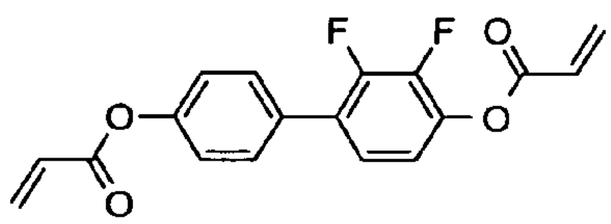

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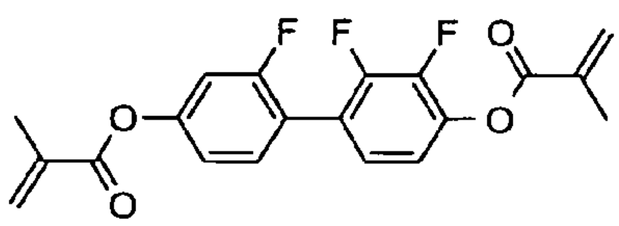

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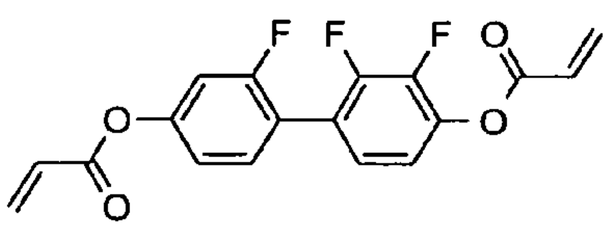

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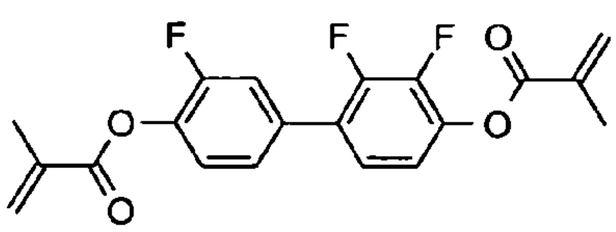

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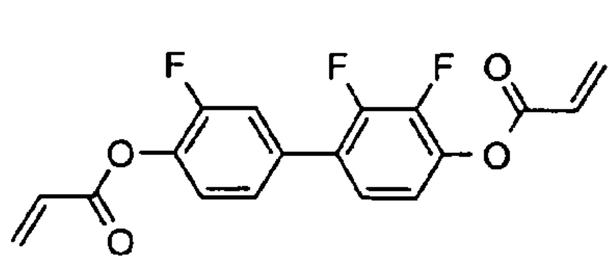

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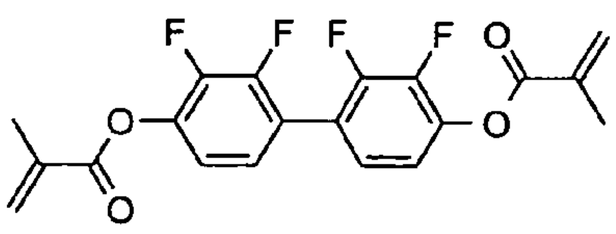

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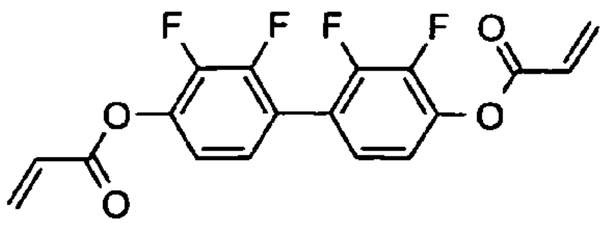

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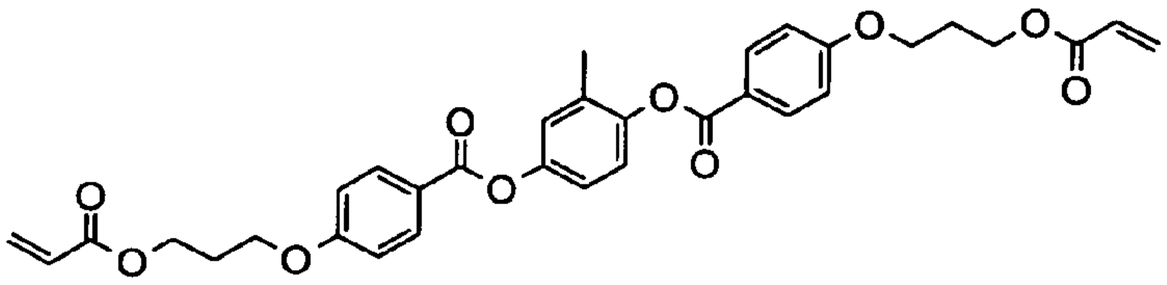

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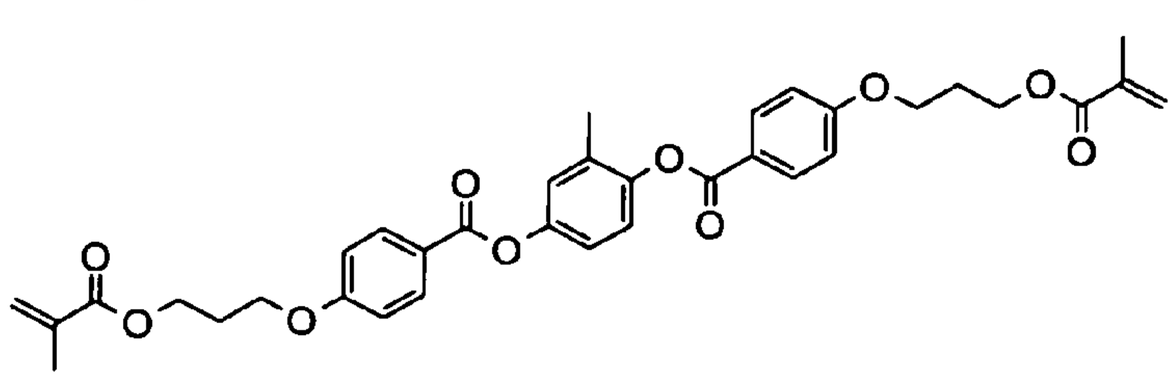

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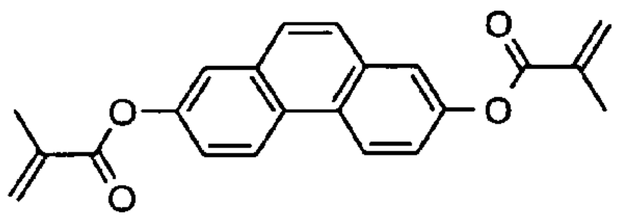

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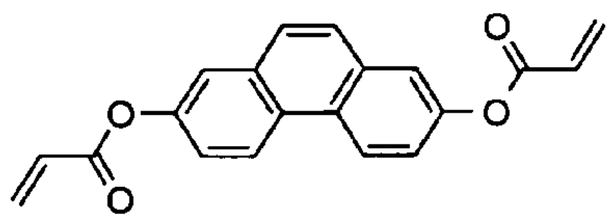
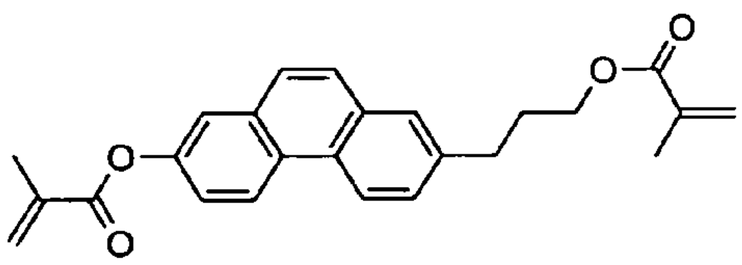
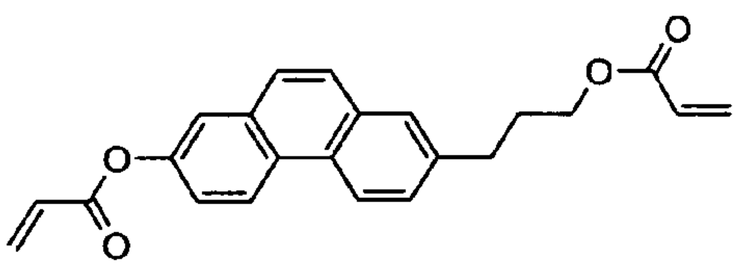


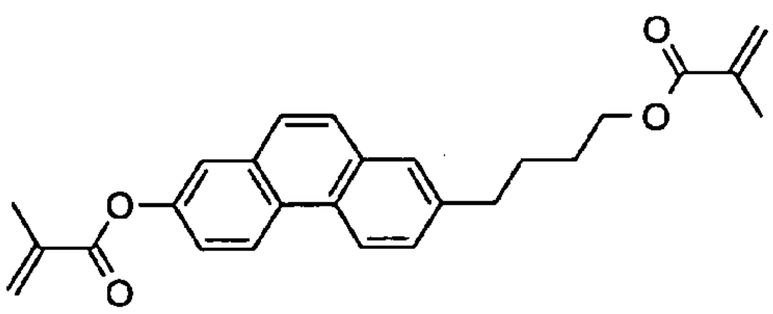
RM-36



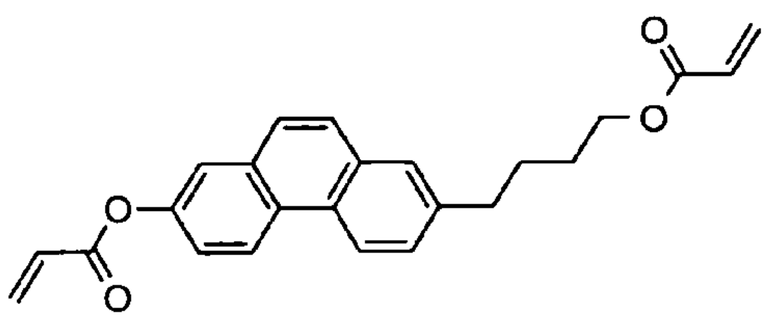
RM-37



RM-38



RM-39



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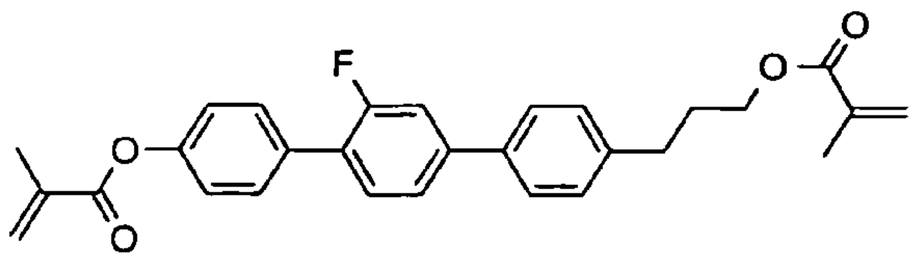
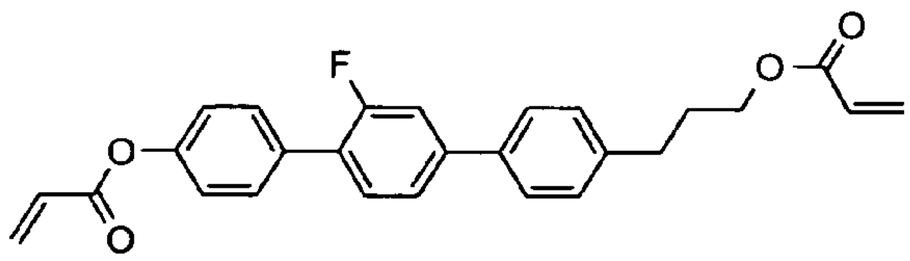
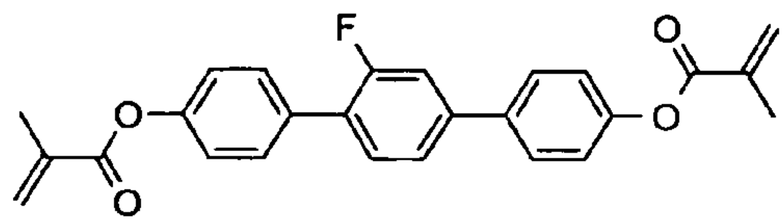


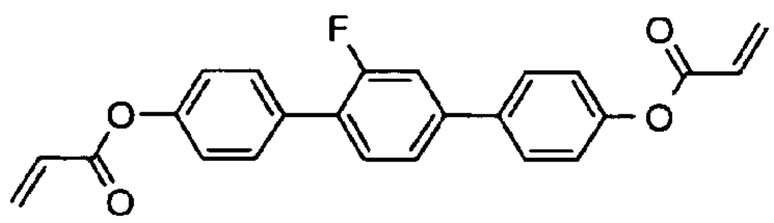
RM-41



RM-42



RM-43



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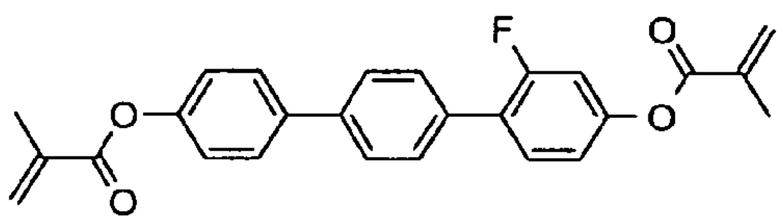
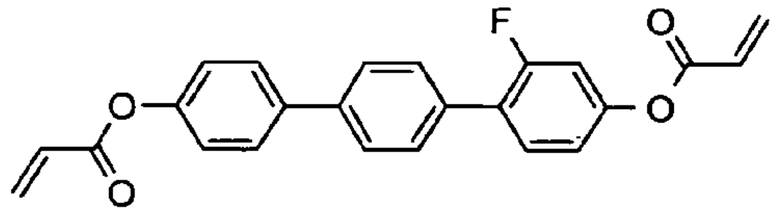
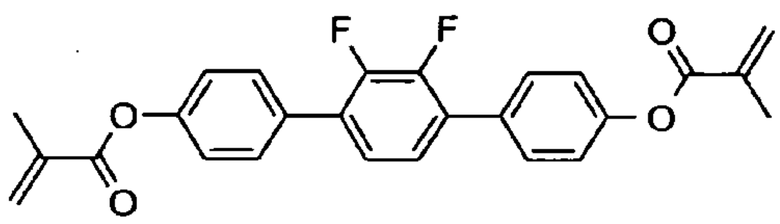


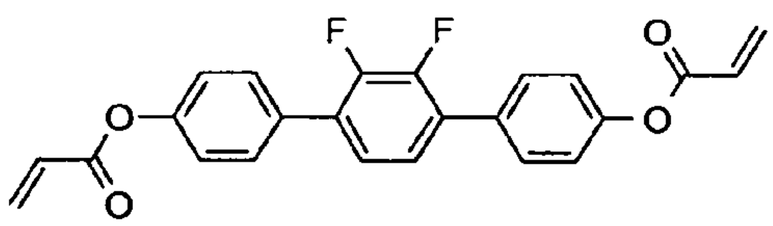
RM-45



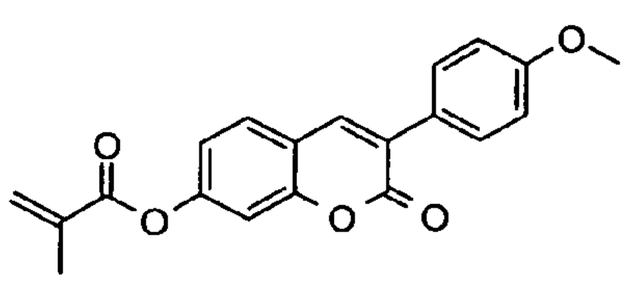
RM-46



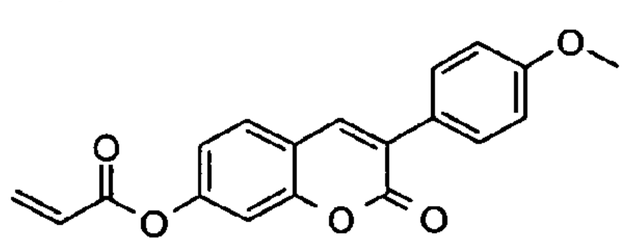
RM-47



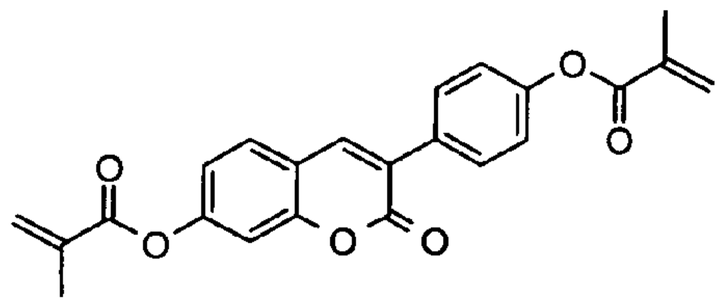
RM-48



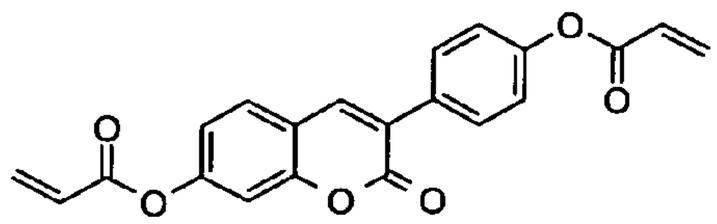
RM-49



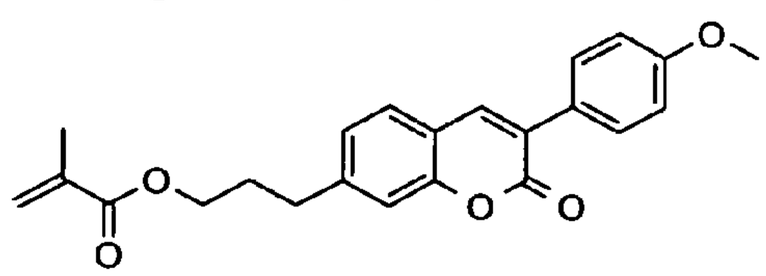
RM-50



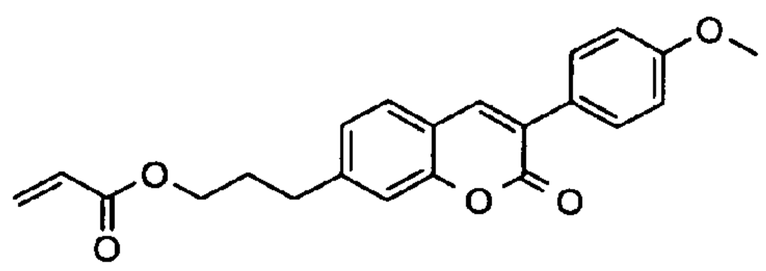
RM-51



RM-52



RM-53



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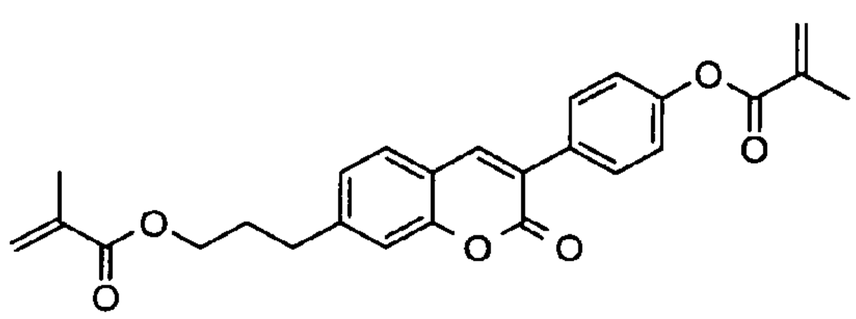
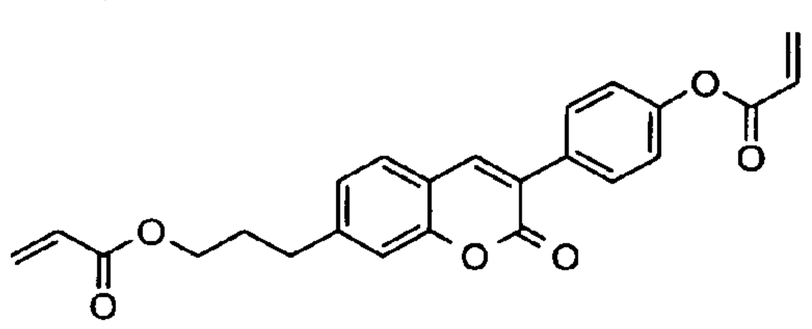


RM-55



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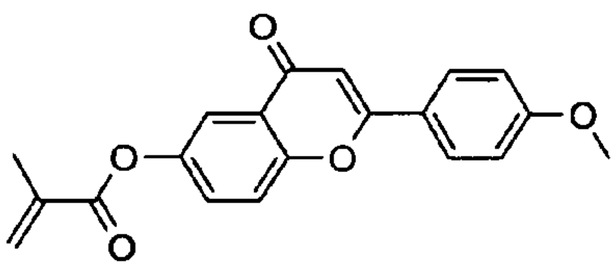

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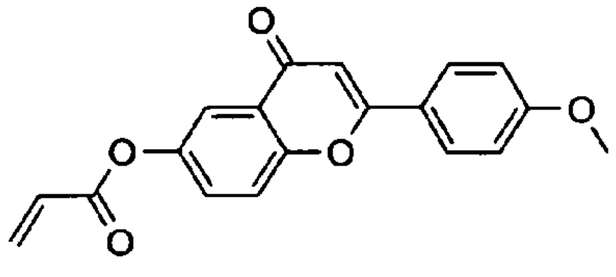

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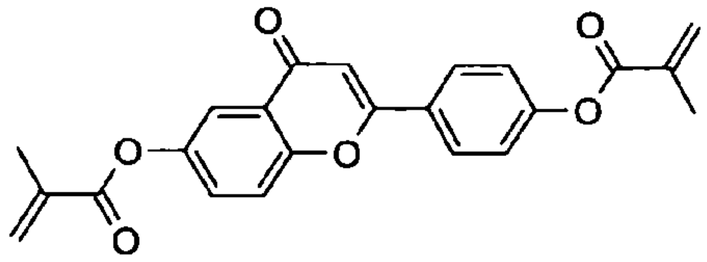

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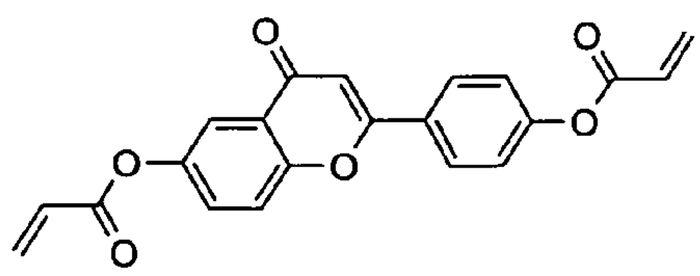

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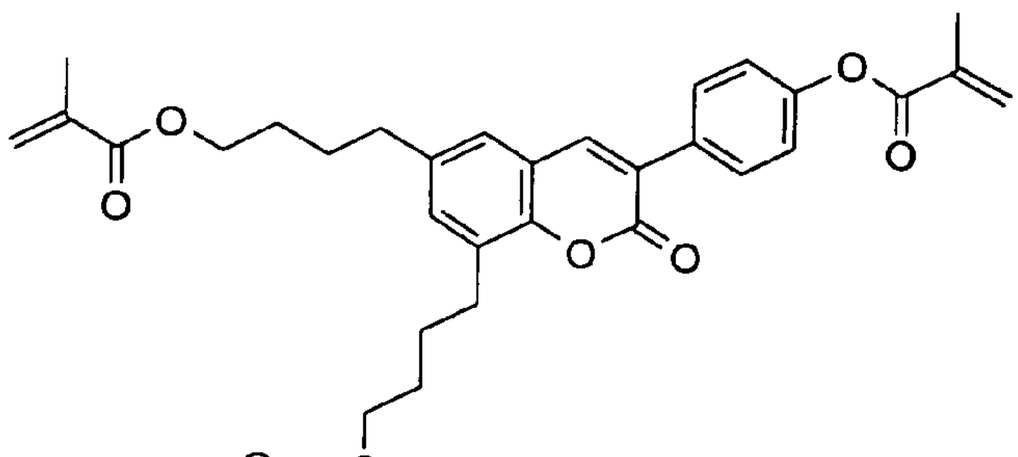

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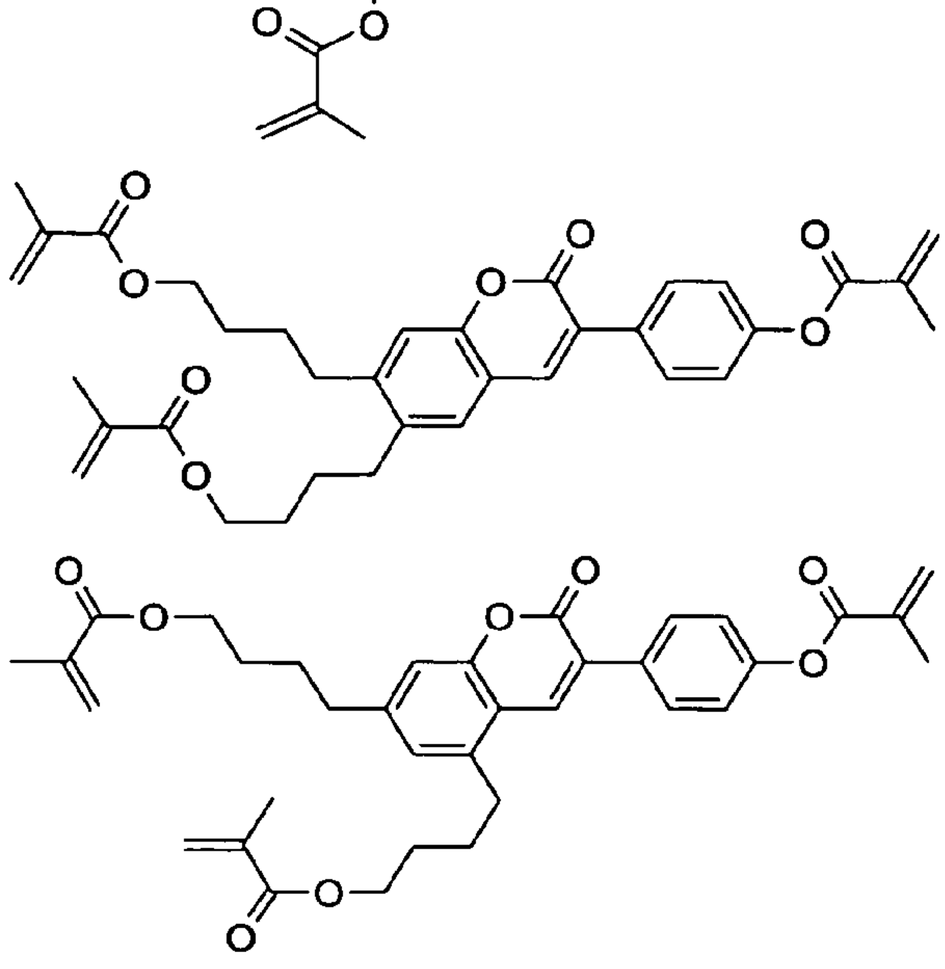
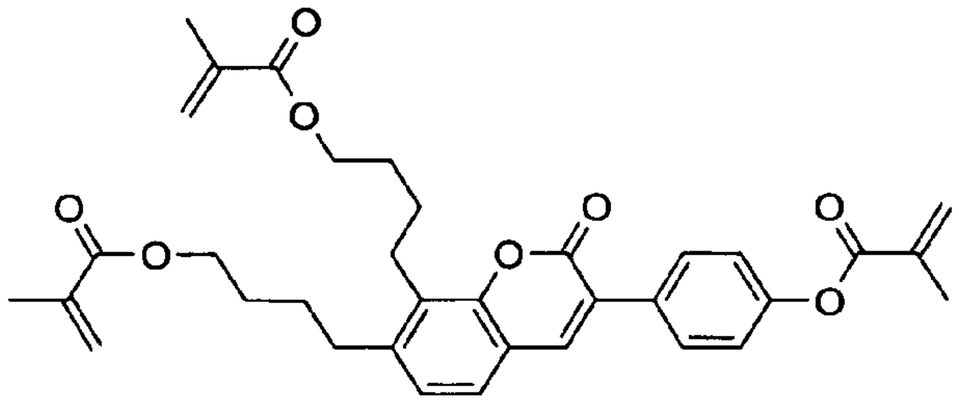


RM-62

RM-63



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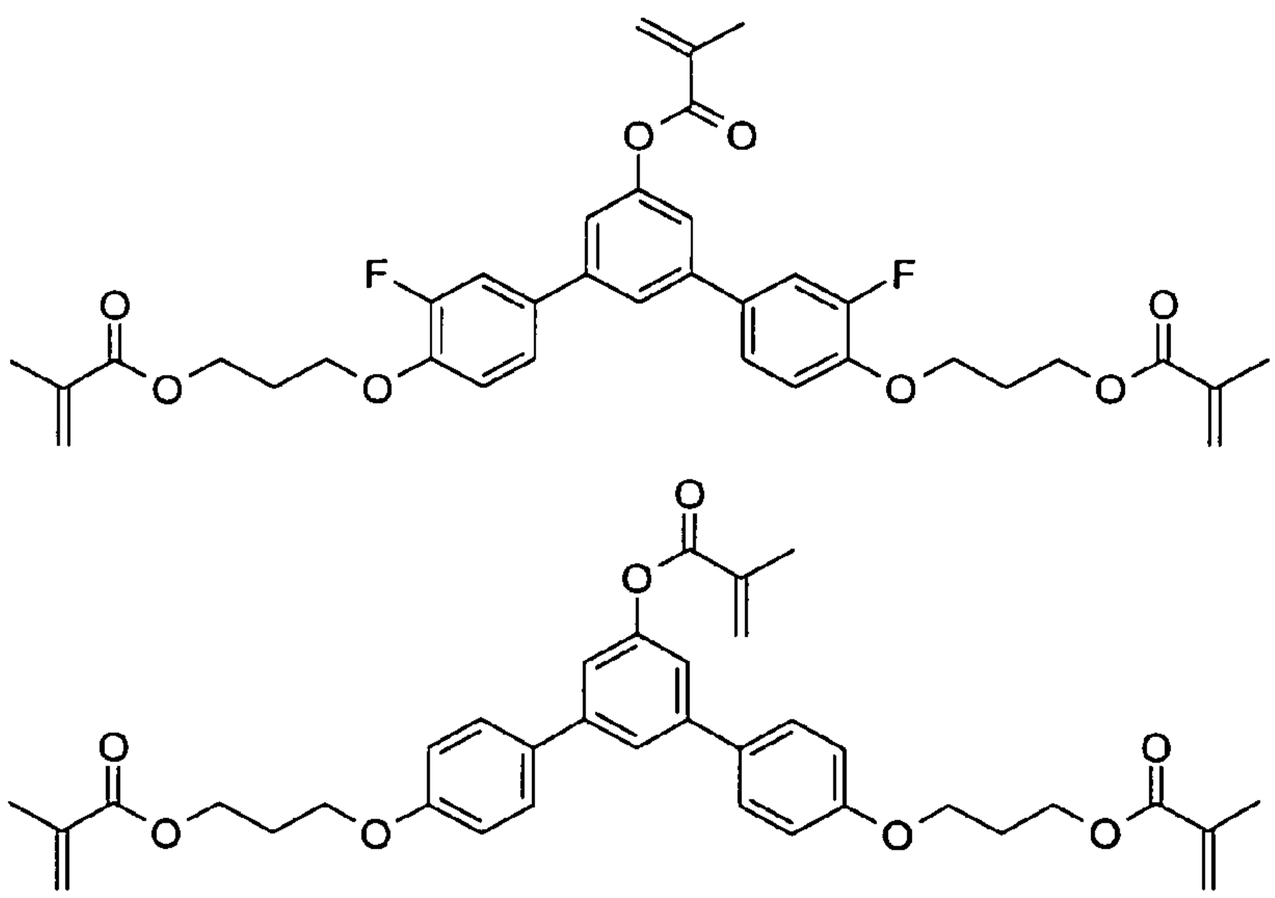
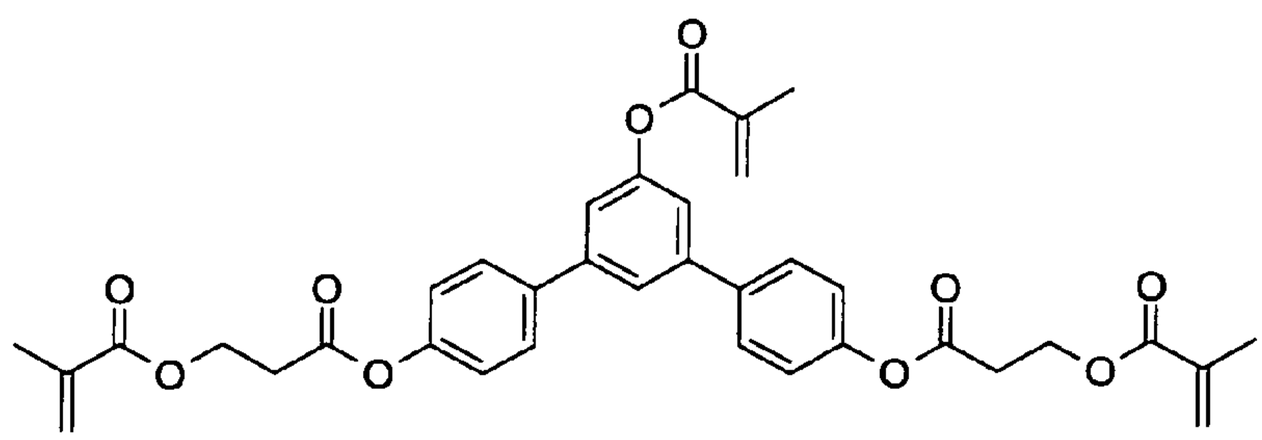
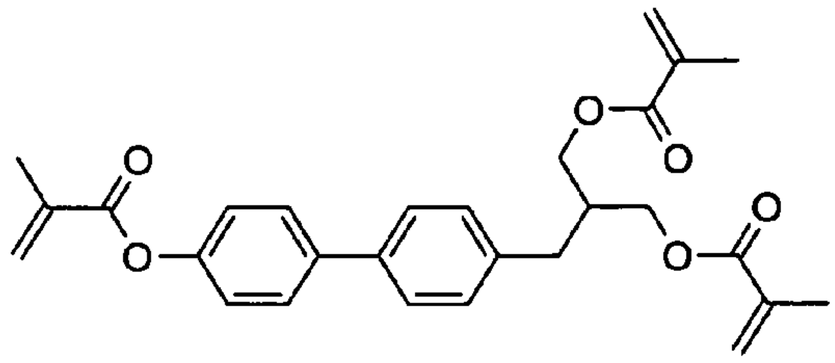


RM-65

RM-66



RM-67



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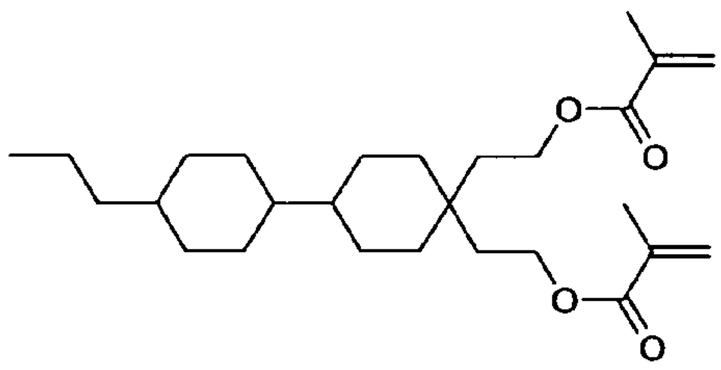

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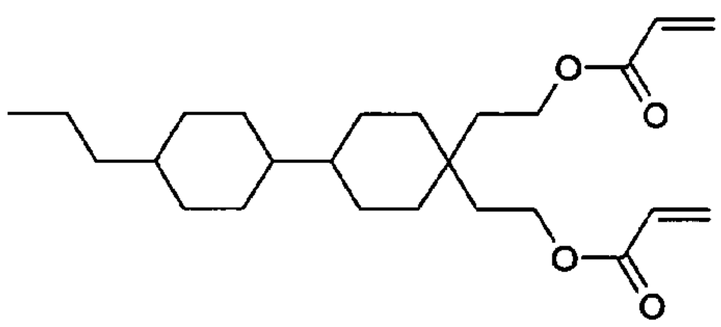

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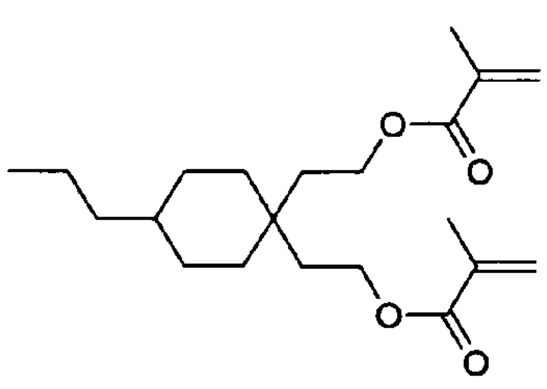

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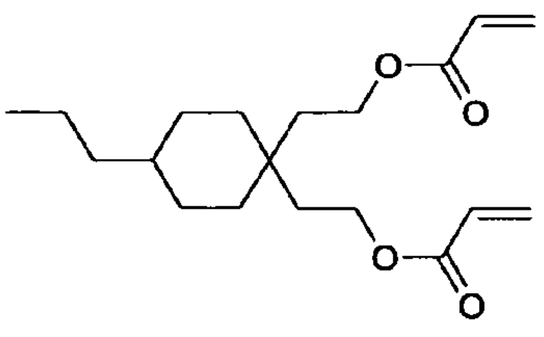
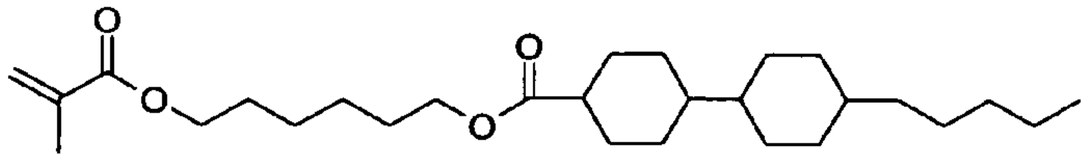
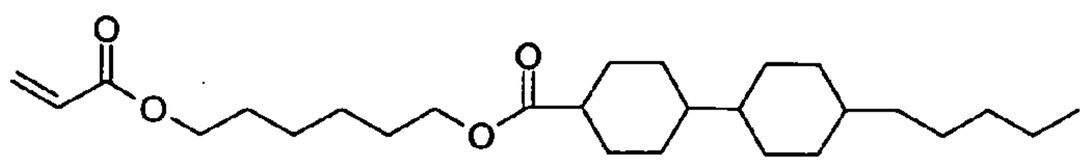


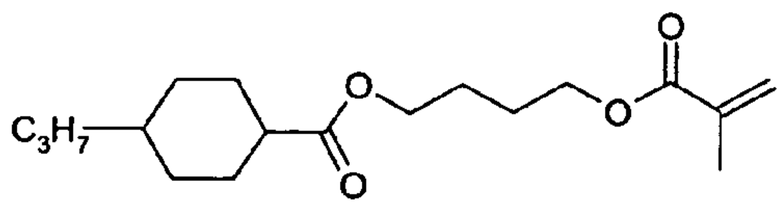
RM-72



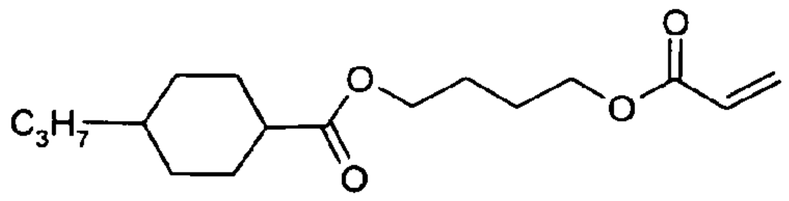
RM-73



RM-74



RM-75



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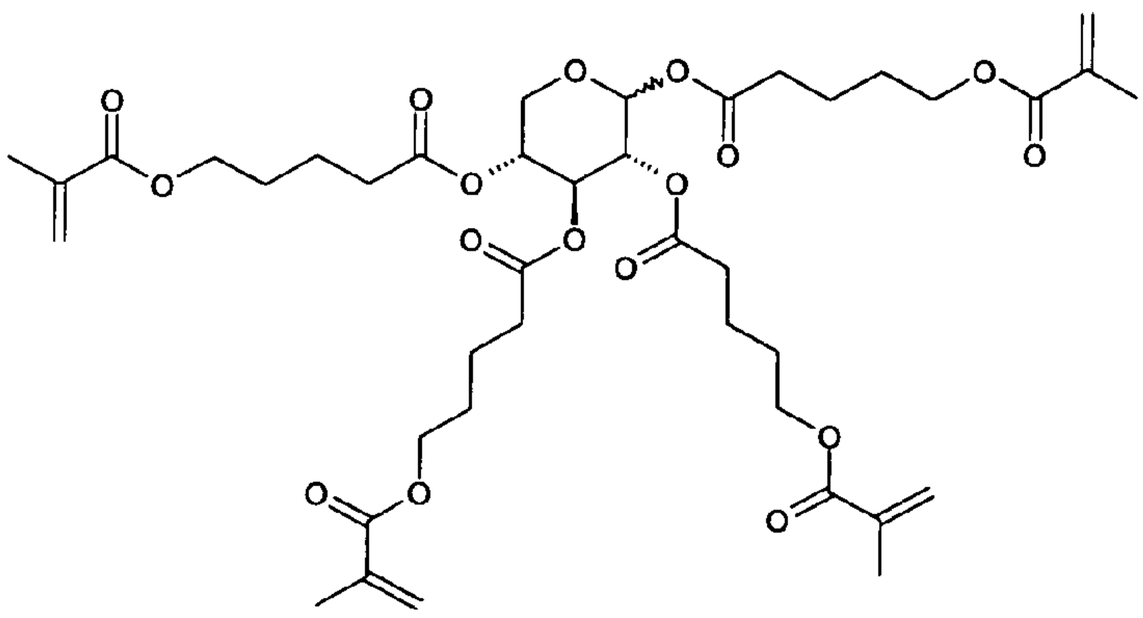

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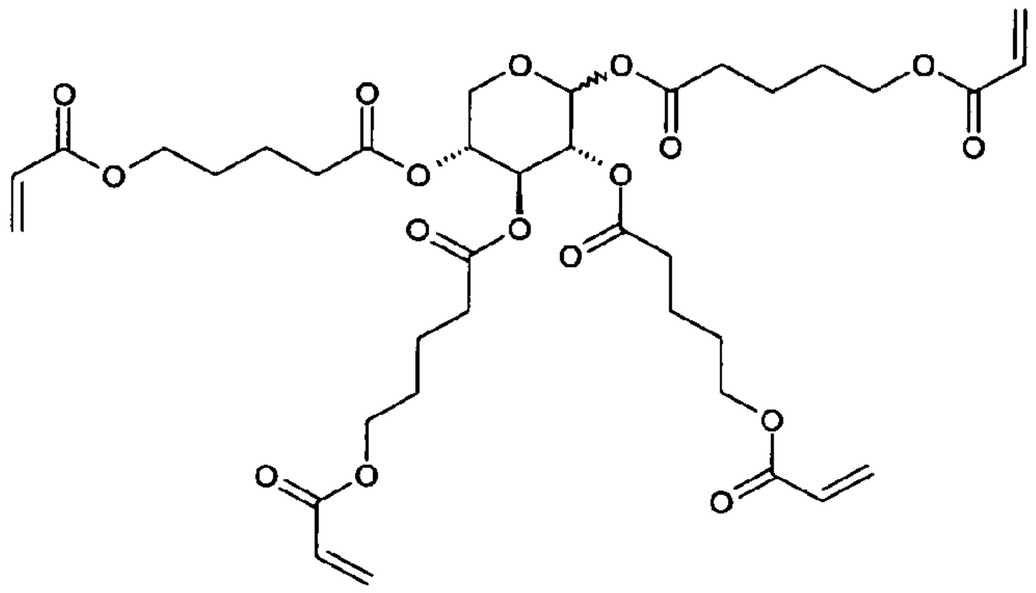

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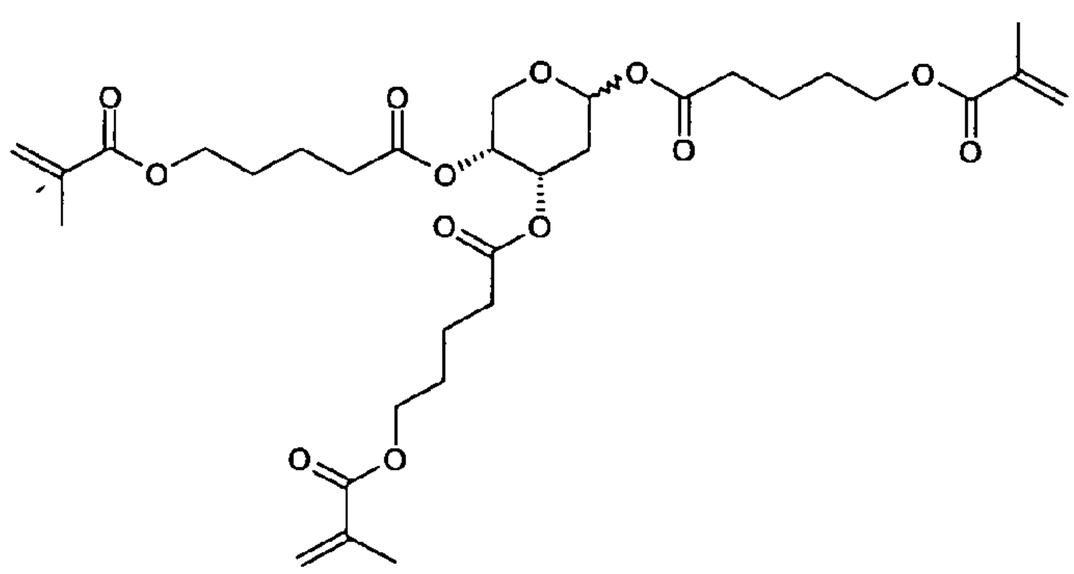
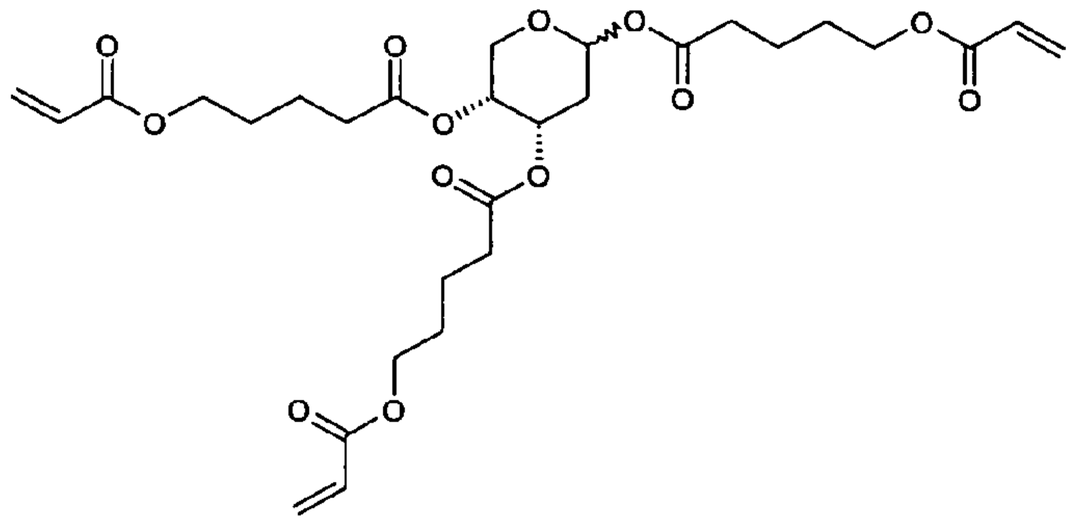
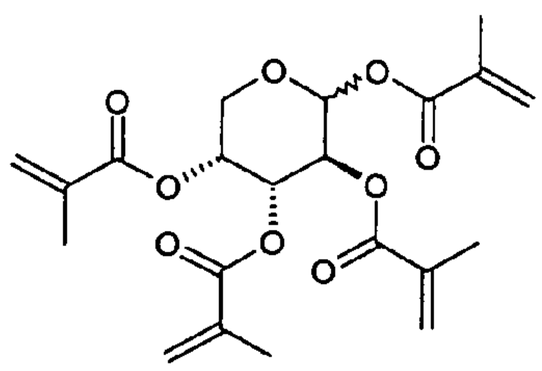


RM-79



RM-80



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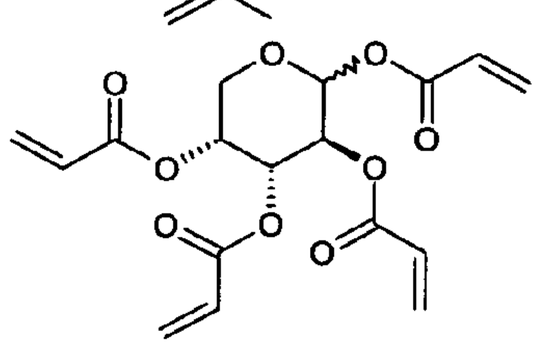
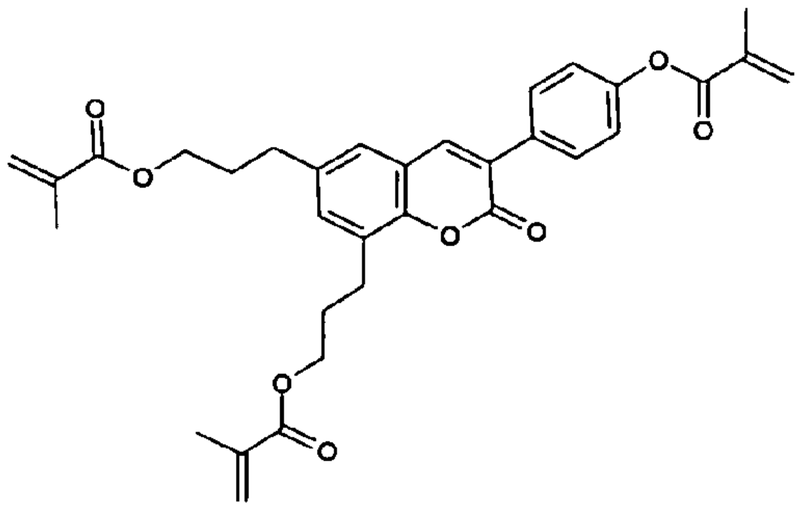


RM-82



RM-83

在本發明之LC介質含有一或多種液晶原基化合物的情況下，該液晶原基化合物較佳選自表D中所提供之化合物。

工作實例：

以下實例意欲解釋本發明而不對其加以限制。在該等實例中，m.p.表示液晶物質之熔點(攝氏度)且C表示液晶物質之清澈點(攝氏度)；沸點溫度由m.p.表示。此外：C表示結晶固態，S表示近晶相(指數表示相類型)，N表示向列狀態，Ch表示膽固醇狀液晶相，I表示各向同性相，T_g表示玻璃轉移溫度。兩個符號之間的數字指示以攝氏度表示之轉化溫度。用於測定式I化合物之光學各向異性Δn之主體混合物為市售混合物ZLI-4792 (Merck KGaA)。介電各向異性Δε係使用市售混合物ZLI-2857來測定。待研究之化合物的物理數據係自在添加待研究化合物後主體混合物之介電常數的變化且外插至100%所用化合物獲得。一般而言，視溶解度而定，將10%待研究化合物溶解於主體混合物中。

除非另外指示，否則份數或百分比數據表示重量份或重量百分比。

在上下文中，

V_o表示20℃下之電容臨限電壓[V]

Δn表示在20℃及589 nm下量測之光學各向異性

Δε表示在20℃及1 kHz下之介電各向異性

cp.，T(N，I)表示清澈點[℃]

K_1表示20℃下「張開」變形之彈性常數[pN]

K_3表示20℃下「彎曲」變形之彈性常數[pN]

γ_1表示20℃下所量測之旋轉黏度[mPa·s]，藉由旋轉法在磁場中測定

LTS表示在測試單元中測定之低溫穩定性(向列相)。

用於量測臨限電壓之顯示器具有兩個間隔20 μm之平面平行外板及在外板之內側上之具有SE-1211(Nissan Chemicals)上覆配向層之電極層，其實現液晶之垂直配向。

除非另外明確指示，否則本申請案中之所有濃度均與相應混合物或混合物組分有關。除非另外明確指示，否則所有物理特性均係如「Merck Liquid Crystals, Physical Properties of Liquid Crystals」，日期1997年11月，Merck KGaA, Germany所述測定且應用於20℃之溫度。

用於量測電容臨限電壓的顯示器由間隔20 μm的兩個平面平行的玻璃外板組成，其各自在內側上具有一電極層且在頂部具有一未經摩擦之聚醯亞胺配向層，其實現液晶分子之垂直邊緣配向。

用於量測傾斜角之顯示器或測試單元由間隔4 μm的兩個平面平行玻璃外板組成，其各自在內側上具有一電極層且在頂部具有一聚醯亞胺配向層，其中該兩個聚醯亞胺層經彼此反向平行地摩擦，且實現

液晶分子之垂直邊緣配向。

可聚合化合物在顯示器或測試單元中，藉由用限定強度之UVA光(例如365 nm)照射預先設定之時間來聚合，同時將電壓施加至顯示器(通常10 V至30 V交流電，1 kHz)。在實例中，除非另外明確地指出，否則使用金屬鹵化物燈及100 mW/cm²之強度來聚合。強度係使用標準UVA計(帶有UVA感應器之高級型Hoenle UV計)來量測。

混合物實例

實例M1

PY-3-O2	8.00%	清澈點[℃]：	74.5
PY-3-O4	9.00%	Δn [589 nm，20℃]：	0.1172
CCY-3-O3	8.00%	Δε [1 kHz，20℃]：	-3.1
CCY-4-O2	6.50%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CPY-2-O2	10.00%	K_3 [pN，20℃]：	12.9
CPY-3-O2	10.00%	K_3/K_1 [20℃]：	0.94
CCH-34	10.00%	γ_1 [mPa·s，20℃]：	116
CCH-23	22.00%	V_0 [20℃，V]：	2.14
PYP-2-3	8.00%		
PYP-2-4	4.00%		
PCH-301	4.50%		

實例M2

PY-3-O2	7.00%	清澈點[℃]：	74.5
PY-3-O4	7.00%	Δn [589 nm，20℃]：	0.1169
CY-3-O2	2.50%	Δε [1 kHz，20℃]：	-3.1
CCY-3-O3	8.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-4-O2	6.00%	K_3 [pN，20℃]：	12.8
CPY-2-O2	10.00%	K_3/K_1 [20℃]：	0.96
CPY-3-O2	10.00%	γ_1 [mPa·s，20℃]：	116
CCH-34	10.00%	V_0 [20℃，V]：	2.14
CCH-23	21.00%		
PYP-2-3	8.00%		
PYP-2-4	5.00%		
PCH-301	5.50%		

實例M3

PY-3-O2	10.00%	清澈點[℃]：	69.0
PY-3-O4	10.00%	Δn [589 nm，20℃]：	0.1199
CCY-3-O3	4.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O2	10.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CPY-2-O2	7.00%	K_3 [pN，20℃]：	13.5
CPY-3-O2	10.00%	K_3/K_1 [20℃]：	0.94
CCH-34	11.00%	γ_1 [mPa·s，20℃]：	104
CCH-23	20.00%	V_0 [20℃，V]：	2.23
PYP-2-3	7.00%		
PYP-2-4	1.50%		
CCP-3-1	2.50%		
PP-1-3	7.00%		

實例M4

BCH-32	6.50%	清澈點[℃]：	74.5
CCP-3-1	6.00%	Δn [589 nm，20℃]：	0.1021
CCH-23	20.00%	Δε [1 kHz，20℃]：	-3.1
CCH-34	3.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.6
CCH-35	3.00%	K_3 [pN，20℃]：	14.5
CCY-3-O2	10.00%	K_3/K_1 [20℃]：	0.99
CCY-3-O1	5.50%	γ_1 [mPa·s，20℃]：	97
CPY-2-O2	6.00%	V_0 [20℃，V]：	2.30
CPY-3-O2	10.00%		
Y-4O-O4	8.00%		
PY-3-O2	9.00%		
PY-3-O4	2.50%		
PYP-2-3	1.50%		
CC-3-V1	9.00%		

實例M5

CY-3-O2	10.00%	清澈點[℃]：	77.5
PY-3-O2	6.00%	Δn [589 nm，20℃]：	0.0957
PY-1-O2	6.00%	Δε [1 kHz，20℃]：	-3.0
CLY-2-O4	5.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.4
CLY-3-O2	4.00%	K_3 [pN，20℃]：	15.0
CLY-3-O3	4.00%	K_3/K_1 [20℃]：	1.01
CCY-4-O2	8.00%	γ_1 [mPa·s，20℃]：	106
CPY-3-O2	8.00%	V_0 [20℃，V]：	2.37

CCH-34	6.00%
CCH-23	22.00%
CCP-3-3	6.00%
CCP-3-1	8.50%
PCH-301	6.50%

實例M6

CY-3-O2	3.00%	清澈點[℃]：	74.0
PY-3-O2	7.00%	Δn [589 nm，20℃]：	0.1040
PY-1-O2	7.00%	Δε [1 kHz，20℃]：	-2.9
CPY-2-O2	7.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CPY-3-O2	8.00%	K_3 [pN，20℃]：	13.5
CCH-34	10.00%	K_3/K_1 [20℃]：	0.99
CCH-23	20.00%	γ_1 [mPa·s，20℃]：	105
CCP-3-3	4.00%	V_0 [20℃，V]：	2.26
BCH-32	3.50%		
PCH-301	11.50%		
CLY-2-O4	7.00%		
CLY-3-O2	5.00%		
CLY-3-O3	7.00%		

實例M7

CY-3-O2	7.00%	清澈點[℃]：	75.0
PY-3-O2	8.00%	Δn [589 nm，20℃]：	0.1075
PY-3-O4	8.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O2	4.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CLY-3-O2	8.00%	K_3 [pN，20℃]：	15.1
CPY-2-O2	8.00%	K_3/K_1 [20℃]：	1.09
CPY-3-O2	9.00%	γ_1 [mPa·s，20℃]：	87
PYP-2-3	3.00%	V_0 [20℃，V]：	2.37
CC-3-V	36.50%		
CCP-3-1	8.50%		

實例M8

CLY-3-O2	11.50%	清澈點[℃]：	74.0
CPY-2-O2	8.00%	Δn [589 nm，20℃]：	0.1150
CPY-3-O2	14.00%	Δε [1 kHz，20℃]：	-2.9
CC-3-V	43.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
PY-3-O2	10.00%	K_3 [pN，20℃]：	14.7
PY-3-O4	7.00%	K_3/K_1 [20℃]：	1.06

PYP-2-3	5.00%	γ_1 [mPa·s，20℃]：	82
PGP-2-4	1.50%	V_0 [20℃，V]：	2.39

實例M9

PY-4-O2	8.00%	清澈點[℃]：	74.0
PY-1-O4	8.00%	Δn [589 nm，20℃]：	0.0958
CCY-3-O1	7.00%	Δε [1 kHz，20℃]：	-2.2
CCY-3-O2	8.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.2
CPY-3-O2	10.00%	K_3 [pN，20℃]：	14.5
CCH-23	20.00%	K_3/K_1 [20℃]：	1.01
CCH-34	5.00%	γ_1 [mPa·s，20℃]：	90
CCH-35	5.00%	V_0 [20℃，V]：	2.73
PCH-302	10.50%		
CCH-301	6.00%		
CCP-3-1	7.50%		
BCH-32	5.00%		

實例M10

BCH-32	3.00%	清澈點[℃]：	75.0
CCH-23	21.00%	Δn [589 nm，20℃]：	0.0952
CCH-34	6.00%	Δε [1 kHz，20℃]：	-2.3
CCP-3-1	12.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.4
CCP-3-3	6.00%	K_3 [pN，20℃]：	14.8
CCY-3-O1	5.50%	K_3/K_1 [20℃]：	1.02
CCY-3-O2	9.00%	γ_1 [mPa·s，20℃]：	93
CPY-3-O2	9.50%	V_0 [20℃，V]：	2.67
PYP-2-3	3.00%		
PCH-302	10.00%		
PY-4-O2	3.50%		
PY-1-O4	3.50%		
Y-4O-O4	8.00%		

實例M11

PY-4-O2	7.00%	清澈點[℃]：	75.5
PY-1-O4	8.00%	Δn [589 nm，20℃]：	0.1074
CCY-3-O1	7.00%	Δε [1 kHz，20℃]：	-2.2
CCY-3-O2	9.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.2
CPY-3-O2	8.50%	K_3 [pN，20℃]：	14.6
PYP-2-3	3.50%	K_3/K_1 [20℃]：	1.00%
CCH-23	20.00%	γ_1 [mPa·s，20℃]：	98

CCH-34	5.00%	V_0 [20℃，V]：	2.74
CCH-35	5.00%		
PCH-302	15.00%		
BCH-32	12.00%		

實例M12

Y-4O-O4	7.00%	清澈點[℃]：	74.5
PY-4-O2	3.50%	Δn [589 nm，20℃]：	0.1069
PY-1-O4	3.50%	Δε [1 kHz，20℃]：	-2.0
CCY-3-O2	8.50%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.3
CPY-3-O2	10.00%	K_3 [pN，20℃]：	14.2
PYP-2-3	9.50%	K_3/K_1 [20℃]：	0.97
CCH-23	19.00%	γ_1 [mPa·s，20℃]：	88
CCH-34	6.00%	V_0 [20℃，V]：	2.80
CCH-35	6.00%		
PCH-302	8.50%		
BCH-32	8.50%		
CCP-3-1	10.00%		

實例M13

PY-3-O2	12.00%	清澈點[℃]：	74.0
PY-2-O2	11.00%	Δn [589 nm，20℃]：	0.1079
CCY-3-O1	6.00%	Δε [1 kHz，20℃]：	-3.1
CCY-3-O2	8.50%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.7
CPY-2-O2	7.00%	K_3 [pN，20℃]：	15.0
CPY-3-O2	10.00%	K_3/K_1 [20℃]：	1.11
CC-3-V	36.50%	γ_1 [mPa·s，20℃]：	85
CCP-3-1	8.50%	V_0 [20℃，V]：	2.34
PPGU-3-F	0.50%		

實例M14

CY-3-O2	3.50%	清澈點[℃]：	75.0
PY-3-O2	9.00%	Δn [589 nm，20℃]：	0.1025
PY-2-O2	6.00%	Δε [1 kHz，20℃]：	-3.1
CCY-3-O2	9.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O1	6.00%	K_3 [pN，20℃]：	14.2
CCY-4-O2	2.00%	K_3/K_1 [20℃]：	1.04
CPY-2-O2	8.00%	γ_1 [mPa·s，20℃]：	103
CPY-3-O2	10.00%	V_0 [20℃，V]：	2.27
CCH-34	10.00%		

CCH-23	21.00%
BCH-32	3.00%
CCP-3-1	4.00%
PCH-301	8.50%

實例M15

PY-3-O2	10.00%	清澈點[℃]：	75.0
PY-2-O2	9.00%	Δn [589 nm，20℃]：	0.1035
CCY-3-O2	9.00%	Δε [1 kHz，20℃]：	-3.1
CCY-3-O1	6.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-4-O2	3.00%	K_3 [pN，20℃]：	14.4
CPY-2-O2	7.00%	K_3/K_1 [20℃]：	1.04
CPY-3-O2	10.00%	γ_1 [mPa·s，20℃]：	103
CCH-34	10.00%	V_0 [20℃，V]：	2.26
CCH-23	20.00%		
CCP-3-1	7.00%		
PCH-301	9.00%		

實例M16

CY-3-O2	8.00%	清澈點[℃]：	79.5
PY-2-O2	8.00%	Δn [589 nm，20℃]：	0.0948
PY-1-O2	6.50%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O2	5.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.4
CCY-3-O3	8.00%	K_3 [pN，20℃]：	15.1
CCY-4-O2	8.00%	K_3/K_1 [20℃]：	1.05
CPY-3-O2	8.00%	γ_1 [mPa·s，20℃]：	110
CCH-34	6.00%	V_0 [20℃，V]：	2.38
CCH-23	22.00%		
CCP-3-3	7.50%		
CCP-3-1	8.50%		
PCH-301	4.50%		

實例M17

PY-4-O2	8.00%	清澈點[℃]：	74.0
PY-1-O4	8.00%	Δn [589 nm，20℃]：	0.0958
CCY-3-O1	7.00%	Δε [1 kHz，20℃]：	-2.2
CCY-3-O2	8.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.2
CPY-3-O2	10.00%	K_3 [pN，20℃]：	14.5
CCH-23	20.00%	K_3/K_1 [20℃]：	1.01
CCH-34	5.00%	γ_1 [mPa·s，20℃]：	90

CCH-35	5.00%	V_0 [20℃，V]：	2.73
PCH-302	10.50%		
CCH-301	6.00%		
CCP-3-1	7.50%		
BCH-32	5.00%		

實例M18

PY-3-O2	11.00%	清澈點[℃]：	74.0
PY-1-O4	6.50%	Δn [589 nm，20℃]：	0.1093
CY-3-O2	5.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O1	6.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.7
CCY-3-O2	8.00%	K_3 [pN，20℃]：	14.6
CPY-2-O2	8.50%	K_3/K_1 [20℃]：	1.11
CPY-3-O2	10.00%	γ_1 [mPa·s，20℃]：	87
CC-3-V	37.50%	V_0 [20℃，V]：	2.32
BCH-32	7.00%		
PPGU-3-F	0.50%		

實例M19

CY-3-O2	4.00%	清澈點[℃]：	75.0
PY-3-O2	9.00%	Δn [589 nm，20℃]：	0.1022
PY-4-O2	6.00%	Δε [1 kHz，20℃]：	-3.1
CCY-3-O2	9.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O1	6.00%	K_3 [pN，20℃]：	14.1
CCY-4-O2	2.00%	K_3/K_1 [20℃]：	1.03
CPY-2-O2	8.00%	γ_1 [mPa·s，20℃]：	104
CPY-3-O2	10.00%	V_0 [20℃，V]：	2.26
CCH-34	10.00%		
CCH-23	21.00%		
BCH-32	3.50%		
CCP-3-1	3.00%		
PCH-301	8.50%		

實例M20

PY-3-O2	12.00%	清澈點[℃]：	74.0
PY-4-O2	11.00%	Δn [589 nm，20℃]：	0.1075
CCY-3-O1	6.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O2	8.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.7
CPY-2-O2	8.00%	K_3 [pN，20℃]：	14.7
CPY-3-O2	10.00%	K_3/K_1 [20℃]：	1.09

CC-3-V	37.00%	γ_1 [mPa·s，20℃]：	87
CCP-3-1	7.50%	V_0 [20℃，V]：	2.35
PPGU-3-F	0.50%		

實例M21

PY-3-O2	6.50%	清澈點[℃]：	75.0
PY-1-O4	6.00%	Δn [589 nm，20℃]：	0.1039
PY-4-O2	6.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O2	9.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O1	5.00%	K_3 [pN，20℃]：	14.1
CCY-4-O2	3.50%	K_3/K_1 [20℃]：	1.01
CPY-2-O2	7.00%	γ_1 [mPa·s，20℃]：	105
CPY-3-O2	10.00%	V_0 [20℃，V]：	2.29
CCH-34	10.00%		
CCH-23	20.00%		
BCH-32	3.50%		
CCP-3-1	3.50%		
PCH-301	10.00%		

實例M22

PY-3-O2	12.00%	清澈點[℃]：	74.0
PY-1-O4	6.00%	Δn [589 nm，20℃]：	0.1080
PY-4-O2	5.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O1	5.50%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.7
CCY-3-O2	9.00%	K_3 [pN，20℃]：	14.9
CPY-2-O2	7.00%	K_3/K_1 [20℃]：	1.10
CPY-3-O2	10.00%	γ_1 [mPa·s，20℃]：	86
CC-3-V	37.50%	V_0 [20℃，V]：	2.36
CCP-3-1	6.00%		
BCH-32	1.50%		
PPGU-3-F	0.50%		

實例M23

CY-3-O2	2.00%	清澈點[℃]：	74.5
PY-3-O2	7.00%	Δn [589 nm，20℃]：	0.1030
PY-1-O4	5.50%	Δε [1 kHz，20℃]：	-3.0
PY-4-O2	4.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O2	9.00%	K_3 [pN，20℃]：	14.2
CCY-3-O1	6.00%	K_3/K_1 [20℃]：	1.04
CCY-4-O2	2.00%	γ_1 [mPa·s，20℃]：	105

CPY-2-O2	8.00%	V_0 [20℃，V]：	2.28
CPY-3-O2	10.00%		
CCH-34	10.00%		
CCH-23	20.00%		
BCH-32	3.00%		
CCP-3-1	3.50%		
PCH-301	10.00%		

實例M24

CY-3-O2	4.00%	清澈點[℃]：	73.5
PY-3-O2	7.00%	Δn [589 nm，20℃]：	0.1034
PY-1-O4	5.50%	Δε [1 kHz，20℃]：	-3.1
PY-4-O2	4.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O2	10.00%	K_3 [pN，20℃]：	14.5
CCY-3-O1	6.00%	K_3/K_1 [20℃]：	1.01
CCY-4-O2	6.00%	γ_1 [mPa·s，20℃]：	105
CPY-2-O2	3.00%	V_0 [20℃，V]：	2.28
CPY-3-O2	10.00%		
CCH-34	10.00%		
CCH-23	20.00%		
CCP-3-1	6.00%		
PCH-301	2.50%		
PP-1-3	6.00%		

實例M25

PY-3-O2	6.00%	清澈點[℃]：	73.0
PY-4-O2	8.00%	Δn [589 nm，20℃]：	0.1175
PY-1-O4	6.50%	Δε [1 kHz，20℃]：	-3.5
CCY-3-O3	5.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.6
CCY-3-O2	12.00%	K_3 [pN，20℃]：	13.9
CPY-2-O2	8.00%	K_3/K_1 [20℃]：	0.96
CPY-3-O2	12.00%	γ_1 [mPa·s，20℃]：	116
CCH-34	10.00%	V_0 [20℃，V]：	2.12
CCH-23	21.00%		
PYP-2-3	4.00%		
PYP-2-4	2.00%		
CCP-3-1	1.00%		
PP-1-3	4.50%		

實例M26

PY-3-O2	10.00%	清澈點[℃]：	75.0
PY-1-O4	5.00%	Δn [589 nm，20℃]：	0.1101
PY-3-O4	2.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O2	10.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-4-O2	4.50%	K_3 [pN，20℃]：	13.9
CCY-3-O1	6.00%	K_3/K_1 [20℃]：	1.08
CPY-2-O2	3.00%	γ_1 [mPa·s，20℃]：	108
CPY-3-O2	10.00%	V_0 [20℃，V]：	2.27
CCH-34	10.00%		
CCH-23	21.00%		
PYP-2-3	7.00%		
BCH-32	2.50%		
PCH-301	9.00%		

實例M27

CY-3-O2	2.50%	清澈點[℃]：	75.0
PY-3-O2	6.00%	Δn [589 nm，20℃]：	0.1025
PY-1-O4	5.00%	Δε [1 kHz，20℃]：	-3.1
PY-2-O2	5.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O2	9.00%	K_3 [pN，20℃]：	14.3
CCY-3-O1	5.00%	K_3/K_1 [20℃]：	1.05
CCY-4-O2	3.00%	γ_1 [mPa·s，20℃]：	104
CPY-2-O2	8.00%	V_0 [20℃，V]：	2.27
CPY-3-O2	10.00%		
CCH-34	10.00%		
CCH-23	20.00%		
BCH-32	3.00%		
CCP-3-1	4.00%		
PCH-301	9.50%		

實例M28

PY-3-O2	10.00%	清澈點[℃]：	73.5
PY-1-O4	7.00%	Δn [589 nm，20℃]：	0.1104
PY-3-O4	6.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O2	9.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O1	6.00%	K_3 [pN，20℃]：	14.0
CPY-2-O2	5.50%	K_3/K_1 [20℃]：	0.99
CPY-3-O2	10.00%	γ_1 [mPa·s，20℃]：	105
CCH-34	10.00%	γ V_0 [20℃，V]：	2.27
CCH-23	20.00%		

CCP-3-1	2.00%
BCH-32	8.50%
PCH-301	6.00%

實例M29

PY-3-O2	7.00%	清澈點[℃]：	73.5
PY-1-O4	6.00%	Δn [589 nm，20℃]：	0.1105
PY-2-O2	5.00%	Δε [1 kHz，20℃]：	-3.0
PY-3-O4	5.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O2	9.00%	K_3 [pN，20℃]：	13.9
CCY-3-O1	6.00%	K_3/K_1 [20℃]：	1.00%
CPY-2-O2	5.50%	γ_1 [mPa·s，20℃]：	103
CPY-3-O2	10.00%	V_0 [20℃，V]：	2.25
CCH-34	10.00%		
CCH-23	20.00%		
CCP-3-1	2.50%		
BCH-32	8.50%		
PCH-301	5.50%		

實例M30

PY-3-O2	12.00%	清澈點[℃]：	74.0
PY-1-O4	6.00%	Δn [589 nm，20℃]：	0.1077
PY-2-O2	5.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O1	5.50%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.7
CCY-3-O2	9.00%	K_3 [pN，20℃]：	15.1
CPY-2-O2	7.00%	K_3/K_1 [20℃]：	1.11
CPY-3-O2	10.00%	γ_1 [mPa·s，20℃]：	86
CC-3-V	37.00%	V_0 [20℃，V]：	2.36
CCP-3-1	8.00%		
PPGU-3-F	0.50%		

實例M31

PY-3-O2	12.00%	清澈點[℃]：	74.0
PY-1-O4	6.00%	Δn [589 nm，20℃]：	0.1080
PY-4-O2	5.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O1	5.50%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.7
CCY-3-O2	9.00%	K_3 [pN，20℃]：	14.9
CPY-2-O2	7.00%	K_3/K_1 [20℃]：	1.10
CPY-3-O2	10.00%	γ_1 [mPa·s，20℃]：	86
CC-3-V	37.50%	V_0 [20℃，V]：	2.36

CCP-3-1	6.00%
BCH-32	1.50%
PPGU-3-F	0.50%

實例M32

PY-3-O2	10.00%	清澈點[℃]：	75.0
PY-2-O2	5.00%	Δn [589 nm，20℃]：	0.1098
PY-3-O4	2.50%	Δε [1 kHz，20℃]：	-3.1
CCY-3-O2	9.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-4-O2	5.00%	K_3 [pN，20℃]：	14.0
CCY-3-O1	5.50%	K_3/K_1 [20℃]：	1.02
CPY-2-O2	4.00%	γ_1 [mPa·s，20℃]：	107
CPY-3-O2	10.00%	V_0 [20℃，V]：	2.25
CCH-34	10.00%		
CCH-23	20.00%		
PYP-2-3	6.50%		
CCP-3-1	2.00%		
BCH-32	1.50%		
PCH-301	9.00%		

實例M33

PY-3-O2	10.00%	清澈點[℃]：	75.0
PY-2-O2	5.00%	Δn [589 nm，20℃]：	0.1098
PY-3-O4	2.50%	Δε [1 kHz，20℃]：	-3.1
CCY-3-O2	9.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-4-O2	5.00%	K_3 [pN，20℃]：	14.0
CCY-3-O1	5.50%	K_3/K_1 [20℃]：	1.02
CPY-2-O2	4.00%	γ_1 [mPa·s，20℃]：	107
CPY-3-O2	10.00%	V_0 [20℃，V]：	2.25
CCH-34	10.00%		
CCH-23	20.00%		
PYP-2-3	6.50%		
CCP-3-1	2.00%		
BCH-32	1.50%		
PCH-301	9.00%		

實例M34

PY-3-O2	10.00%	清澈點[℃]：	75.0
PY-1-O4	5.00%	Δn [589 nm，20℃]：	0.1101
PY-3-O4	2.00%	Δε [1 kHz，20℃]：	-3.0

CCY-3-O2	10.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-4-O2	4.50%	K_3 [pN，20℃]：	13.9
CCY-3-O1	6.00%	K_3/K_1 [20℃]：	1.08
CPY-2-O2	3.00%	γ_1 [mPa·s，20℃]：	108
CPY-3-O2	10.00%	V_0 [20℃，V]：	2.27
CCH-34	10.00%		
CCH-23	21.00%		
PYP-2-3	7.00%		
BCH-32	2.50%		
PCH-301	9.00%		

實例M35

CY-3-O2	2.50%	清澈點[℃]：	75.0
PY-3-O2	6.00%	Δn [589 nm，20℃]：	0.1025
PY-1-O4	5.00%	Δε [1 kHz，20℃]：	-3.1
PY-2-O2	5.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O2	9.00%	K_3 [pN，20℃]：	14.3
CCY-3-O1	5.00%	K_3/K_1 [20℃]：	1.05
CCY-4-O2	3.00%	γ_1 [mPa·s，20℃]：	104
CPY-2-O2	8.00%	V_0 [20℃，V]：	2.27
CPY-3-O2	10.00%		
CCH-34	10.00%		
CCH-23	20.00%		
BCH-32	3.00%		
CCP-3-1	4.00%		
PCH-301	9.50%		

實例M36

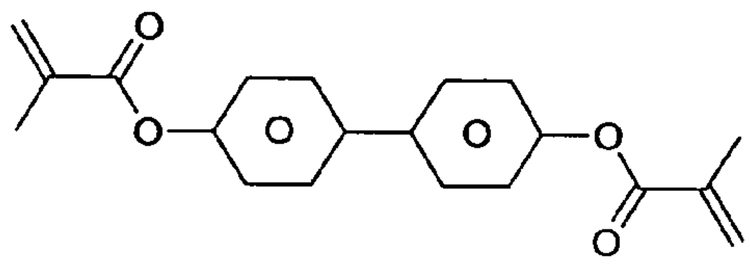
PY-4-O2	5.00%	清澈點[℃]：	75.0
PY-1-O4	4.00%	Δn [589 nm，20℃]：	0.1072
PY-3-O2	8.00%	Δε [1 kHz，20℃]：	-1.9
CPY-2-O2	10.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.2
CPY-3-O2	10.00%	K_3 [pN，20℃]：	13.6
BCH-32	12.00%	K_3/K_1 [20℃]：	0.93
CCP-3-1	7.00%	γ_1 [mPa·s，20℃]：	86
CCH-23	15.00%	V_0 [20℃，V]：	2.84
CCH-34	7.00%		
CCH-35	10.00%		
CCH-301	6.00%		
PCH-301	6.00%		

實例M37

CCY-3-O2	7.50%	清澈點[℃]：	75.0
CCY-3-O1	8.00%	Δn [589 nm，20℃]：	0.0902
CCY-3-O3	5.00%	Δε [1 kHz，20℃]：	-3.9
CCY-4-O2	8.50%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.7
CPY-2-O2	5.00%	K_3 [pN，20℃]：	15.0
CPY-3-O2	6.00%	K_3/K_1 [20℃]：	1.18
CY-3-O2	18.00%	γ_1 [mPa·s，20℃]：	99
PY-3-O2	6.00%	V_0 [20℃，V]：	2.08
CC-3-V	35.50%		

實例M38

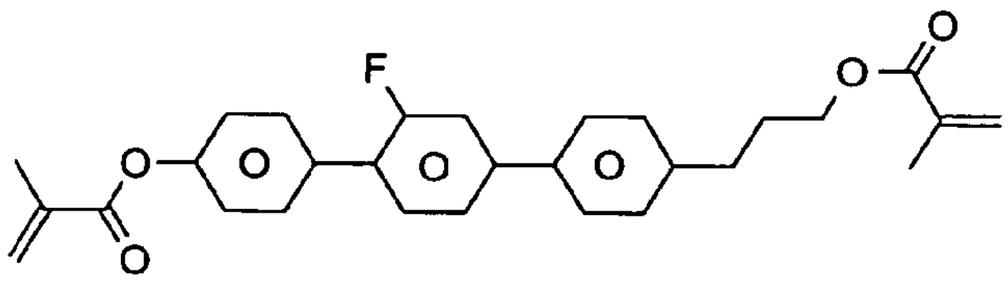
為製備PS-FFS混合物或PS-IPS混合物，添加0.25%之式



之可聚合化合物至99.75%之實例M37之混合物中。

實例M39

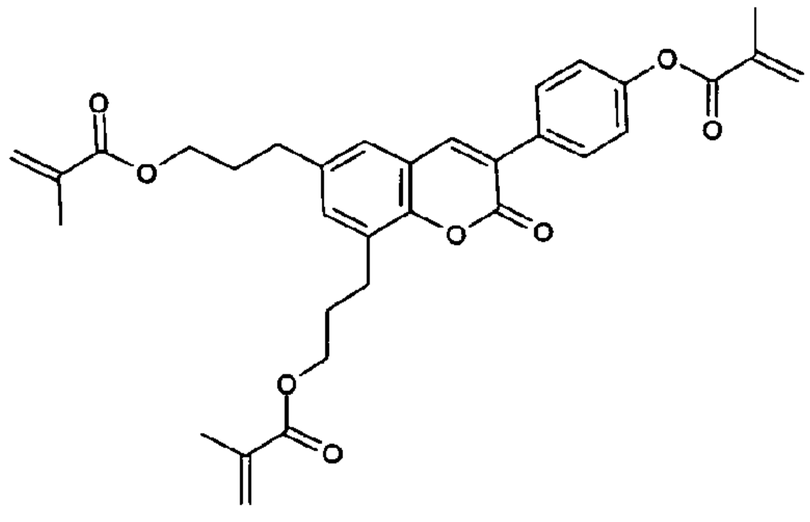
為製備PS-FFS混合物或PS-IPS混合物，添加0.25%之式



之可聚合化合物至99.75%之實例M37之混合物中。

實例M40

為製備PS-FFS混合物或PS-IPS混合物，添加0.4%之式



之可聚合化合物至99.6%之實例M37之混

合物中，使得混合物M37之電壓保持率顯著增加(在UV曝光之後，VHR > 90%)。

實例M41

PY-3-O2	10.00%	清澈點[℃]：	73.5
PY-1-O4	7.00%	Δn [589 nm，20℃]：	0.1105
PY-3-O4	6.00%	Δε [1 kHz，20℃]：	-3.0
CCY-3-O2	9.00%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.5
CCY-3-O1	5.00%	K_3 [pN，20℃]：	13.8
CPY-2-O2	6.50%	K_3/K_1 [20℃]：	0.97
CPY-3-O2	10.00%	γ_1 [mPa·s，20℃]：	105
CCH-34	10.00%	V_0 [20℃，V]：	2.26
CCH-23	21.00%		
CCP-3-1	2.00%		
BCH-32	8.50%		
PCH-301	5.00%		

實例M42

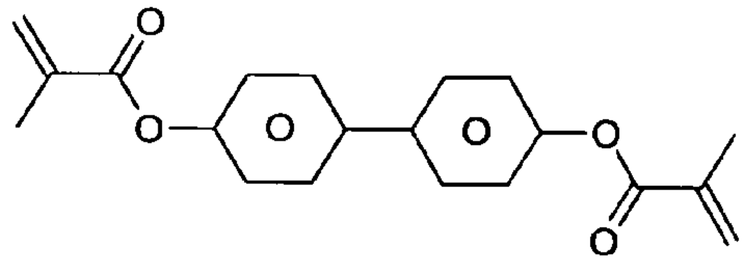
PY-4-O2	10.00%	清澈點[℃]：	70.5
PY-1-O4	8.00%	Δn [589 nm，20℃]：	0.1158
CCY-3-O2	10.00%	Δε [1 kHz，20℃]：	-3.0
CPY-3-O2	12.00%	γ_1 [mPa·s，20℃]：	105
CLY-3-O2	8.00%		
PYP-2-3	5.00%		
PYP-2-4	5.00%		
CCH-35	6.00%		
CCH-23	21.00%		
PCH-301	8.00%		
PP-1-2V1	7.00%		

實例M43

PY-3-O2	6.50%	清澈點[℃]：	73.0
PY-1-O4	6.00%	Δn [589 nm，20℃]：	0.1018
PY-4-O2	6.00%	Δε [1 kHz，20℃]：	-2.9
CCP-304FCl	6.00%	γ_1 [mPa·s，20℃]：	111
CCP-302FCl	5.00%		
CCY-4-O2	6.50%		
CPY-2-O2	7.00%		
CPY-3-O2	10.00%		

CCH-34	10.00%
CCH-23	20.00%
BCH-32	3.50%
CCP-3-1	3.50%
PCH-301	10.00%

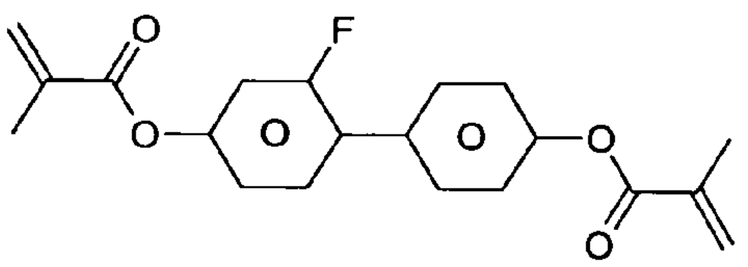
實例M44

為製備PS-VA混合物，添加0.2%之式 

之可聚合化合物至99.8%之實例M6之混合物中。

將PS-VA混合物引入具有垂直配向之單元中。在施加24 V電壓後，用功率為100 mW/cm^{2}之UV光照射該單元。

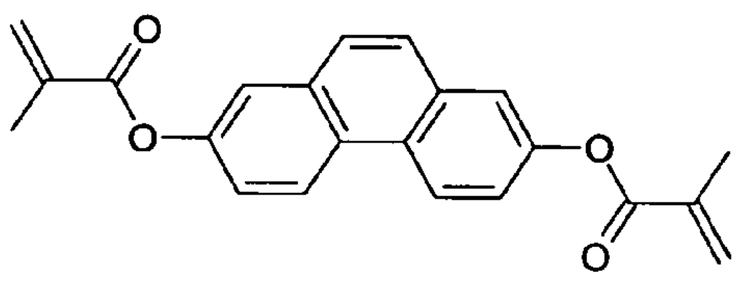
實例M45

為製備PS-VA混合物，添加0.2%之式 

之可聚合化合物至99.8%之實例M6之混合物中。

將PS-VA混合物引入具有垂直配向之單元中。在施加24 V電壓後，用功率為100 mW/cm^{2}之UV光照射該單元。

實例M46

為製備PS-VA混合物，添加0.2%之式 

之可聚合化合物至99.8%之實例M6之混合物中。

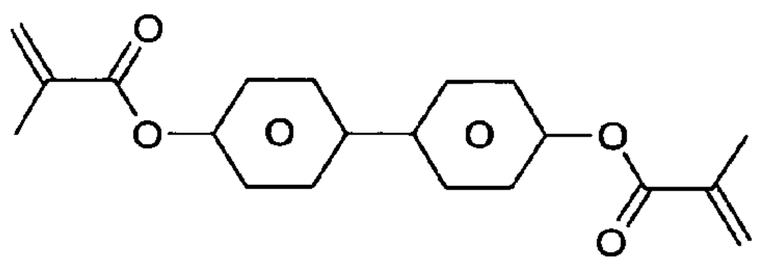
將PS-VA混合物引入具有垂直配向之單元中。在施加24 V電壓後，用功率為100 mW/cm^{2}之UV光照射該單元。

實例M47

CC-3-V	28.50%	清澈點[℃]：	75.1
CC-3-V1	5.00%	Δn [589 nm，20℃]：	0.1090
CCH-34	6.50%	Δε [1 kHz，20℃]：	-3.0

CCY-3-O3	9.50%	$\varepsilon_{\parallel}$ [1 kHz，20℃]：	3.6
CCY-4-O2	10.00%	K_1 [pN，20℃]：	13.5
CPY-2-O2	7.50%	K_3/K_1 [20℃]：	1.02
CPY-3-O2	6.50%	V_0 [20℃，V]：	2.26
PY-1-O4	5.00%		
PY-3-O2	14.50%		
PYP-2-4	6.50%		
PPGU-3-F	0.50%		

實例M48

為製備PS-VA混合物，添加0.45%之式 

之可聚合化合物至99.55%之實例M45之混合物中。

將PS-VA混合物引入具有垂直配向之單元中。在施加24 V電壓後，用功率為100 mW/cm^{2}之UV光照射該單元。

實例M49

CCY-3-O1	5.00%	清澈點[℃]：	79.8
CCY-3-O2	8.00%	Δn [589 nm，20℃]：	0.1406
CCY-3-O3	8.00%	Δε [1 kHz，20℃]：	-7.0
CCY-4-O2	8.00%	K_1 [pN，25℃]：	13.0
CCY-5-O2	2.00%	K_3 [pN，25℃]：	15.3
CPY-2-O2	10.00%	V_0 [25℃，V]：	1.56
CPY-3-O2	10.00%		
CY-3-O2	8.00%		
CY-3-O4	5.00%		
PY-1-O4	12.00%		
PY-3-O2	6.00%		
PY-4-O2	12.00%		
PYP-2-3	6.00%		

實例M50

CC-4-V	4.00%	清澈點[℃]：	80.2
CCY-3-O1	5.50%	Δn [589 nm，20℃]：	0.1401
CCY-3-O2	8.00%	Δε [1 kHz，20℃]：	-6.5
CCY-3-O3	8.00%	K_1 [pN，25℃]：	13.4
CCY-4-O2	8.00%	K_3 [pN，25℃]：	14.5

CPY-2-O2	10.00%	V_0 [25℃，V]：	1.59
CPY-3-O2	10.00%		
CY-3-O2	4.00%		
CY-3-O4	5.00%		
PY-1-O4	12.00%		
PY-3-O2	6.00%		
PY-4-O2	12.00%		
PYP-2-3	7.50%		

實例M51

CC-4-V	3.50%	清澈點[℃]：	74.8
CCY-3-O1	5.00%	Δn [589 nm，20℃]：	0.1392
CCY-3-O2	8.00%	Δε [1 kHz，20℃]：	-6.5
CCY-4-O2	8.00%	K_1 [pN，25℃]：	12.6
CCY-5-O2	5.00%	K_3 [pN，25℃]：	14.6
CPY-2-O2	10.00%	V_0 [25℃，V]：	1.58
CPY-3-O2	10.00%		
CY-3-O2	8.00%		
CY-3-O4	5.00%		
PY-1-O4	12.00%		
PY-3-O2	6.00%		
PY-4-O2	12.00%		
PYP-2-3	7.50%		

實例M52

CCH-23	20.00%	清澈點[℃]：	76.0
CCH-34	6.00%	Δn [589 nm，20℃]：	0.0987
CCH-35	3.00%	Δε [1 kHz，20℃]：	-3.1
CCH-301	6.00%	γ_1 [mPa·s，20℃]：	107
PCH-301	6.00%	K_1 [pN，20℃]：	13.9
CCP-3-1	6.50%	K_3 [pN，20℃]：	14.3
CCY-3-O1	5.00%	V_0 [20℃，V]：	2.26
CCY-3-O2	5.00%		
CCY-4-O2	3.50%		
COY-3-O2	5.00%		
PY-3-O2	8.00%		
PY-4-O2	4.00%		
CPY-2-O2	10.00%		
CPY-3-O2	12.00%		

實例M53

CCH-23	20.00%	清澈點[℃]：	76.0
CCH-34	6.00%	Δn [589 nm，20℃]：	0.0988
CCH-35	3.00%	Δε [1 kHz，20℃]：	-3.2
CCH-301	6.00%	γ_1 [mPa·s，20℃]：	108
PCH-301	6.00%	K_1 [pN，20℃]：	13.9
CCP-3-1	5.50%	K_3 [pN，20℃]：	14.2
CCY-3-O1	4.50%	V_0 [20℃，V]：	2.24
CCY-3-O2	5.00%		
CCY-4-O2	3.00%		
CCOY-2-O2	4.00%		
COY-3-O2	3.00%		
PY-3-O2	8.00%		
PY-4-O2	4.00%		
CPY-2-O2	10.00%		
CPY-3-O2	11.00%		
PP-1-3	1.00%		

實例M54

CC-3-V	28.00%	清澈點[℃]：	74.0
CY-3-O2	10.00%	Δn [589 nm，20℃]：	0.1082
CCY-3-O1	5.50%	Δε [1 kHz，20℃]：	-3.5
CCY-3-O2	11.00%	γ_1 [mPa·s，20℃]：	101
CCY-4-O2	5.00%	K_1 [pN，20℃]：	13.9
CPY-3-O2	11.00%	K_3 [pN，20℃]：	16.1
PY-3-O2	11.50%	V_0 [20℃，V]：	2.27
PY-1-O4	3.00%		
PYP-2-3	5.00%		
PP-1-2V1	2.00%		
CC-3-2V1	8.00%		

實例M55

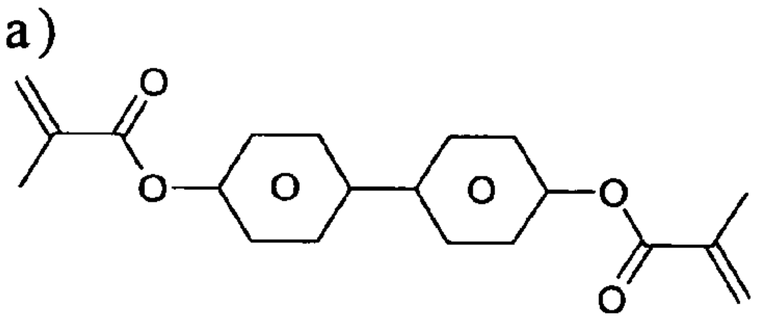
CC-3-V	32.50%	清澈點[℃]：	75.1
CC-3-V1	9.50%	Δn [589 nm，20℃]：	0.1092
CCY-3-O1	9.50%	Δε [1 kHz，20℃]：	-3.2
CCY-3-O2	4.50%	γ_1 [mPa·s，20℃]：	91
CLY-3-O2	10.00%	K_1 [pN，20℃]：	13.9

CPY-3-O2	8.00%	K_3 [pN，20℃]：	16.4
PY-1-O4	4.00%	V_0 [20℃，V]：	2.39
PY-3-O2	17.00%		
PYP-2-3	5.00%		

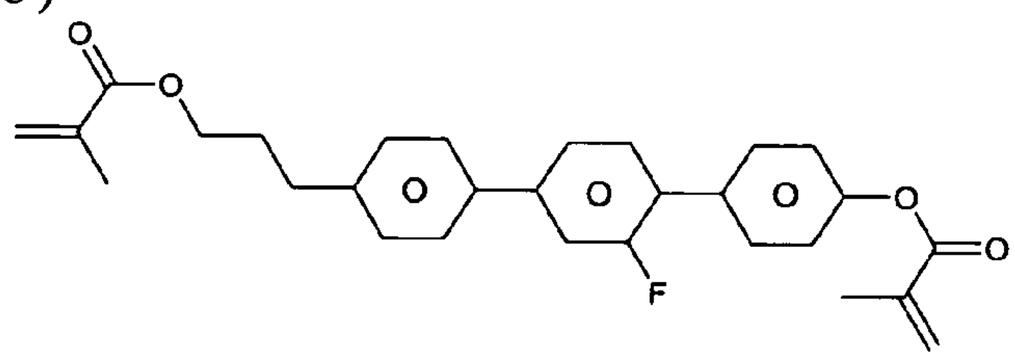
實例M56 a)-e)

為製備PS-VA混合物，添加0.45%之式a)、式b)、式c)、式d)或式e)之可聚合物化合物至99.55%之實例M55之混合物中。

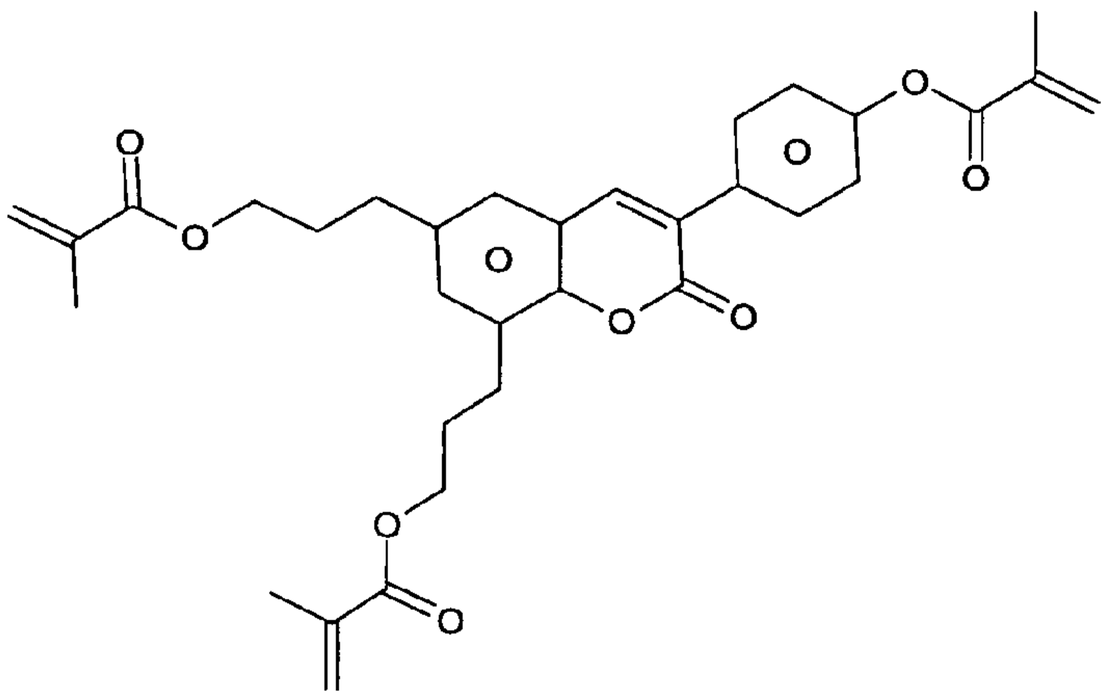
a)



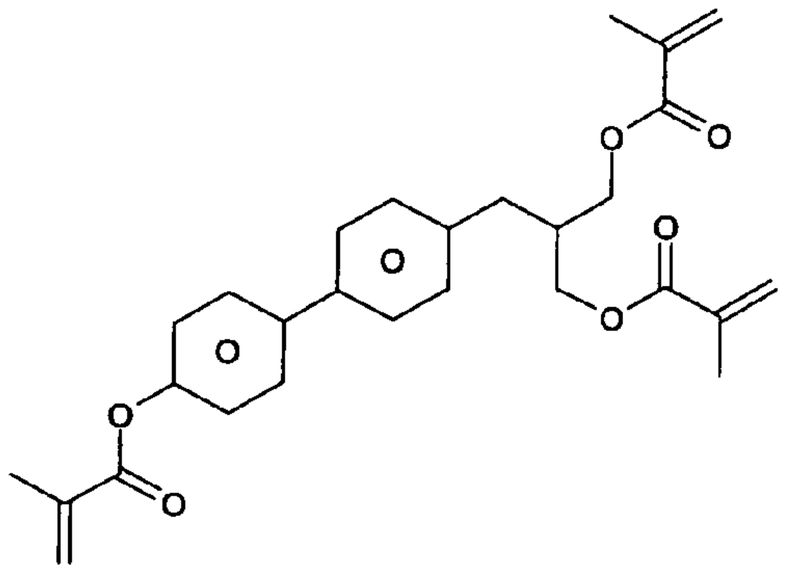
b)



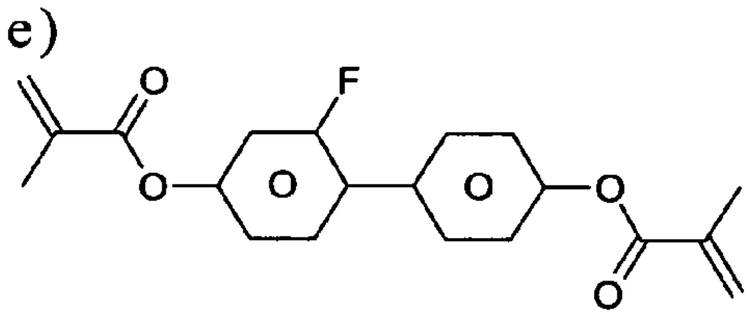
c)



d)



e)

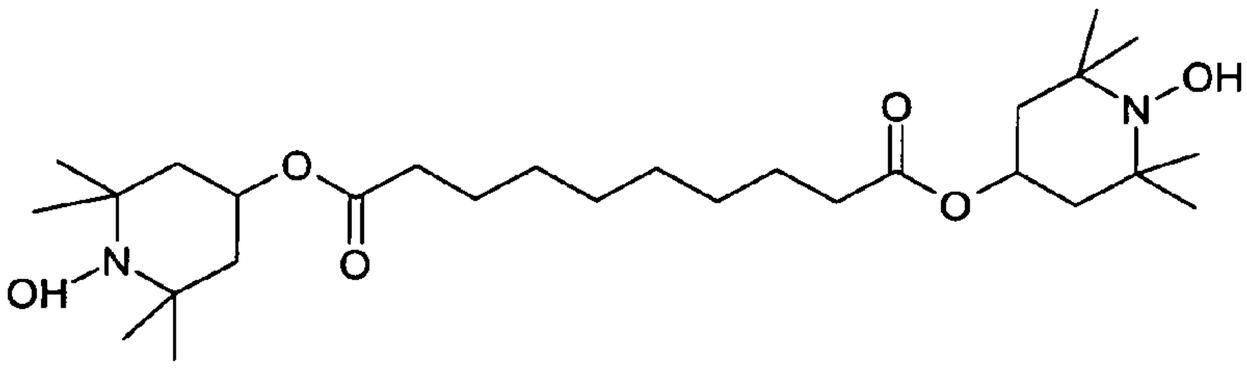


實例M57

BCH-32	3.00%	清澈點[℃]：	70.5
CC-3-V	28.00%	Δn [589 nm，20℃]：	0.1064
CC-3-V1	10.00%	Δε [1 kHz，20℃]：	-2.9
CCY-3-O1	6.00%	γ_1 [mPa·s，20℃]：	86
CCY-3-O2	11.50%	K_1 [pN，20℃]：	13.9
CPY-3-O2	12.00%	K_3 [pN，20℃]：	16.4
CY-3-O2	10.50%	V_0 [20℃，V]：	2.53
PP-1-2V1	7.00%		
PY-3-O2	12.00%		

實例M58

為穩定起見，添加0.02%之式



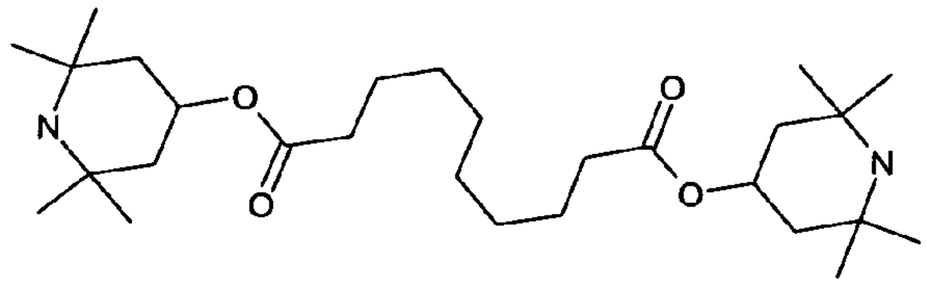
之化合物至實例M57之VA混合物中。

實例M59

CC-3-V	29.00%	清澈點[℃]：	80.5
CY-3-O2	13.00%	Δn [589 nm，20℃]：	0.1072
CY-5-O2	2.00%	Δε [1 kHz，20℃]：	-4.4

CCY-3-O2	9.00%	γ_1 [mPa·s，20℃]：	131
CCY-4-O2	9.00%	K_1 [pN，20℃]：	14.3
CCY-5-O2	3.00%	K_3 [pN，20℃]：	15.9
CPY-2-O2	9.50%	V_0 [20℃，V]：	2.00
CPY-3-O2	9.50%		
PYP-2-3	2.50%		
PY-3-O2	10.00%		
CCY-3-O1	3.50%		

實例M60

為穩定起見，添加0.025%之式 

之化合物至實例M59之FFS混合物中。

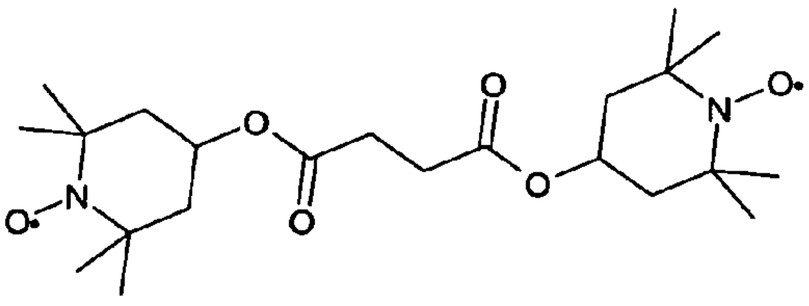
實例M61

CC-3-V	23.50%	清澈點[℃]：	77.8
CCP-V-1	15.00%	Δn [589 nm，20℃]：	0.1089
CCY-3-O2	3.00%	Δε [1 kHz，20℃]：	-2.9
CCY-4-O2	13.50%	γ_1 [mPa·s，20℃]：	108
CPY-2-O2	2.00%	K_1 [pN，20℃]：	12.3
CY-3-O2	9.00%	K_3 [pN，20℃]：	14.2
CY-5-O2	15.00%	V_0 [20℃，V]：	2.33
PY-3-O2	2.00%		
PYP-2-3	4.00%		
PYP-2-4	13.00%		

實例M62

BCH-32	1.50%	清澈點[℃]：	74.4
CC-3-V	30.00%	Δn [589 nm，20℃]：	0.1051
CC-3-V1	9.00%	Δε [1 kHz，20℃]：	-3.5
CCY-3-O1	7.00%	γ_1 [mPa·s，20℃]：	94
CCY-3-O2	11.00%	K_1 [pN，20℃]：	13.4
CPY-2-O2	11.00%	K_3 [pN，20℃]：	14.9
CPY-3-O2	11.00%	V_0 [20℃，V]：	2.18
PY-3-O2	15.00%		
Y-4O-O4	4.50%		

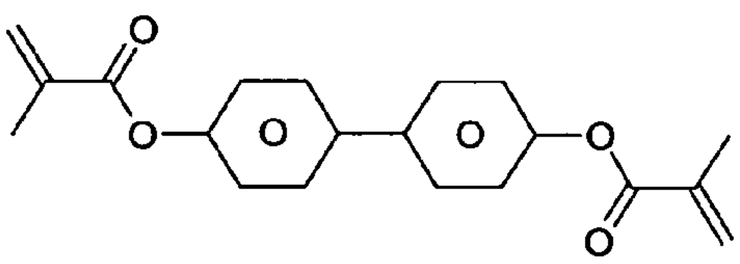
實例M63

為穩定起見，添加0.01%之式  之化合物至實例M62之VA混合物中。

實例M64

BCH-32	4.50%	清澈點[℃]：	74.2
CC-3-V	21.00%	Δn [589 nm，20℃]：	0.1028
CC-3-V1	10.50%	Δε [1 kHz，20℃]：	-3.4
CCH-23	6.00%	γ_1 [mPa·s，20℃]：	96
CCY-3-O1	6.00%	K_1 [pN，20℃]：	14.0
CCY-3-O2	12.50%	K_3 [pN，20℃]：	16.0
CPY-2-O2	5.00%	V_0 [20℃，V]：	2.29
CPY-3-O2	9.00%		
CY-3-O2	10.50%		
PY-3-O2	15.00%		

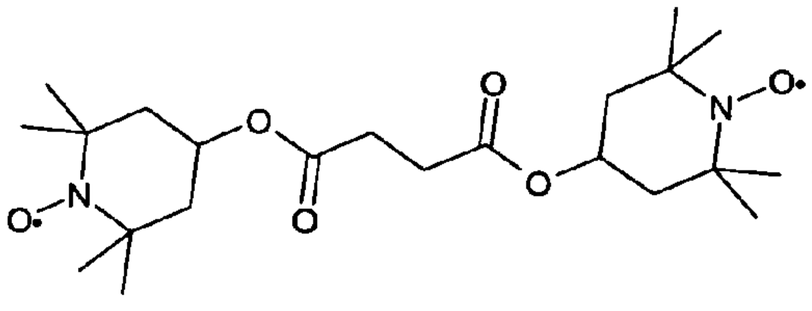
實例M65

為製備PS-VA混合物，添加0.01%之BASF的Irganox-1076及0.3%之式  之化合物至實例M64之VA混合物中。

實例M66

CC-3-V	36.00%	清澈點[℃]：	77.8
CCP-V-1	5.50%	Δn [589 nm，20℃]：	0.1046
CCY-3-O2	12.50%	Δε [1 kHz，20℃]：	-3.4
CPY-2-O2	11.00%	γ_1 [mPa·s，20℃]：	94
CPY-3-O2	11.00%	K_1 [pN，20℃]：	13.3
CY-5-O2	9.50%	K_3 [pN，20℃]：	15.2
PY-3-O2	14.50%	V_0 [20℃，V]：	2.25

實例M67

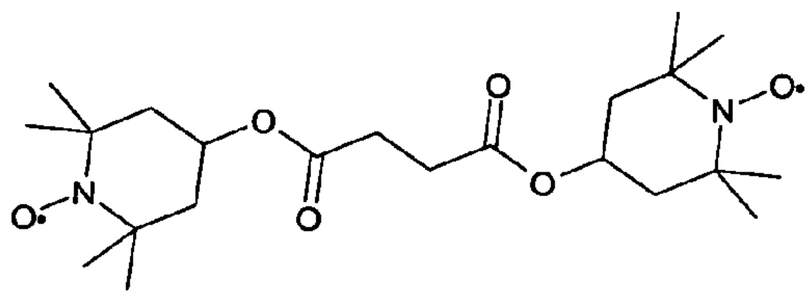
為穩定起見，添加0.01%之式  之化合

物至實例M66之VA混合物中。

實例M68

BCH-32	1.50%	清澈點[℃]：	74.4
CC-3-V	30.00%	Δn [589 nm，20℃]：	0.1051
CC-3-V1	9.00%	Δε [1 kHz，20℃]：	-3.5
CCY-3-O1	7.00%	γ_1 [mPa·s，20℃]：	94
CCY-3-O2	11.00%	K_1 [pN，20℃]：	13.4
CPY-2-O2	11.00%	K_3 [pN，20℃]：	14.9
CPY-3-O2	11.00%	V_0 [20℃，V]：	2.18
PY-3-O2	15.00%		
Y-4O-O4	4.50%		

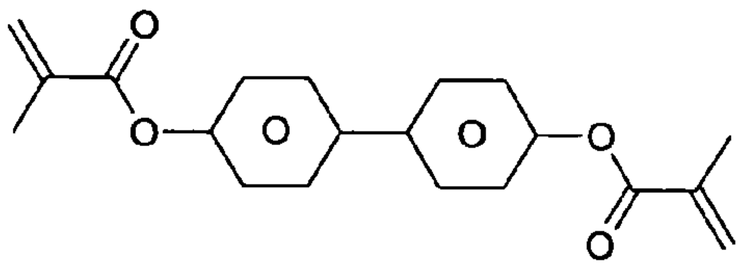
實例M69

為穩定起見，添加0.01%之式  之化合物至實例M68之VA混合物中。

實例M70

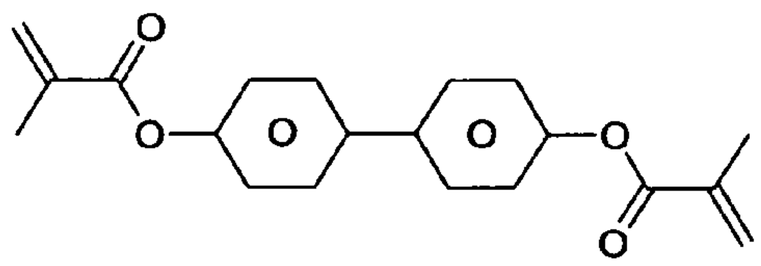
BCH-32	4.00%	清澈點[℃]：	74.8
CC-3-V1	8.00%	Δn [589 nm，20℃]：	0.1057
CCH-23	13.00%	Δε [1 kHz，20℃]：	-3.5
CCH-34	7.00%	γ_1 [mPa·s，20℃]：	115
CCH-35	7.00%	K_1 [pN，20℃]：	14.8
CCY-3-O2	13.00%	K_3 [pN，20℃]：	15.8
CPY-2-O2	7.00%	V_0 [20℃，V]：	2.23
CPY-3-O2	12.00%		
CY-3-O2	12.00%		
PCH-301	2.00%		
PY-3-O2	15.00%		

實例M71

為製備PS-VA混合物，添加0.4%之式 

之可聚合物化合物至實例M70之VA混合物中。

實例M72

為製備PS-VA混合物，添加0.35%之式 

之可聚合物化合物至實例M70之VA混合物中。

實例M73

CC-3-V	28.00%	清澈點[℃]：	77.2
CC-3-V1	4.00%	Δn [589 nm，20℃]：	0.1053
CCH-34	7.00%	Δε [1 kHz，20℃]：	-3.4
CCY-3-1	2.00%	γ_1 [mPa·s，20℃]：	105
CCY-3-O3	12.00%	K_1 [pN，20℃]：	14.0
CCY-4-O2	5.00%	K_3 [pN，20℃]：	14.2
CPY-2-O2	12.00%	V_0 [20℃，V]：	2.17
CPY-3-O2	10.00%		
PY-3-O2	10.00%		
PY-4-O2	10.00%		

實例M74

BCH-32	6.00%	清澈點[℃]：	76.6
CCH-23	16.00%	Δn [589 nm，20℃]：	0.0935
CCH-301	3.00%	Δε [1 kHz，20℃]：	-2.6
CCH-34	6.00%	γ_1 [mPa·s，20℃]：	107
CCH-35	6.00%	K_1 [pN，20℃]：	14.8
CCP-3-1	12.00%	K_3 [pN，20℃]：	15.4
CY-3-O2	15.00%	V_0 [20℃，V]：	2.59
CCY-3-O1	5.00%		
CCY-3-O2	8.00%		
CPY-3-O2	8.50%		
PCH-302	5.00%		
PY-1-O4	3.50%		
PY-4-O2	6.00%		

實例M75

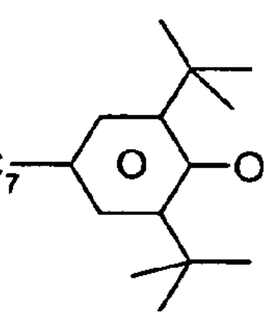
BCH-32	8.00%	清澈點[℃]：	75.5
CCH-23	15.00%	Δn [589 nm，20℃]：	0.0940
CCH-301	9.00%	Δε [1 kHz，20℃]：	-2.3
CCH-34	5.00%	γ_1 [mPa·s，20℃]：	95

CCH-35	5.00%	K_1 [pN，20℃]：	14.4
CCP-3-1	8.00%	K_3 [pN，20℃]：	14.1
CCP-3-3	3.50%	V_0 [20℃，V]：	2.61
CCY-3-O1	5.00%		
CCY-3-O2	8.00%		
CPY-2-O2	6.00%		
CPY-3-O2	8.00%		
PCH-302	6.00%		
PY-1-O4	2.50%		
PY-4-O2	4.00%		
Y-4O-O4	7.00%		

實例M76

BCH-32	8.00%	清澈點[℃]：	76.4
CCH-23	15.00%	Δn [589 nm，20℃]：	0.0951
CCH-301	5.50%	Δε [1 kHz，20℃]：	-2.4
CCH-34	5.00%	γ_1 [mPa·s，20℃]：	96
CCH-35	5.00%	K_1 [pN，20℃]：	15.1
CCP-3-1	12.00%	K_3 [pN，20℃]：	15.0
CCY-3-O1	4.00%	V_0 [20℃，V]：	2.61
CCY-3-O2	6.00%		
CPY-3-O2	8.00%		
CLY-3-O2	8.00%		
PCH-302	8.00%		
PY-1-O4	3.50%		
PY-4-O2	4.00%		
Y-4O-O4	8.00%		

實例M77

為穩定起見，添加0.01%之式  之化合物至實例M71之VA混合物中。

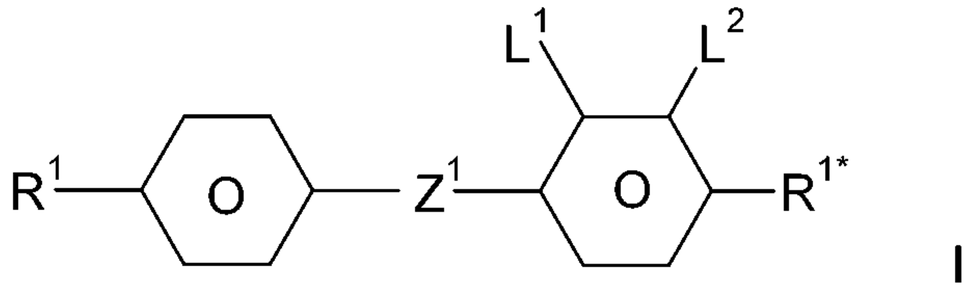
【符號說明】

無

申請專利範圍

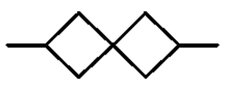
1. 一種液晶介質，其特徵在於該液晶介質包含

i) 至少一種式I化合物，



I

其中：

R^1及R^{1*}各自彼此獨立地表示具有1至15個C原子之烷基或烷氧基，其中另外，此等基團中之一或多個CH_2基團可各自彼此獨立地經-C≡C-、$-CF_2O-$、-CH=CH-、 、  、-O-、-CO-O-、-O-CO-以使得O原子不彼此直接連接的方式置換，且其中另外，一或多個H原子可經鹵素置換；

Z^1表示單鍵、$-CH_2CH_2-$、-CH=CH-、$-CH_2O-$、$-OCH_2-$、$-CF_2O-$、$-OCF_2-$、-COO-、-OCO-、$-C_2F_4-$、-CF=CF-、-CH=CHCHO-；

L^1及L^2各自彼此獨立地表示F、Cl、CF_3或CHF_2；

ii) 至少一種選自式M化合物之可聚合化合物

$$R^a\text{-}A^1\text{-}(Z^1\text{-}A^2)_m\text{-}R^b \qquad M$$

其中

R^a及R^b各自彼此獨立地表示P、P-Sp-、H、鹵素、SF_5、NO_2、碳基或烴基，其中R^a及R^b中之至少一者表示或含有P或P-Sp-基

團；

P在每次出現時相同或不同地表示可聚合基團；

Sp在每次出現時相同或不同地表示間隔基團或單鍵；

A^1及A^2各自彼此獨立地表示芳族基、雜芳基、脂環基或雜環基，較佳具有4至25個環原子，其亦可含有稠環且其亦可經L單取代或多取代；

L表示P-Sp-、H、OH、CH_2OH、鹵素、SF_5、NO_2、碳基或烴基；

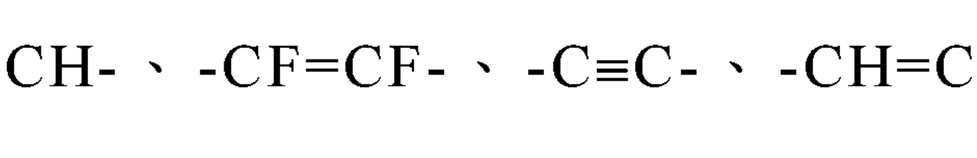
Z^1在每次出現時相同或不同地表示-O-、-S-、-CO-、-CO-O-、-OCO-、-O-CO-O-、-OCH_2-、-CH_2O-、-SCH_2-、-CH_2S-、-CF_2O-、-OCF_2-、-CF_2S-、-SCF_2-、-$(CH_2)_{n1}$-、-CF_2CH_2-、-CH_2CF_2-、-$(CF_2)_{n1}$-、-CH=CH-、-CF=CF-、-C≡C-、-CH=CH-COO-、-OCO-CH=CH-、CR^0R^{00}或單鍵；

R^0及R^{00}各自彼此獨立地表示H或具有1至12個C原子之烷基；

m表示0、1、2、3或4；且

n1表示1、2、3或4；及

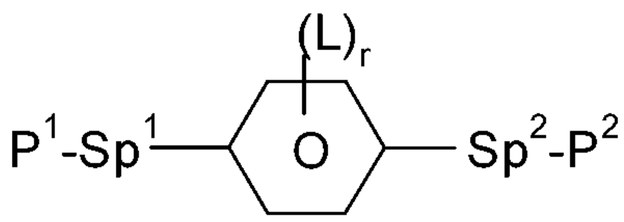
iii)式CC-3-V化合物



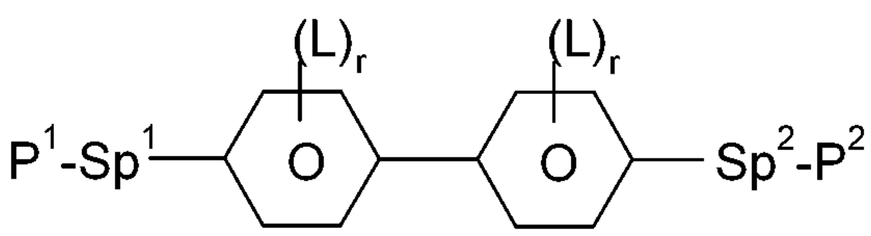
其中該式CC-3-V化合物在整體混合物中之比例為大於10重量-%。

2. 如請求項1之液晶介質，其中該可聚合化合物係選自M1至M40化

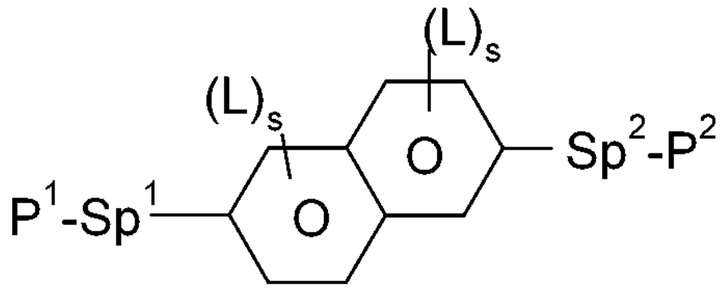
合物，



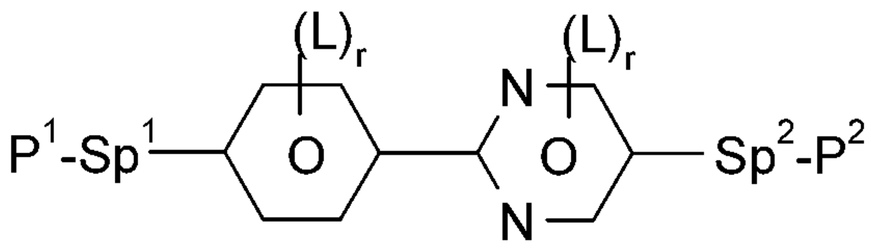
M1



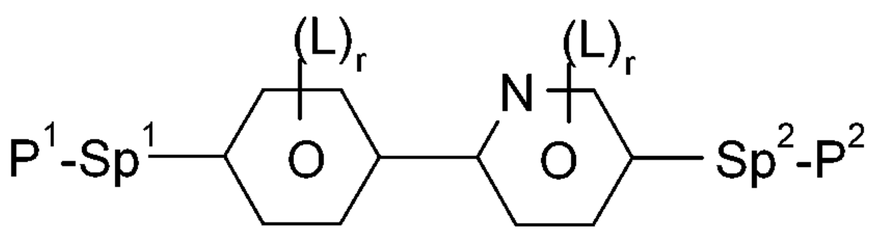
M2



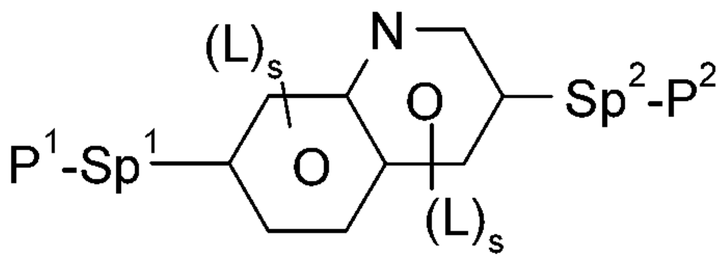
M3



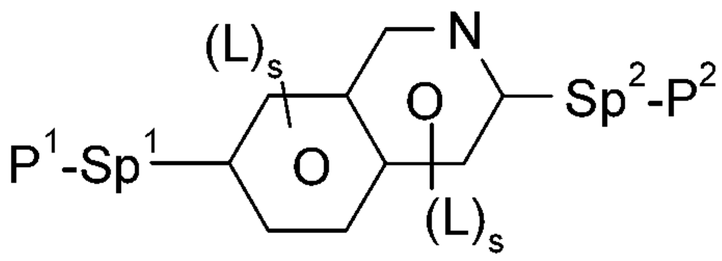
M4



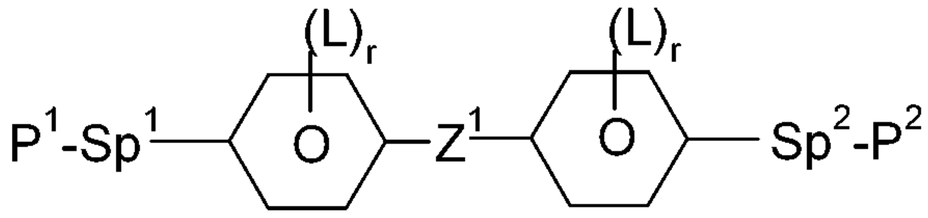
M5



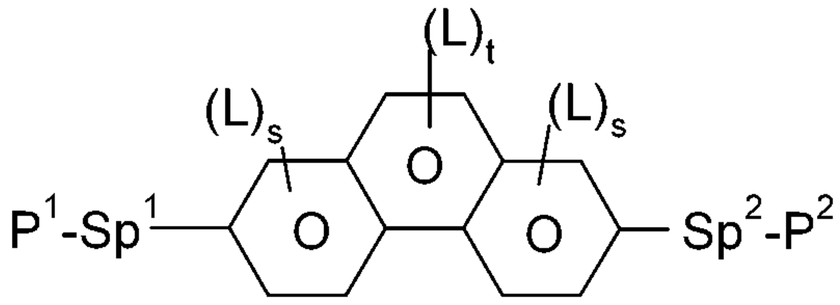
M6



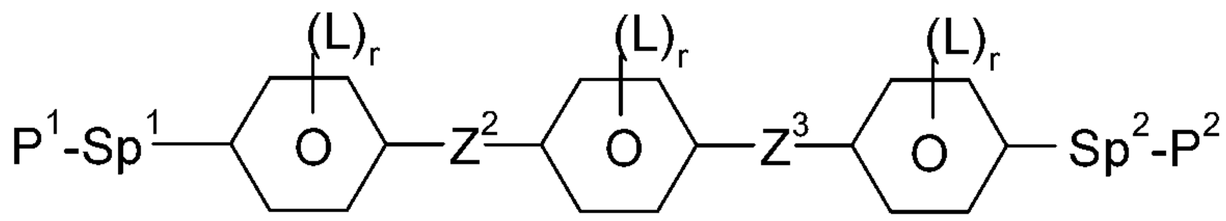
M7



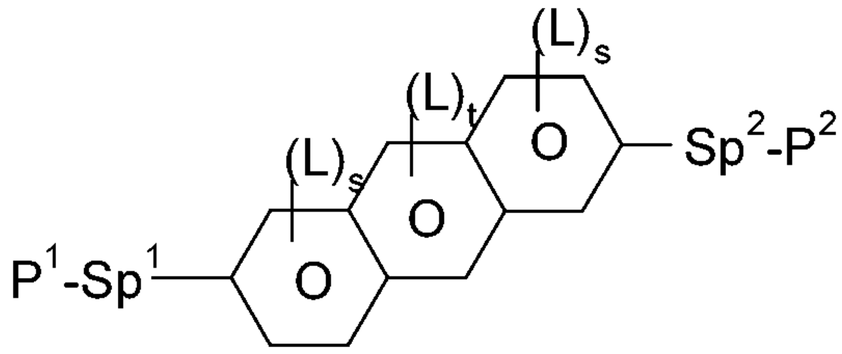
M8



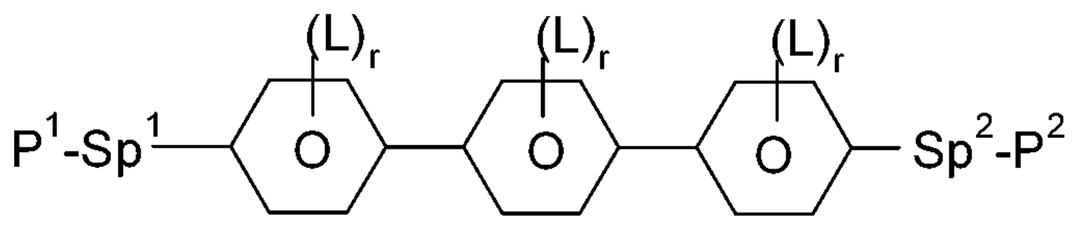
M9



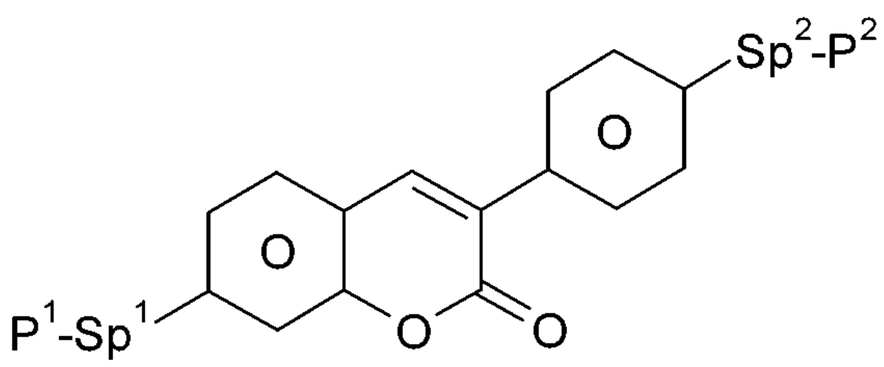
M10



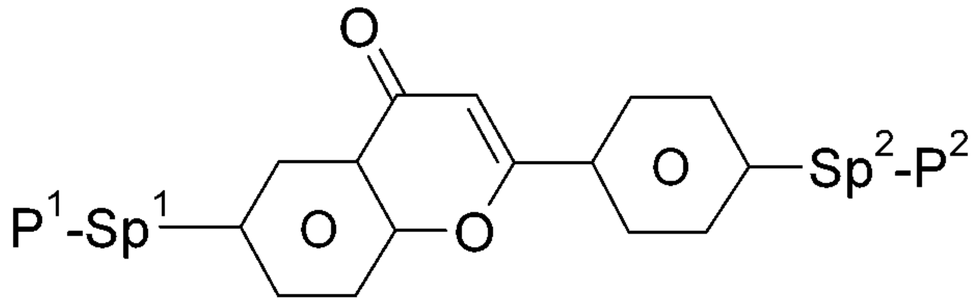
M11



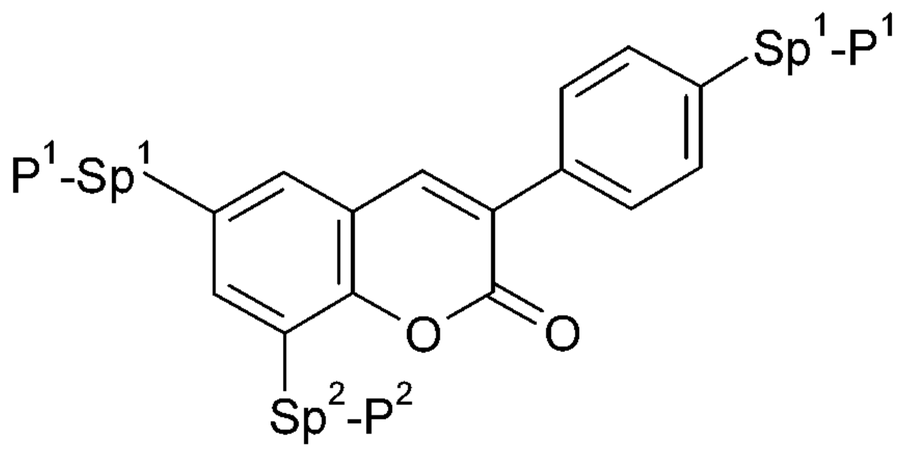
M12



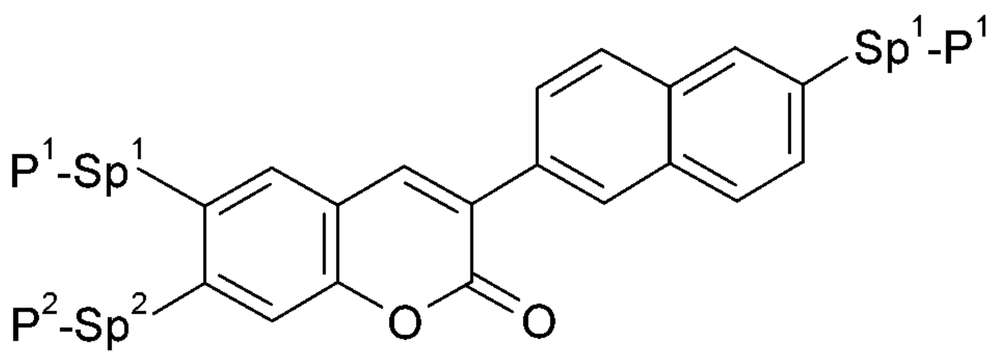
M13



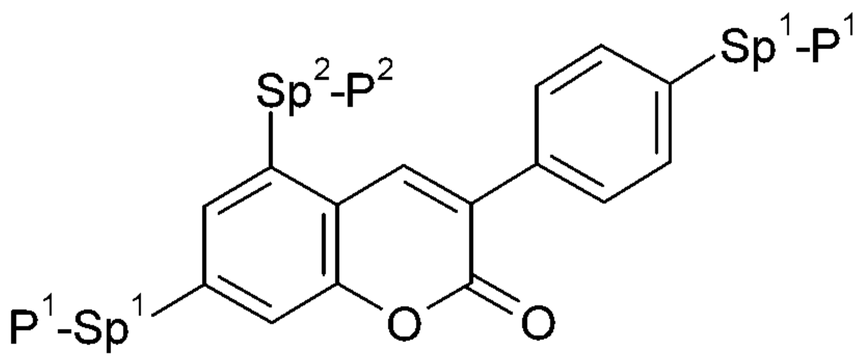
M14



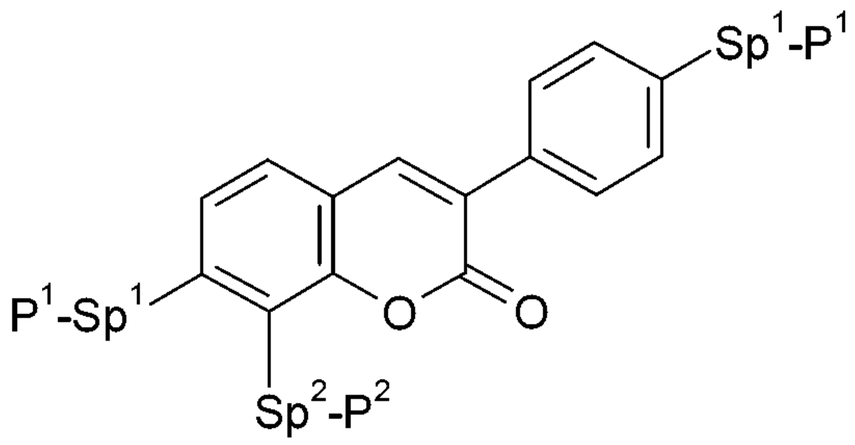
M15



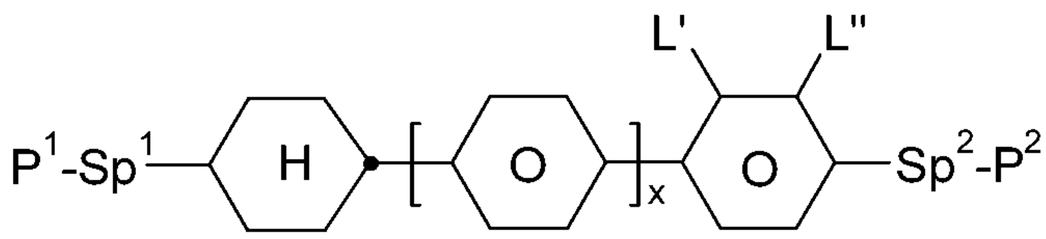
M16



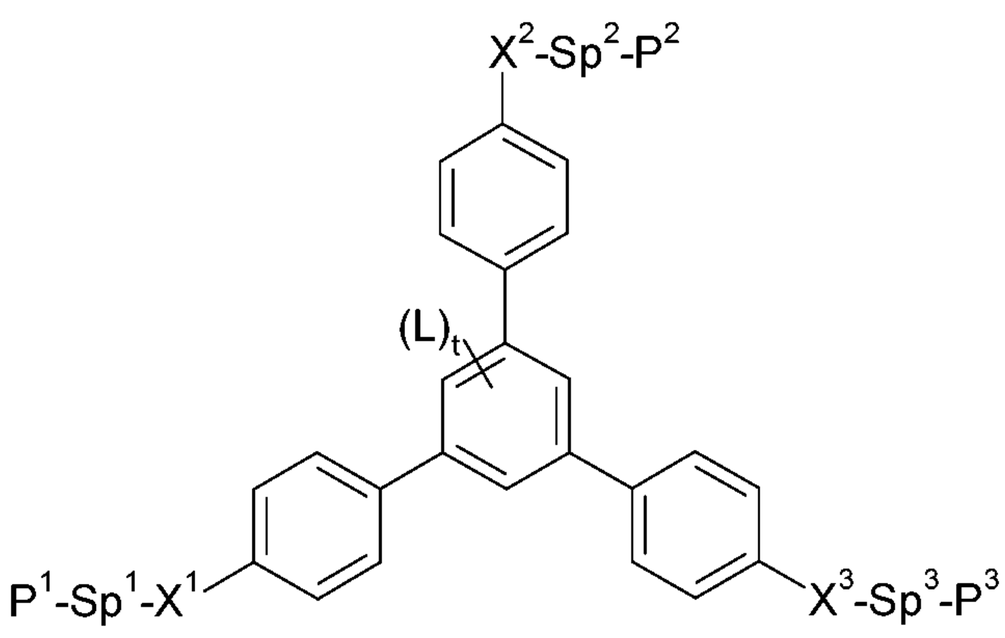
M17



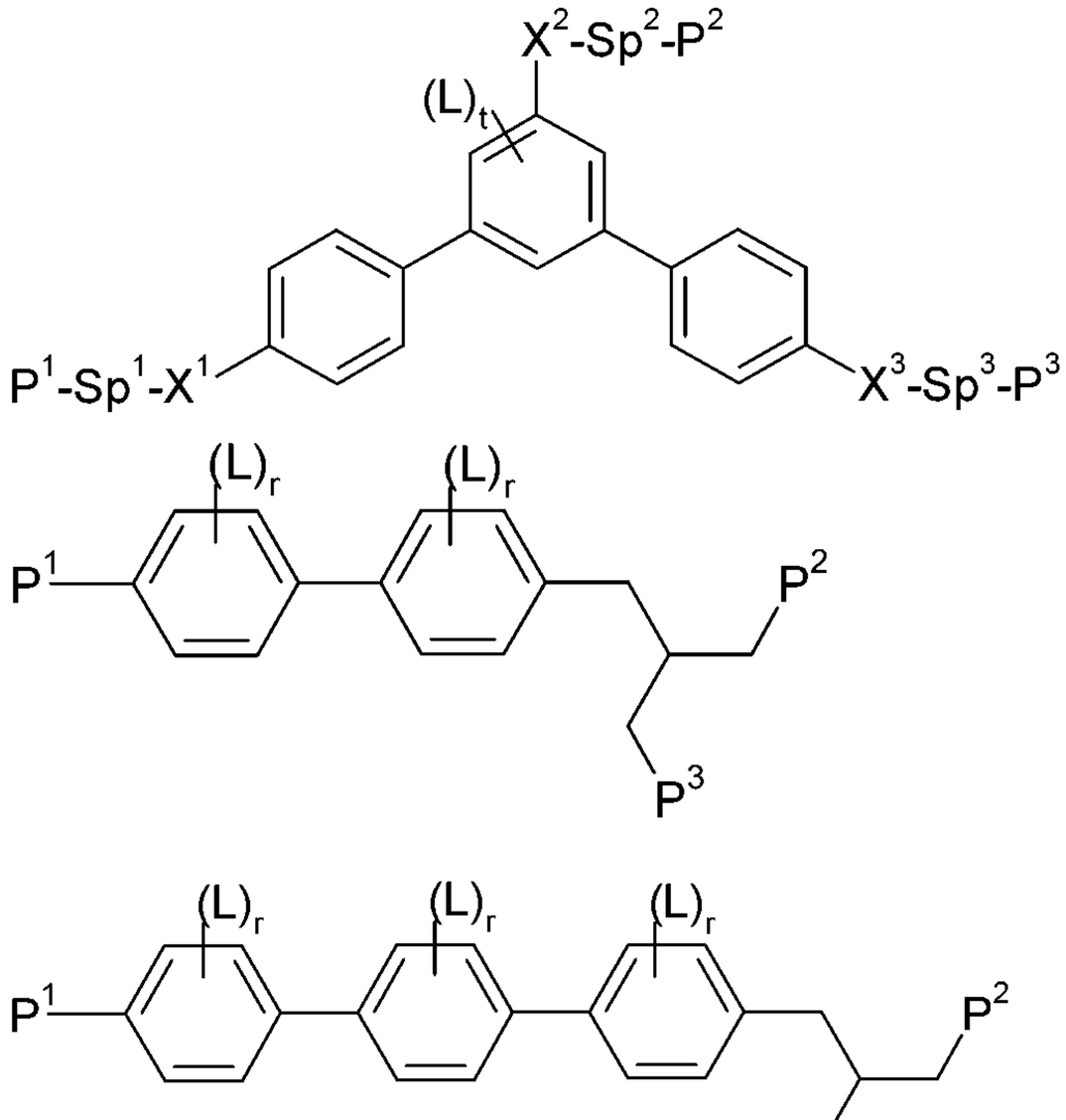
M18



M19

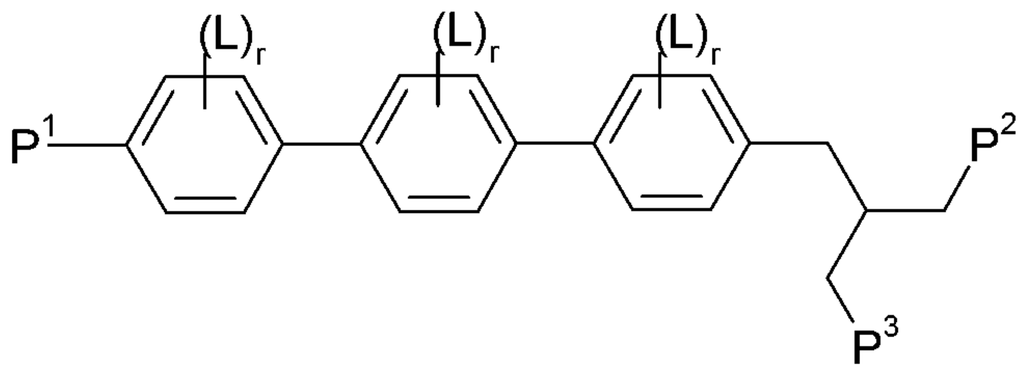


M20

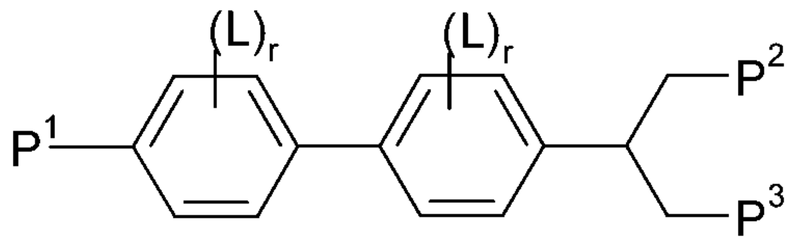


M21

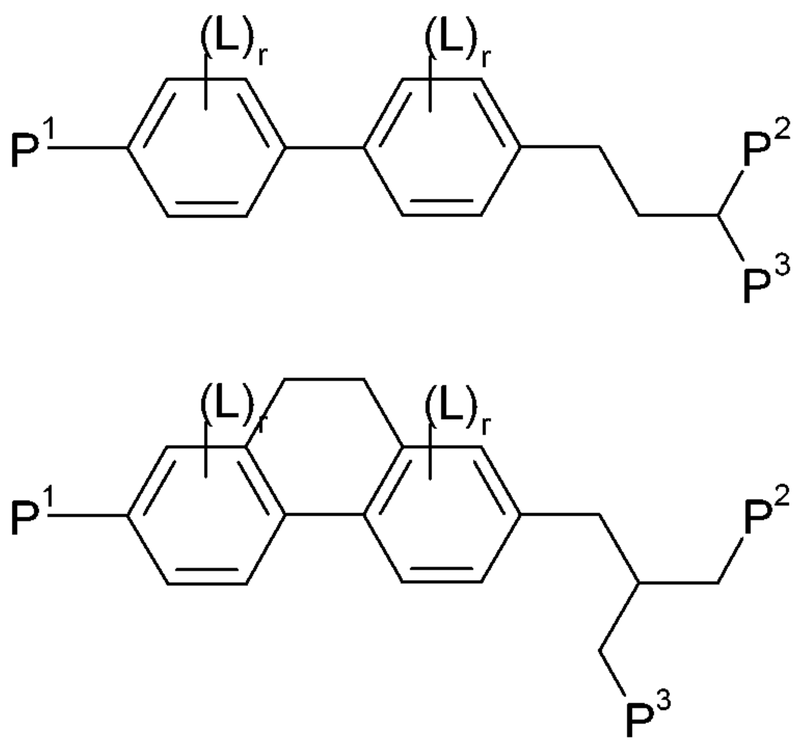
M22



M23

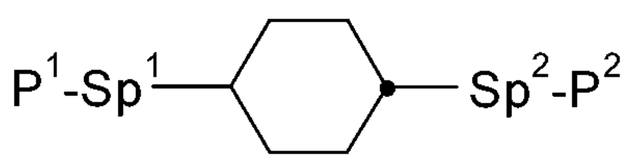


M24

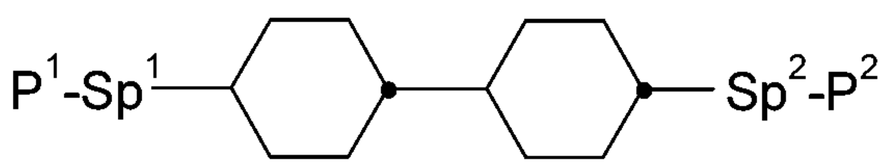


M25

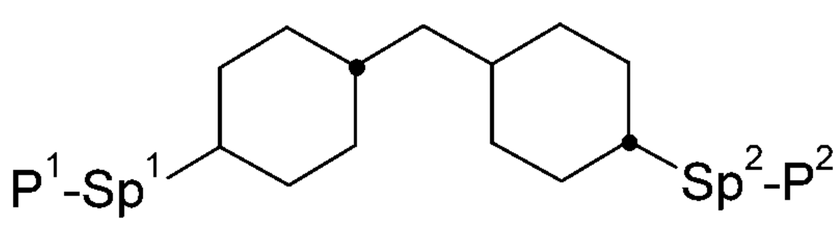
M26



M27



M28



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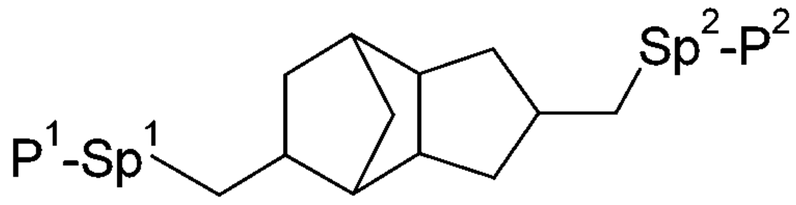

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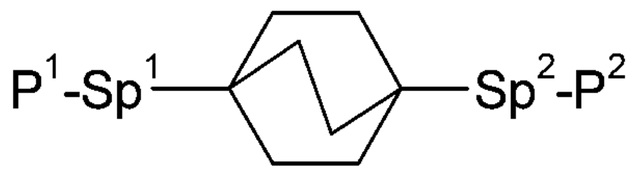

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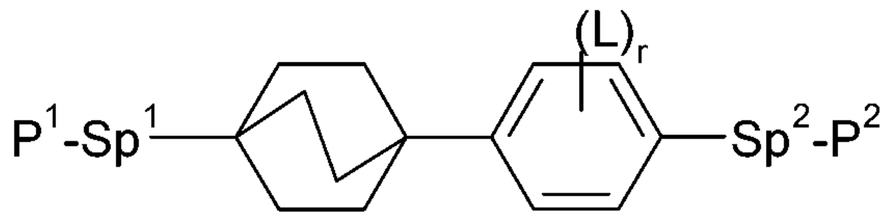
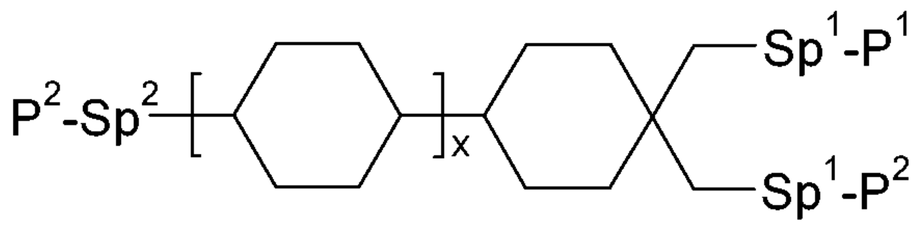


M32



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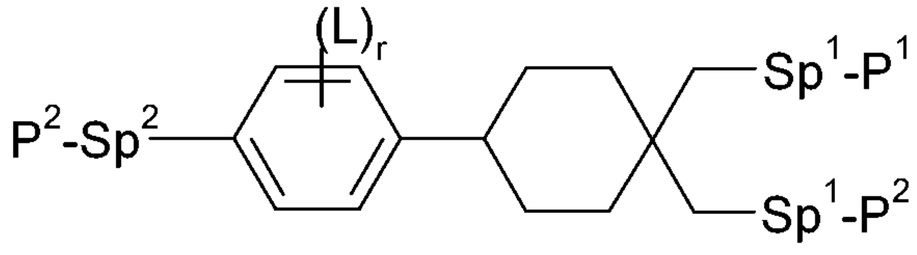

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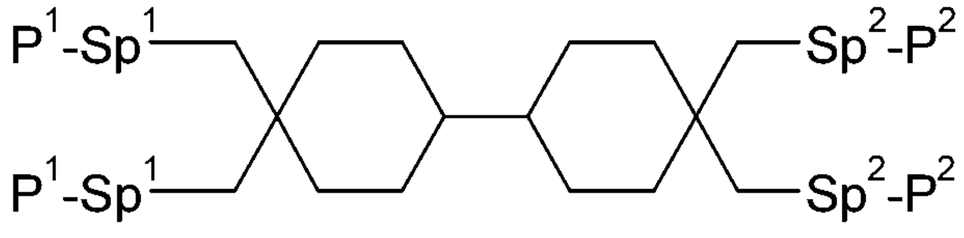

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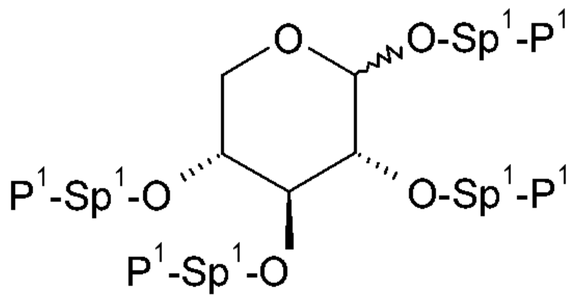

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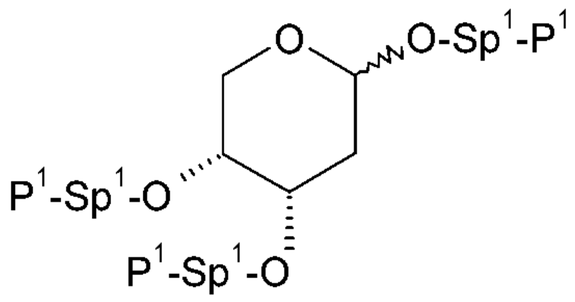

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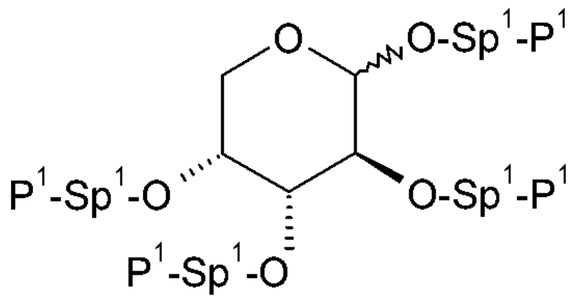
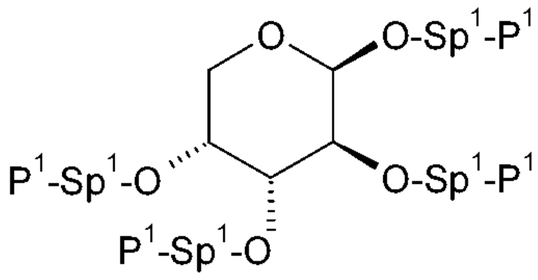


M38



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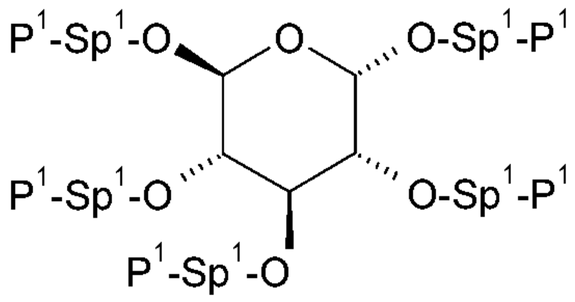


M40

其中，

P^1、P^2及P^3各自相同或不同地表示可聚合基團，且可為丙烯酸酯、甲基丙烯酸酯、氟化丙烯酸酯、氧雜環丁烷、乙烯氧基或環氧基；

Sp^1、Sp^2及Sp^3各自彼此獨立地表示單鍵或間隔基團，且可為-$(CH_2)_{p1}$-、-$(CH_2)_{p1}$-O-、-$(CH_2)_{p1}$-CO-O-或-$(CH_2)_{p1}$-O-CO-O-，其中p1為1至12之整數，且其中在最後提及之基團中經由O原子連接至相鄰環，其中基團P^1-Sp^1-、P^2-Sp^2-及P^3-Sp^3-中之一或多者亦可表示R^{aa}，其條件為所存在之基團P^1-Sp^1-、P^2-Sp^2-及P^3-Sp^3-中

之一或多者不表示R^{aa}；

R^{aa}表示H、F、Cl、CN或具有1至25個C原子之直鏈或分支鏈烷基，其中另外，一或多個不相鄰CH_2基團可各自彼此獨立地經$C(R^0)=C(R^{00})$-、-C≡C-、$-N(R^0)$-、-O-、-S-、-CO-、-CO-O-、-O-CO-、-O-CO-O-以使得O及/或S原子不彼此直接連接的方式置換，且其中另外，一或多個H原子可經F、Cl、CN或P^1-Sp^1-置換，尤其較佳為具有1至12個C原子之直鏈或分支鏈，未經氟化、經單氟化或經多氟化之烷基、烷氧基、烯基、炔基、烷基羰基、烷氧基羰基或烷基羰基氧基(其中烯基及炔基具有至少兩個C原子，且分支鏈基團具有至少三個C原子)；

R^0、R^{00}各自彼此獨立且在每次出現時相同或不同地表示H或具有1至12個C原子之烷基；

X^1、X^2及X^3各自彼此獨立地表示-CO-O-、-O-CO-或單鍵；

Z^1表示-O-、-CO-、$-C(R^yR^z)$-或$-CF_2CF_2$-；

Z^2及Z^3各自彼此獨立地表示-CO-O-、-O-CO-、$-CH_2O$-、$-OCH_2$-、$-CF_2O$-、$-OCF_2$-或$-(CH_2)_n$-，其中n為2、3或4；

R^y及R^z各自彼此獨立地表示H、F、CH_3或CF_3；

L在每次出現時相同或不同地表示F、Cl、CN、SCN、SF_5或具有1至12個C原子的直鏈或分支鏈的未經氟化、經單氟化或經多氟化之烷基、烷氧基、烯基、炔基、烷基羰基、烷氧基羰基、烷基羰基氧基或烷氧基羰基氧基；

L'及L"各自彼此獨立地表示H、F或Cl；

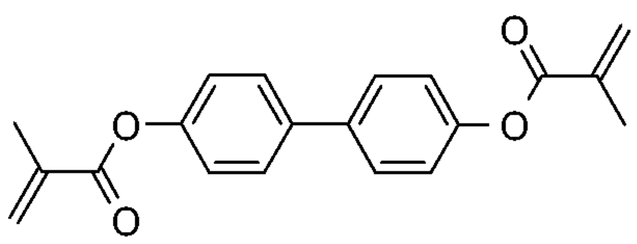
r表示0、1、2、3或4；

s表示0、1、2或3；

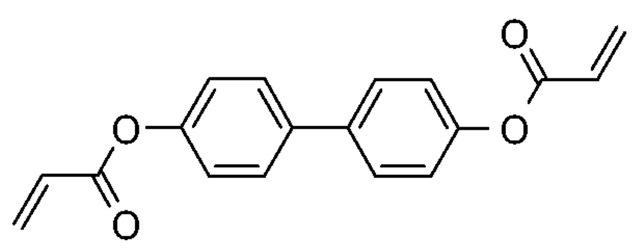
t表示0、1或2；及

x表示0或1。

3. 如請求項1之液晶介質，其中該可聚合化合物係選自RM-1至RM-83：



RM-1



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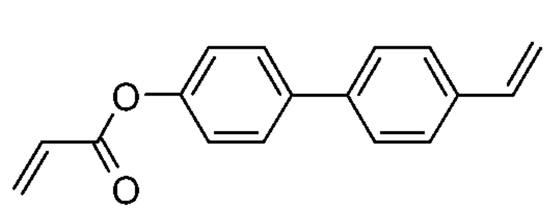
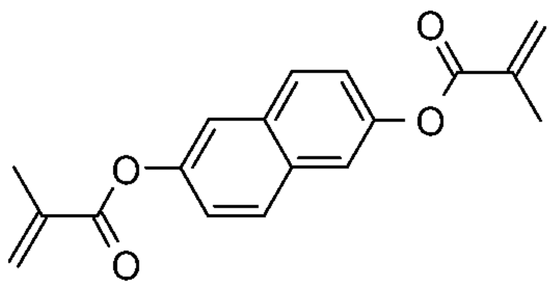
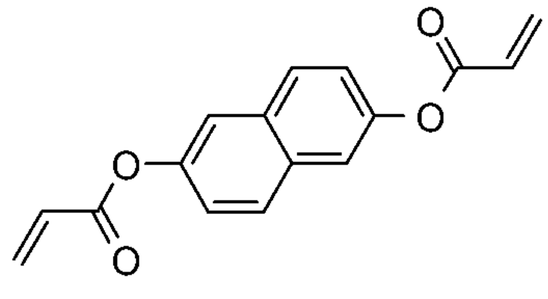


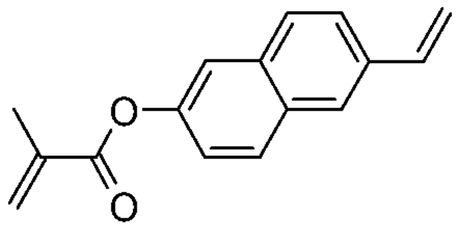
RM-3



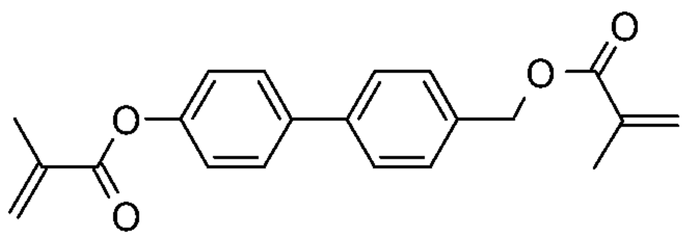
RM-4



RM-5



RM-6



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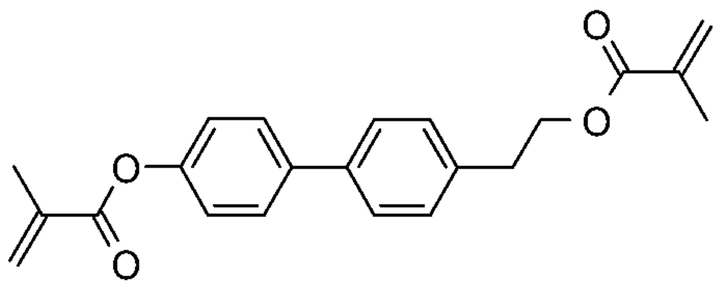

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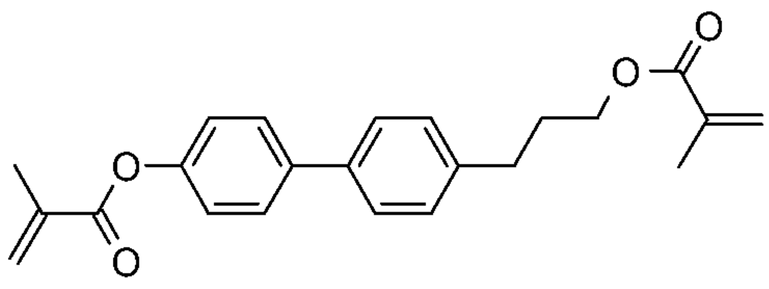

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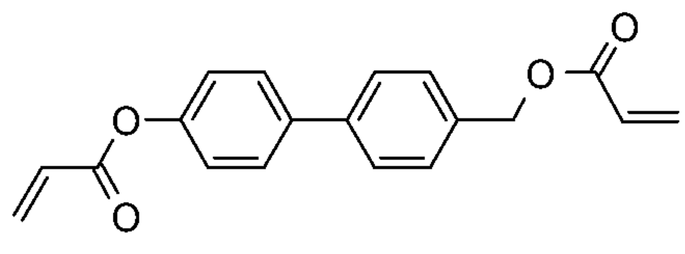

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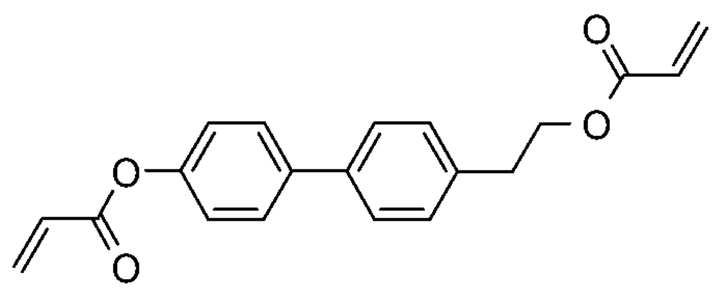

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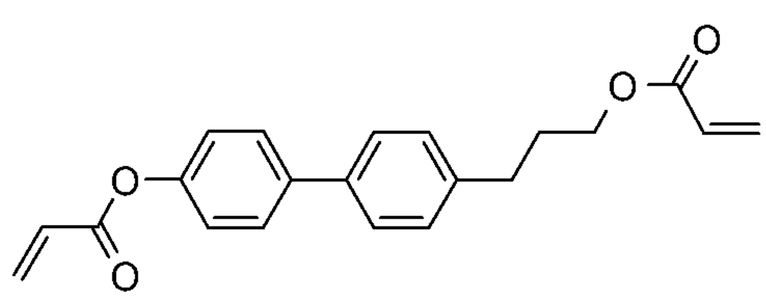

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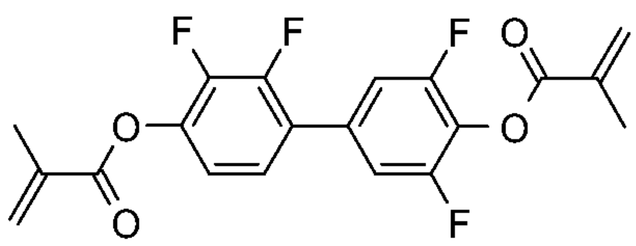

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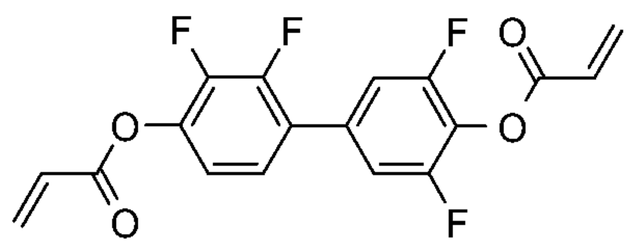

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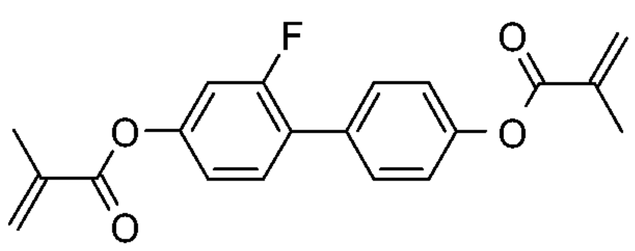

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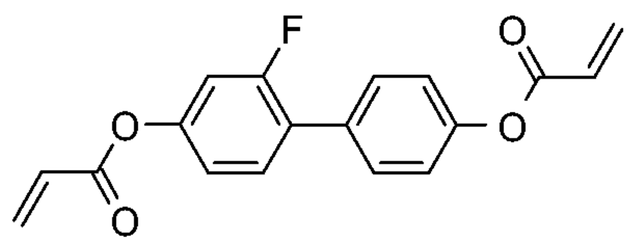

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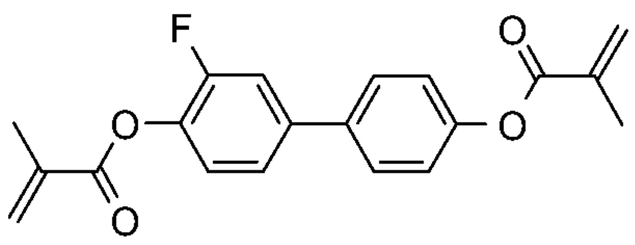

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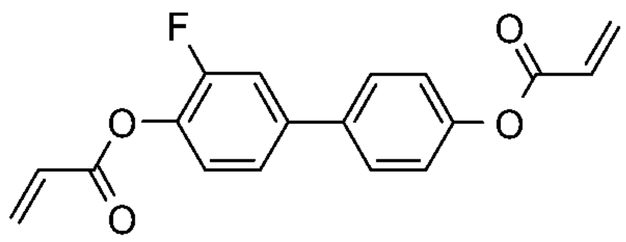

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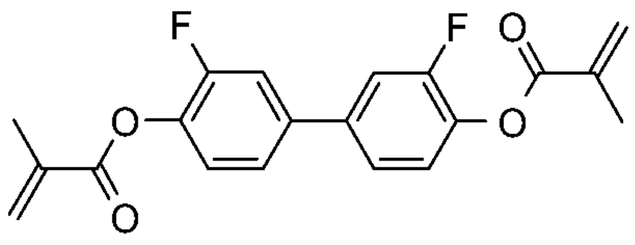

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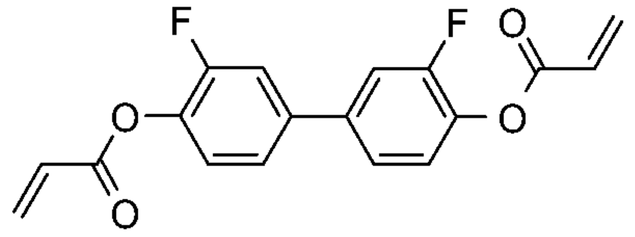

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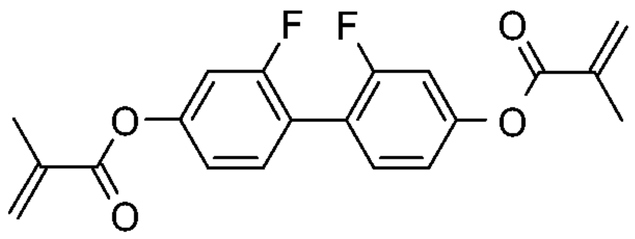

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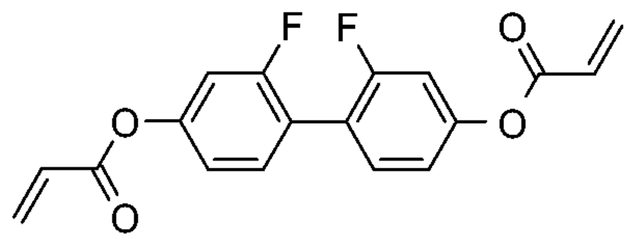

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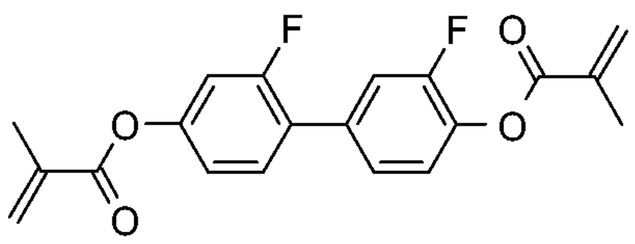

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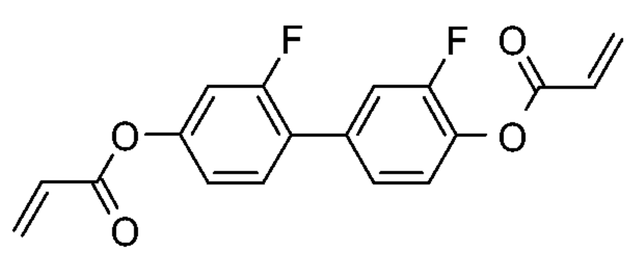

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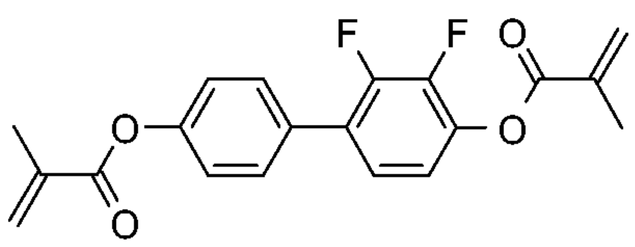

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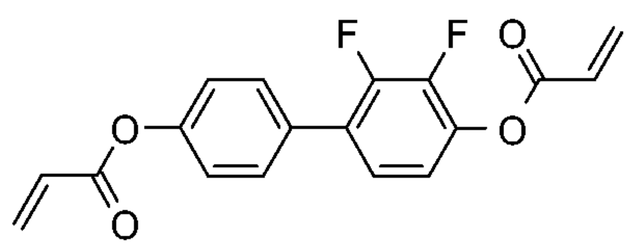

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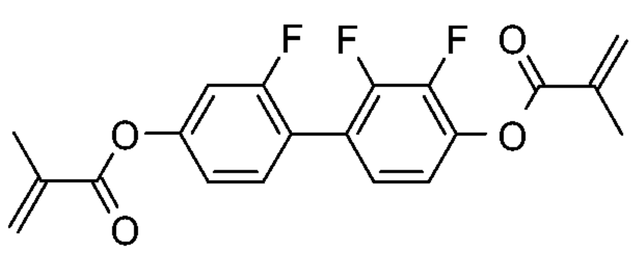

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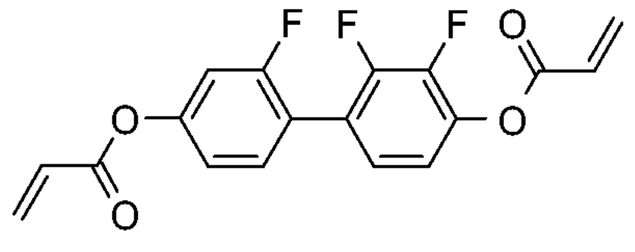

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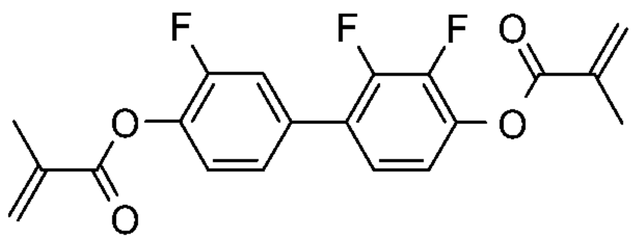

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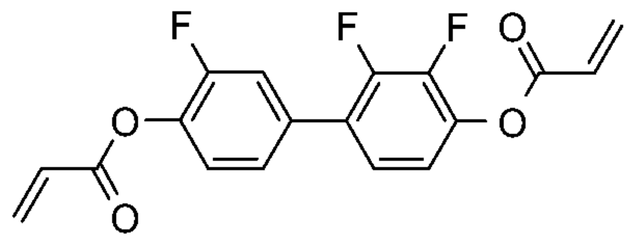
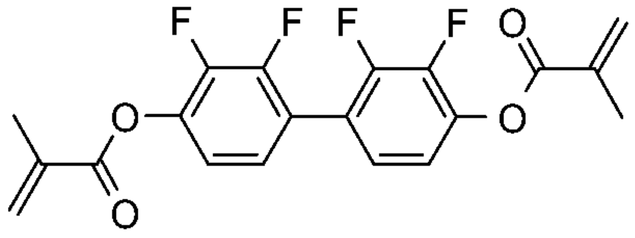


RM-30



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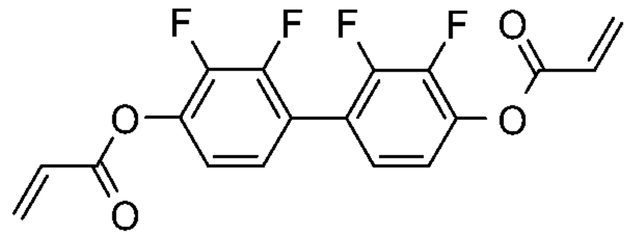

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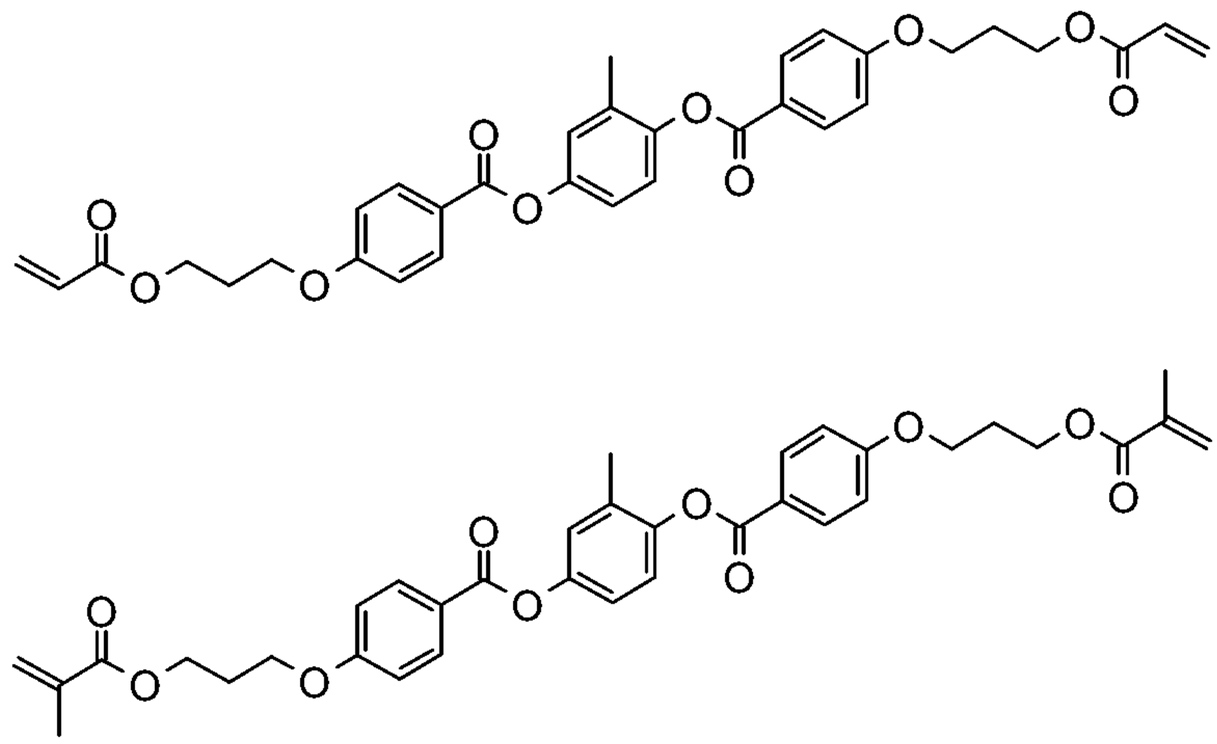
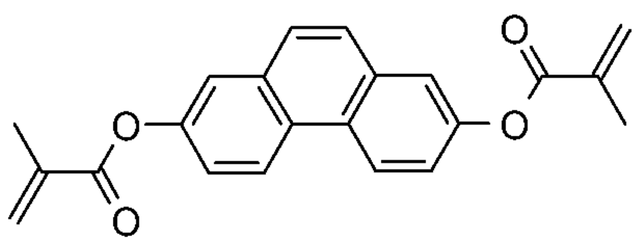
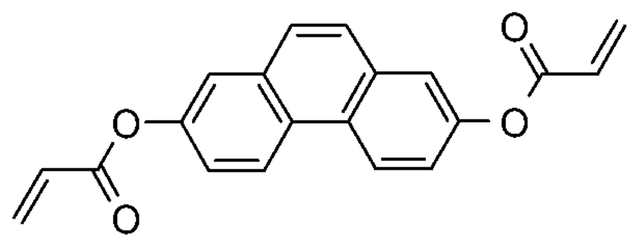


RM-33

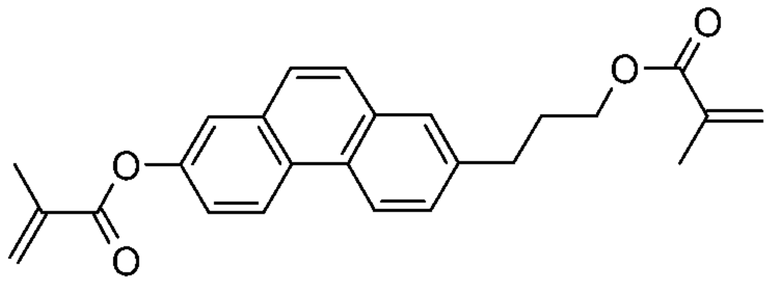
RM-34



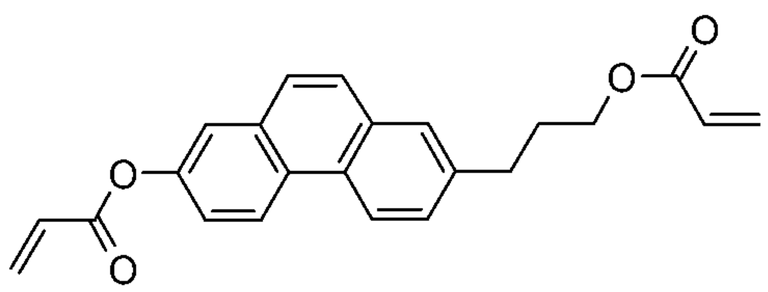
RM-35



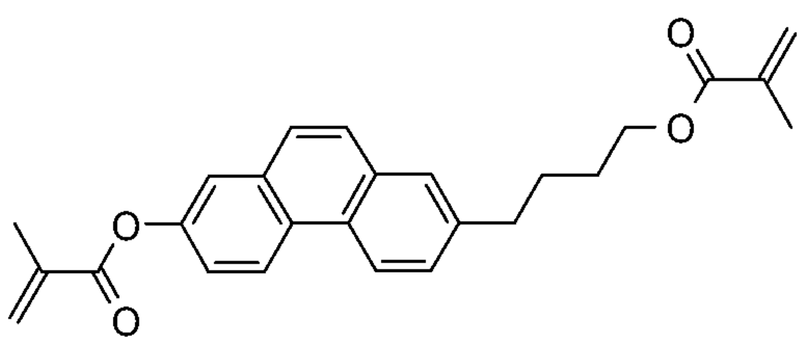
RM-36



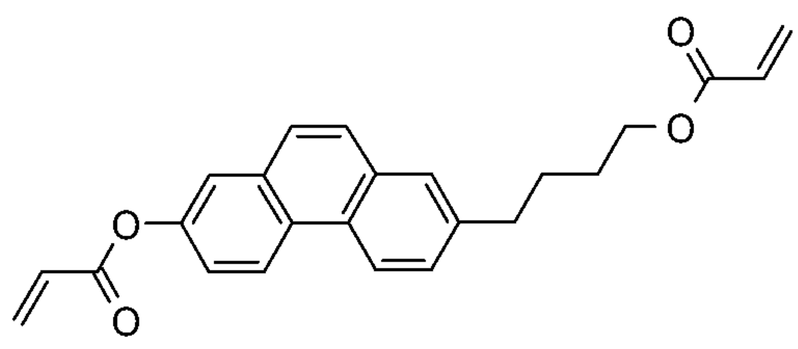
RM-37



RM-38



RM-39



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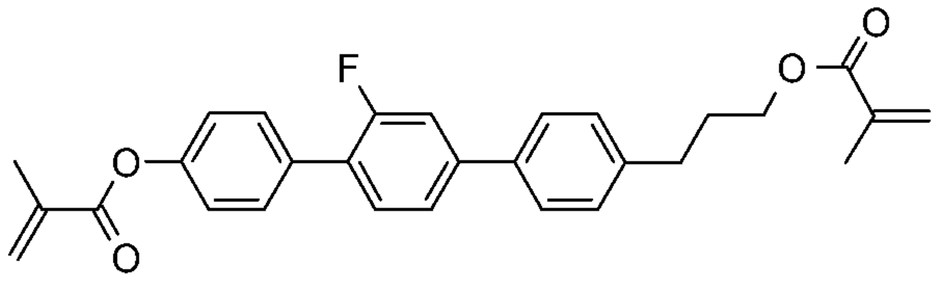
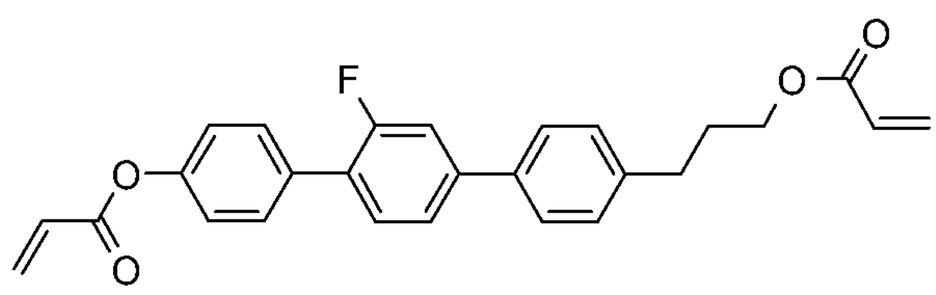


RM-41



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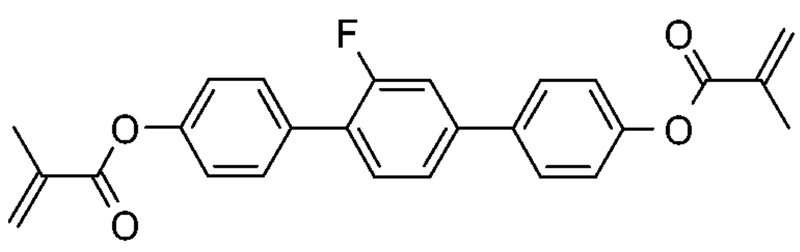
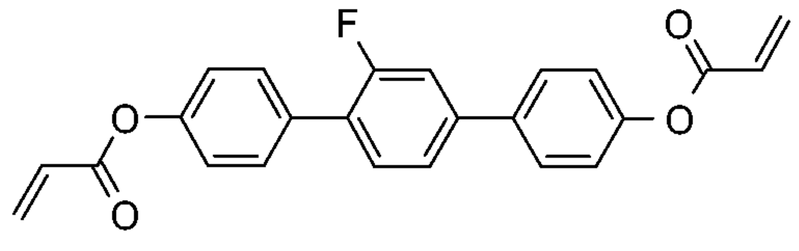
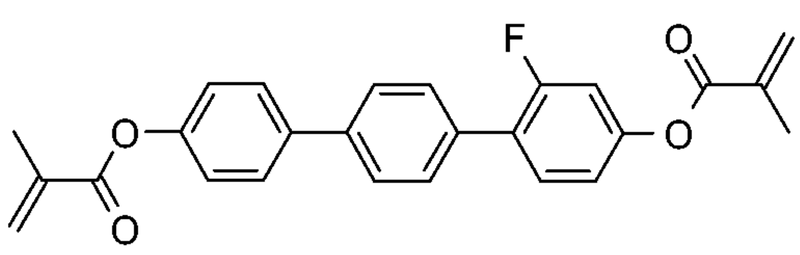


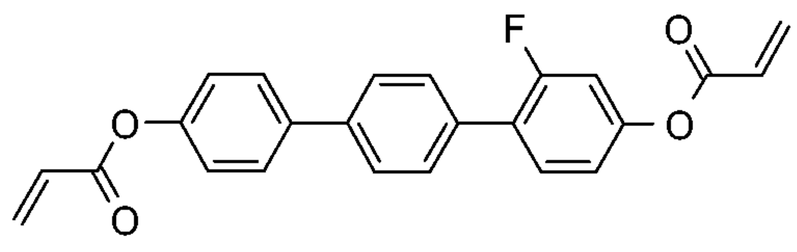
RM-43



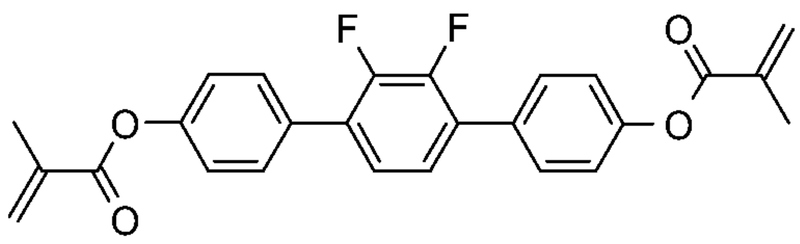
RM-44



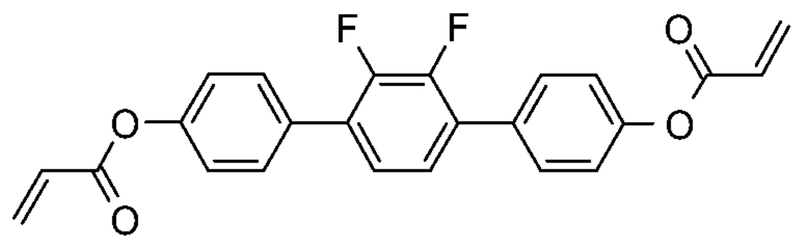
RM-45



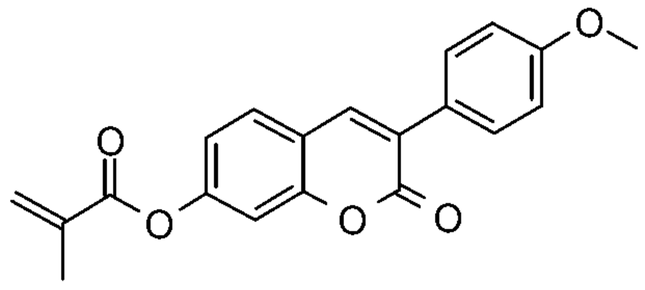
RM-46



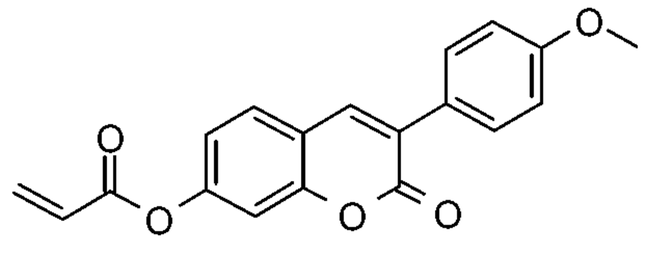
RM-47



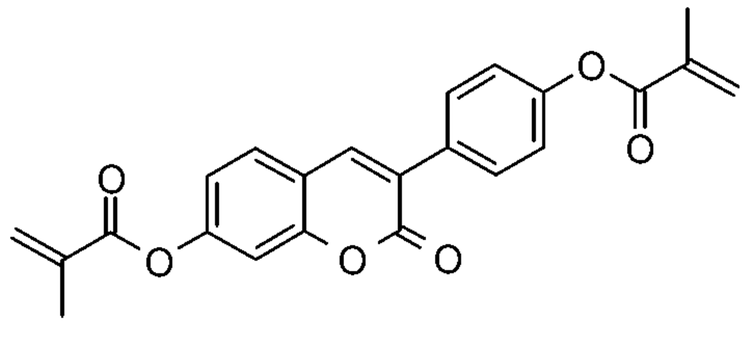
RM-48



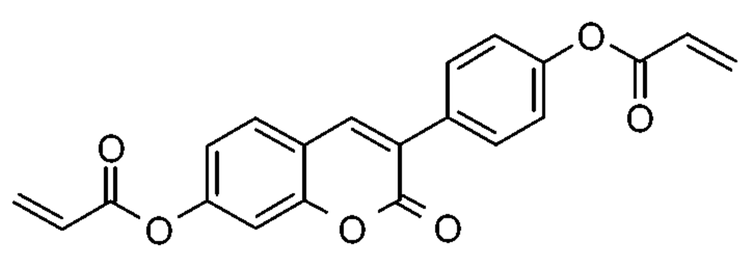
RM-49



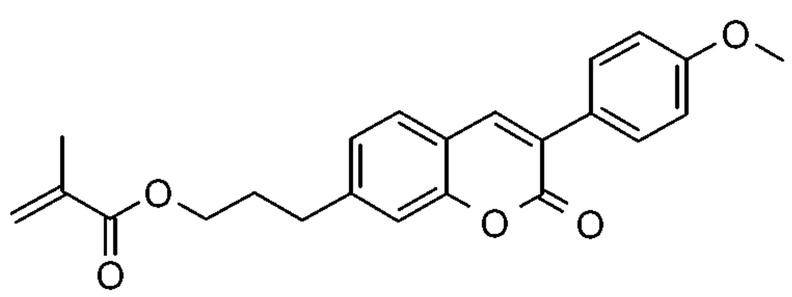
RM-50



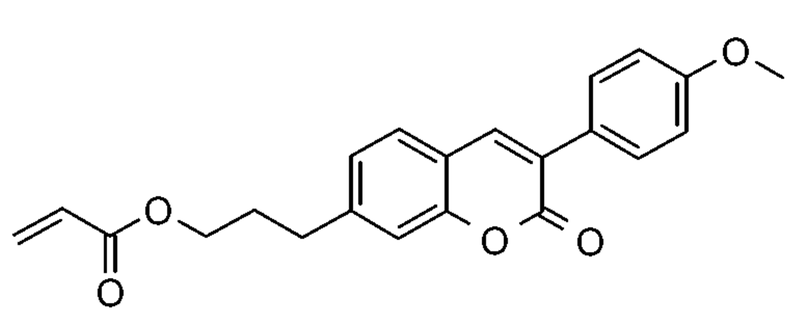
RM-51



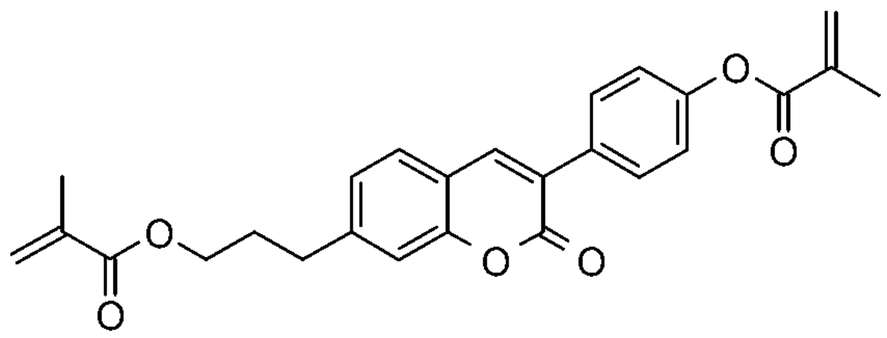
RM-52



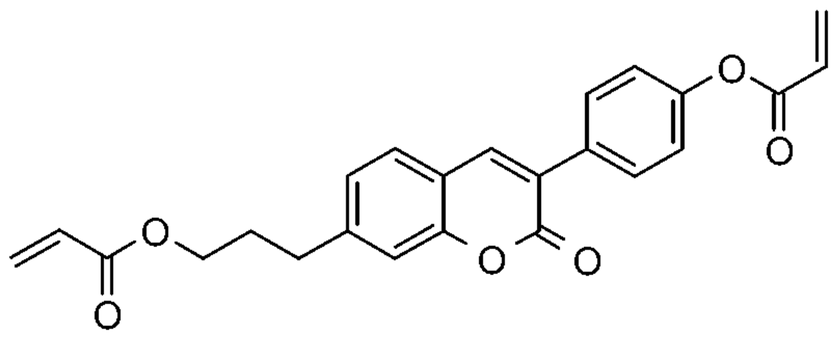
RM-53



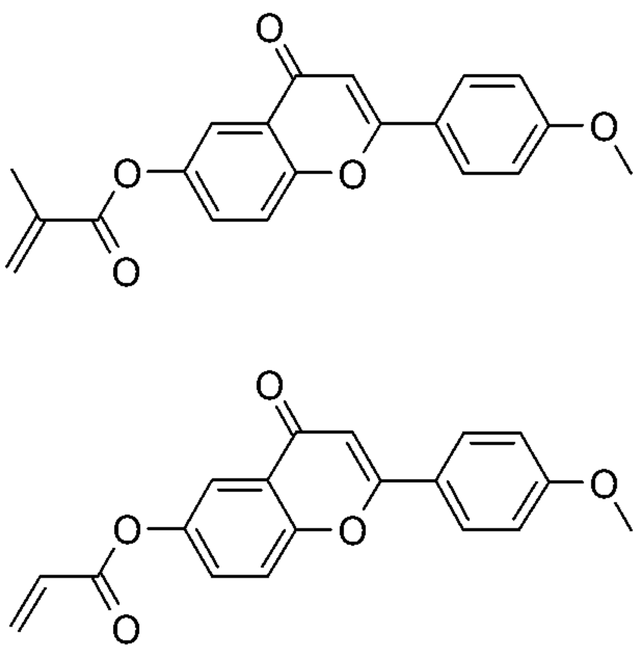
RM-54



RM-55

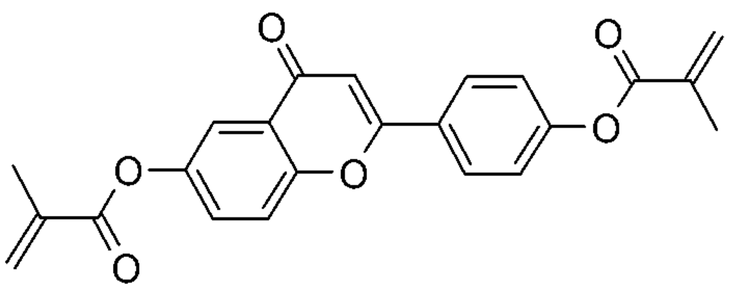


RM-56

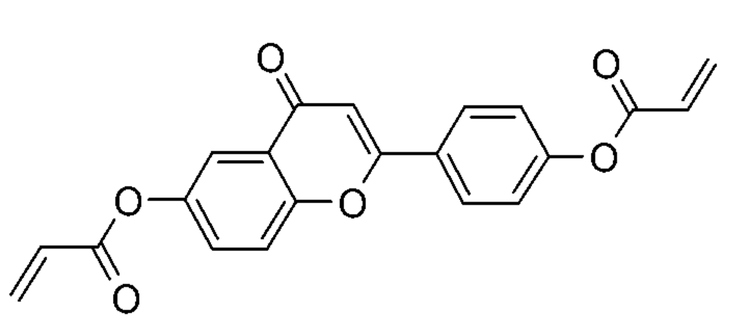


RM-57

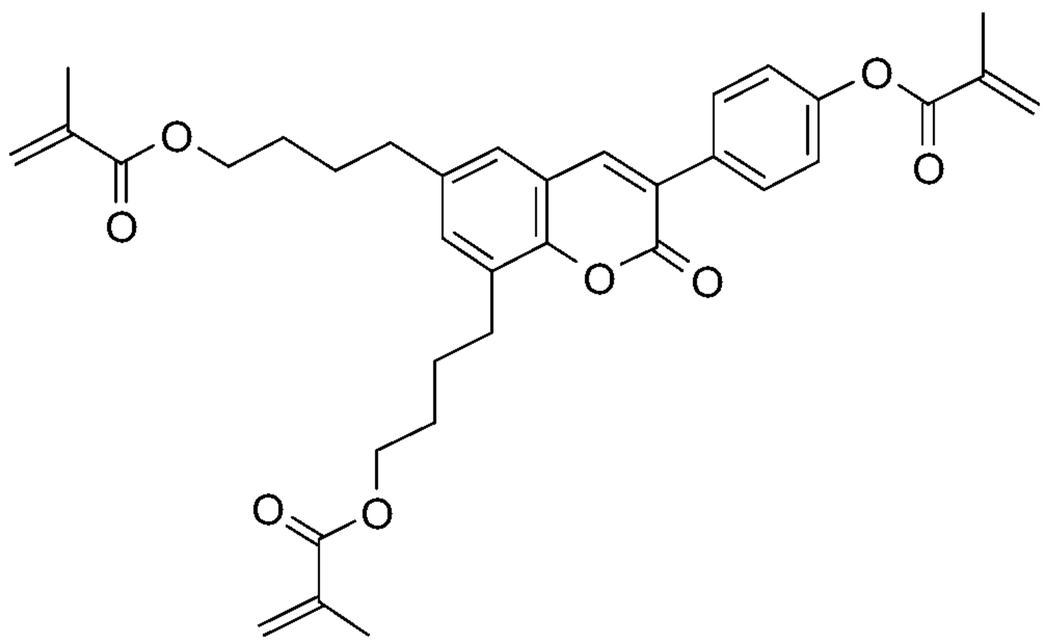
RM-58



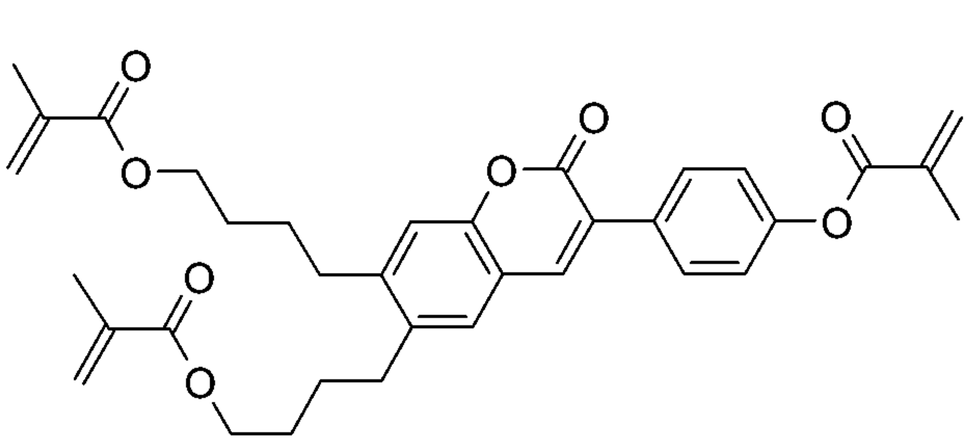
RM-59



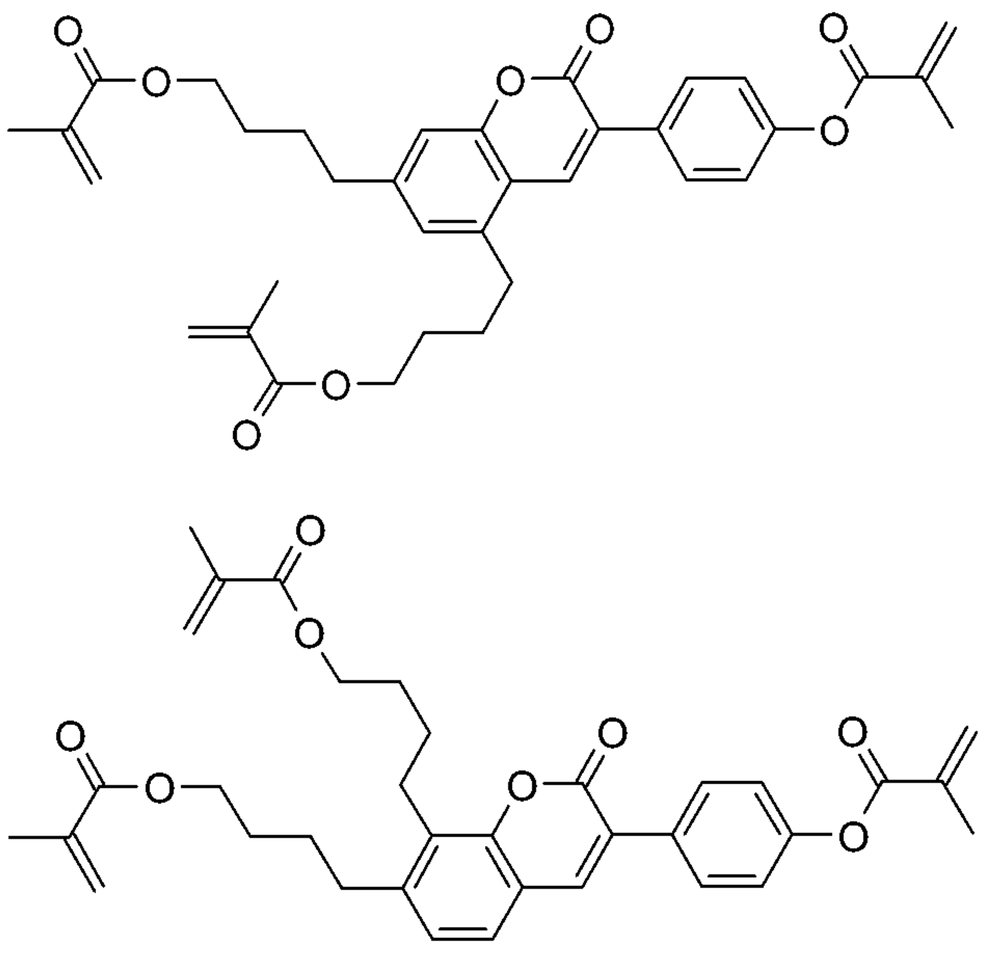
RM-60



RM-61

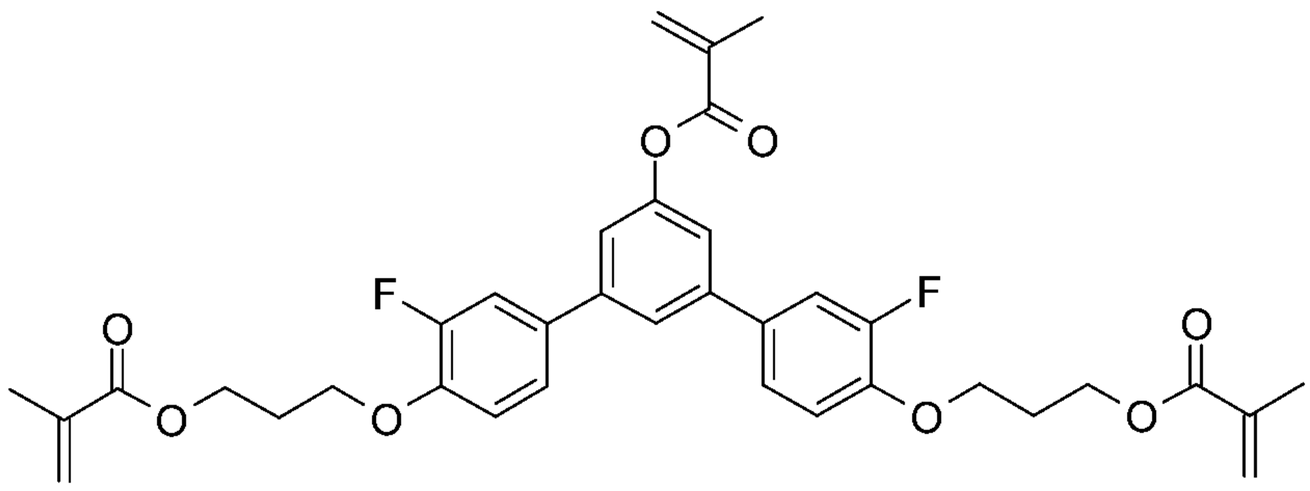


RM-62

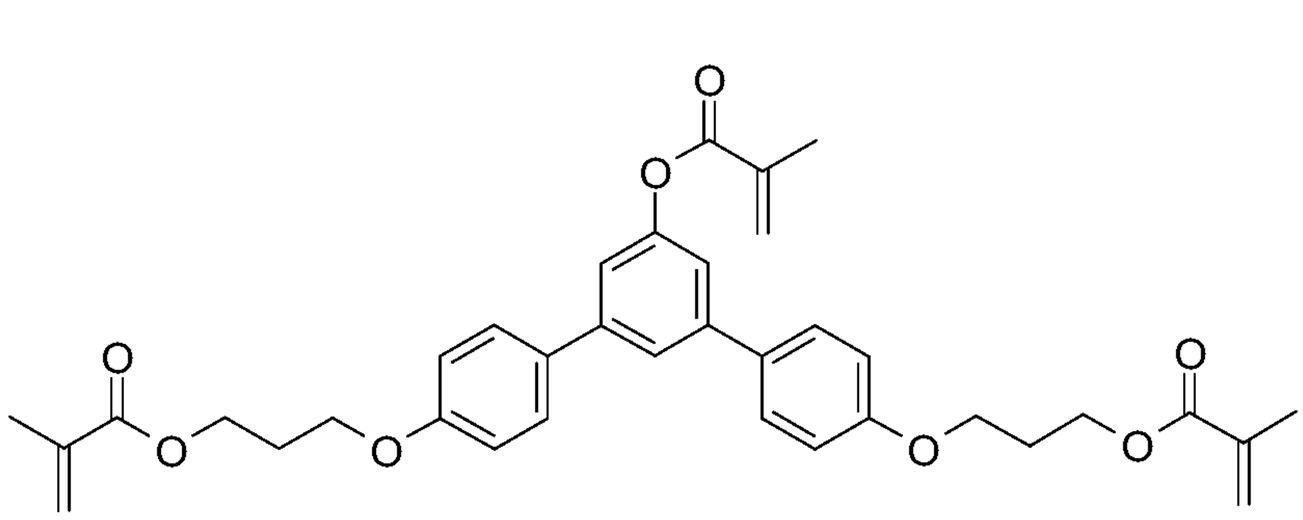


RM-63

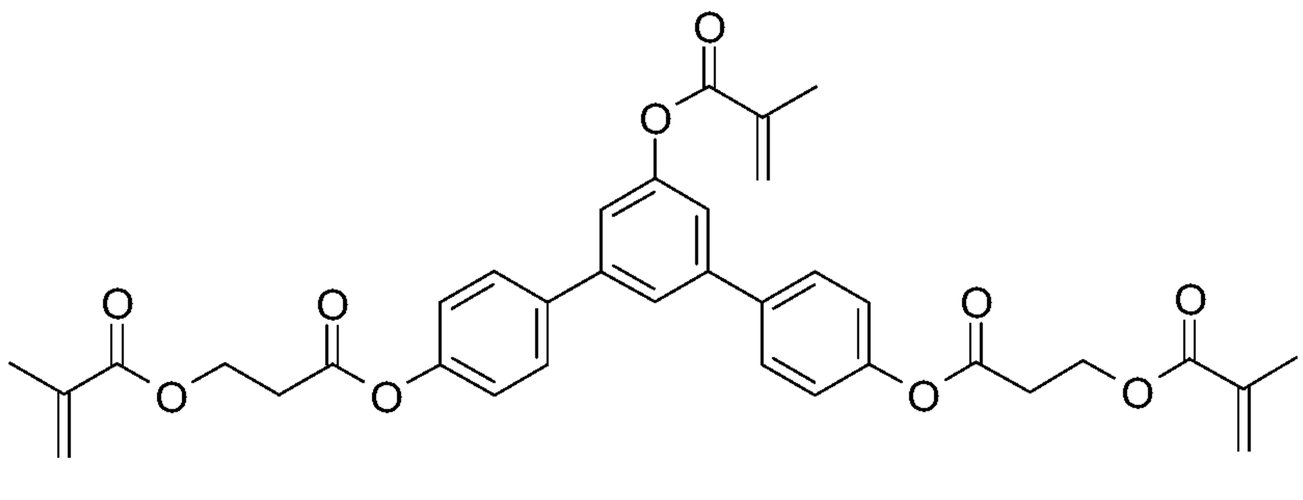
RM-64



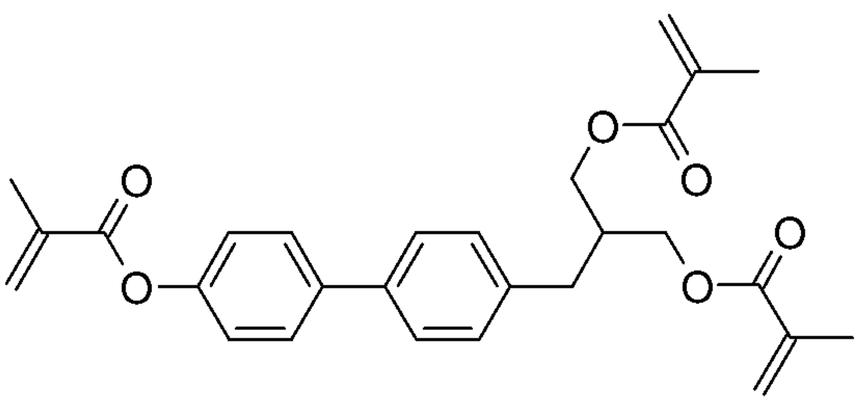
RM-65



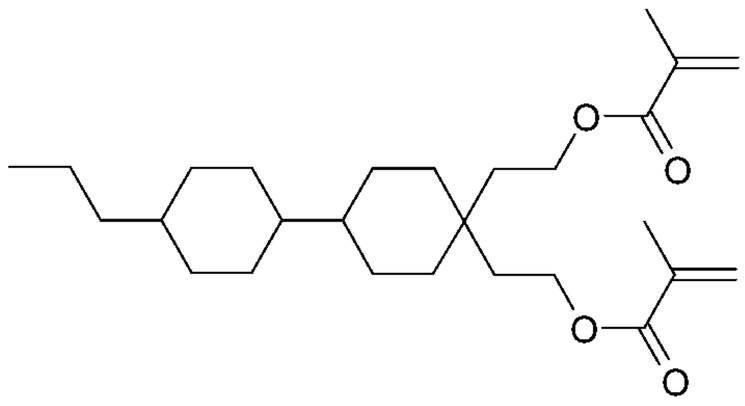
RM-66



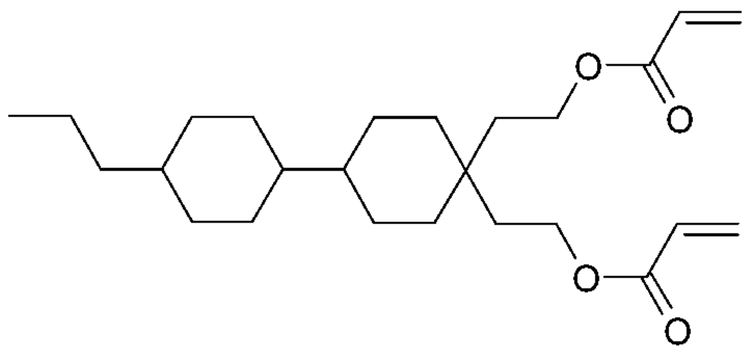
RM-67



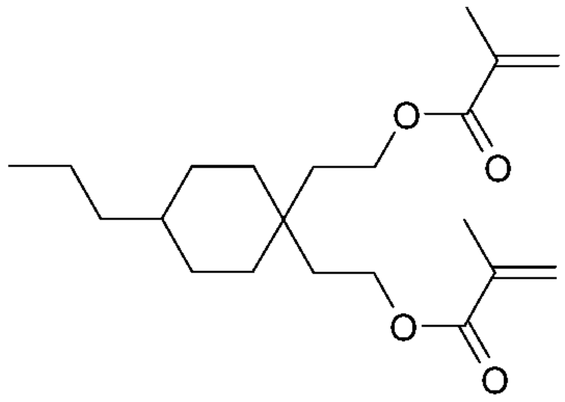
RM-68



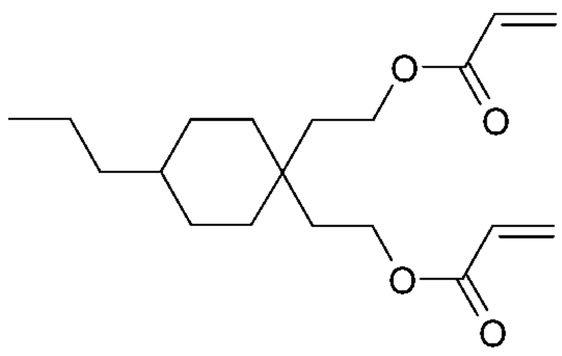
RM-69



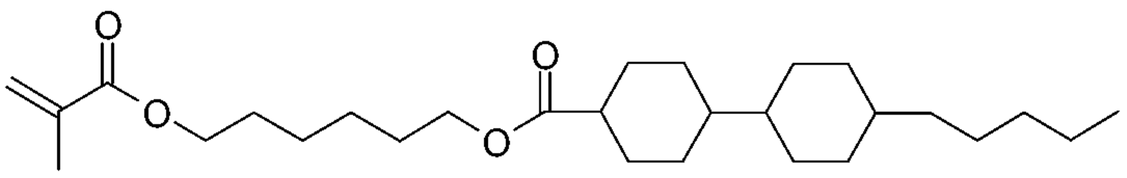
RM-70



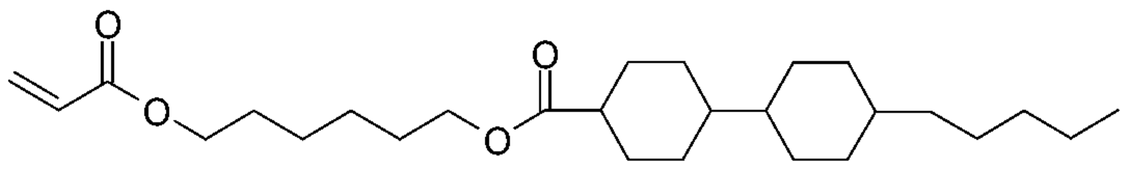
RM-71



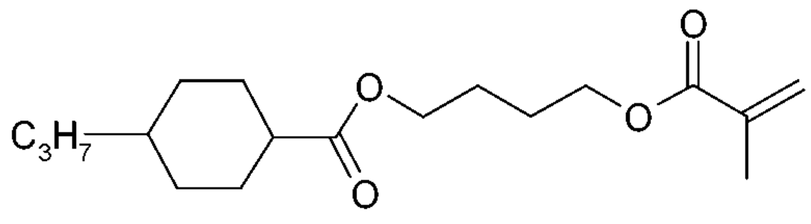
RM-72



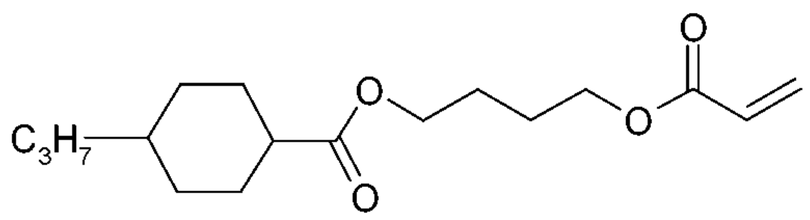
RM-73



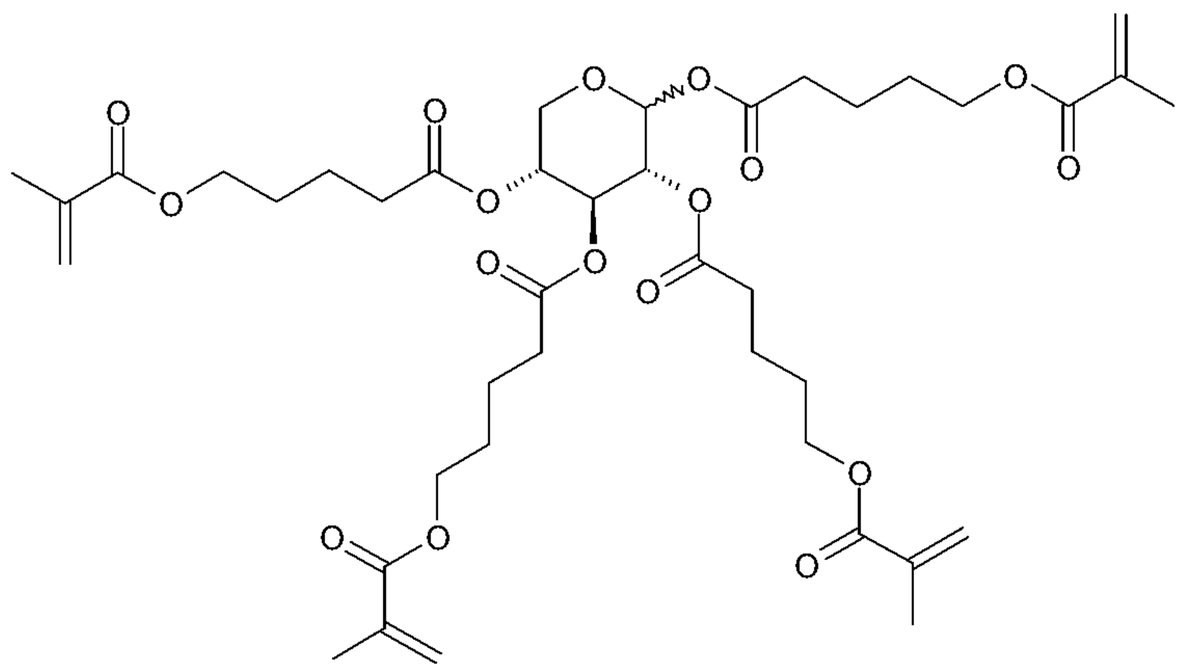
RM-74



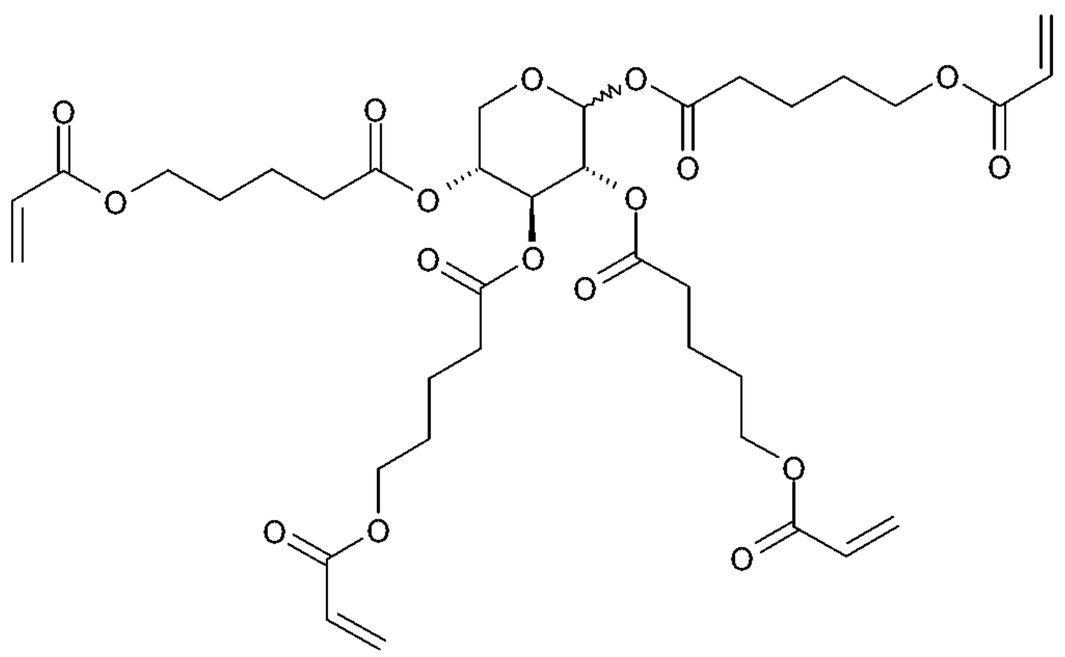
RM-75



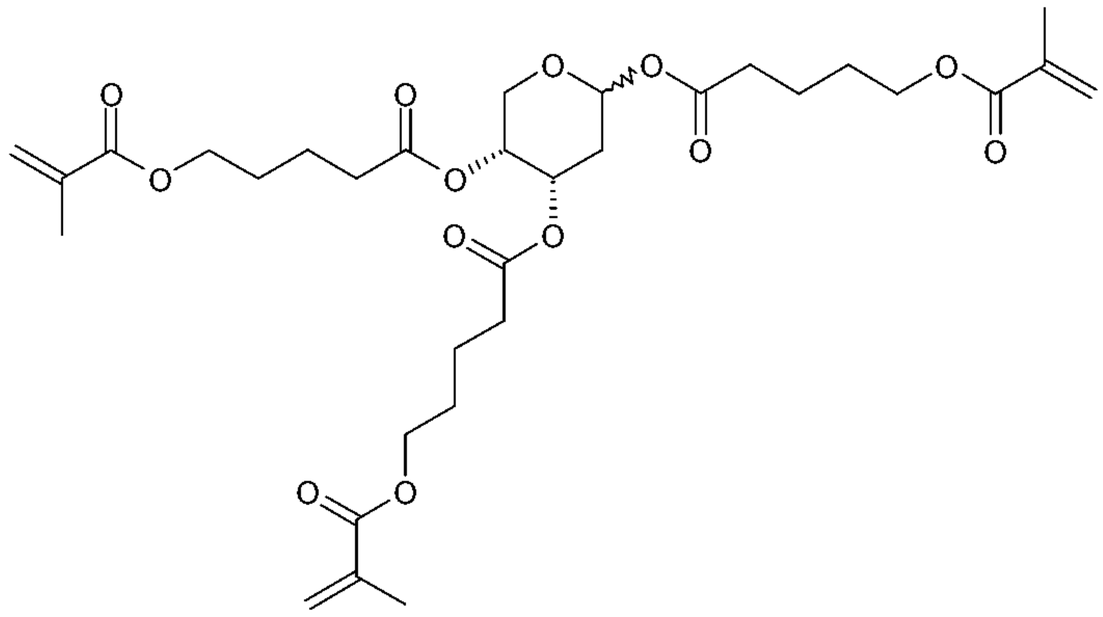
RM-76



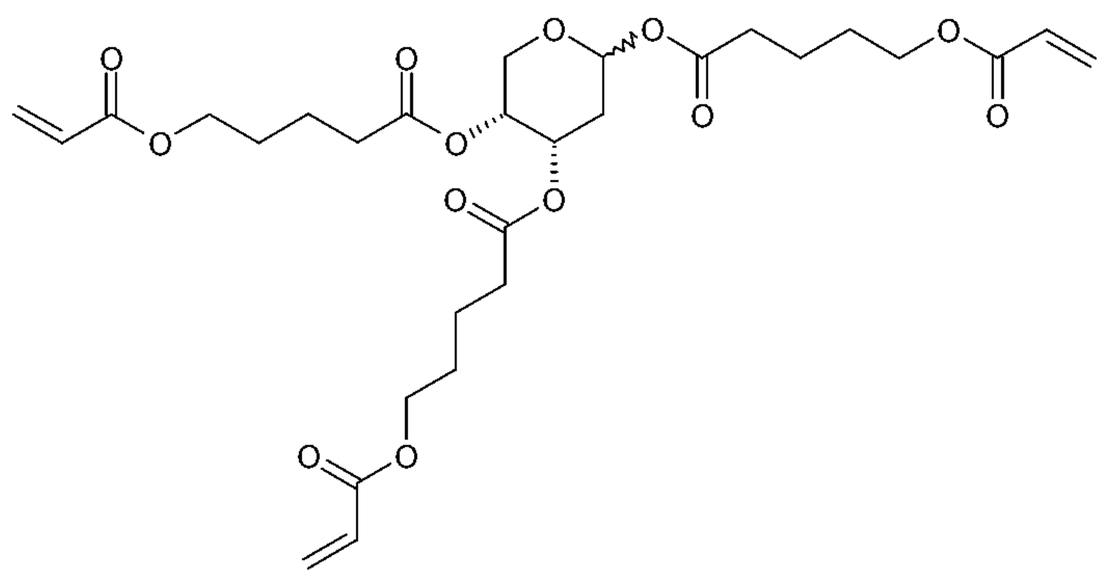
RM-77



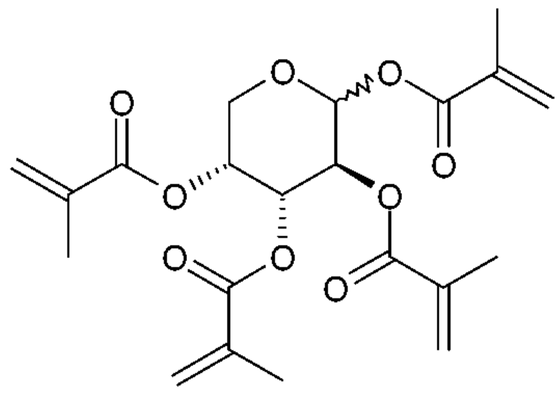
RM-78



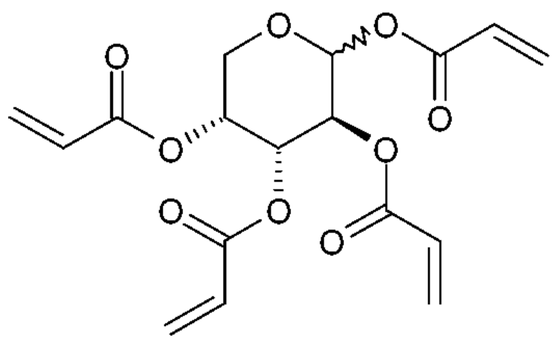
RM-79



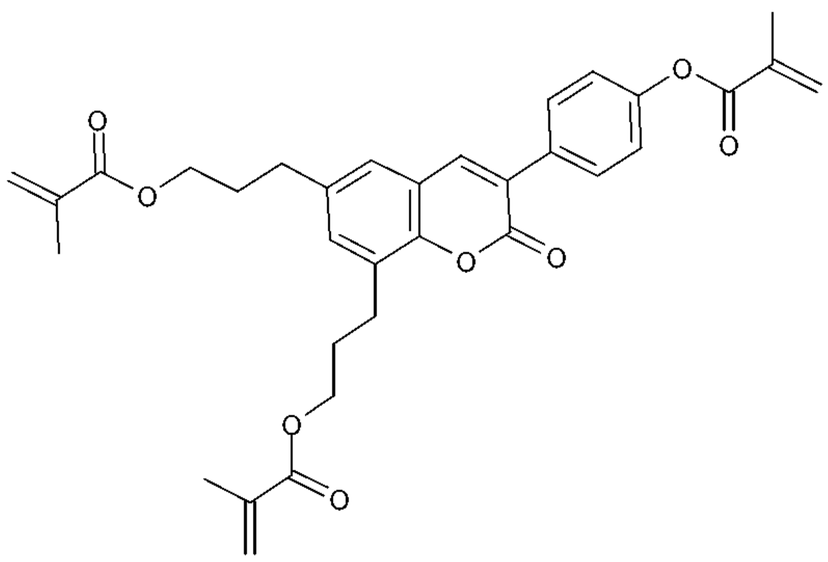
RM-80



RM-81



RM-82



RM-83。

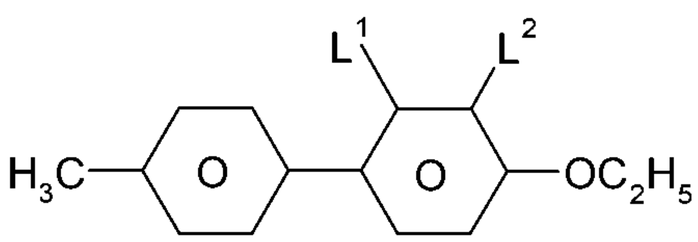
4. 如請求項1至3中任一項之液晶介質，其中該液晶介質包含至少兩種式I化合物。

5. 如請求項1至3中任一項之液晶介質，其中該液晶介質包含至少三種式I化合物。

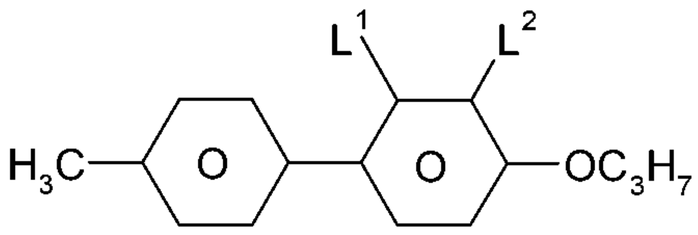
6. 如請求項1至3中任一項之液晶介質，其中L^1及L^2各自為氟。

7. 如請求項1至3中任一項之液晶介質，其中Z^1為單鍵。

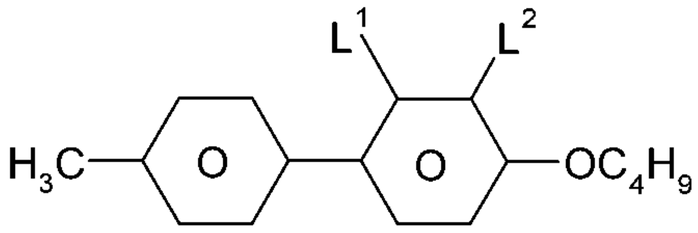
8. 如請求項1至3中任一項之液晶介質，其中該液晶介質包含至少一種式I-1至式I-145之化合物，



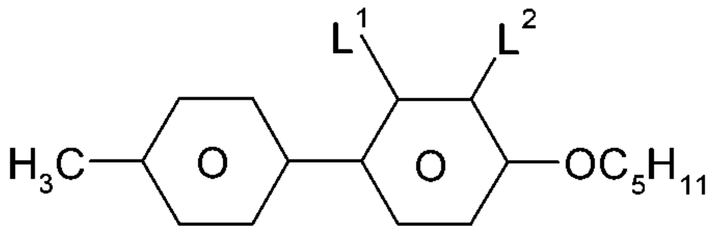
I-1



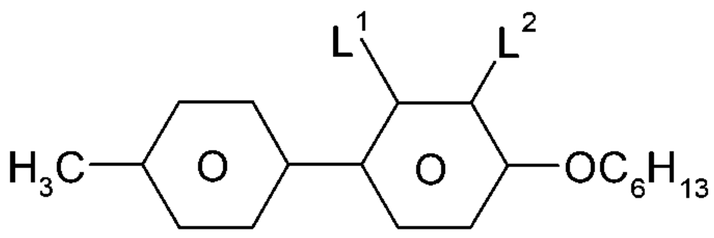
I-2



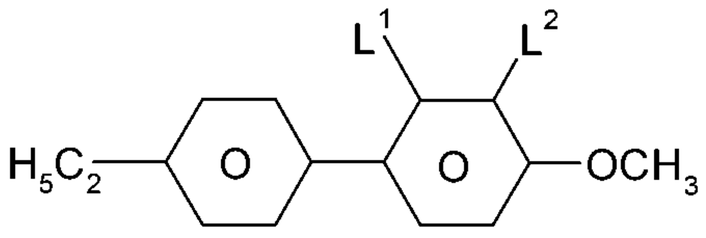
I-3



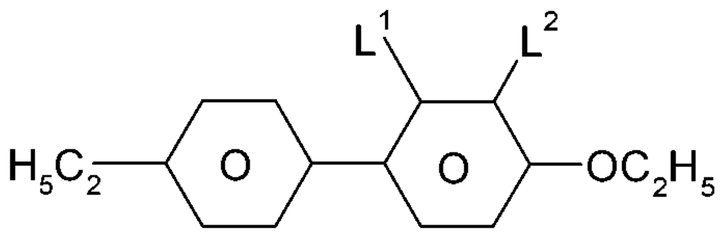
I-4



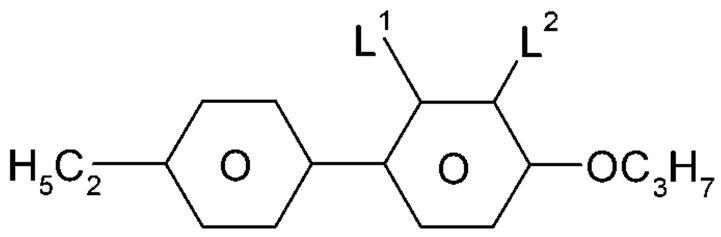
I-5



I-6



I-7



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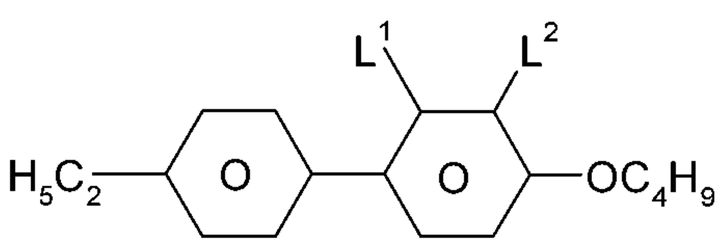

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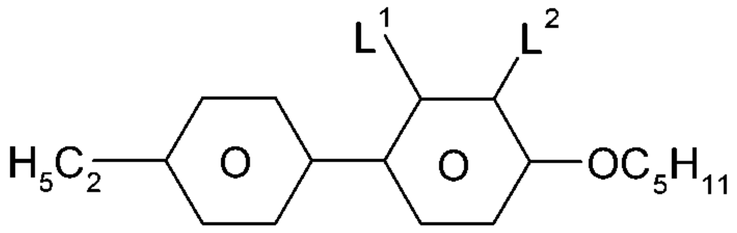

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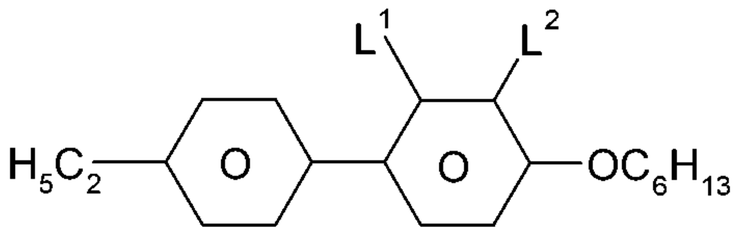

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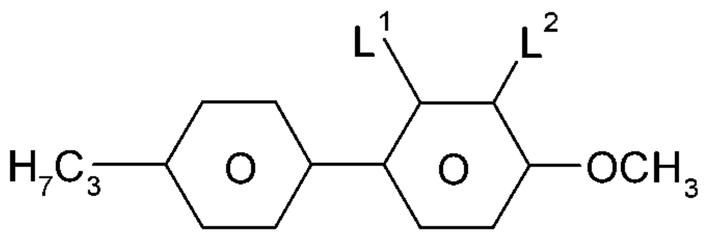

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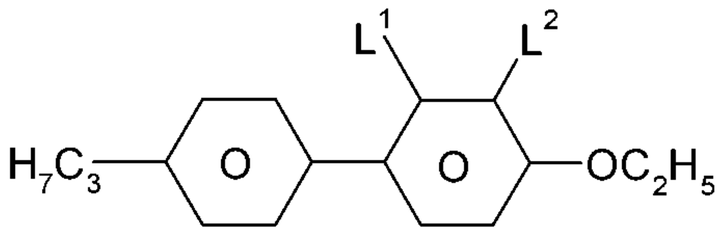

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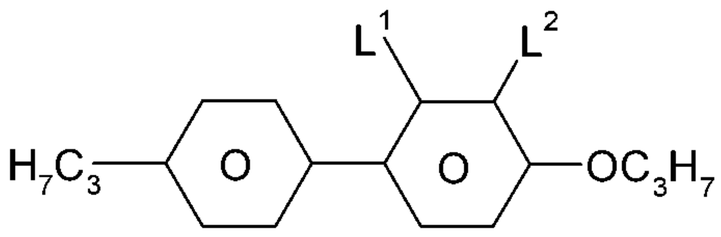

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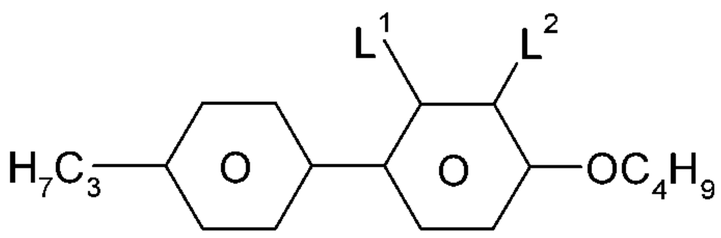

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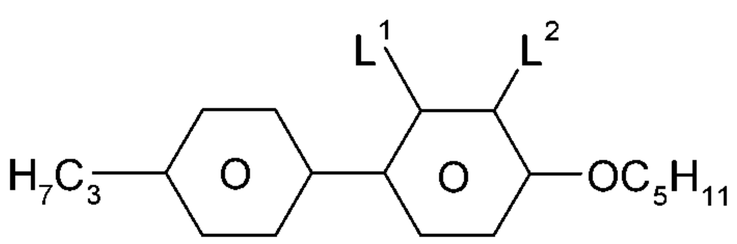

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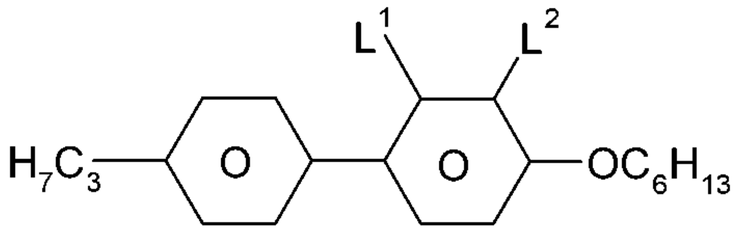

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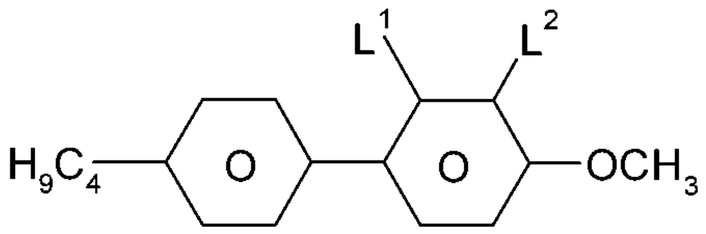

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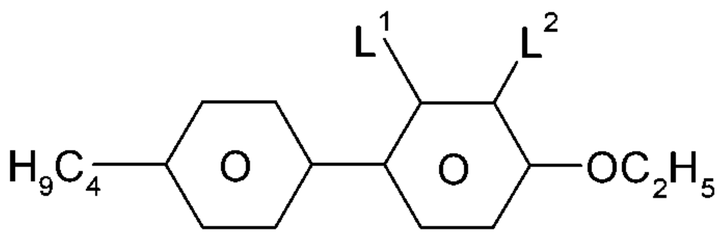

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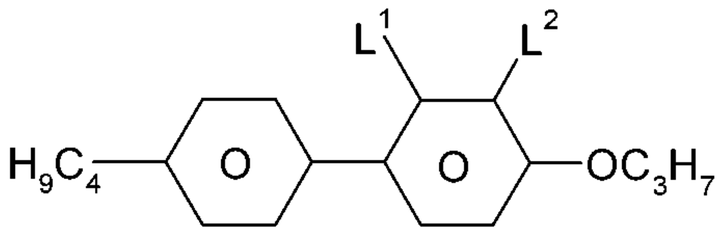

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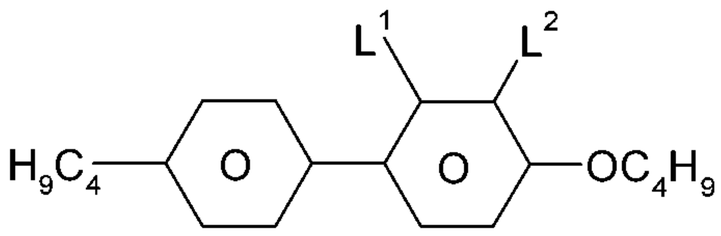

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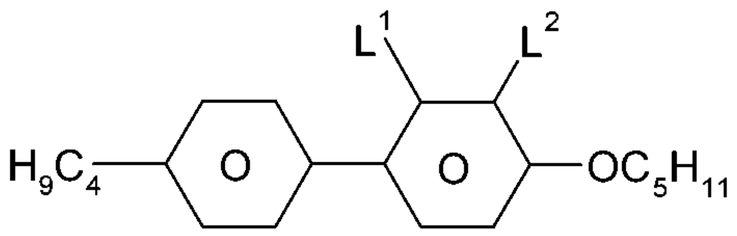

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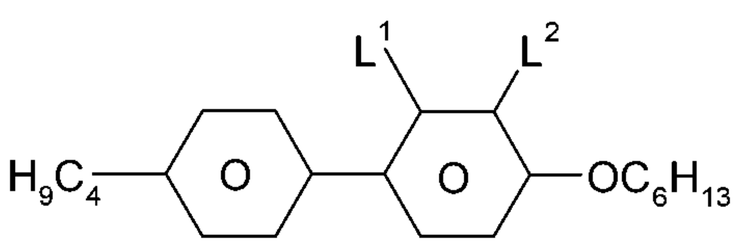

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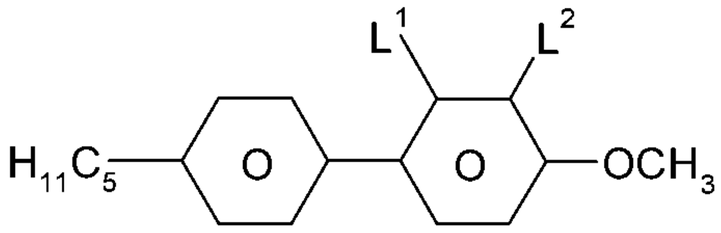

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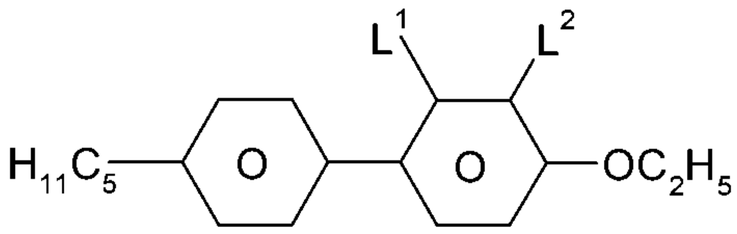

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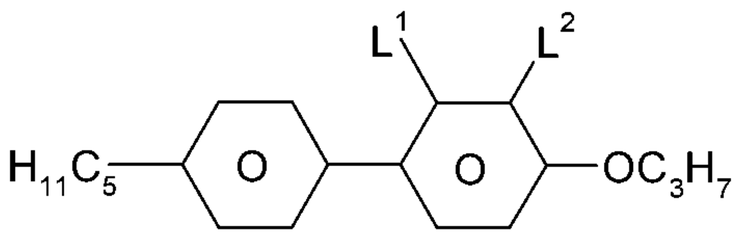

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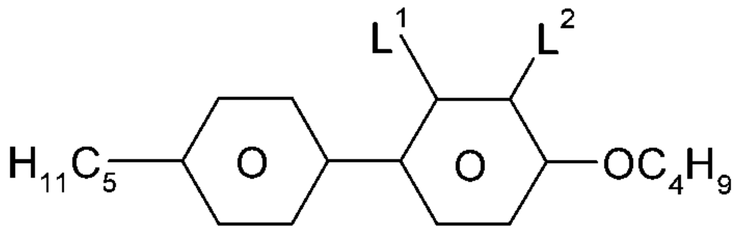

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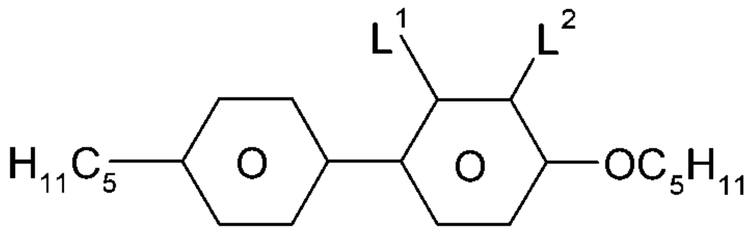

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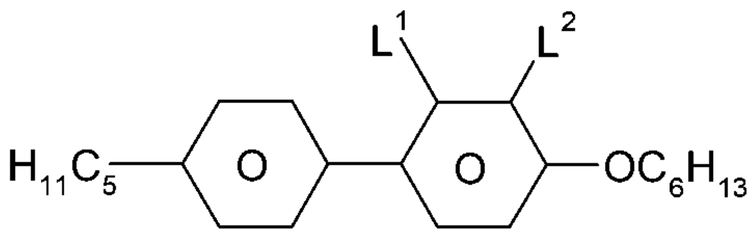

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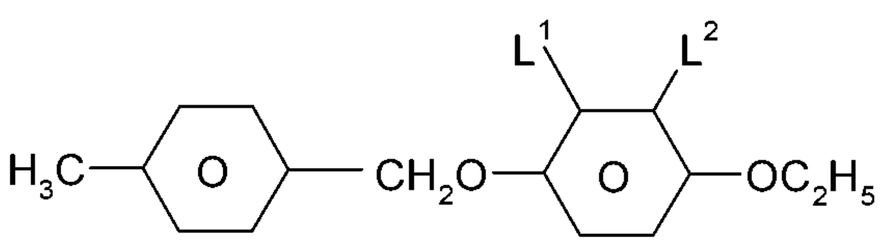

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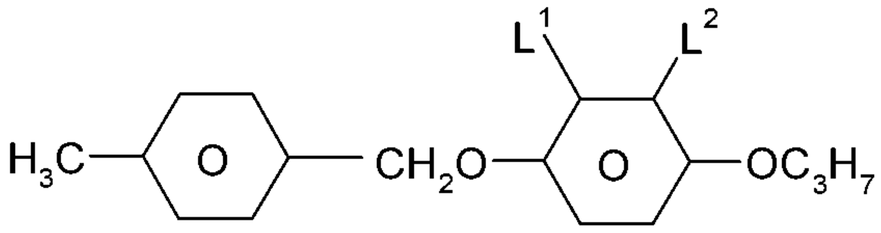

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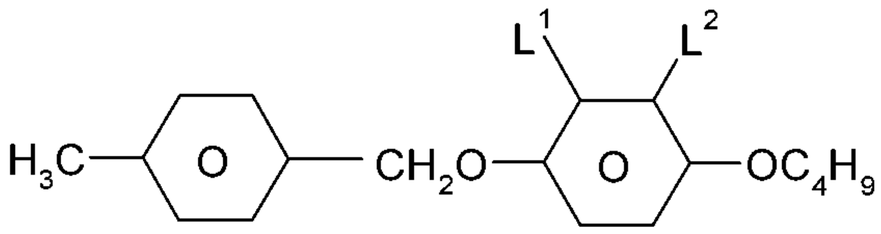

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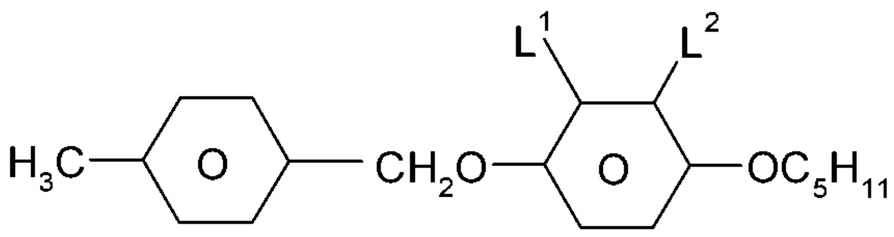

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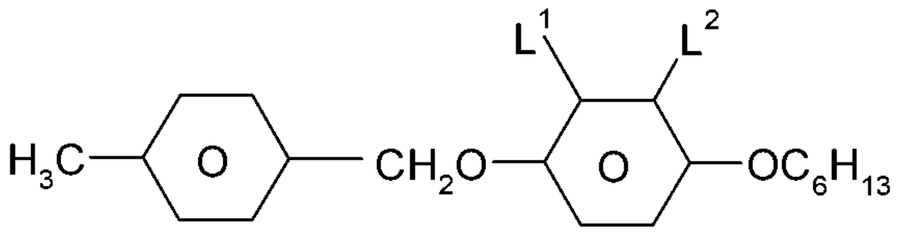

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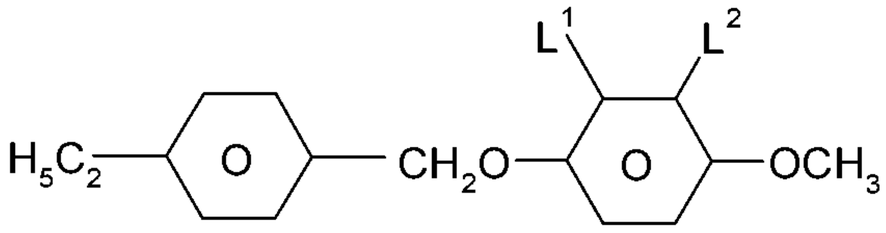

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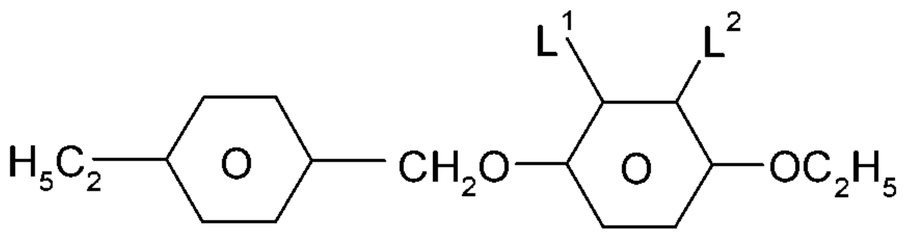

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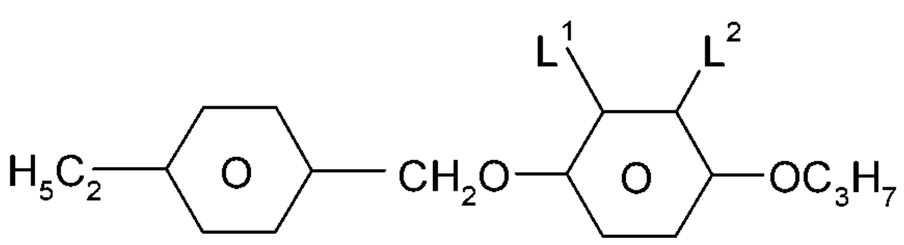

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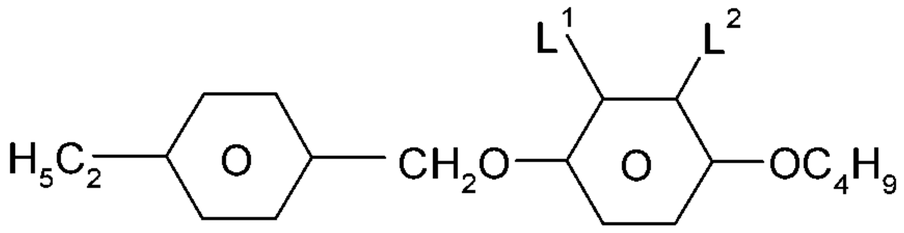

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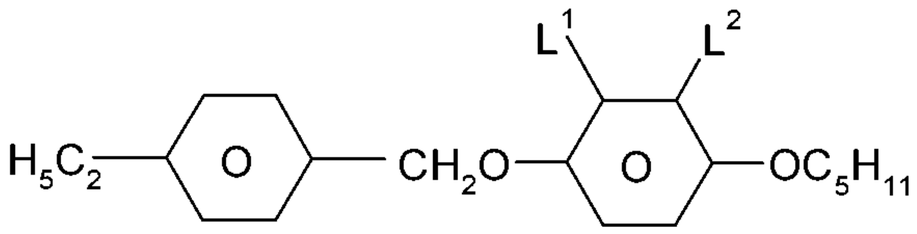

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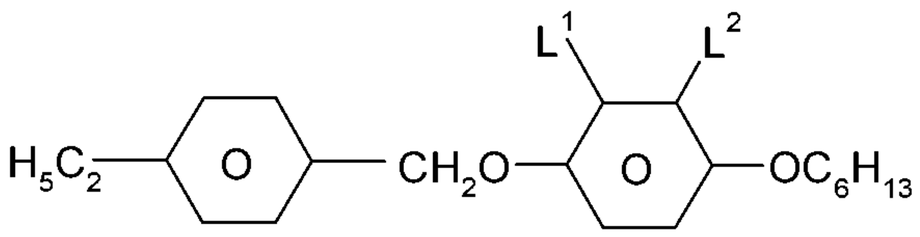

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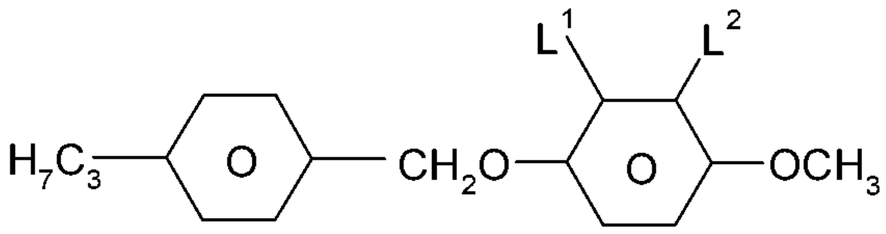

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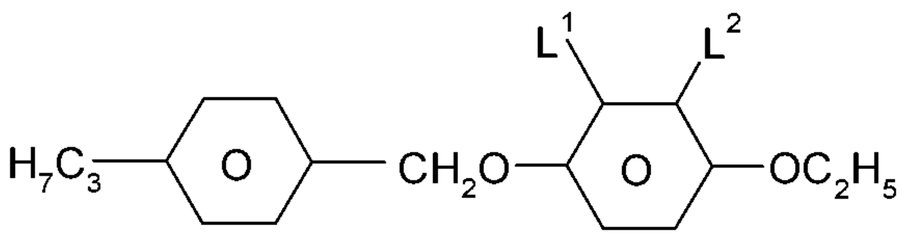

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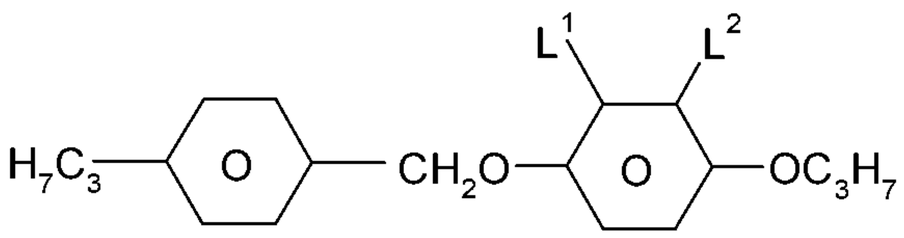

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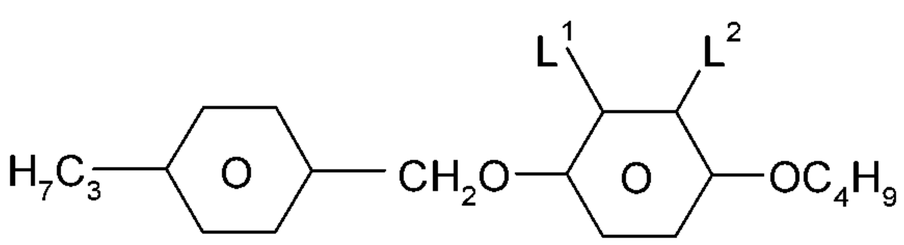

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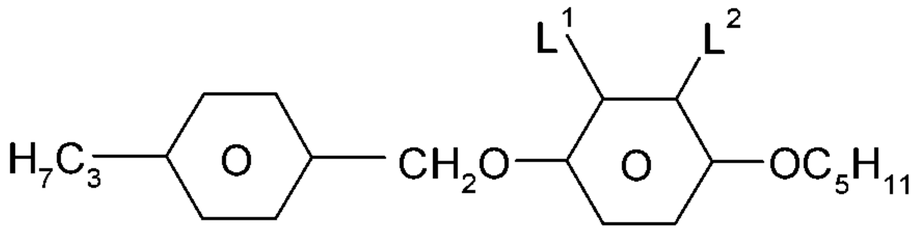

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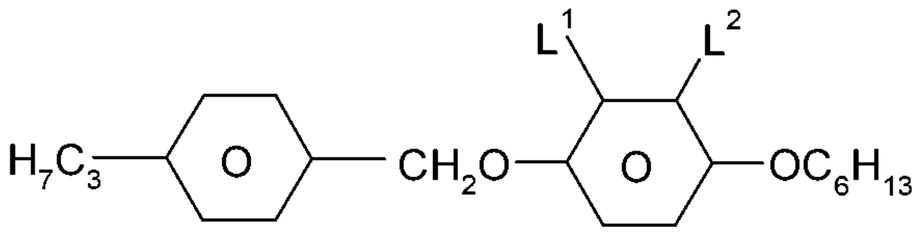

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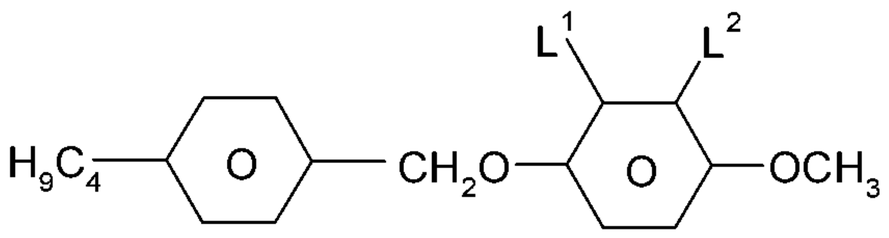

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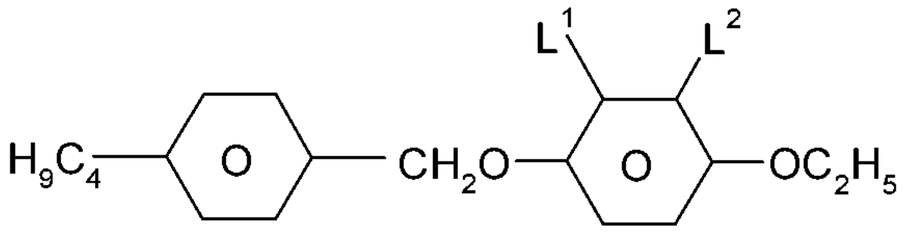

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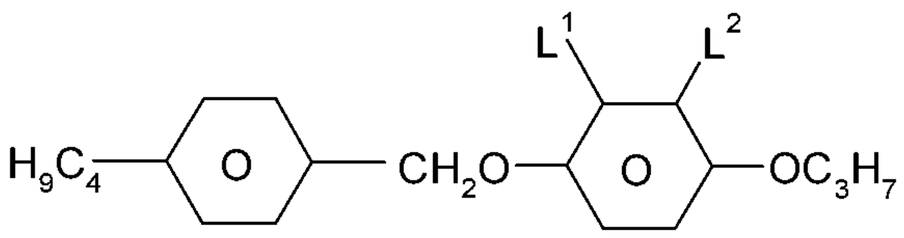

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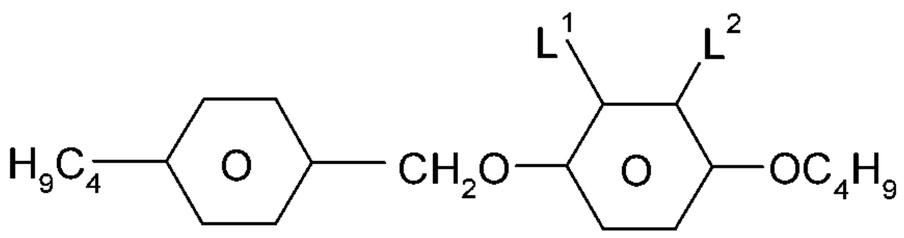

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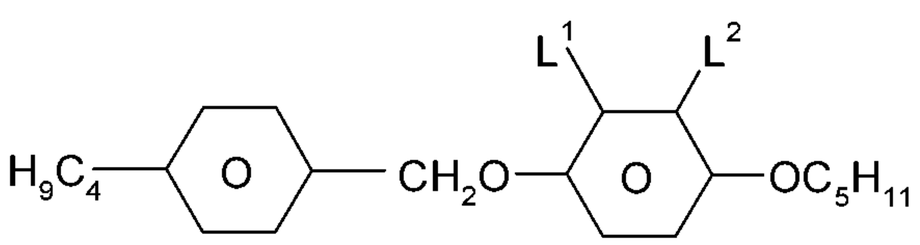

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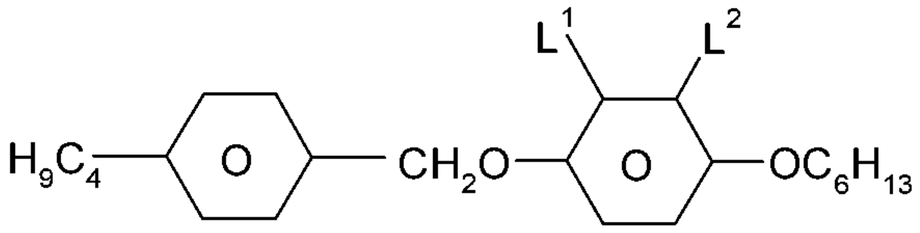

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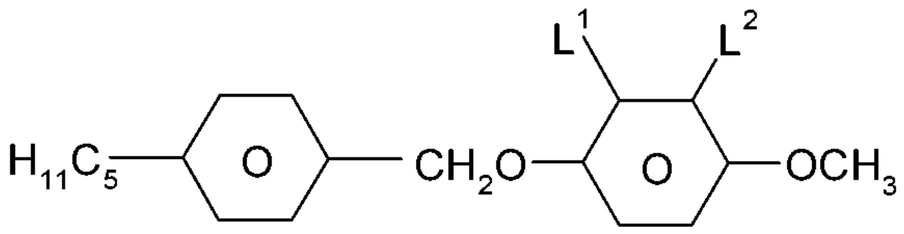

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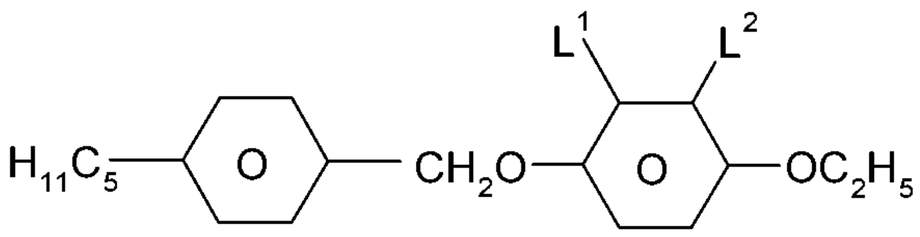

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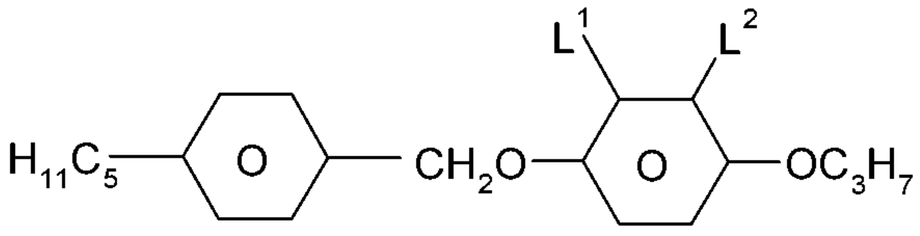

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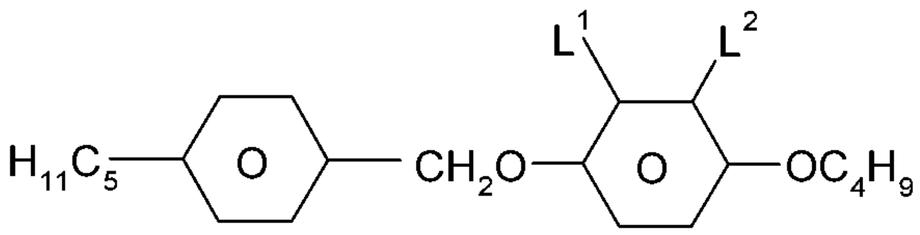

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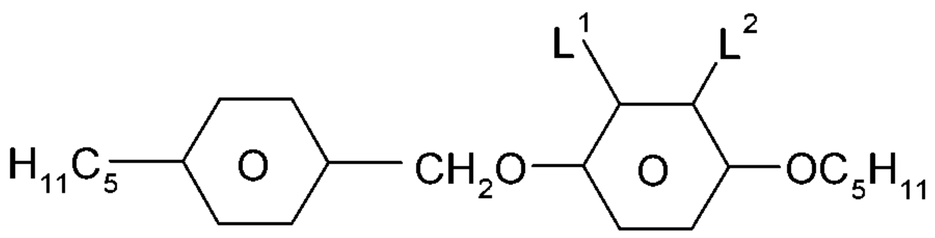

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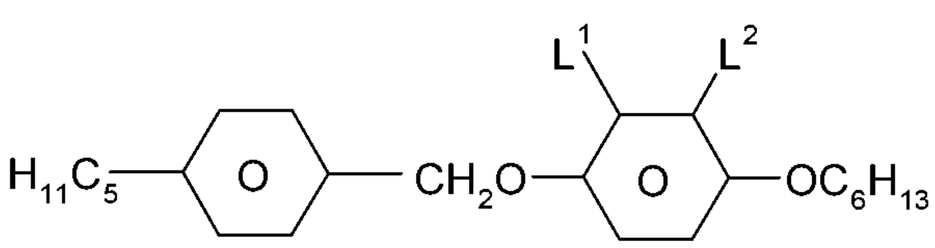

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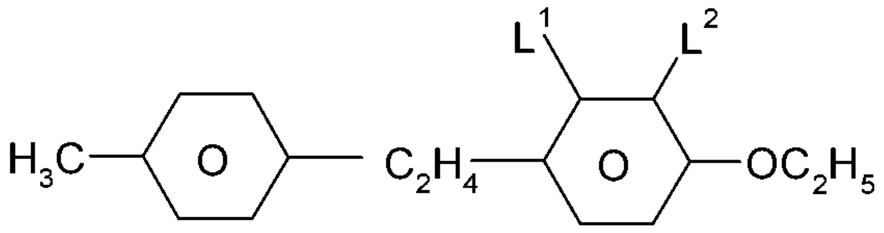

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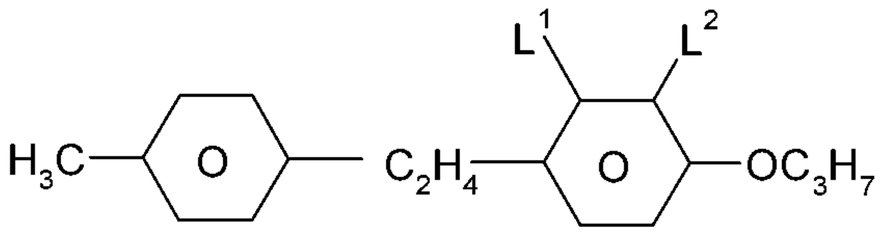

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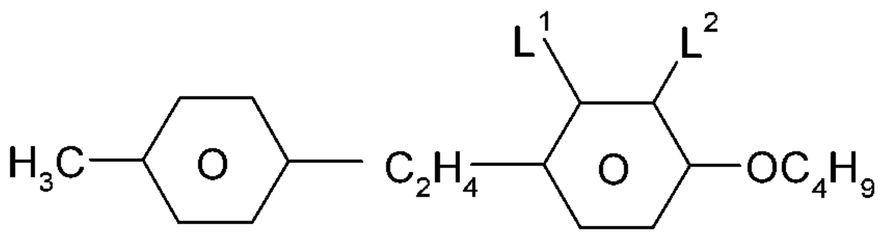

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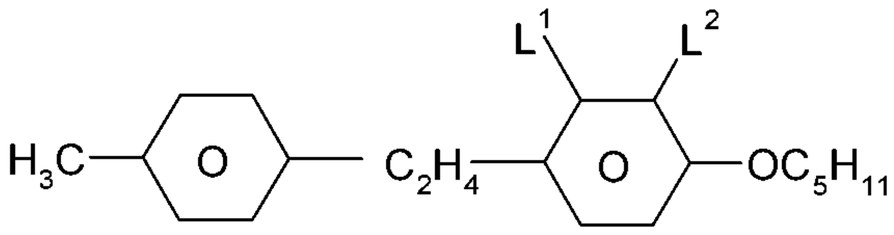
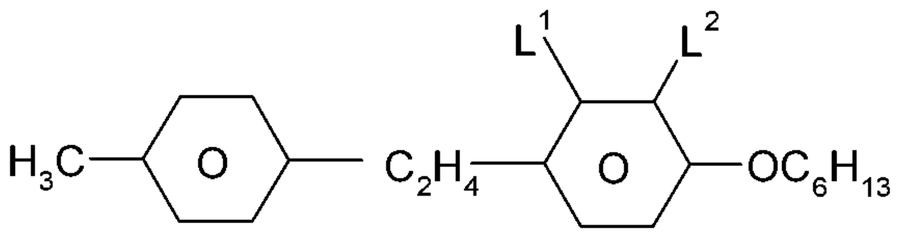


I-62



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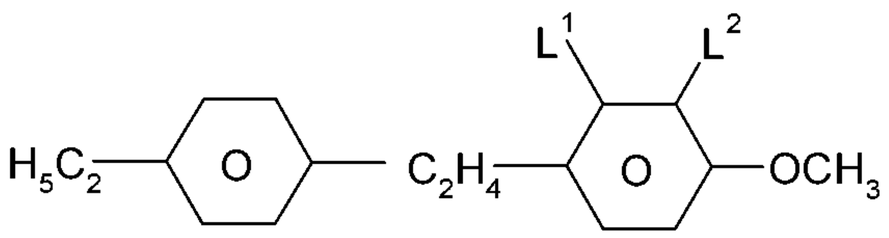

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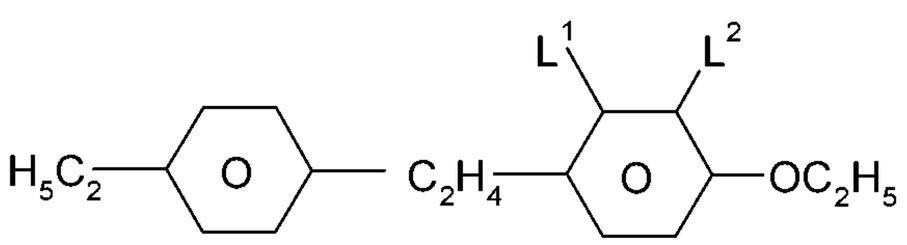

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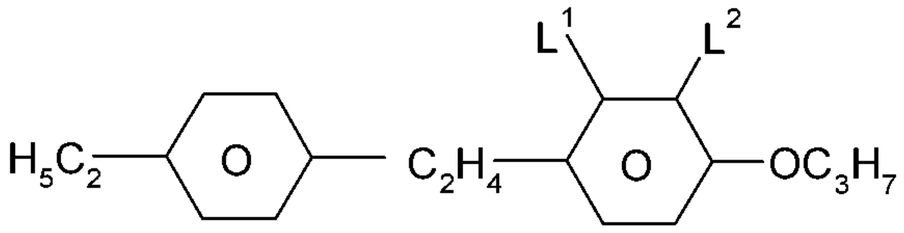

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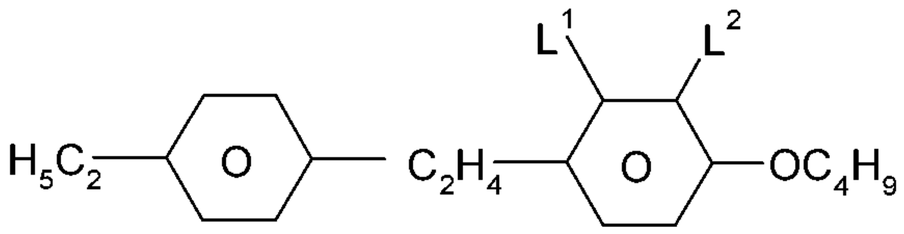

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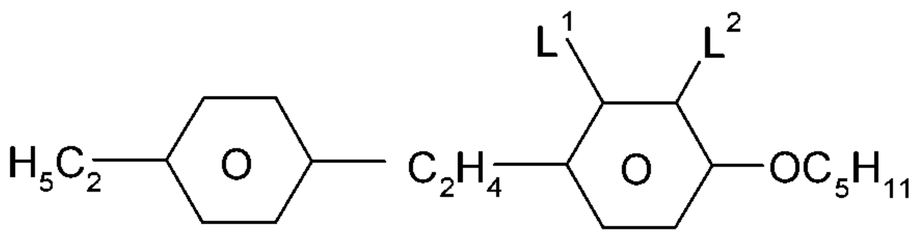

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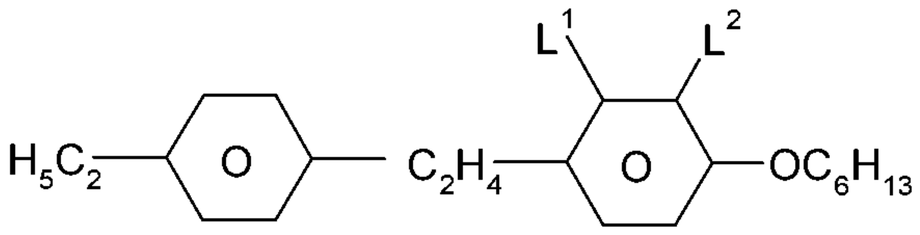

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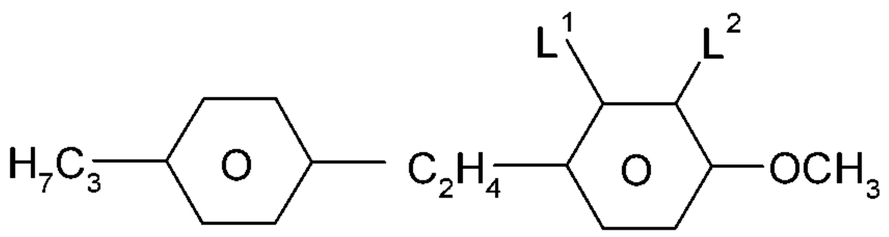

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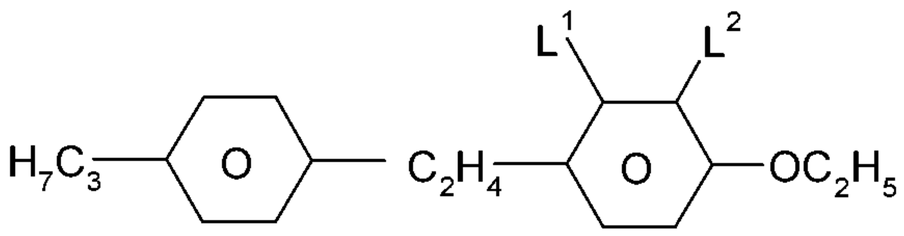

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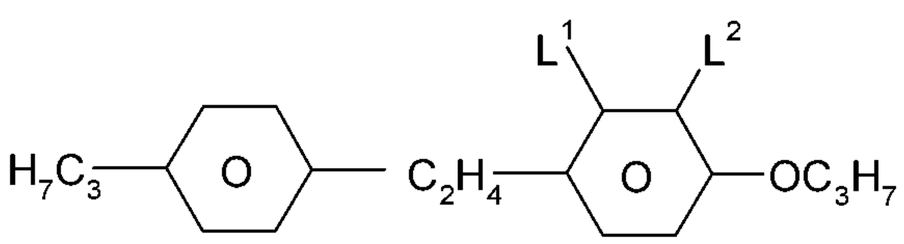

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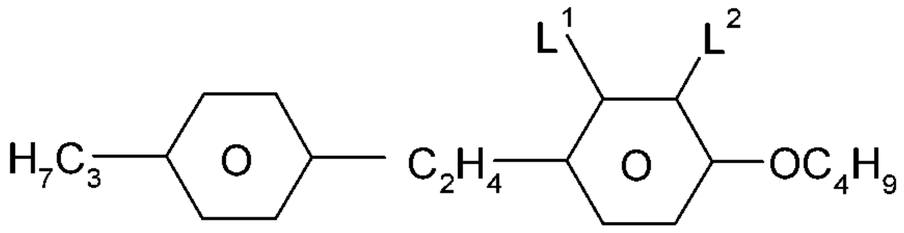

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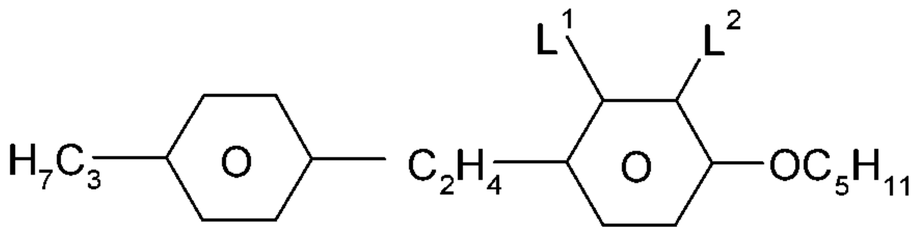

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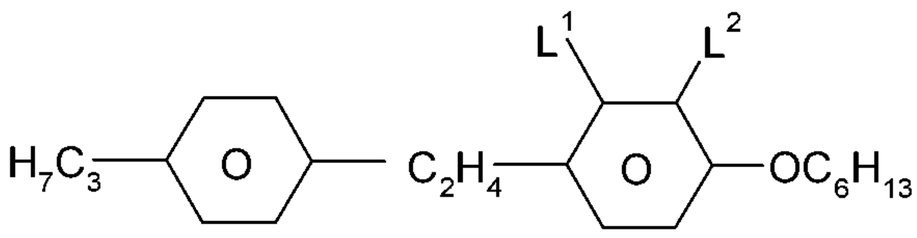

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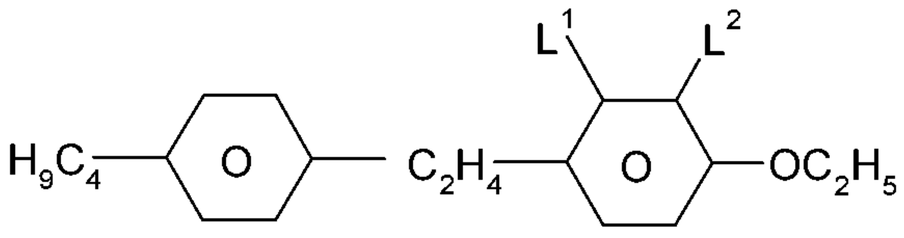

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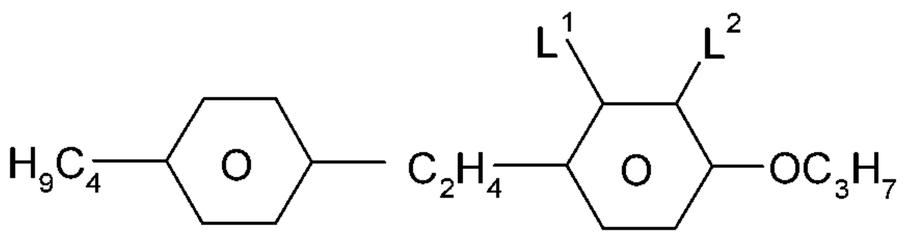

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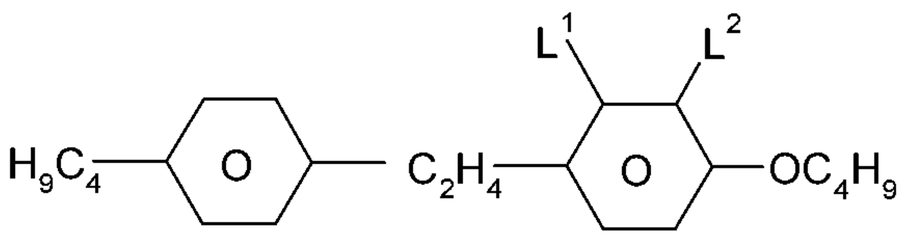

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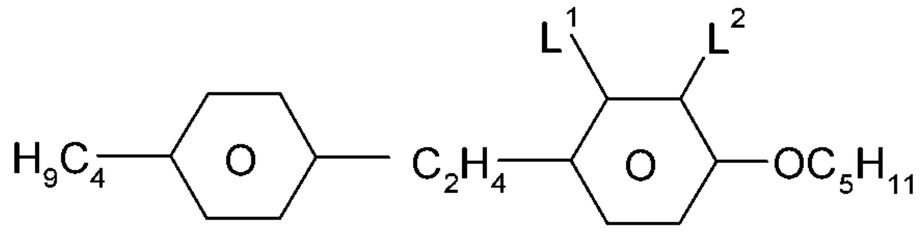

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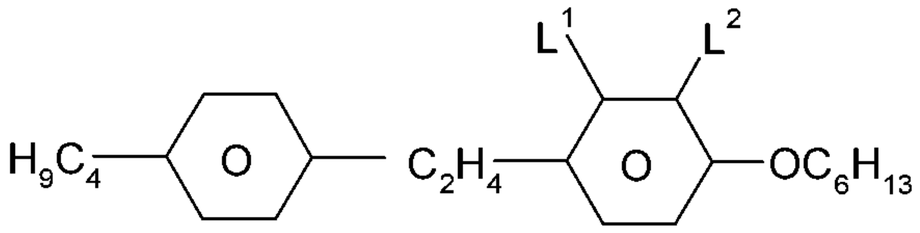

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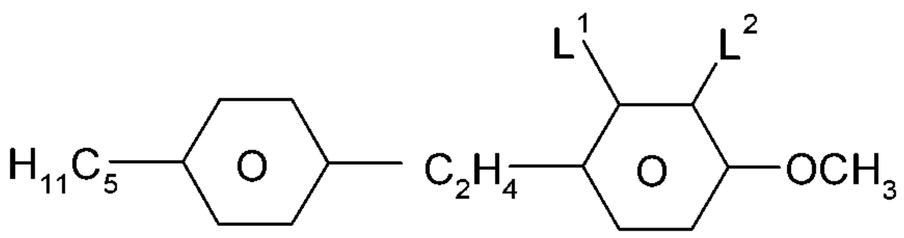

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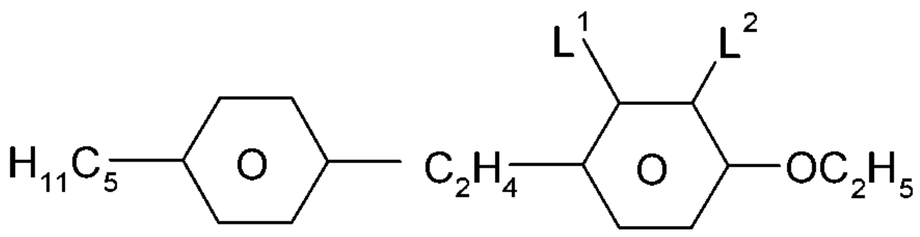

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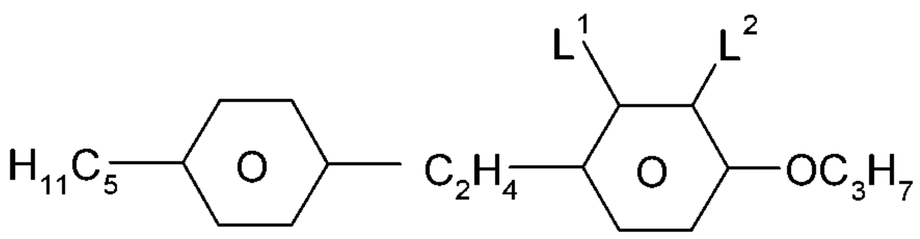

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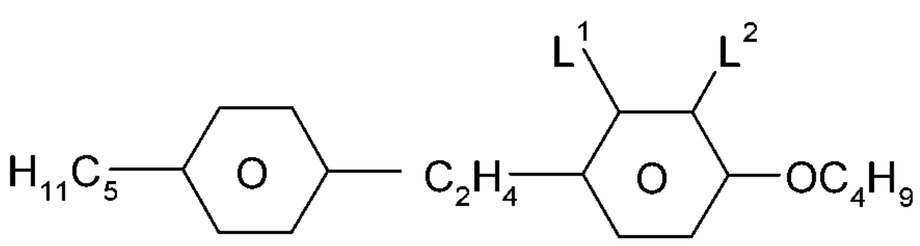

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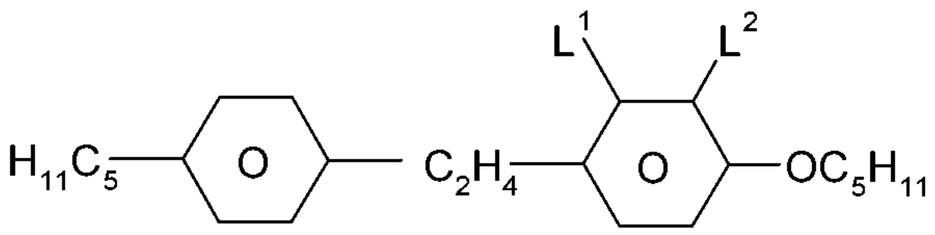

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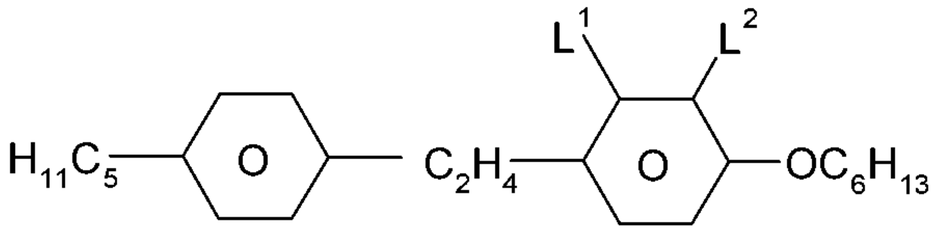

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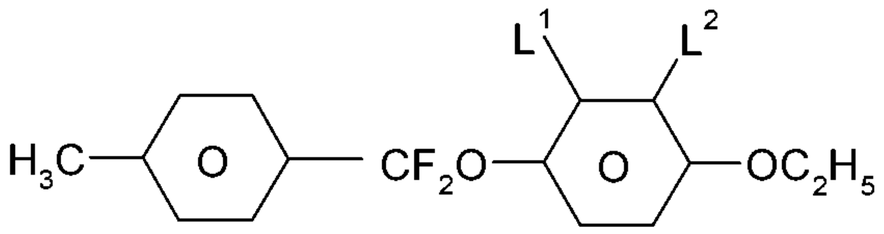

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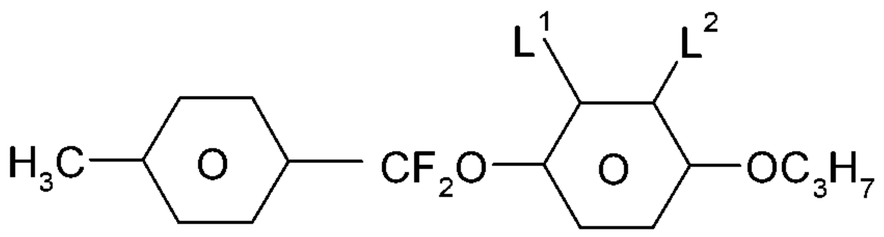

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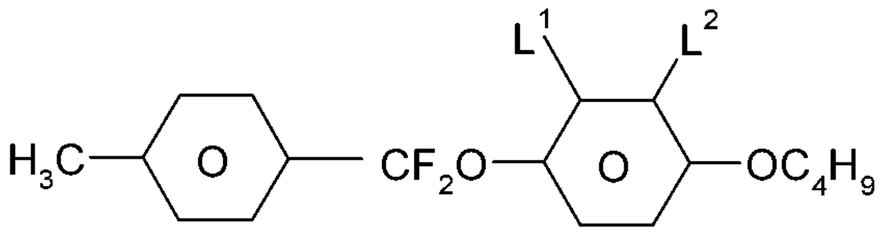

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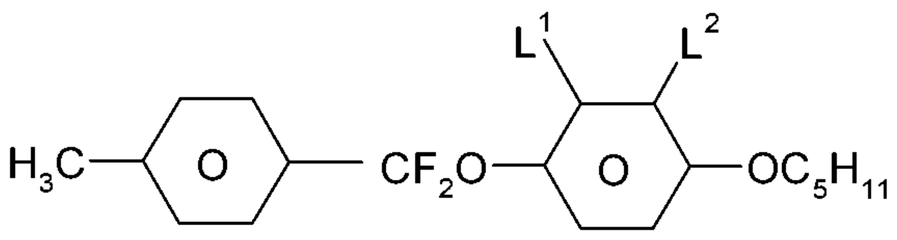

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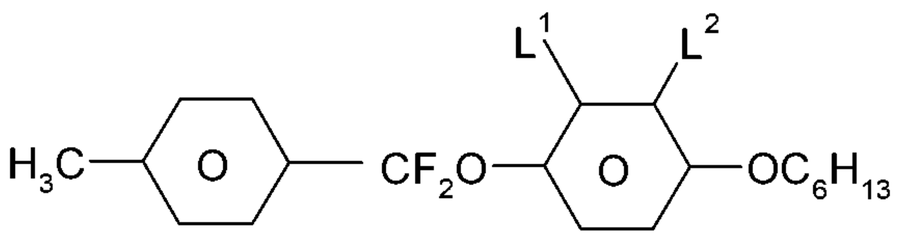

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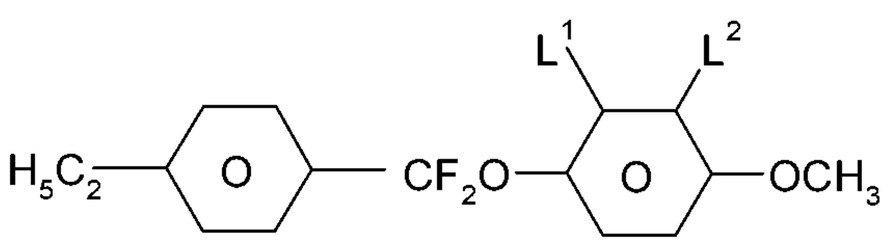

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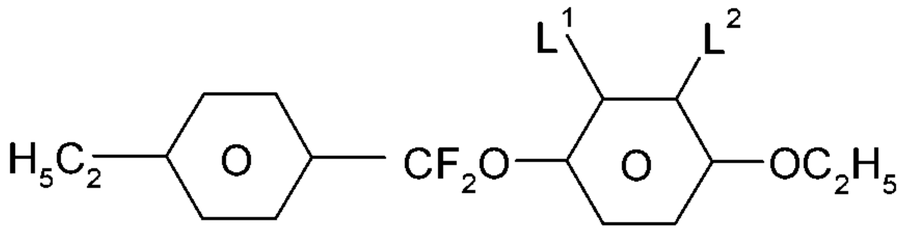

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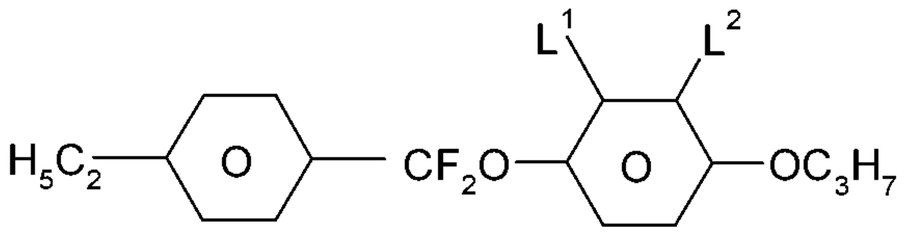

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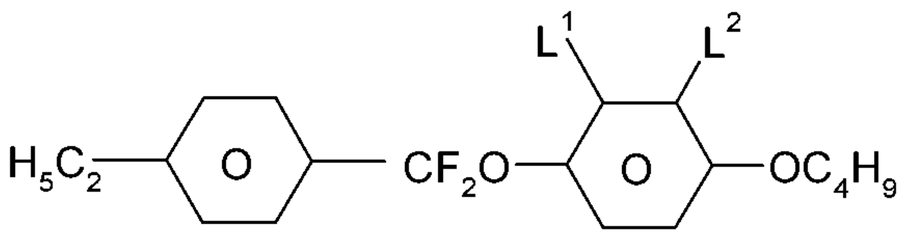

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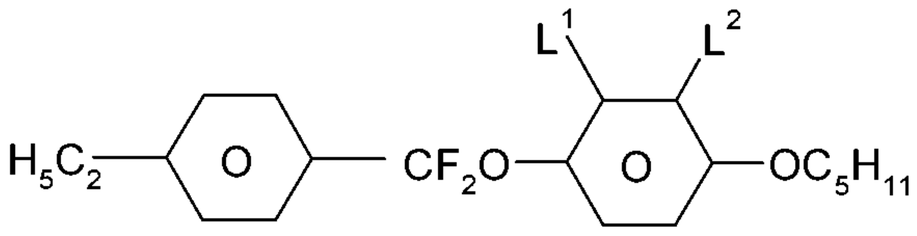

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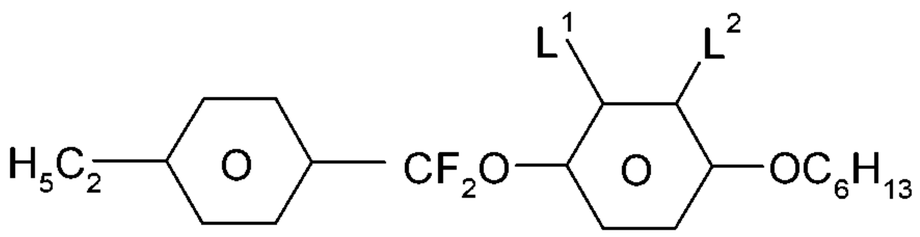

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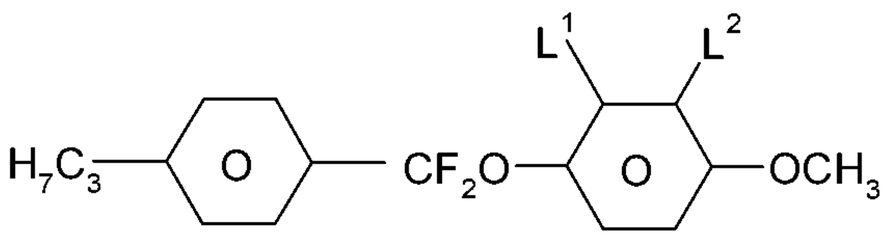

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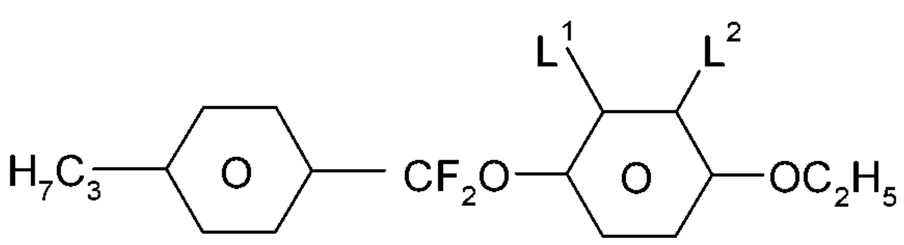

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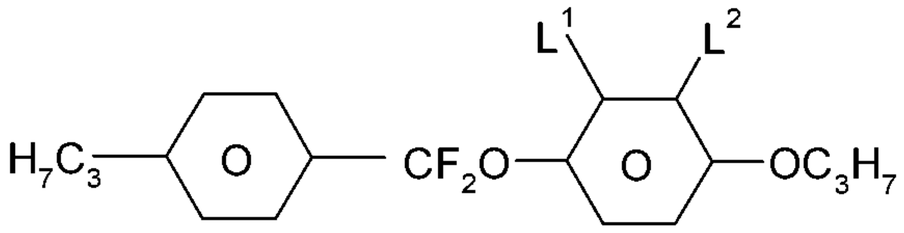

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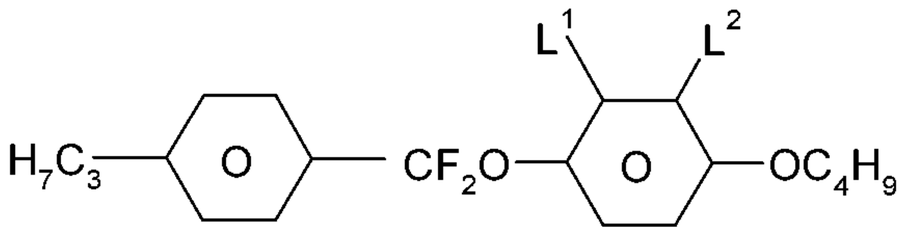

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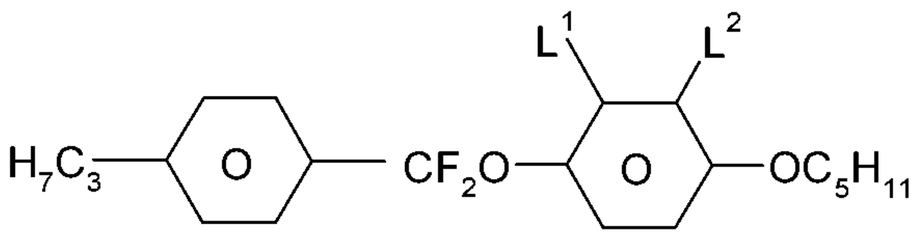

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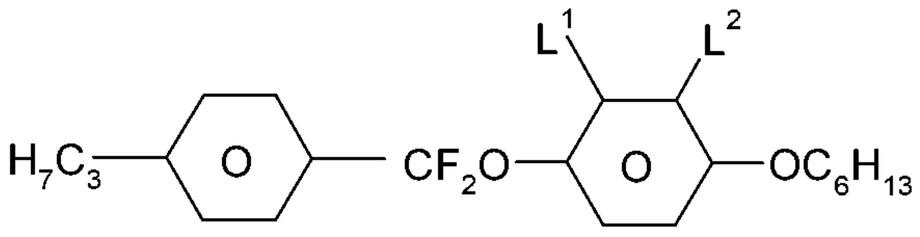

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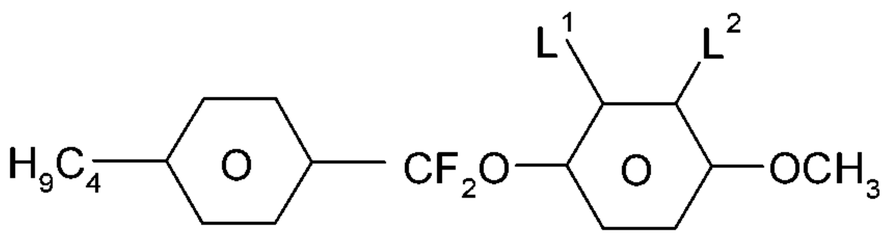

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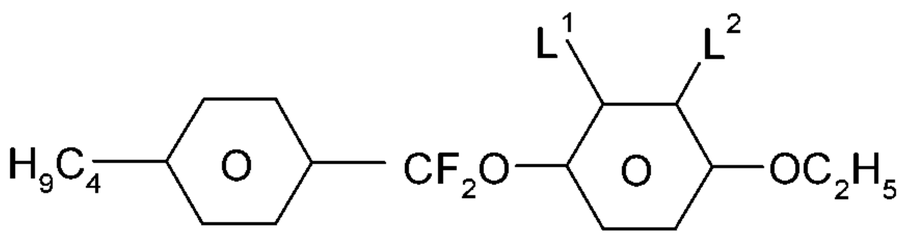

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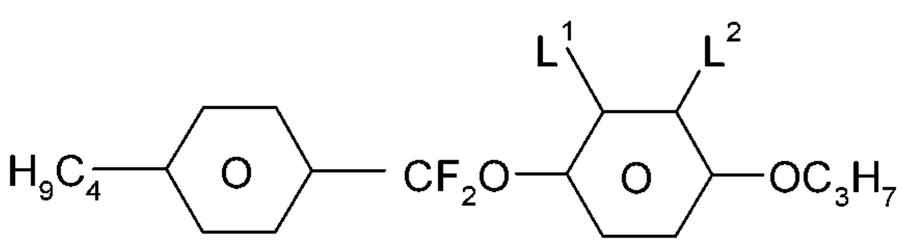

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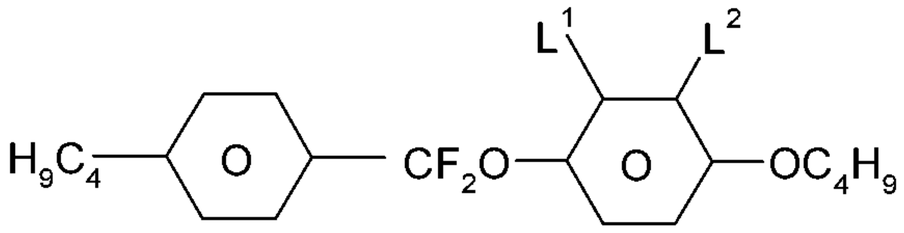

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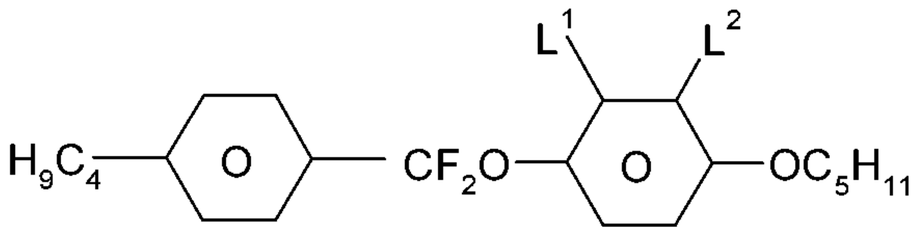

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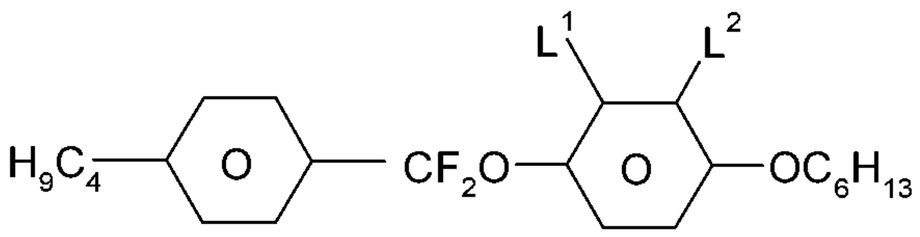

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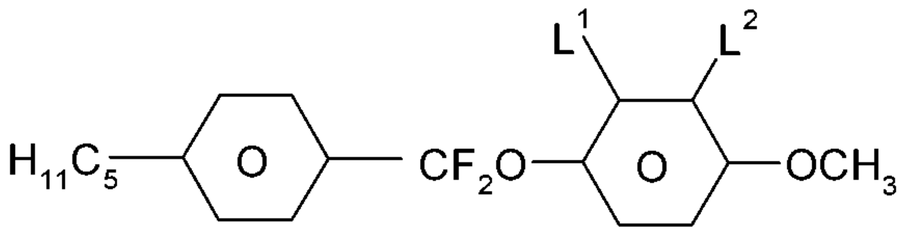

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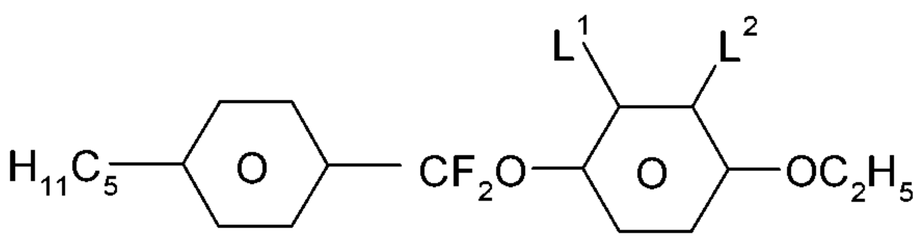

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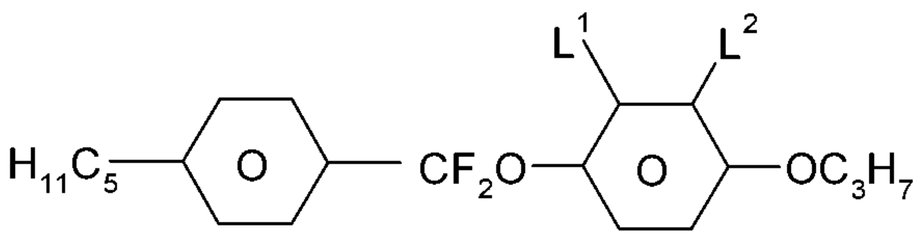

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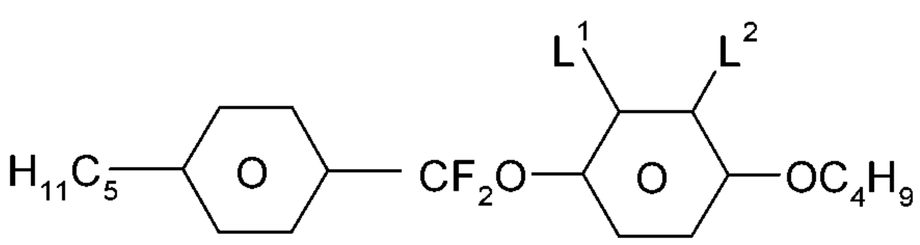

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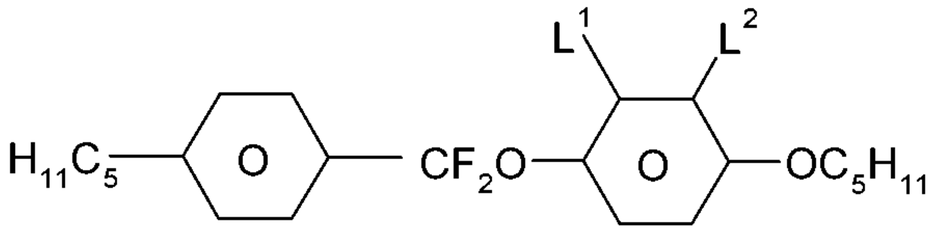

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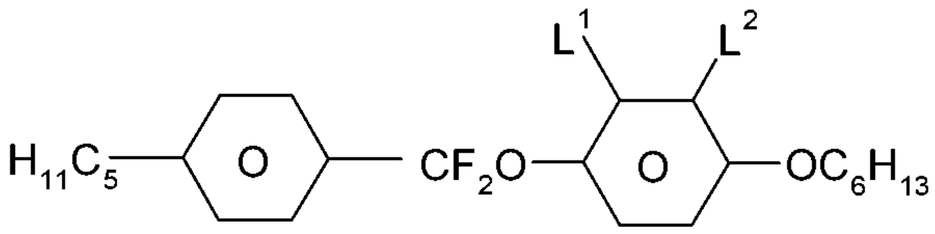

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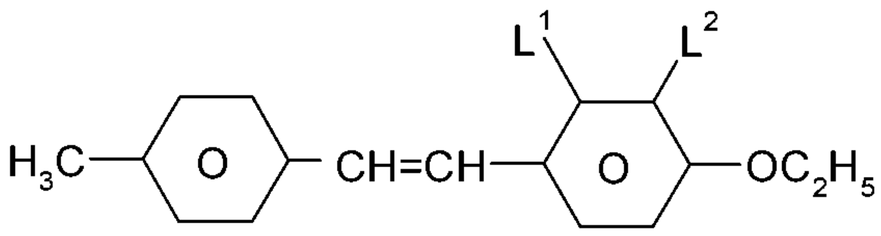

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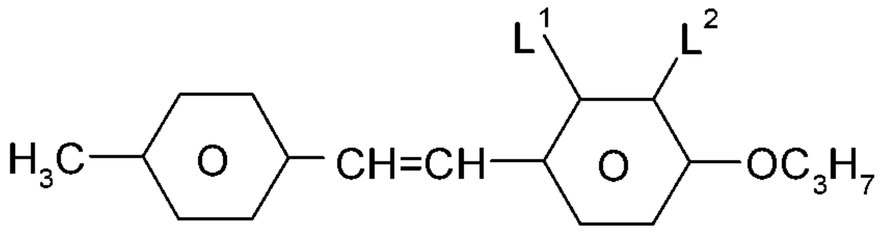
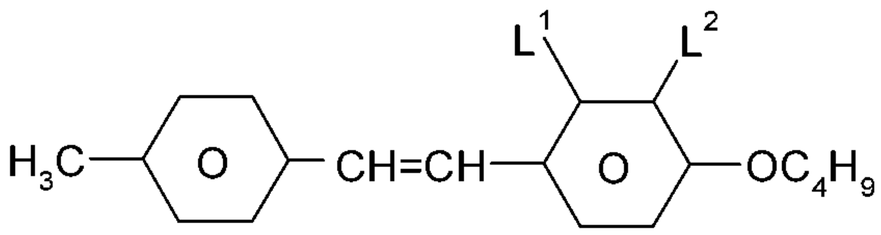
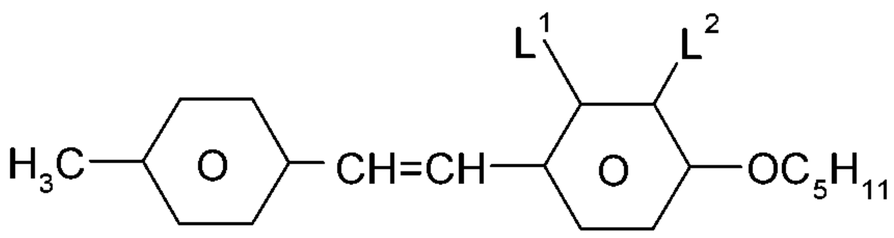


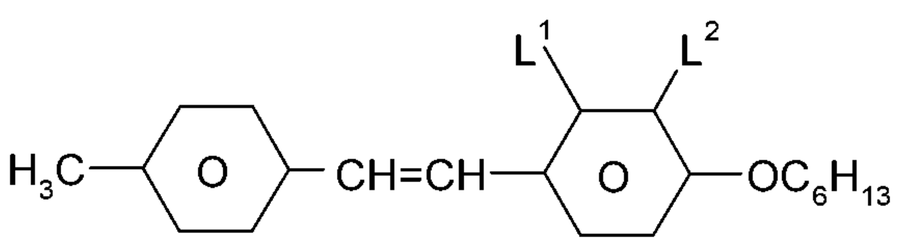
I-118



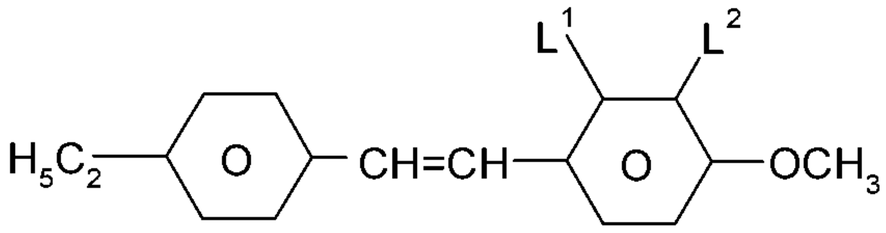
I-119



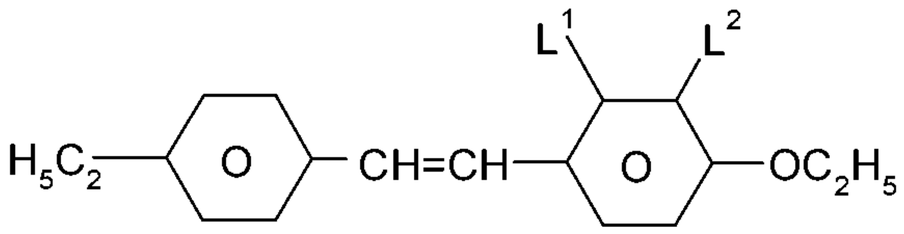
I-120



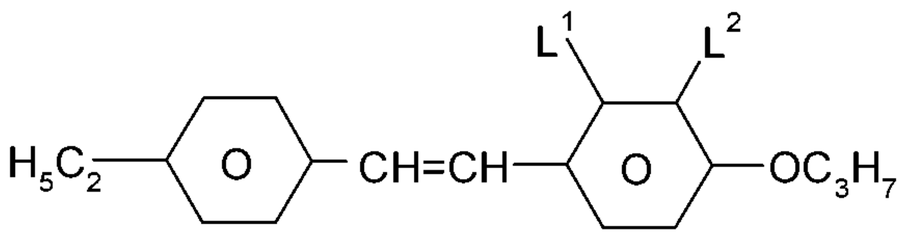
I-121



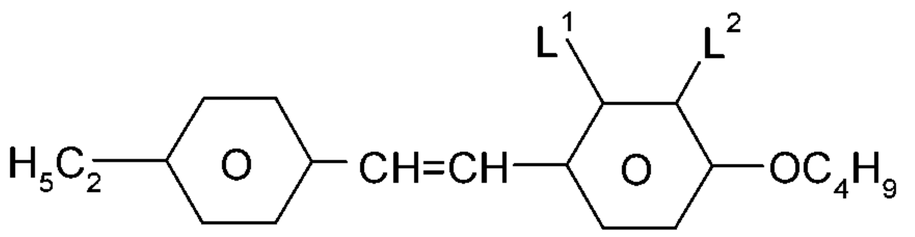
I-122



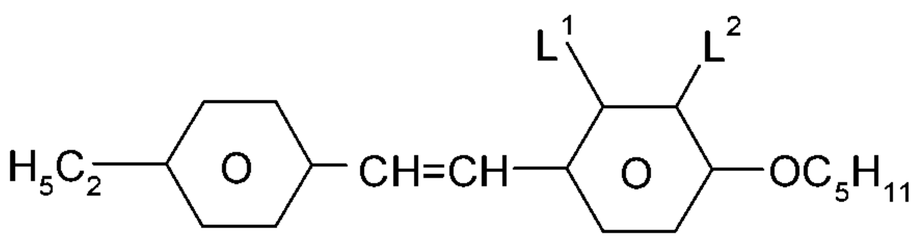
I-123



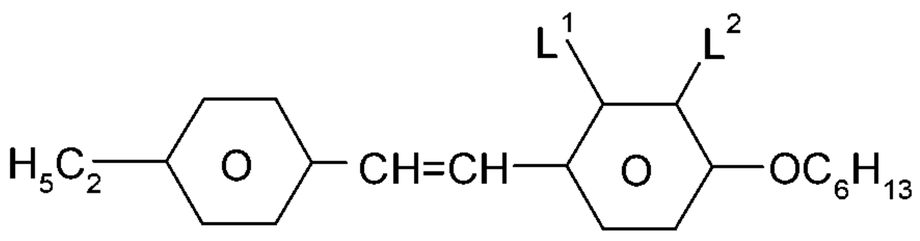
I-124



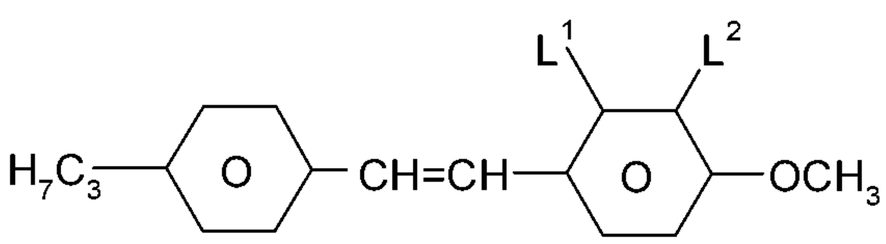
I-125



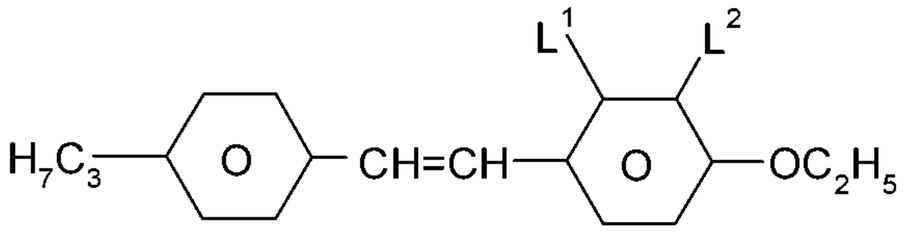
I-126



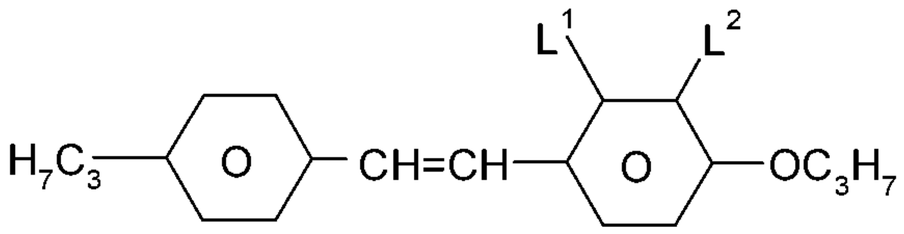
I-127



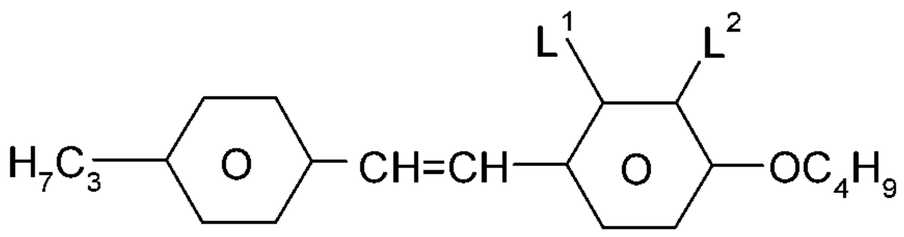
I-128



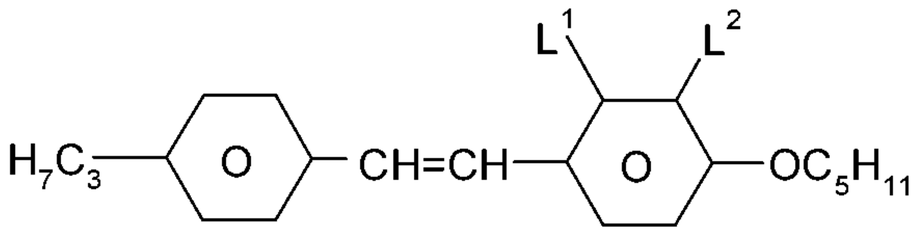
I-129



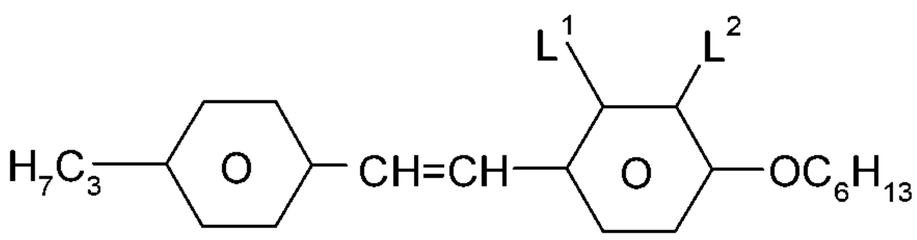
I-130



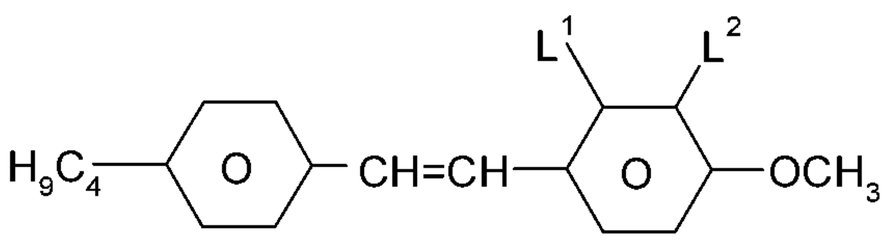
I-131



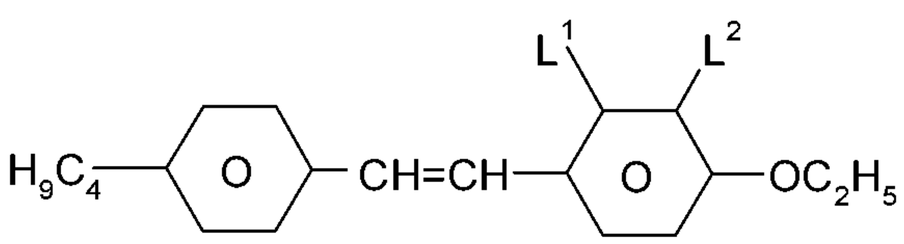
I-132



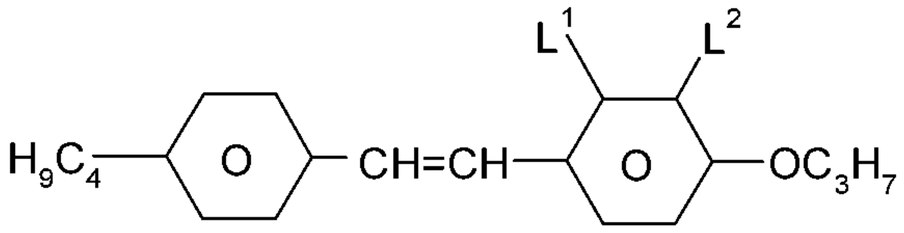
I-133



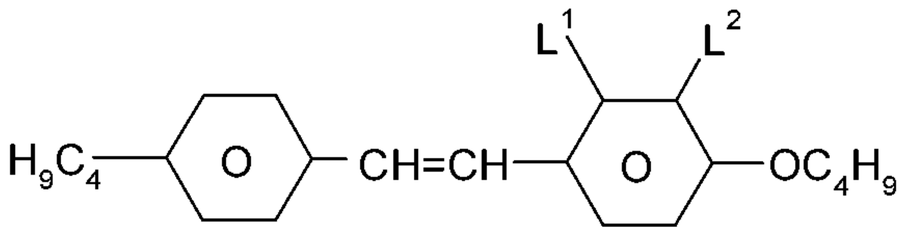
I-134



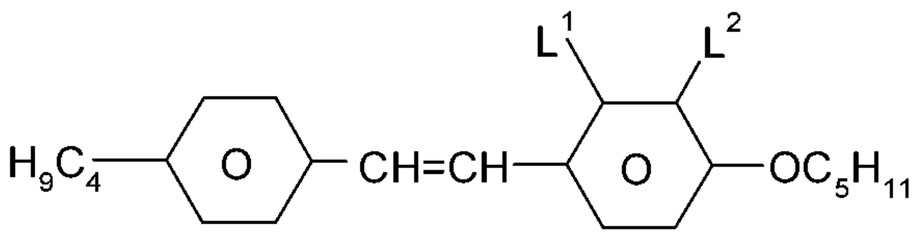
I-135



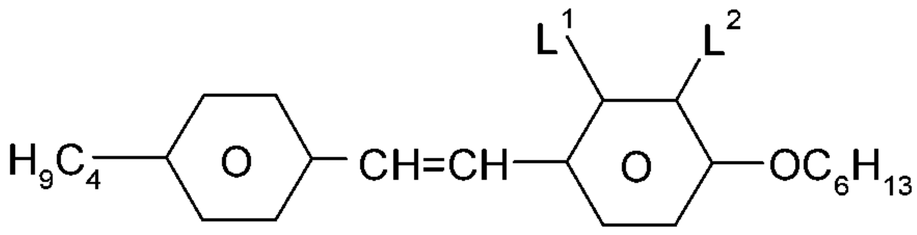
I-136



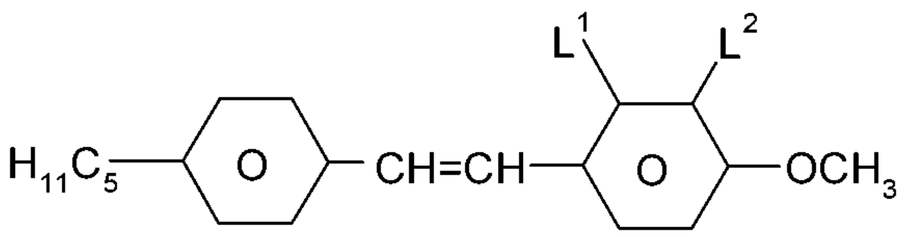
I-137



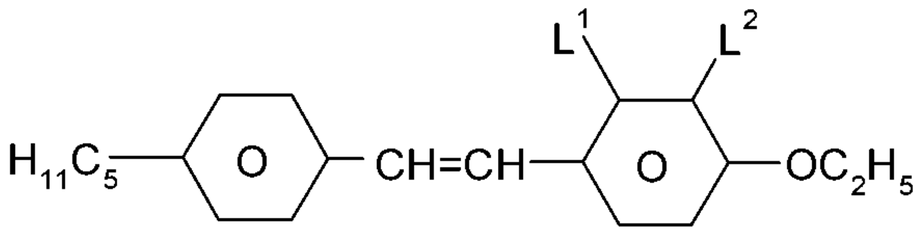
I-138



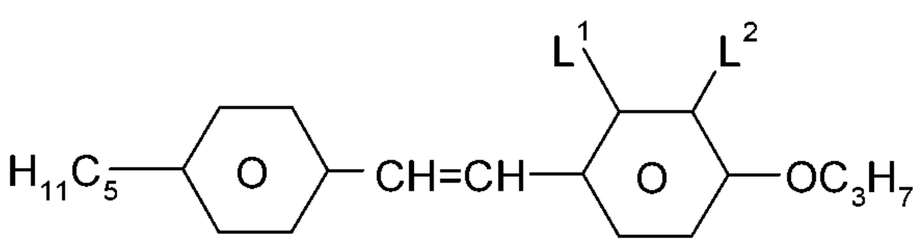
I-139



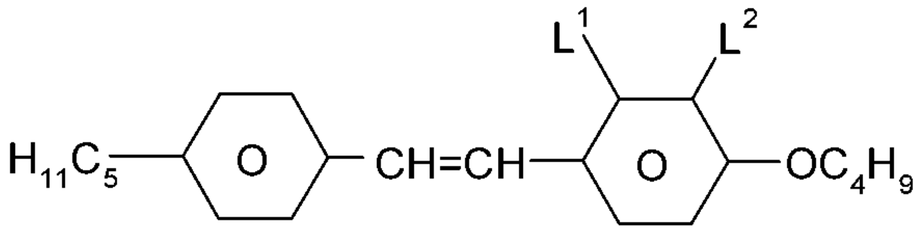
I-140



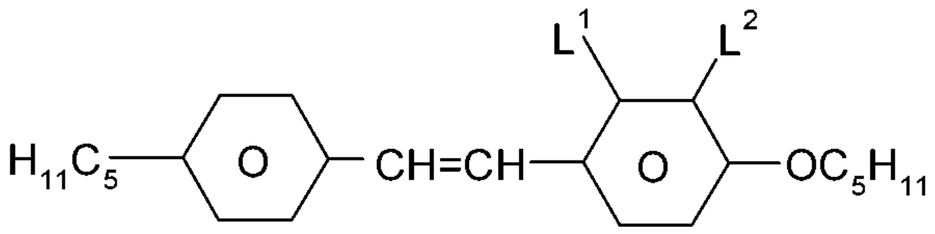
I-141



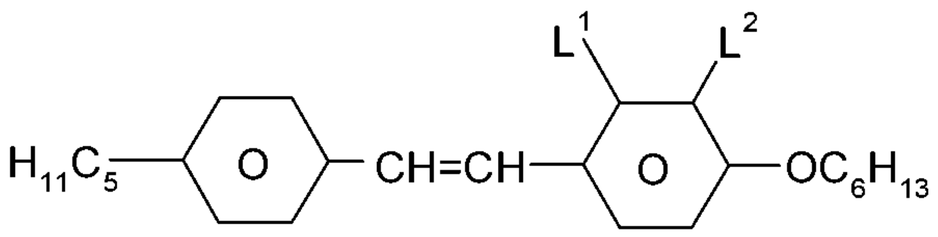
I-142



I-143



I-144



I-145，

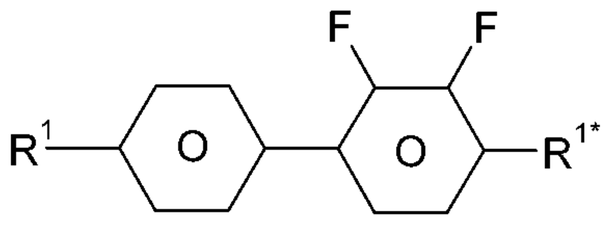
其中L^1及L^2具有請求項1中所示之含義。

9. 如請求項8之液晶介質，其中該液晶介質包含至少一種式I-1、式I-3、式I-7、式I-13、式I-15、式I-19、式I-25及式I-26之化合物。

10. 如請求項8之液晶介質，其中該液晶介質包含至少兩種選自由式I-1、式I-3、式I-7、式I-13、式I-15、式I-19、式I-25及式I-26之化合物組成之群之化合物。

11. 如請求項1至3中任一項之液晶介質，其中該一種或一種以上之式I化合物在整體混合物中之比例為5重量%至65重量%。

12. 如請求項1至3中任一項之液晶介質，其中該液晶介質包含至少兩種式I-A化合物，



I-A

其中，

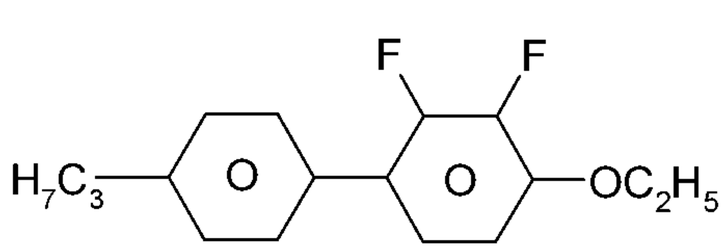
R^1 為直鏈烷基 CH_3、C_2H_5、n-C_3H_7、n-C_4H_9、n-C_5H_{11} 或 n-C_6H_{13}，且

R^{1*} 為直鏈烷氧基 OC_2H_5、OC_3H_7、OC_4H_9、OC_5H_{11}、OC_6H_{13}、烯氧基 $OCH_2CH=CH_2$、$OCH_2CH=CHCH_3$、$OCH_2CH=CHC_2H_5$ 或烷基 n-C_3H_7、n-C_4H_9、n-C_5H_{11} 或 n-C_6H_{13}。

13. 如請求項12之液晶介質，其中該液晶介質包含至少三種如請求項12所定義之式I-A化合物。

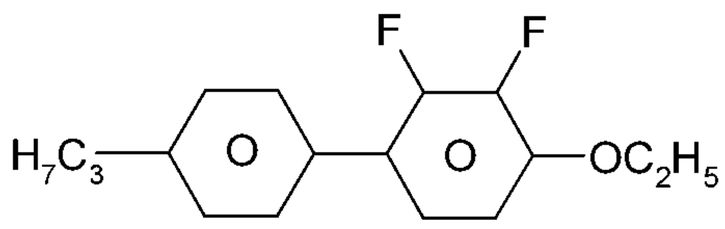
14. 如請求項1至3中任一項之液晶介質，其中R^1為CH_3、C_2H_5、n-C_3H_7或n-C_4H_9。

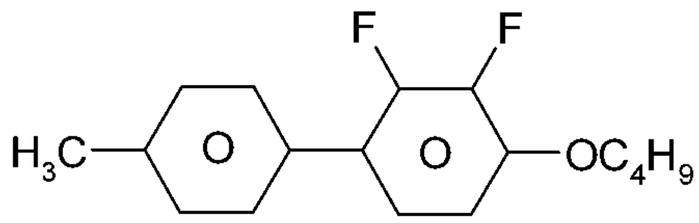
15. 如請求項14之液晶介質，其中該液晶介質包含化合物

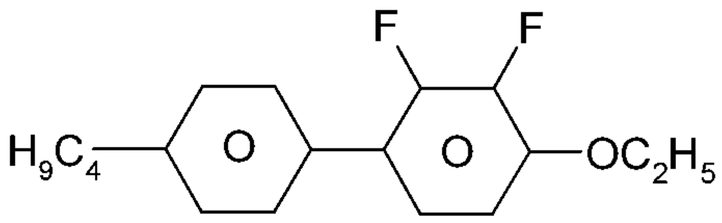


。

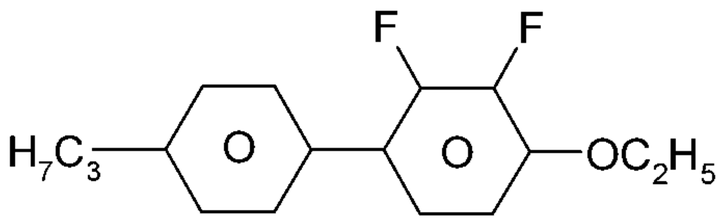
16. 如請求項15之液晶介質，其中該液晶介質包含至少三種式I化合物，且其中該三種式I化合物為：

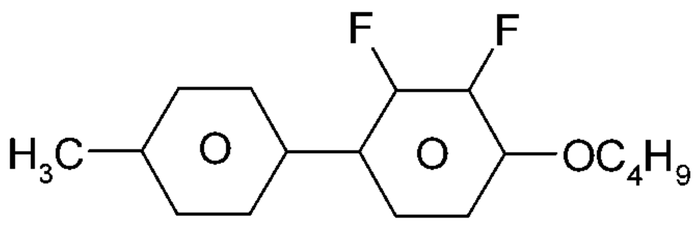


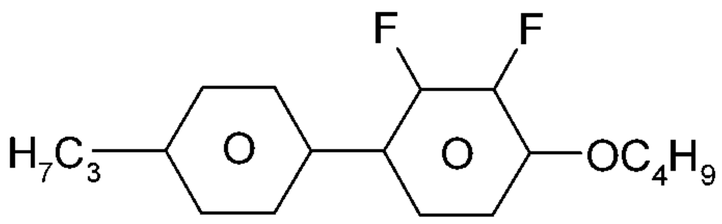




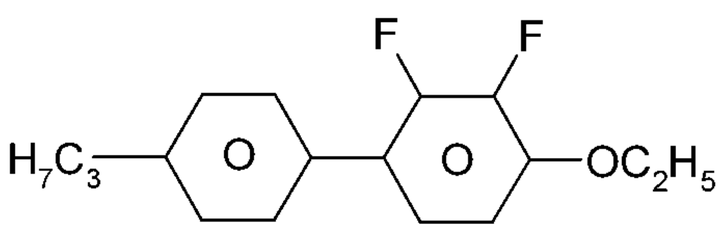
或

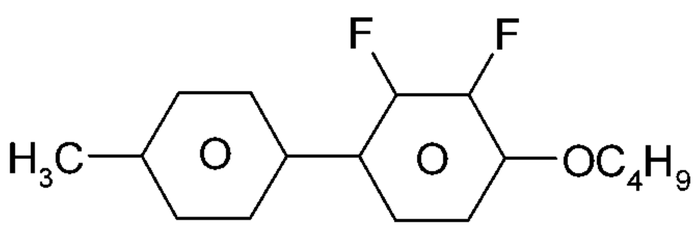


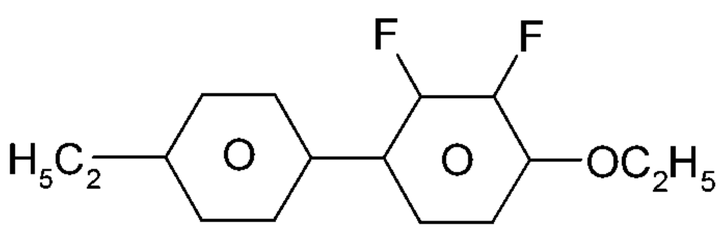




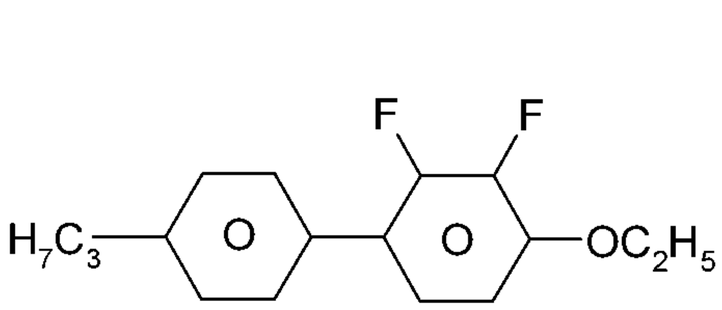
或

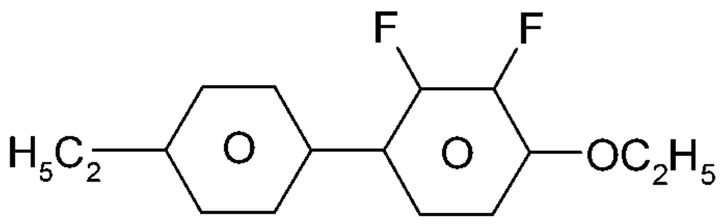


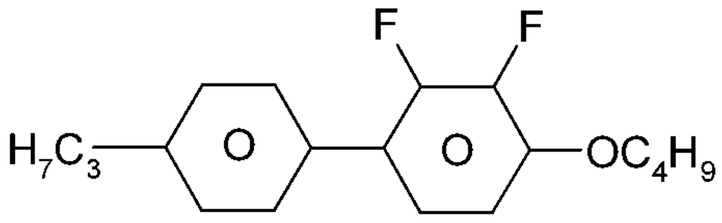




或

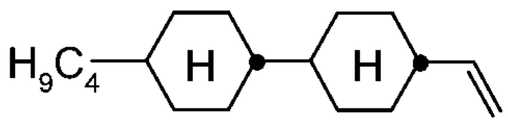




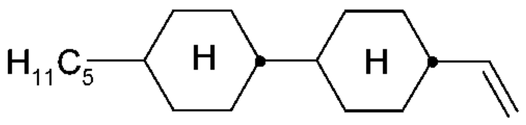


。

17. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種選自下列之群之化合物，

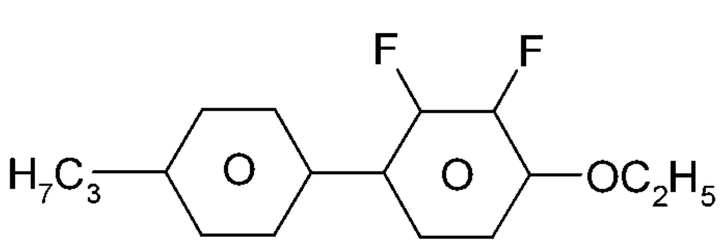


及/或



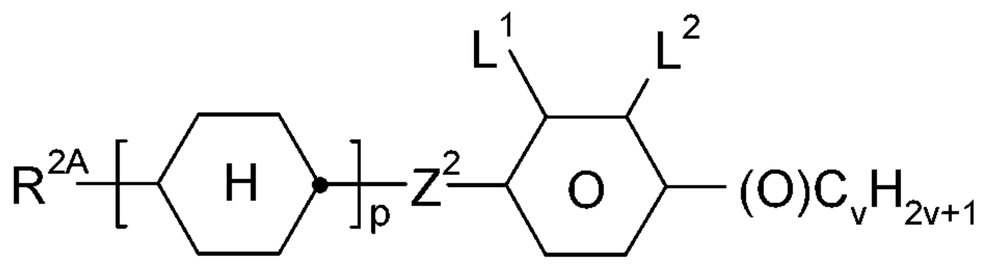
。

18. 如請求項17之液晶介質，其中該液晶介質另外包含化合物

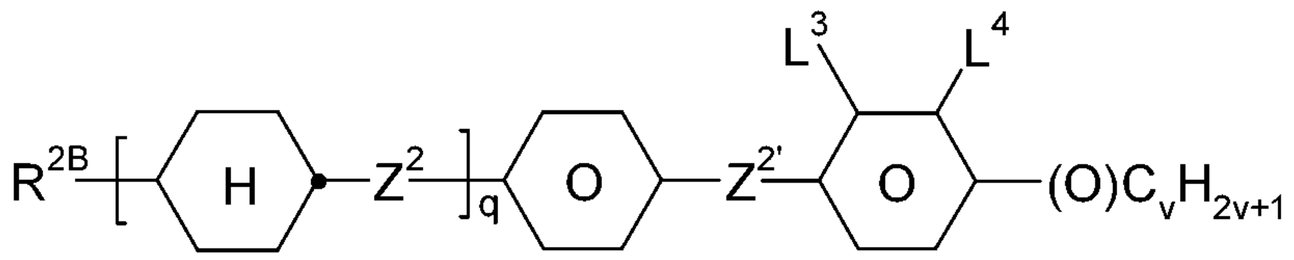


。

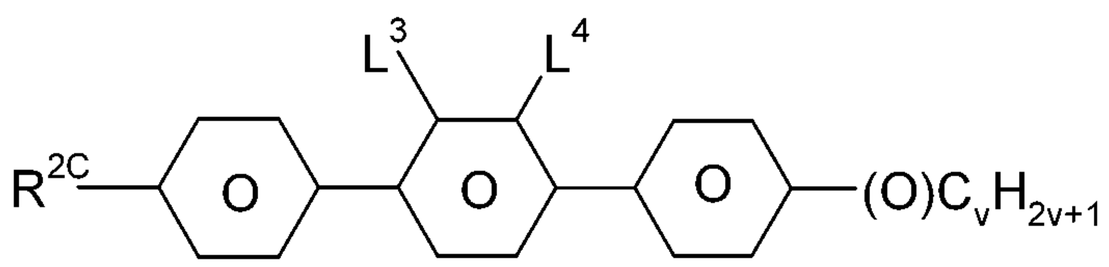
19. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種選自由式IIA、IIB及IIC所組成之群之化合物，



IIA

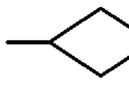


IIB



IIC

其中：

R^{2A}、R^{2B}及R^{2C}各自彼此獨立地表示H、具有至多15個C原子之未經取代、經CN或CF_3單取代或經鹵素至少單取代之烷基，其中另外，此等基團中之一或多個CH_2基團可經-O-、-S-、  、-C≡C-、-CF_2O-、-OCF_2-、-OC-O-或-O-CO-以使得O原子不彼此直接連接的方式置換、或具有2-6個C原子之直鏈烯基；

L^{1-4}各自彼此獨立地表示F或Cl；

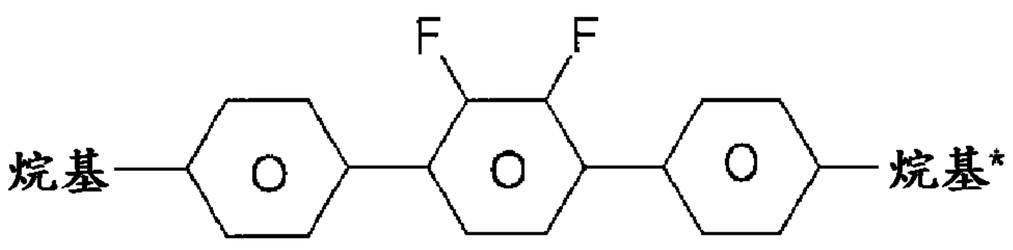
Z^2及$Z^{2'}$各自彼此獨立地表示單鍵、-CH_2CH_2-、-CH=CH-、-CF_2O-、-OCF_2-、-CH_2O-、-OCH_2-、-COO-、-OCO-、-C_2F_4-、-CF=CF-、-CH=CHCH_2O-；

p表示1或2；

q表示1或2，且

v表示1至6。

20. 如請求項19之液晶介質，其中該液晶介質包含式IIC-1化合物，

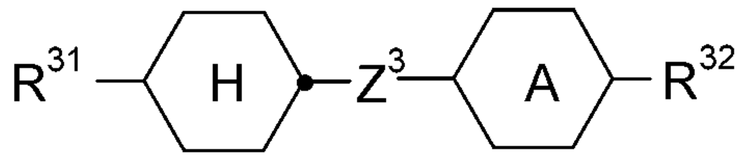


IIC-1

，

其中烷基及烷基*各自彼此獨立地表示具有1至6個C原子之直鏈烷基基團。

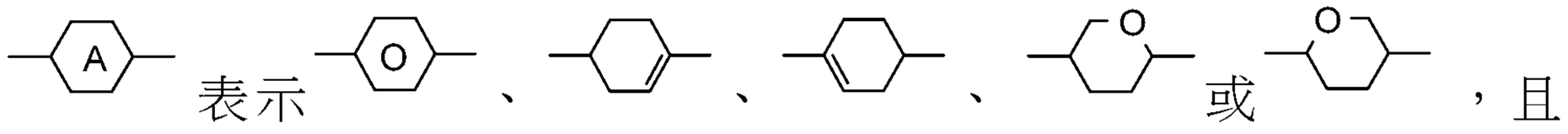
21. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種式III化合物，



III

其中：

R^{31}及R^{32}各自彼此獨立地表示具有至多12個C原子之直鏈烷基、烷氧基烷基或烷氧基，

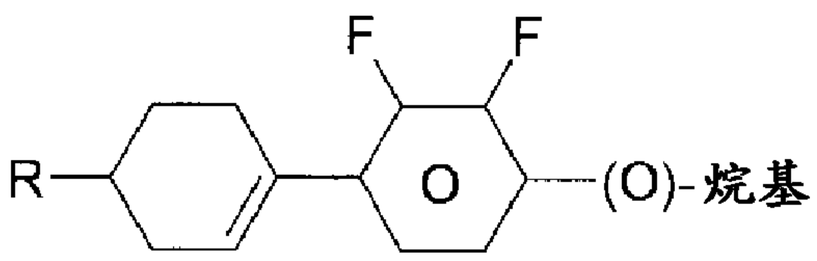


表示

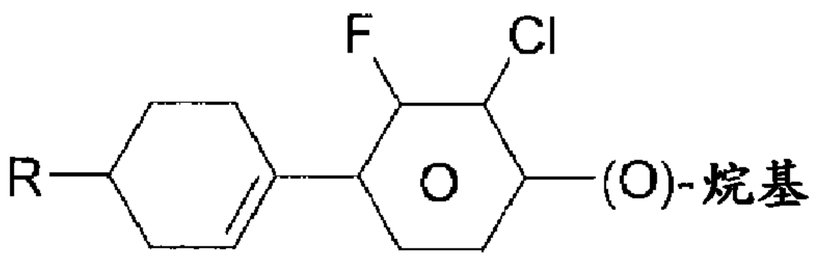
，且

Z^3表示單鍵、$-CH_2CH_2-$、$-CH=CH-$、$-CF_2O-$、$-OCF_2-$、$-CH_2O-$、$-OCH_2-$、$-COO-$、$-OCO-$、$-C_2F_4-$、$-C_4H_8-$、$-CF=CF-$。

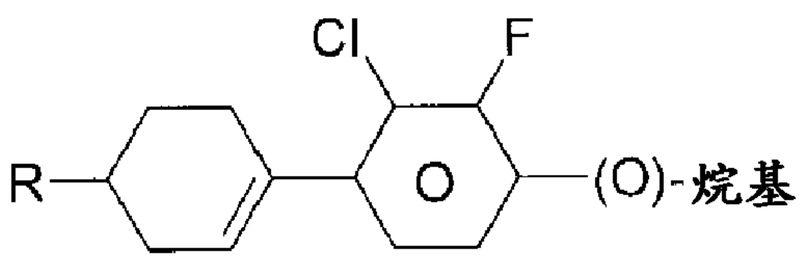
22. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種式L-1至L-11化合物，



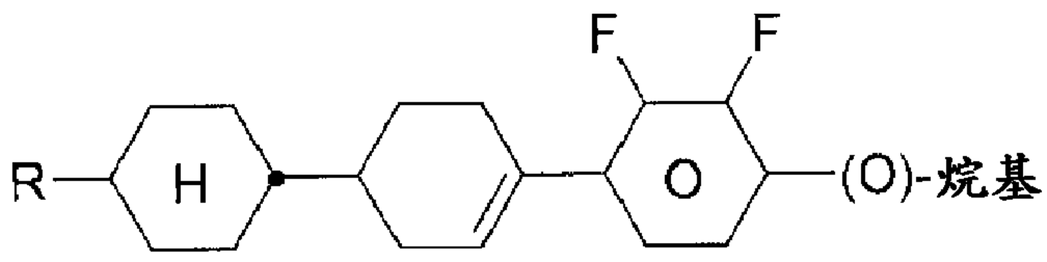
L-1



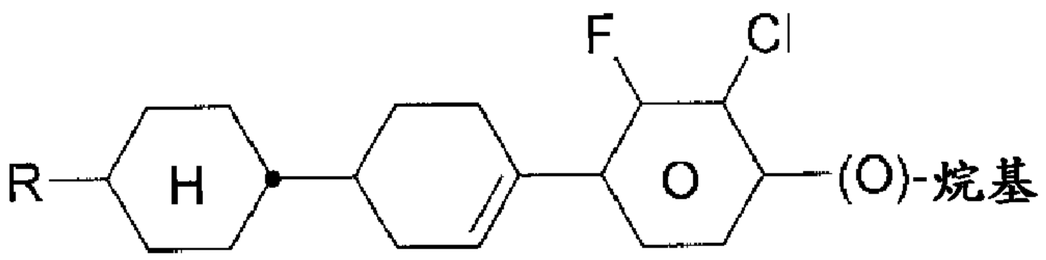
L-2



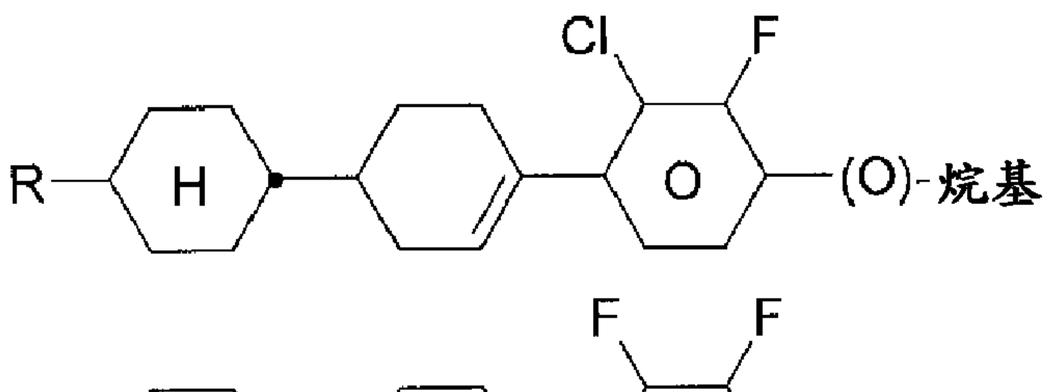
L-3



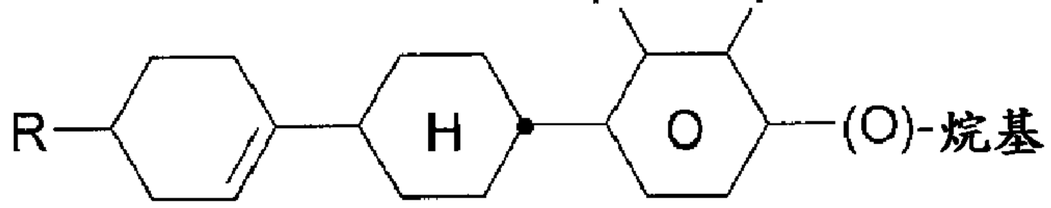
L-4



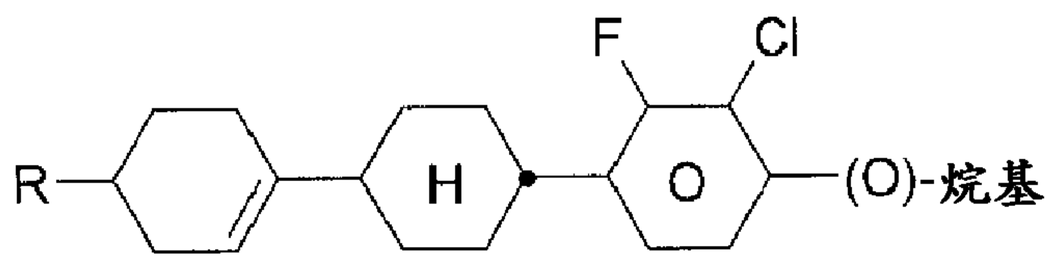
L-5



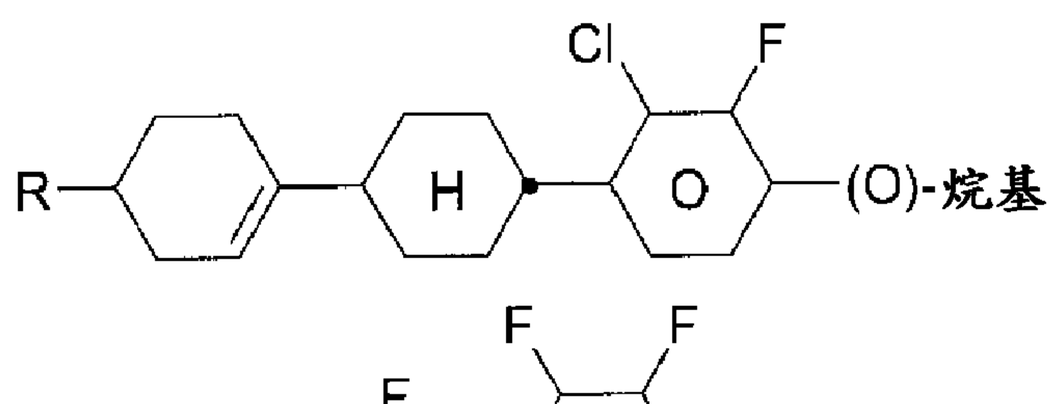
L-6



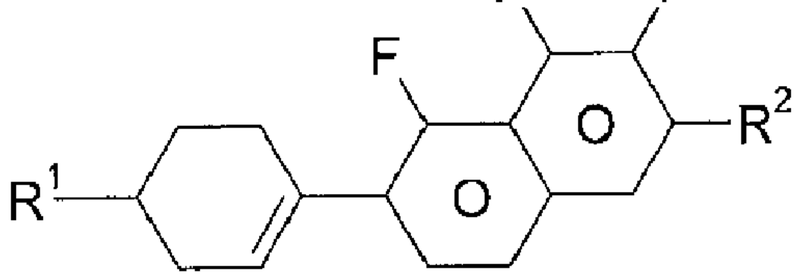
L-7



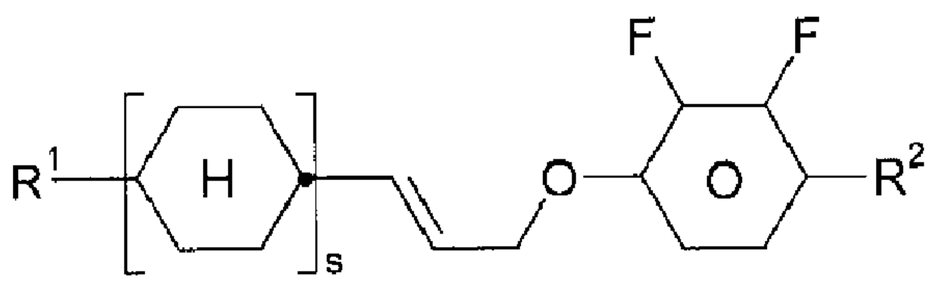
L-8



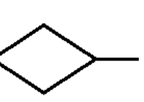
L-9



L-10

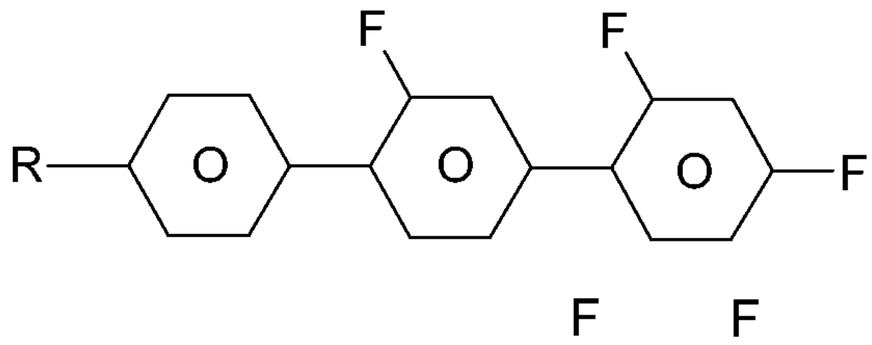


L-11，

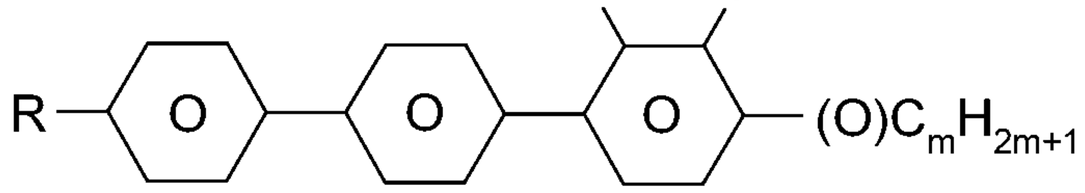
其中R、R^1及R^2各自彼此獨立表示H、具有至多15個C原子之未經取代、經CN或CF_3單取代或經鹵素至少單取代之烷基，其中另外，此等基團中之一或多個CH_2基團可經-O-、-S-、  、-C≡C-、-CF_2O-、-OCF_2-、-OC-O-或-O-CO-以使得O原子不彼此直接連接的方式置換、或具有2-6個C原子之直鏈烯基，烷基表示具有1-6個C原子之烷基，且

s表示1或2。

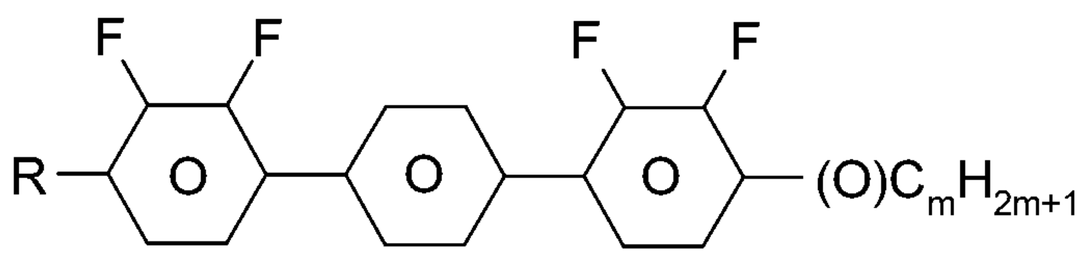
23. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種式T-1至式T-21之聯三苯，



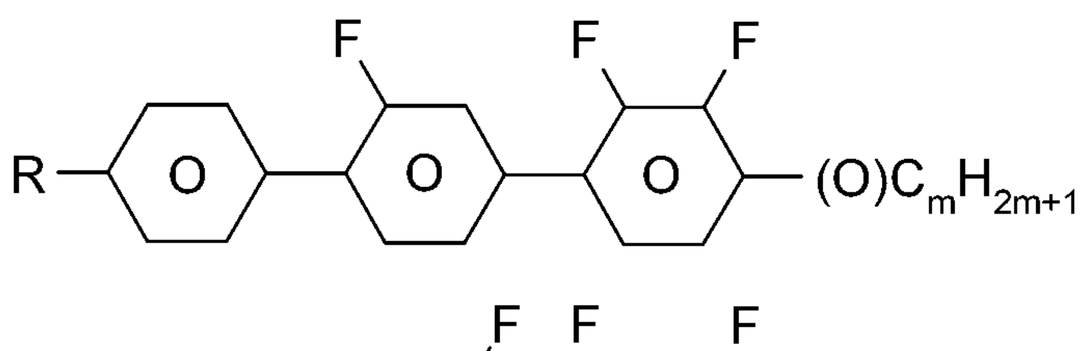
T-1



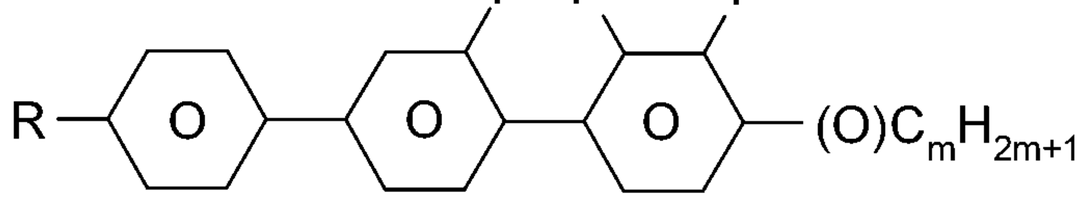
T-2



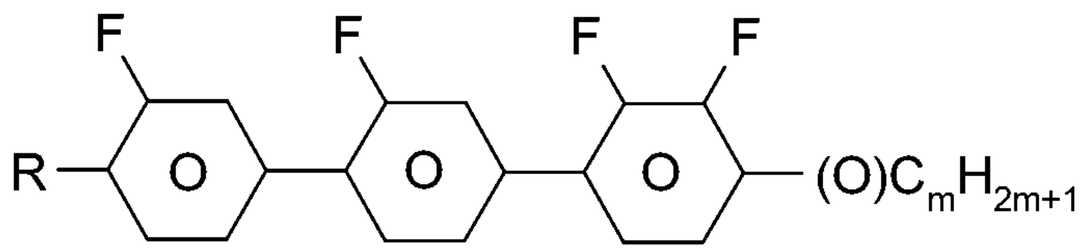
T-3



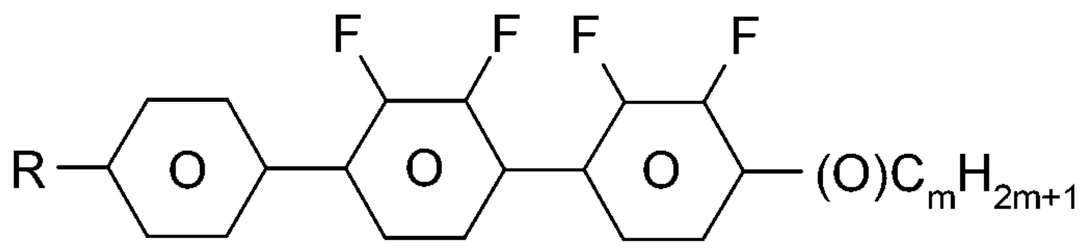
T-4



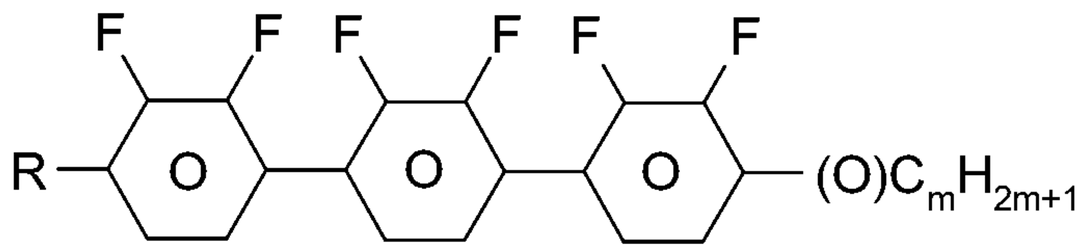
T-5



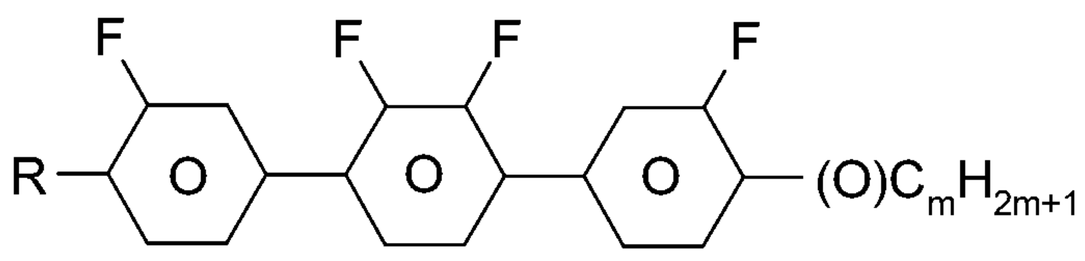
T-6



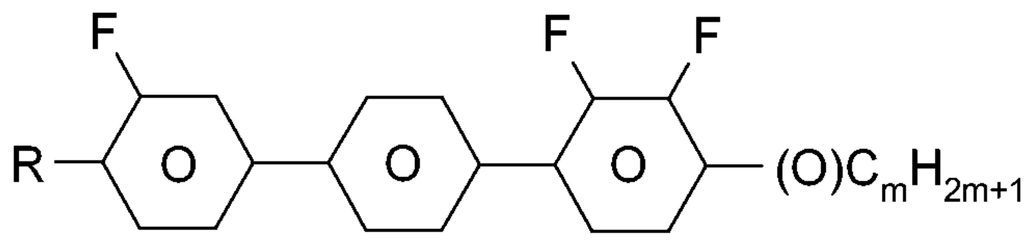
T-7



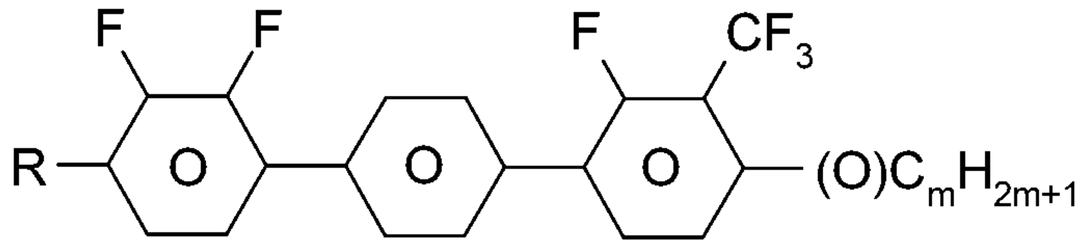
T-8



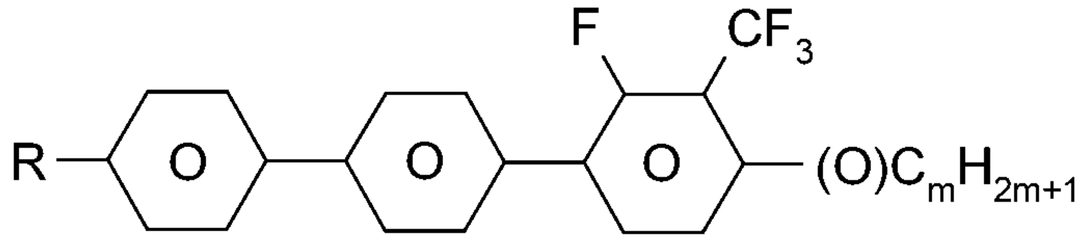
T-9



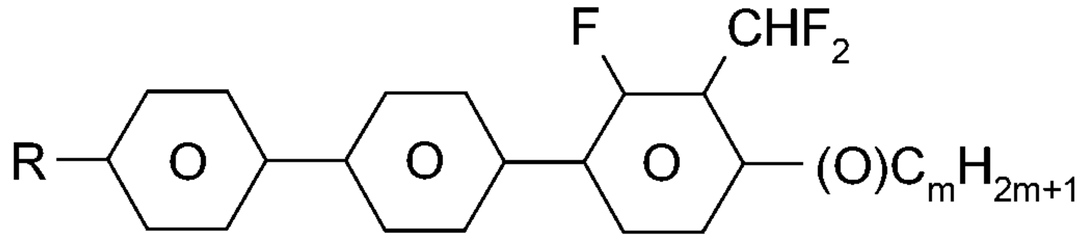
T-10



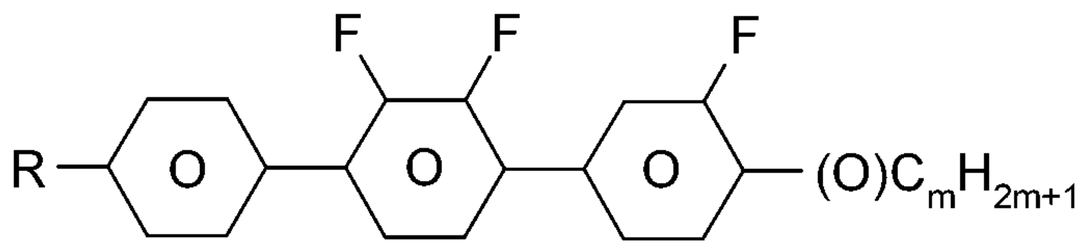
T-11



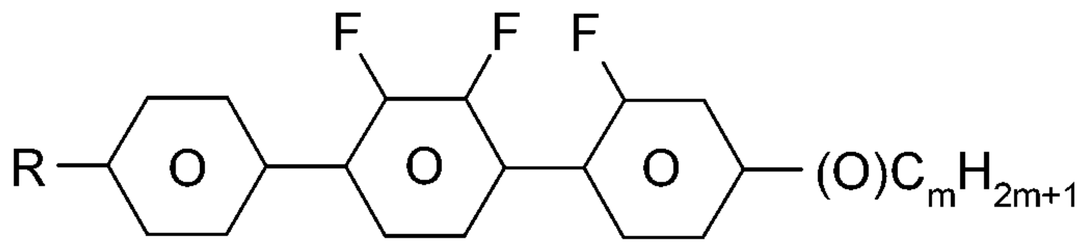
T-12



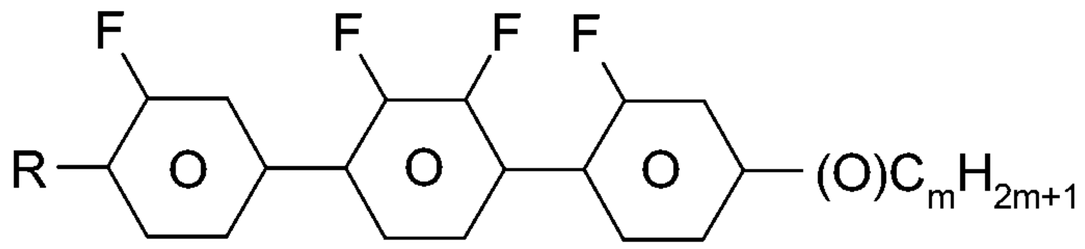
T-13



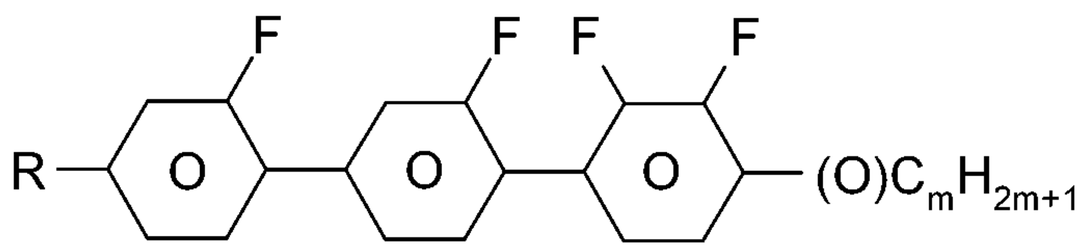
T-14



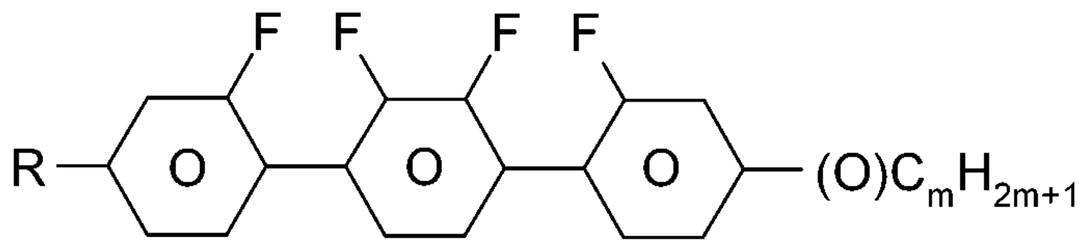
T-15



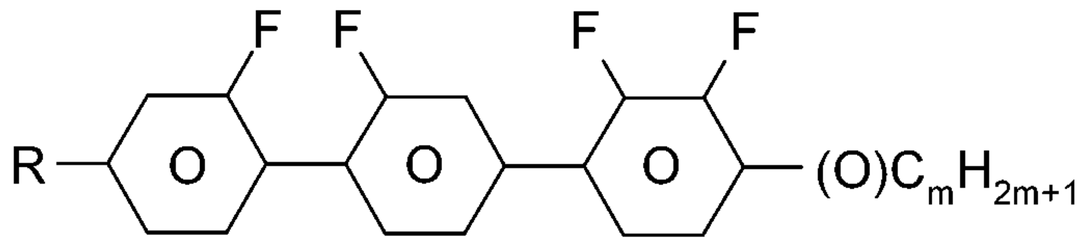
T-16



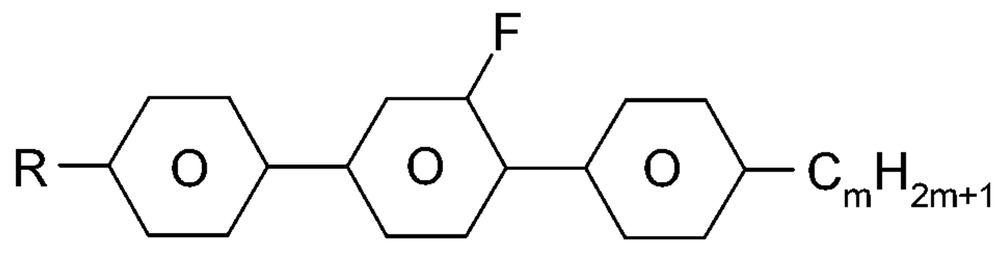
T-17



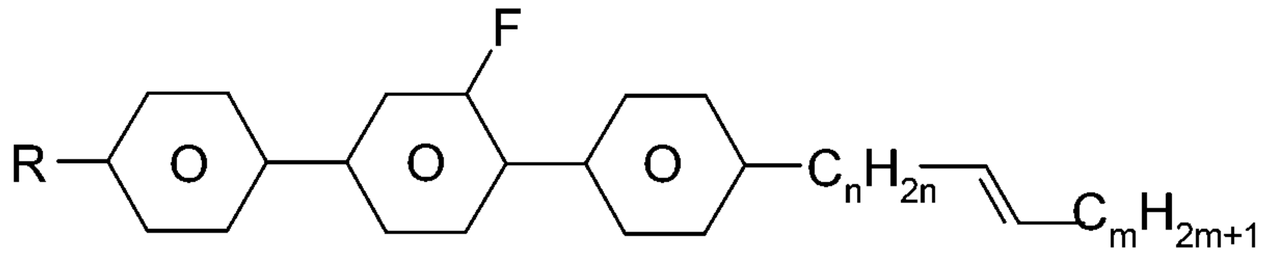
T-18



T-19



T-20



T-21

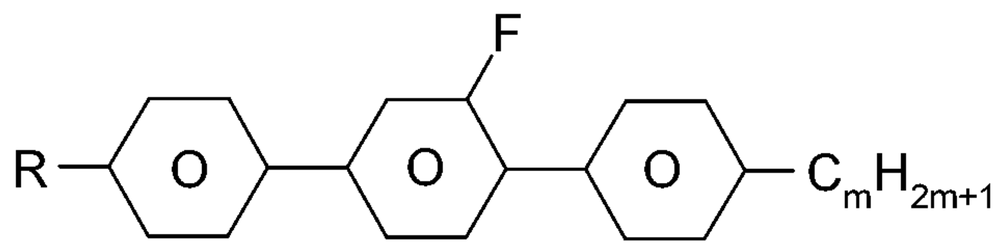
其中：

R表示具有1-7個C原子之直鏈烷基或烷氧基，

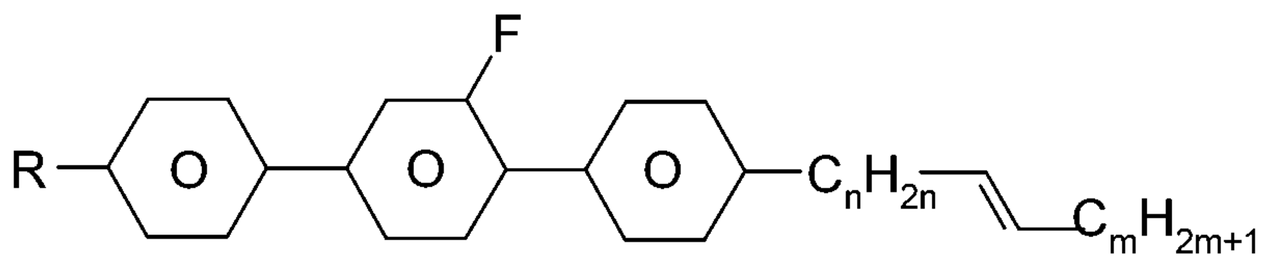
m表示1、2、3、4、5或6，且

n表示0、1、2、3或4。

24. 如請求項23之液晶介質，其中該液晶介質包含一或多種式T-20或T-21化合物，



T-20



T-21

其中：

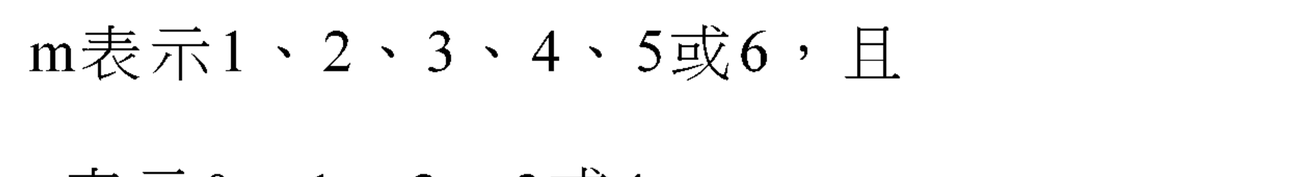
R表示具有1-7個C原子之直鏈烷基或烷氧基，

m表示1、2、3、4、5或6，且

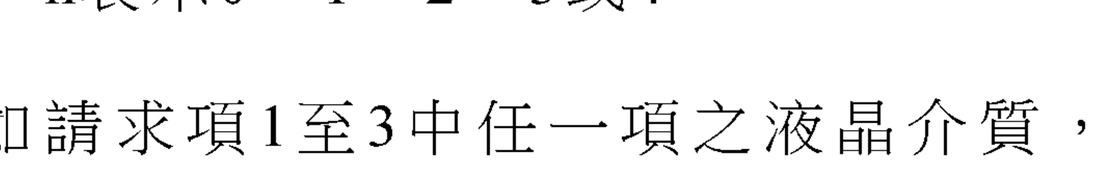
n表示0、1、2、3或4。

25. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種式O-1至式O-17之化合物，

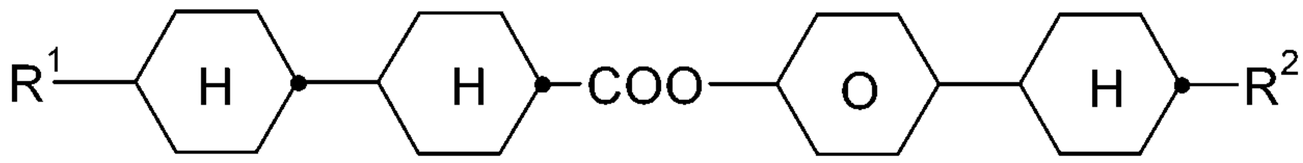
O-1



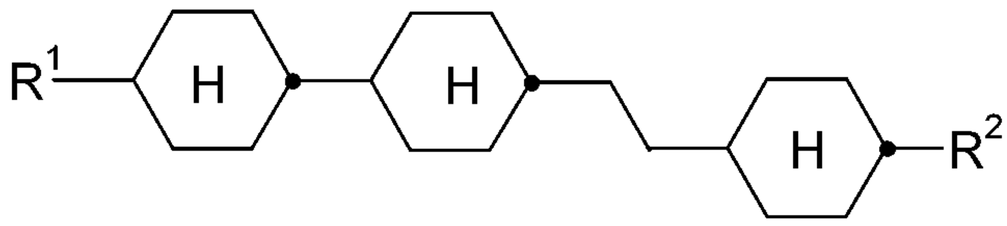
O-2



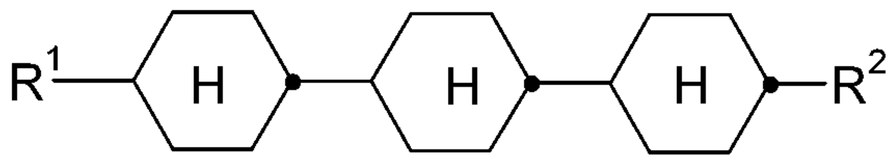
O-3



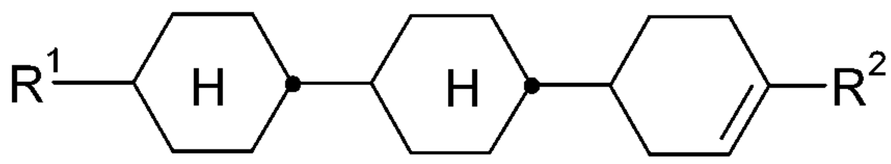
O-4



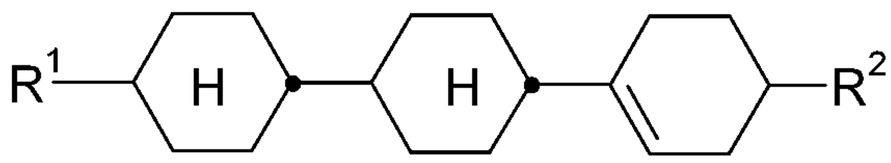
O-5



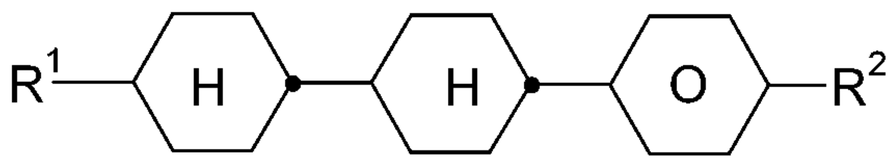
O-6



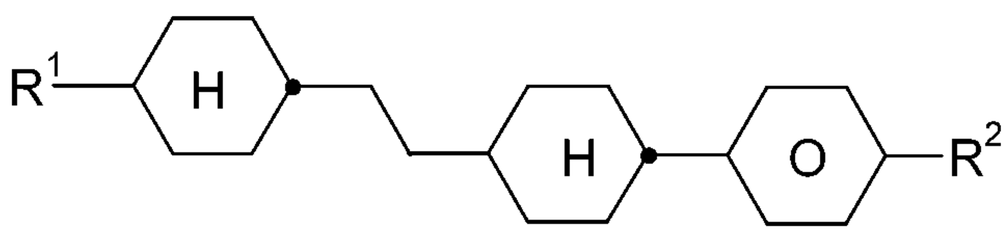
O-7



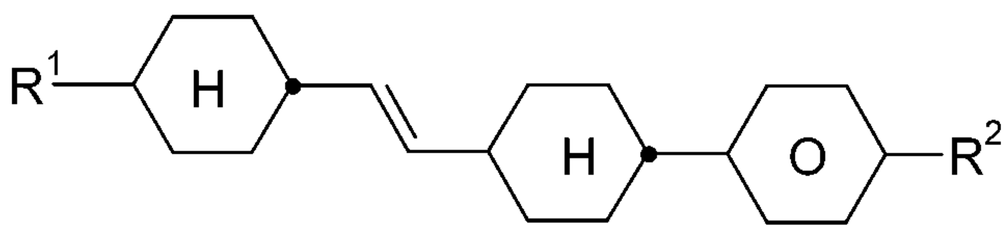
O-8



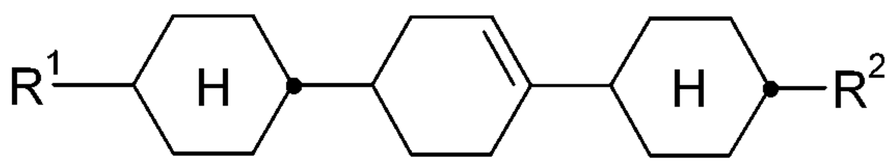
O-9



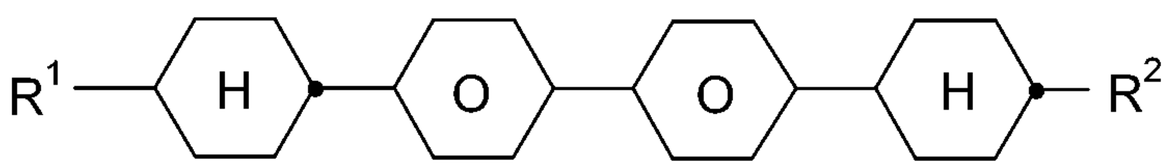
O-10



O-11

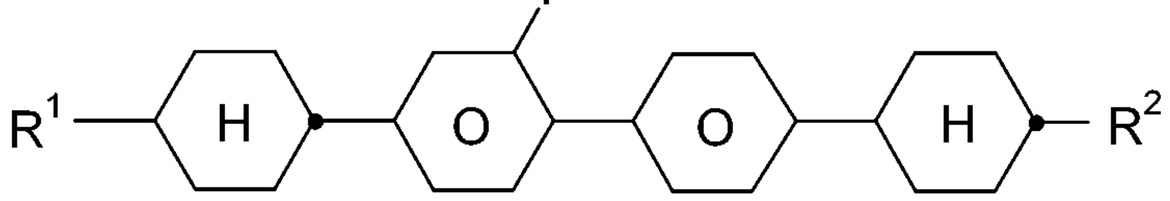


O-12

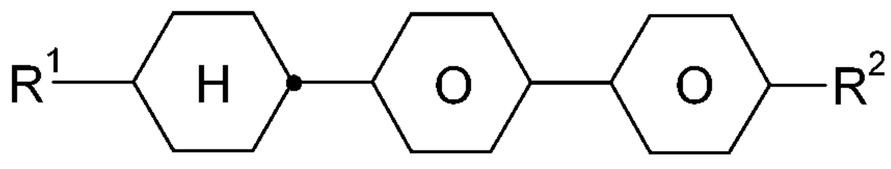


O-13

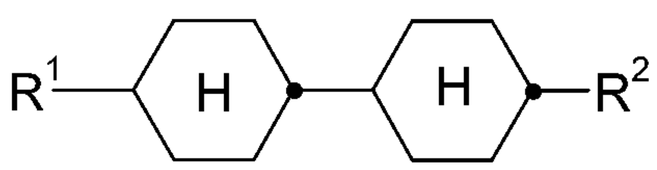
F



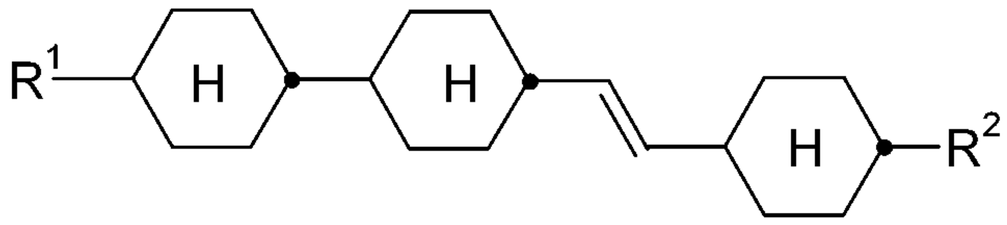
O-14



O-15

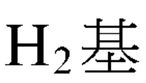


O-16

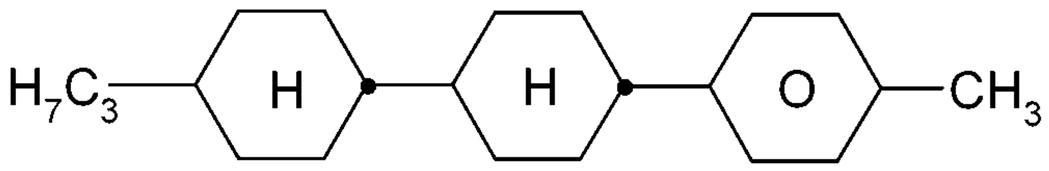


O-17

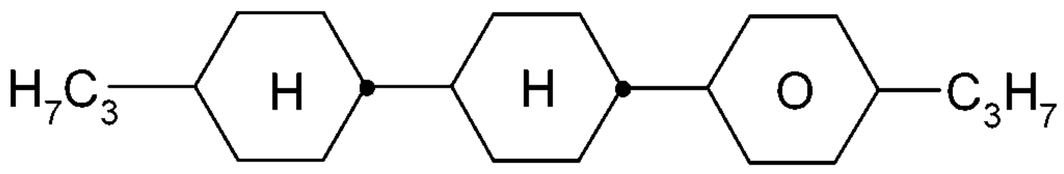
其中：

R^1及R^2各自彼此獨立地表示H、具有至多15個C原子之未經取代、經CN或CF_3單取代或經鹵素至少單取代之烷基，其中另外，此等基團中之一或多個CH_2基團可經-O-、-S-、  、-C≡C-、-CF_2O-、-OCF_2-、-OC-O-或-O-CO-以使得O原子不彼此直接連接的方式置換、或具有2-6個C原子之直鏈烯基。

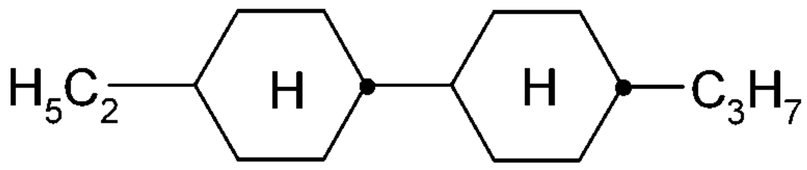
26. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含至少一種式O-15a、O-15b、O-16a、O-16b、O-16c或O-16d之化合物，



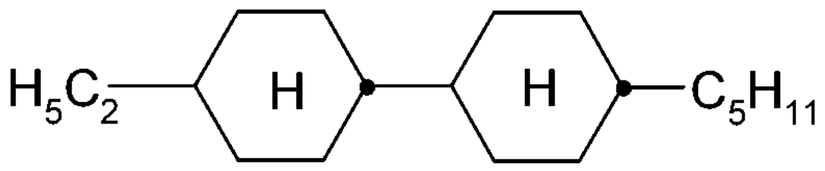
O-15a



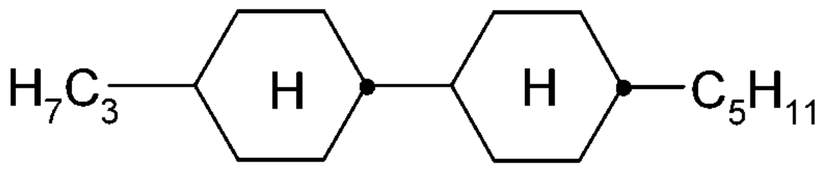
O-15b



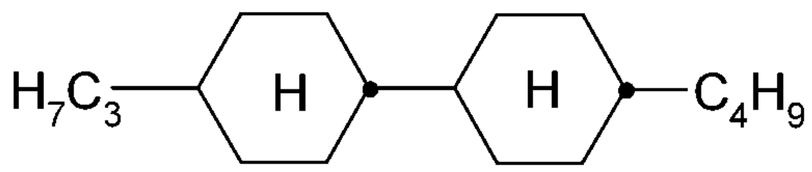
O-16a



O-16b

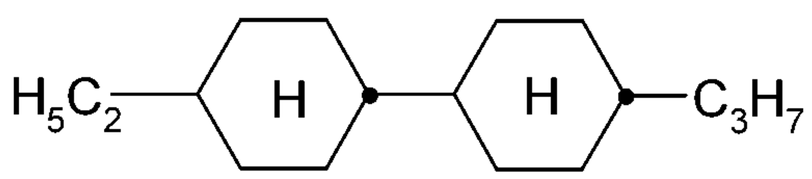


O-16c



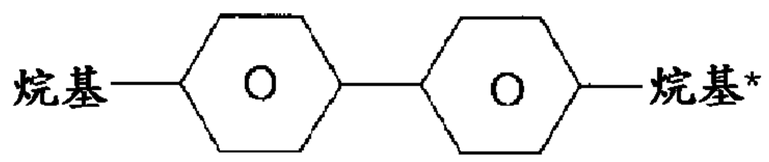
O-16d。

27. 如請求項26之液晶介質，其中該液晶介質包含式O-16a之化合物，

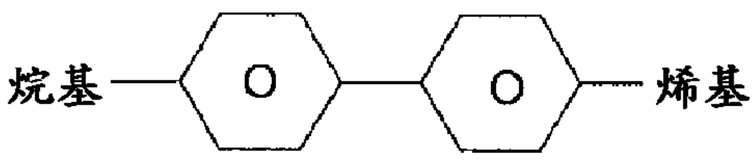


O-16a。

28. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種式B-1及/或B-2之化合物，



B-1



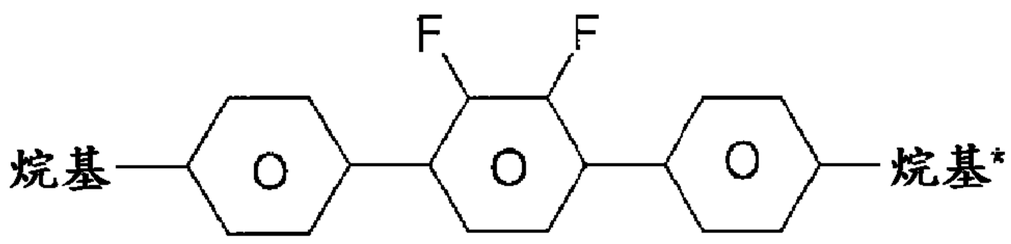
B-2

其中：

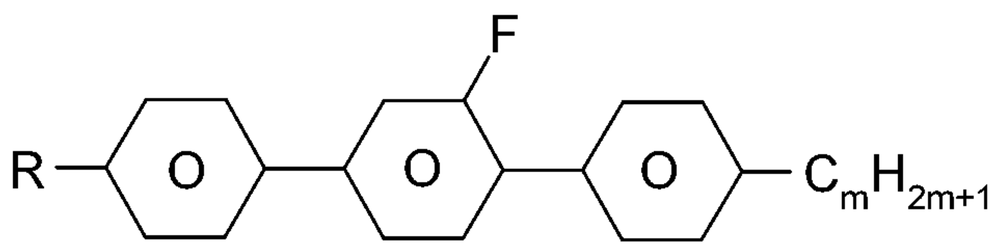
烷基及烷基*各自彼此獨立地表示具有1-6個C原子之直鏈烷基，且

烯基表示具有2-6個C原子之直鏈烯基。

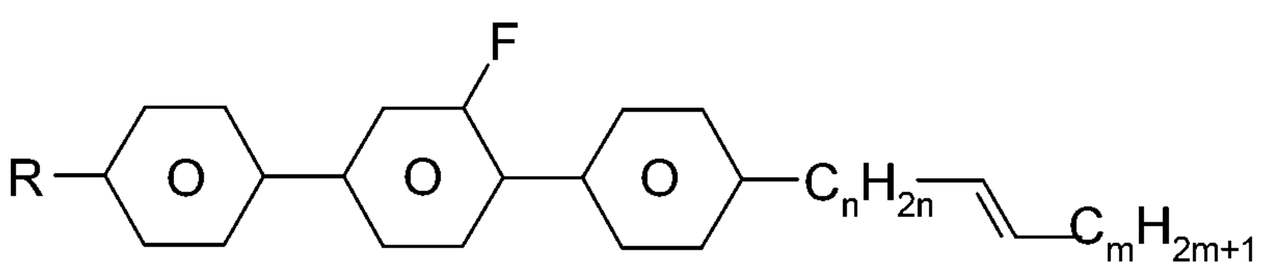
29. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種選自式IIC-1、T-20、T-21、B-1、B-2、O-15及O-16之化合物，



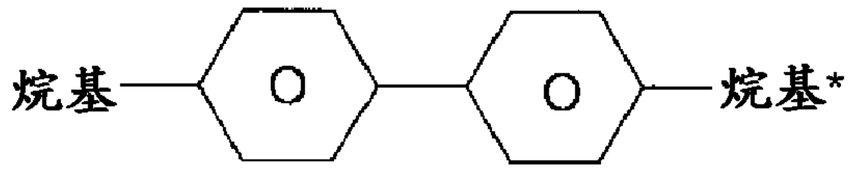
IIC-1



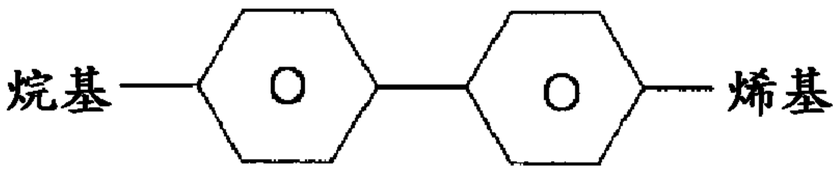
T-20



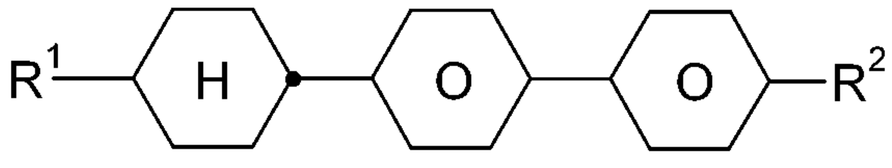
T-21



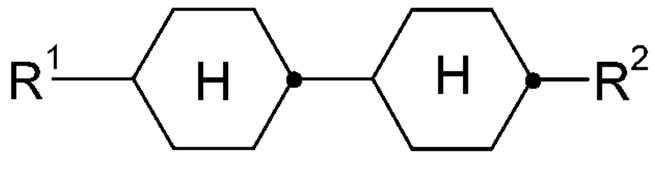
B-1



B-2



O-15



O-16

其中

烷基及烷基*各自彼此獨立地表示具有1至6個C原子之直鏈烷基基團，

烯基表示具有2-6個C原子之直鏈烯基，

R表示具有1-7個C原子之直鏈烷基或烷氧基，

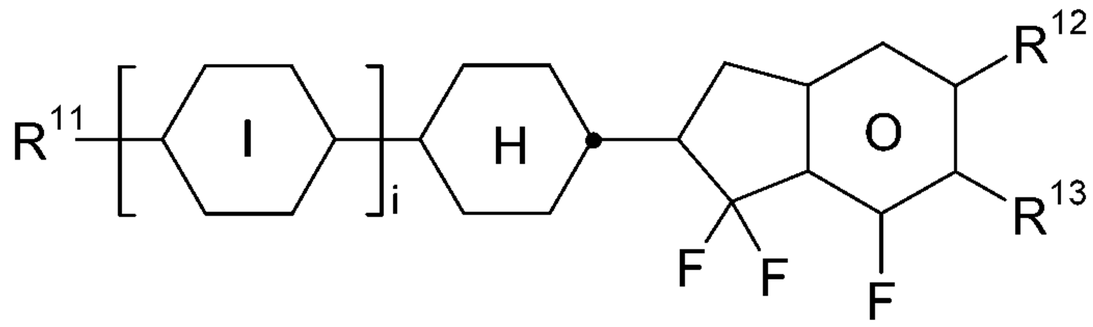
m表示1、2、3、4、5或6，

n表示0、1、2、3或4，且

R^1及R^2各自彼此獨立地表示H、具有至多15個C原子之未經取代、經CN或CF_3單取代或經鹵素至少單取代之烷基，其中另外，此等基團中之一或多個CH_2基團可經-O-、-S-、 、-C≡C-、$-CF_2O-$、$-OCF_2-$、-OC-O-或-O-CO-以使得O原子不彼此直接連

接的方式置換。

30. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種式In之二氫茚化合物，

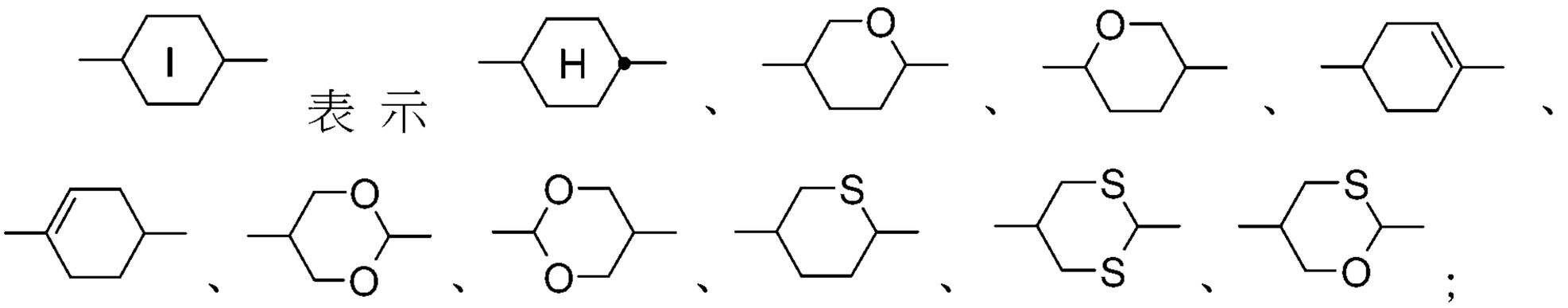


In

其中：

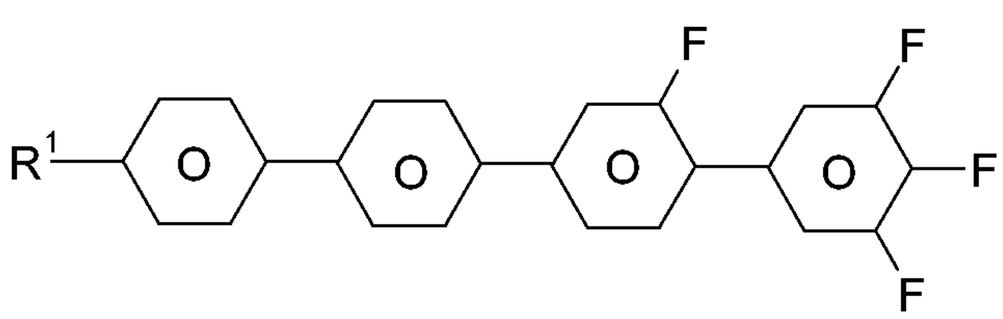
R^{11}、R^{12}、R^{13}表示具有1-5個C原子之直鏈烷基、烷氧基、烷氧基烷基或烯基；

R^{12}及R^{13}另外亦表示鹵素；



i表示0、1或2。

31. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種式P4之化合物，



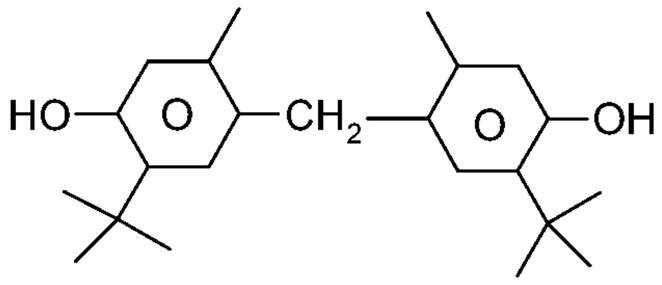
P4

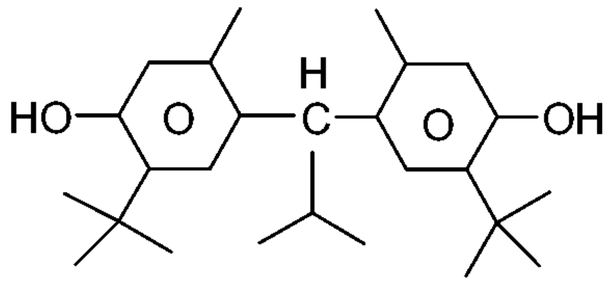
其中，R^1具有請求項1中關於式I所示之含義。

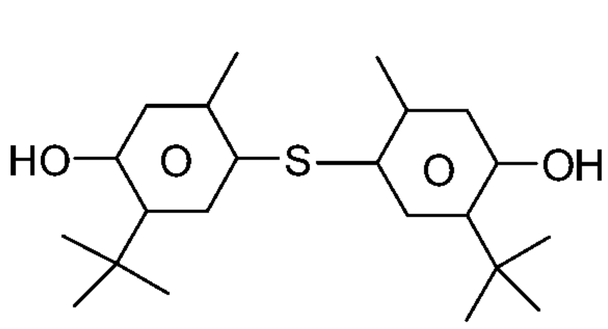
32. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含

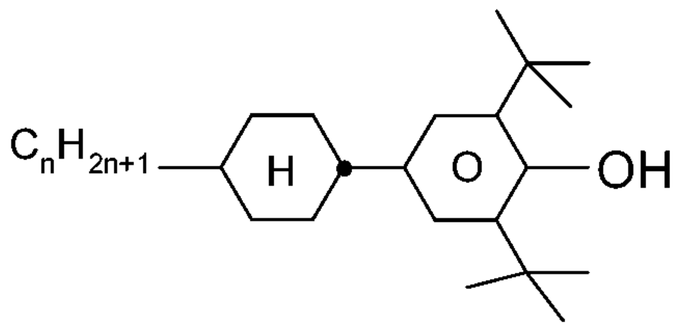
一或多種選自由穩定劑、抗氧化劑、UV吸收劑、奈米粒子及微粒所組成之群之添加劑。

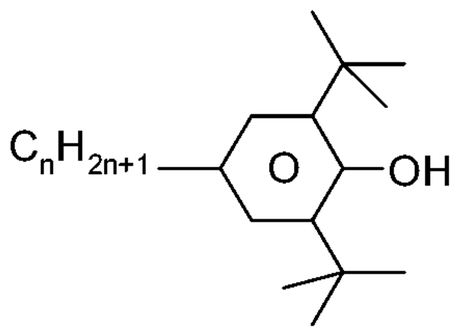
33. 如請求項32之液晶介質，其中該添加劑係選自下列化合物：

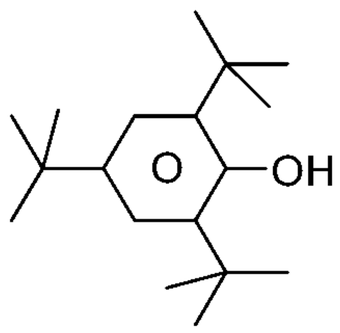


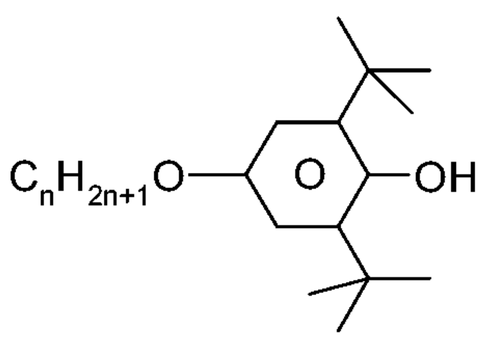


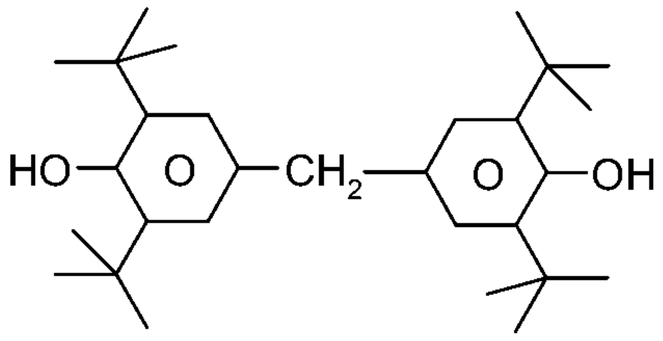


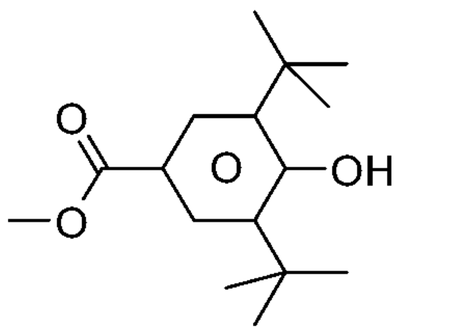


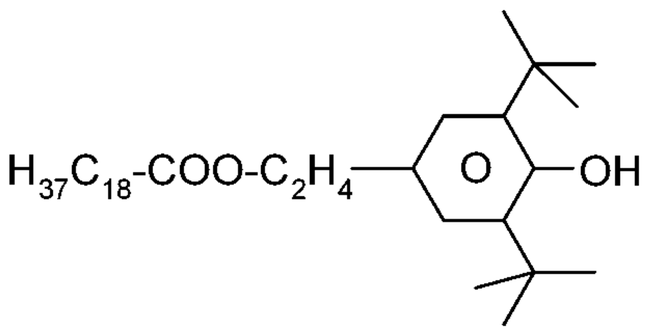


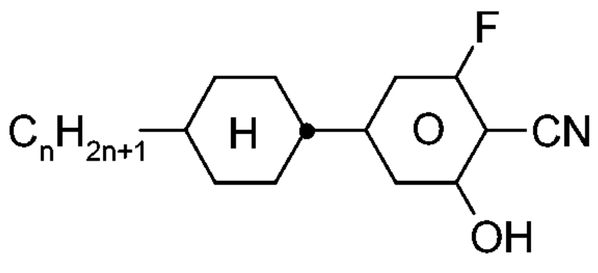


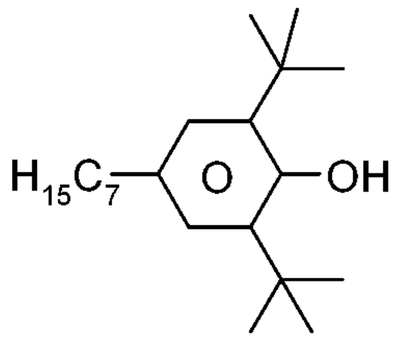


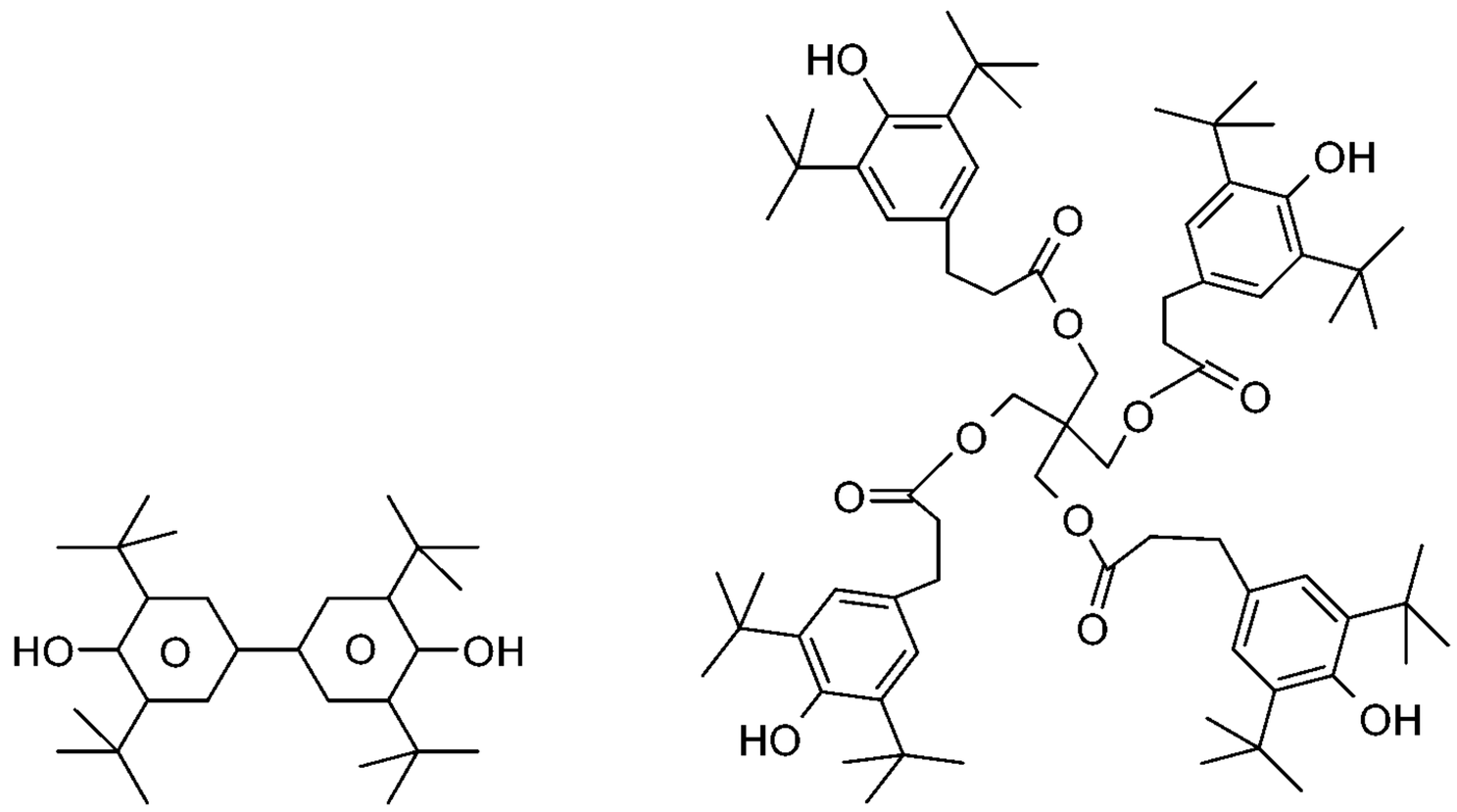


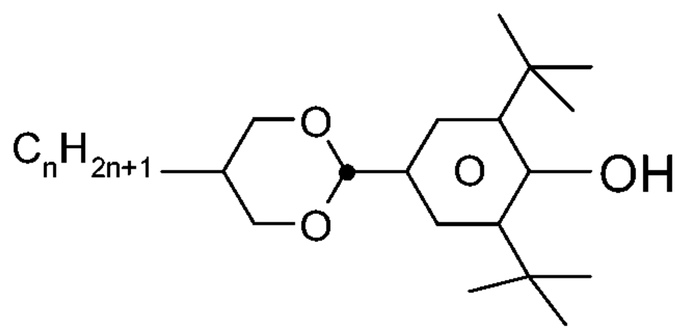


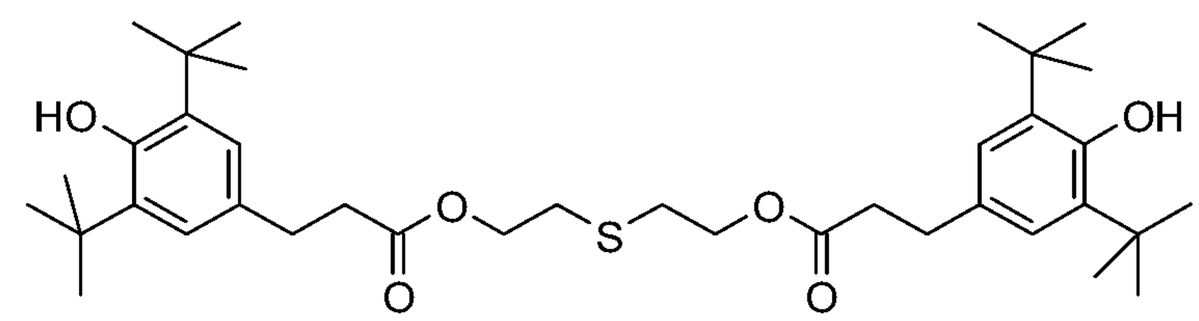


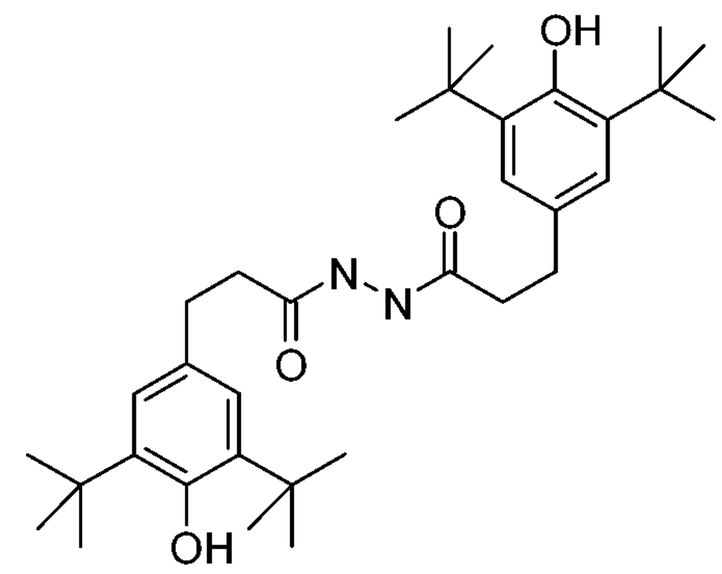


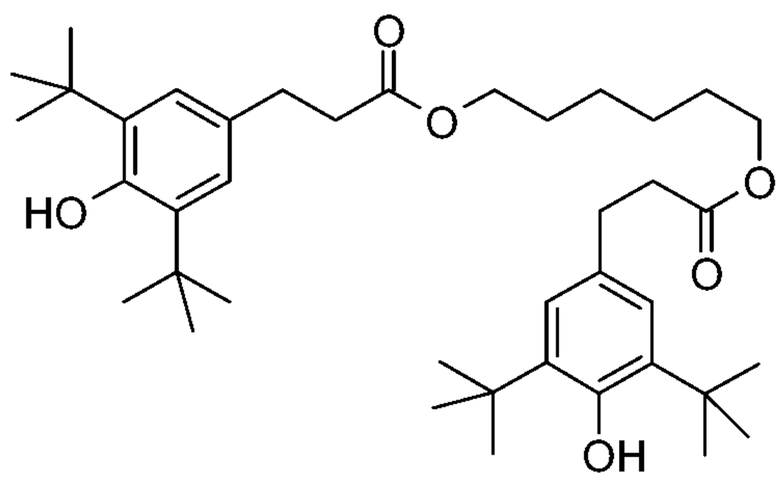


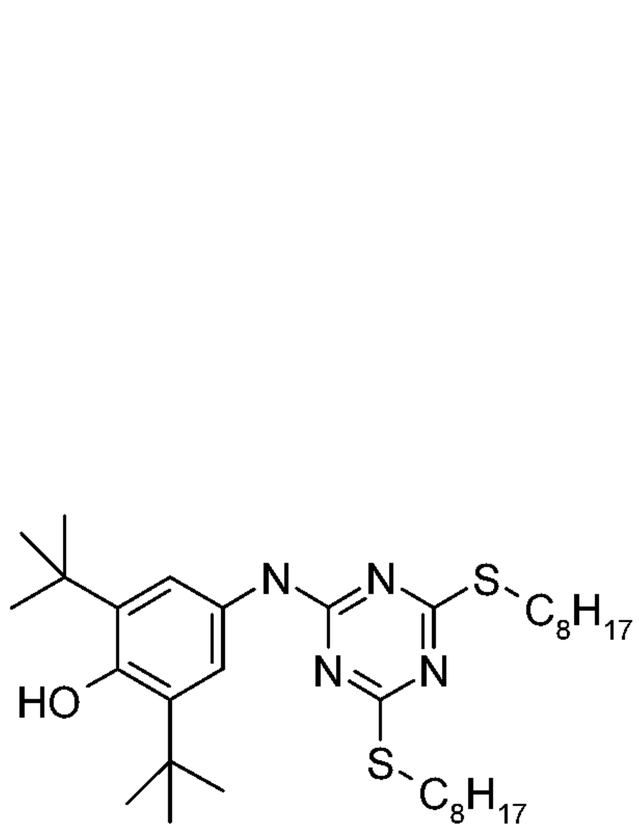


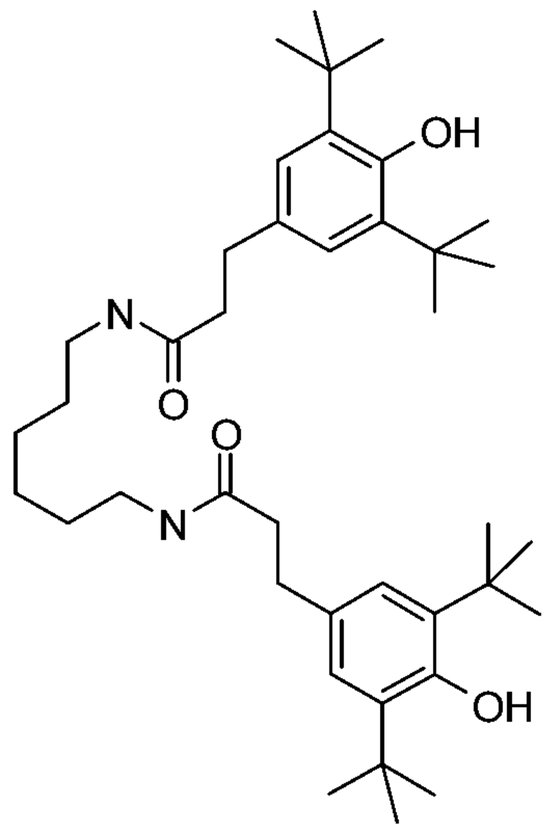


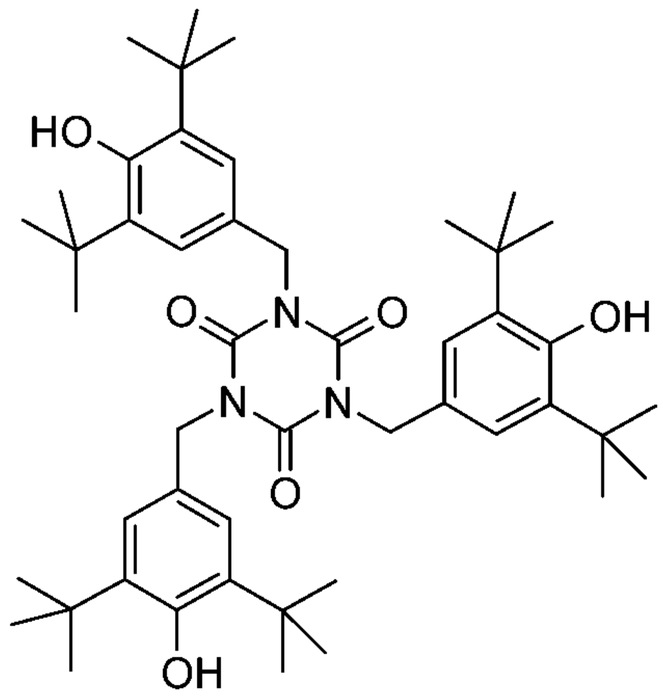


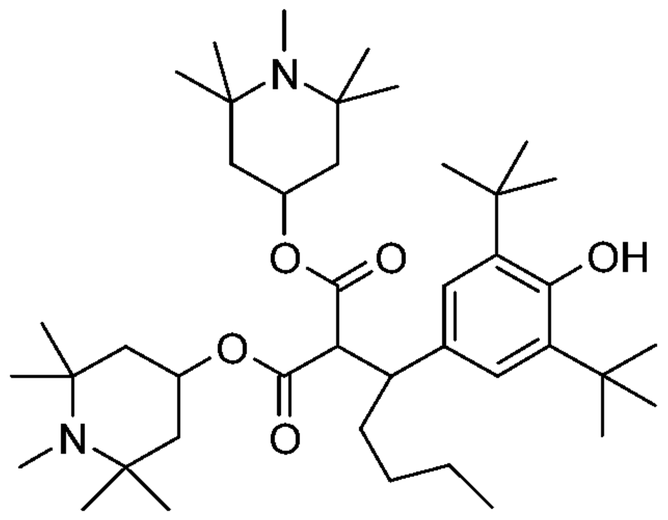


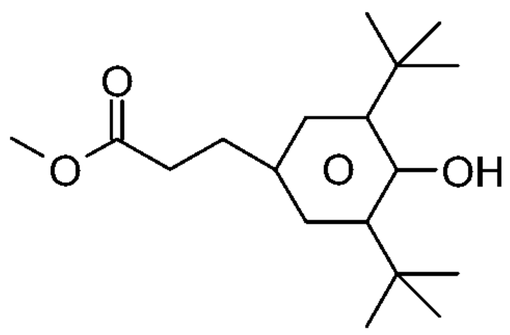


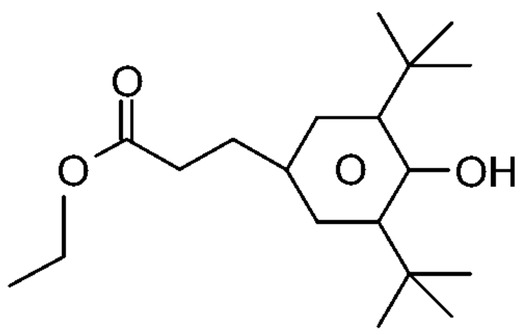


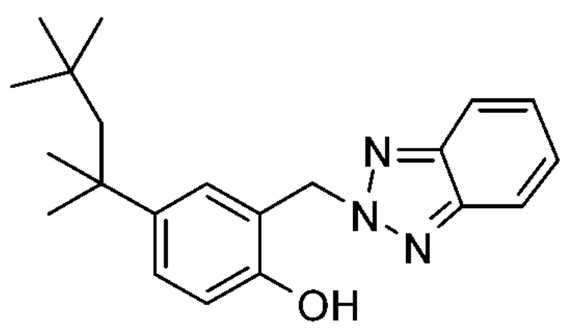


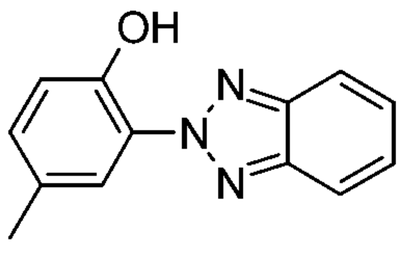


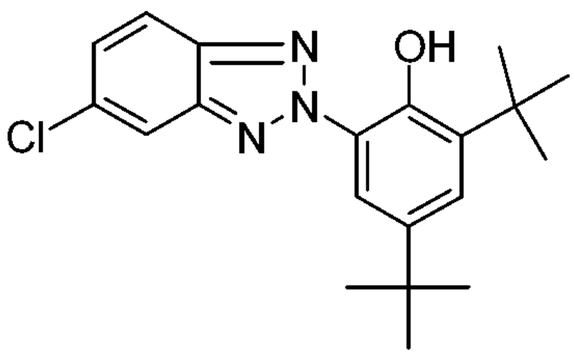


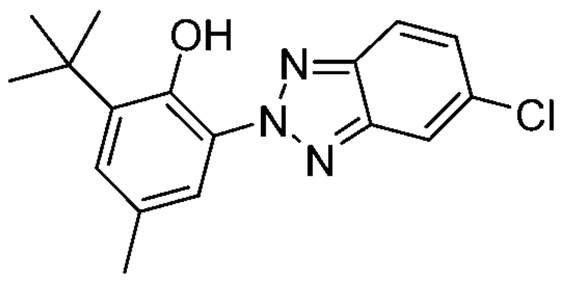


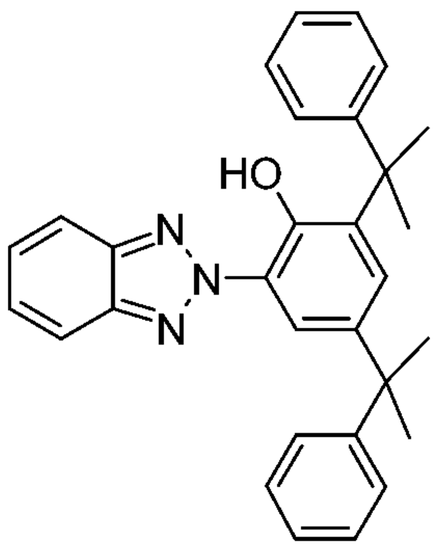


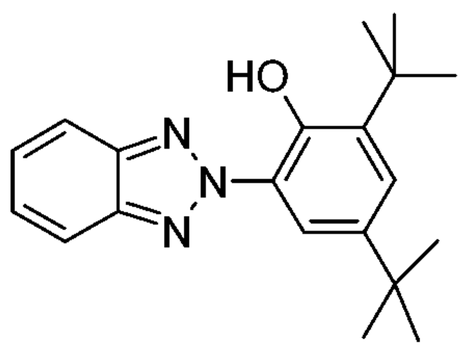


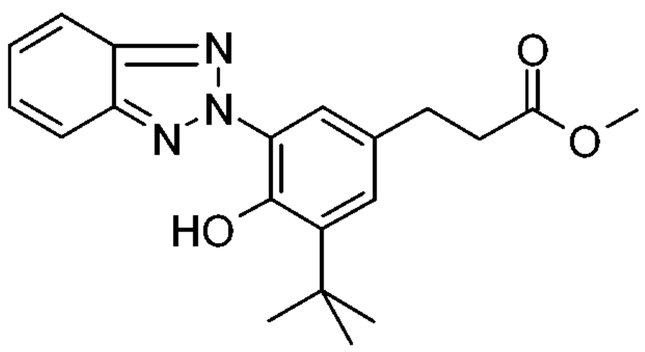


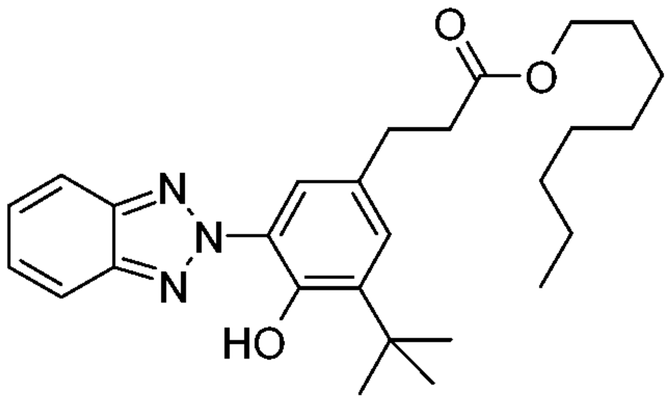


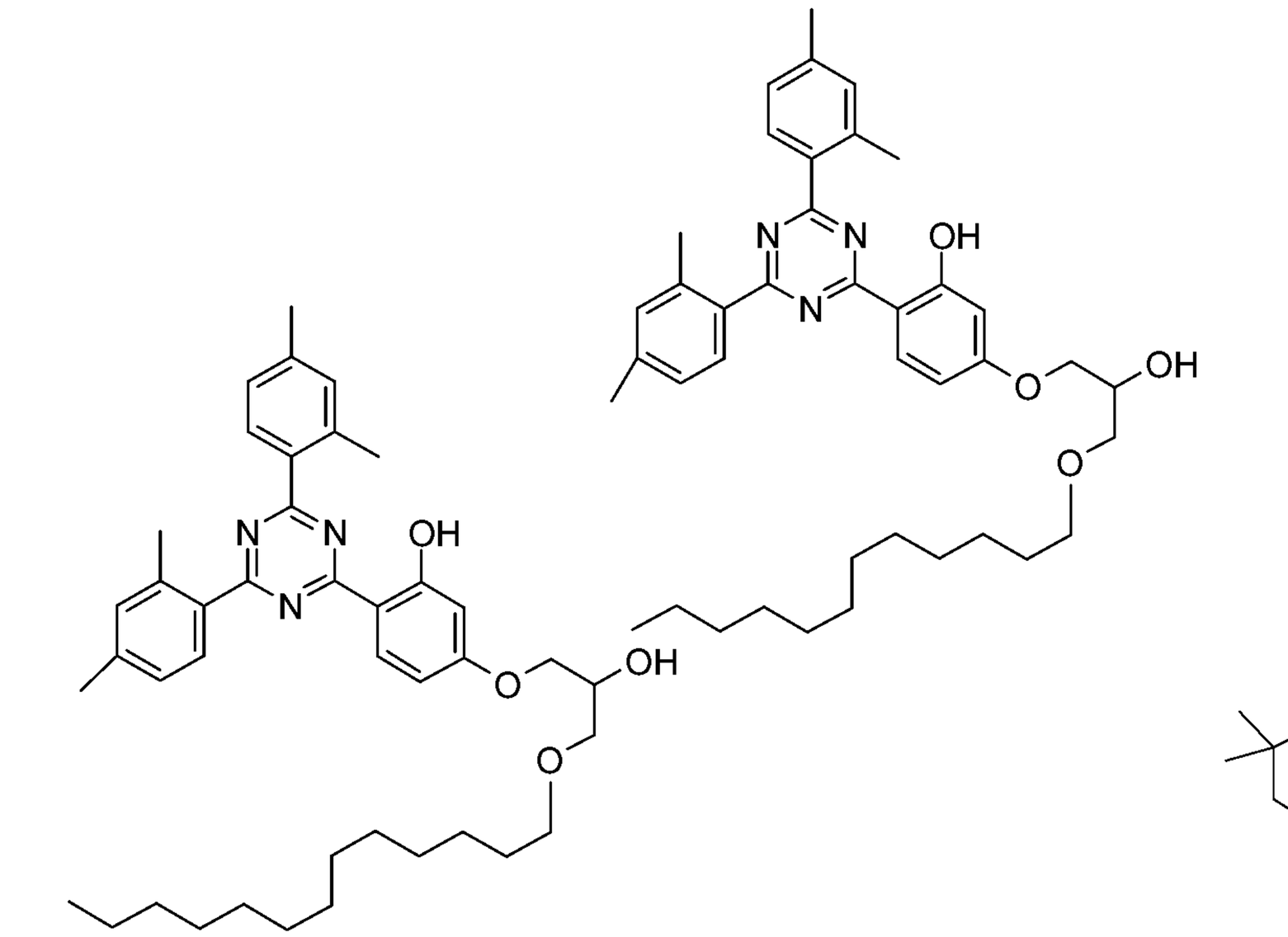


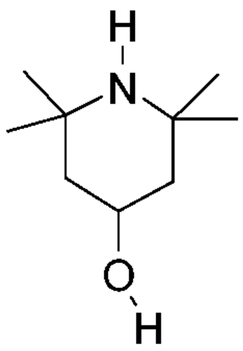


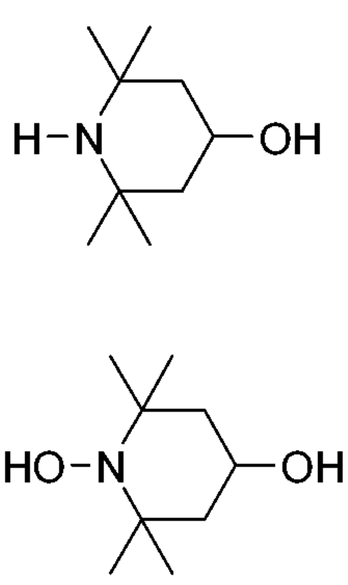


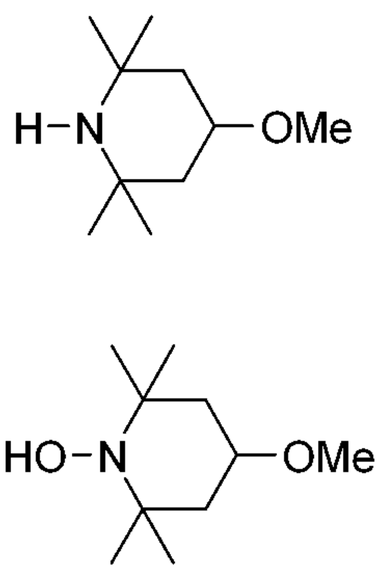


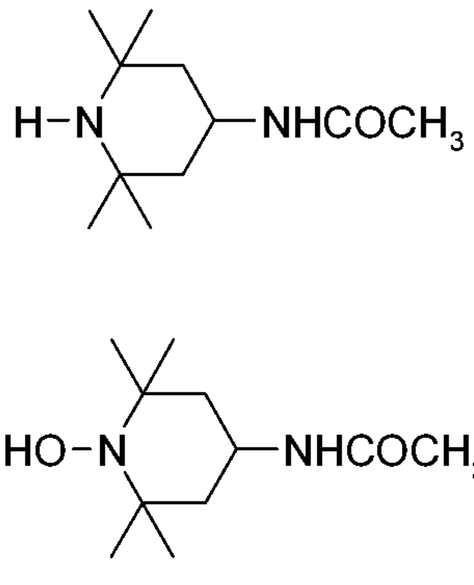


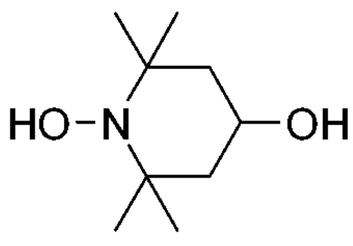


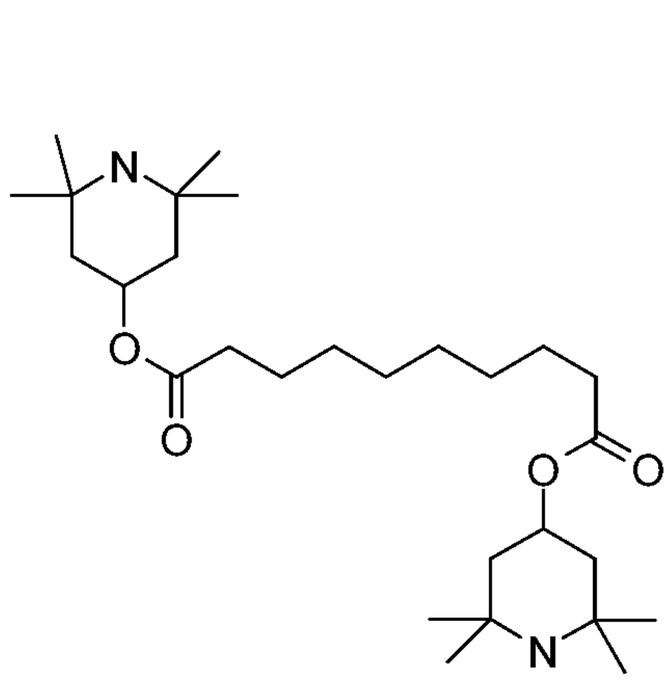


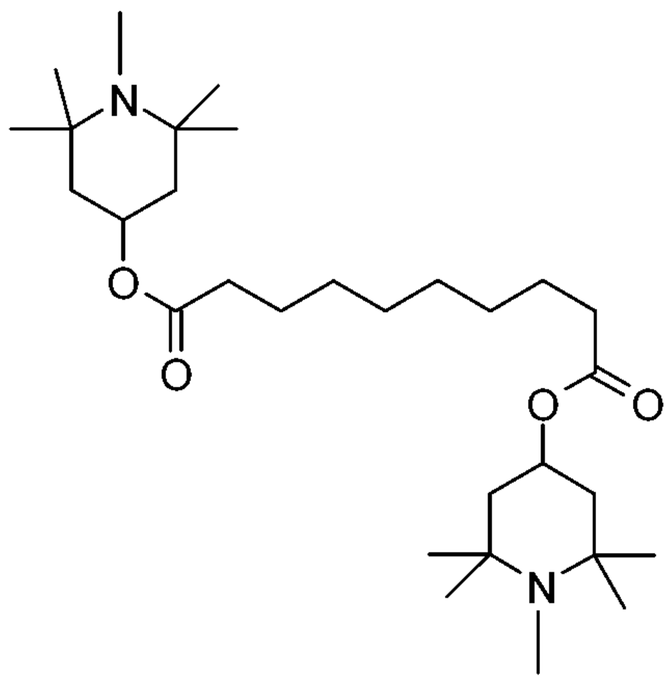


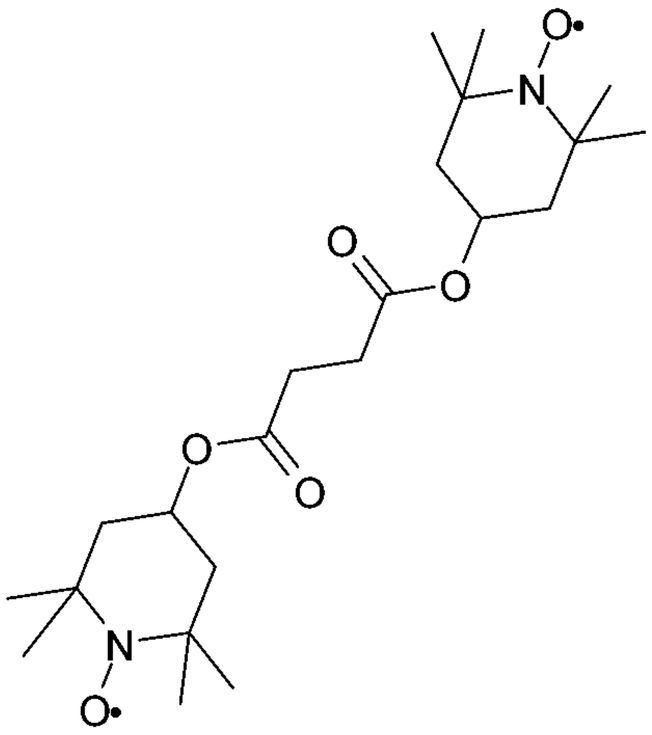


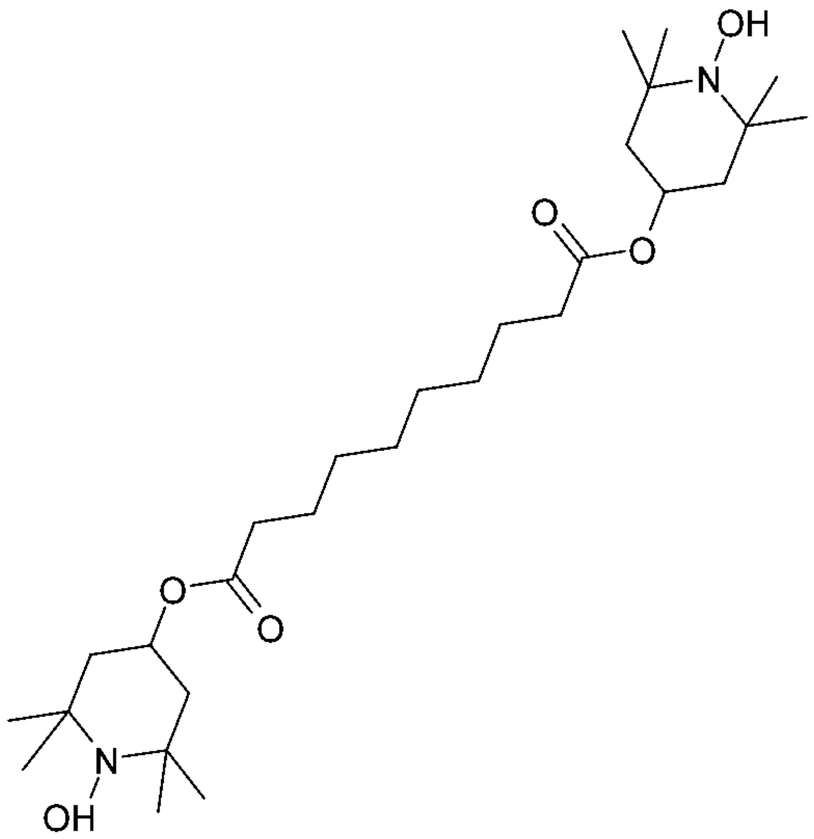










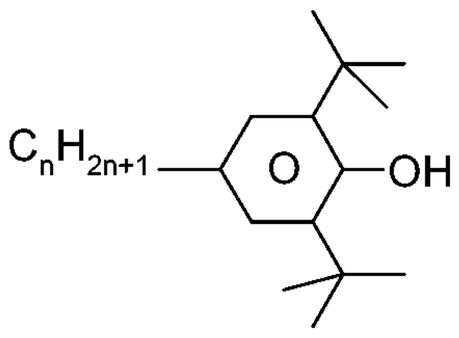


其中n為1至12。

34. 如請求項32之液晶介質，其中該添加劑係為穩定劑，其中該穩定劑係選自丁基羥基甲苯(BHT)衍生物。

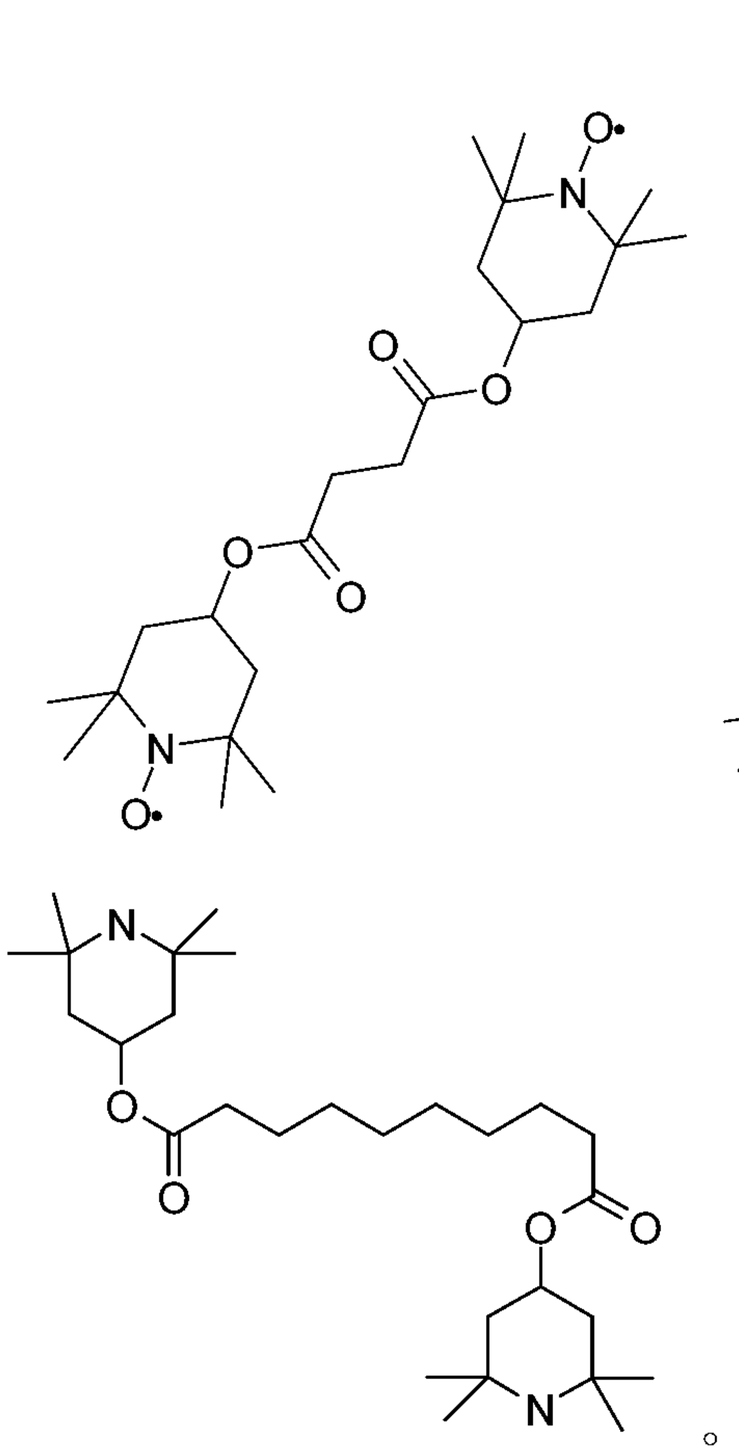
35. 如請求項34之液晶介質，其中該BHT衍生物係為2,6-二第三丁基-4-烷基酚。

36. 如請求項35之液晶介質，其中該2,6-二第三丁基-4-烷基酚係



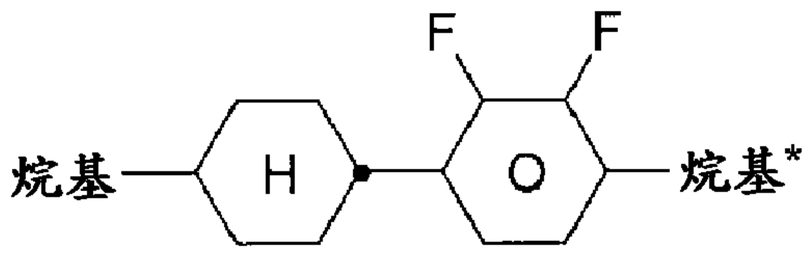
，其中n為7。

37. 如請求項33之液晶介質，其中該添加劑係選自下列化合物：

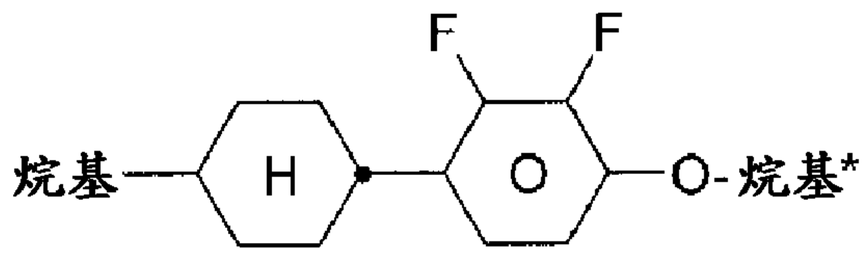


。

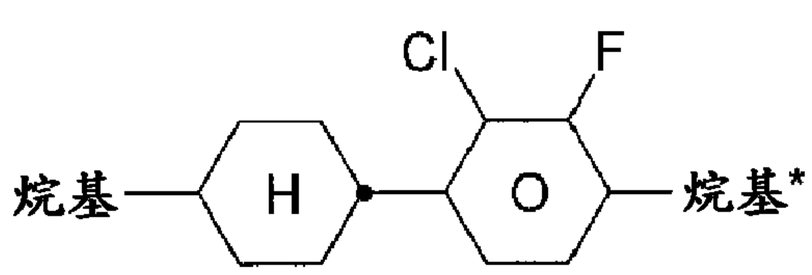
38. 如請求項1至3中任一項之液晶介質，其中該液晶介質另外包含一或多種選自由式IIA-1至IIA-41或IIB-1至IIB-12所組成之群之化合物，



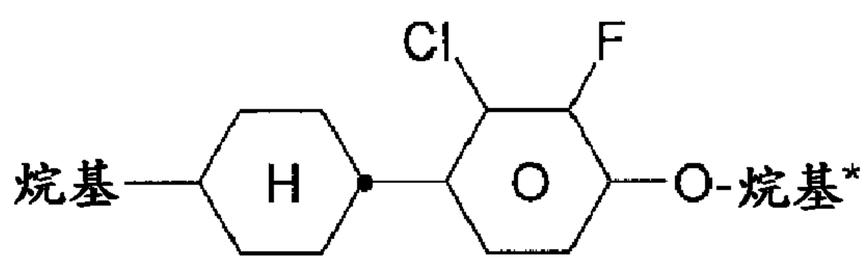
IIA-1



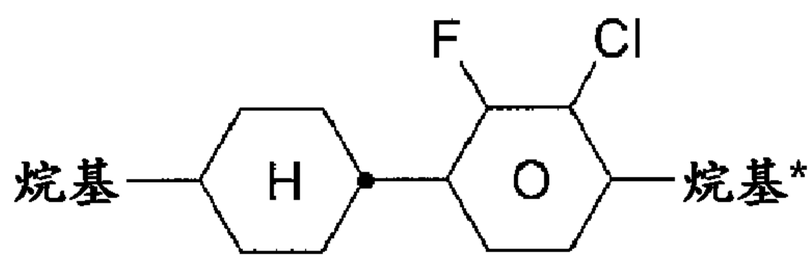
IIA-2



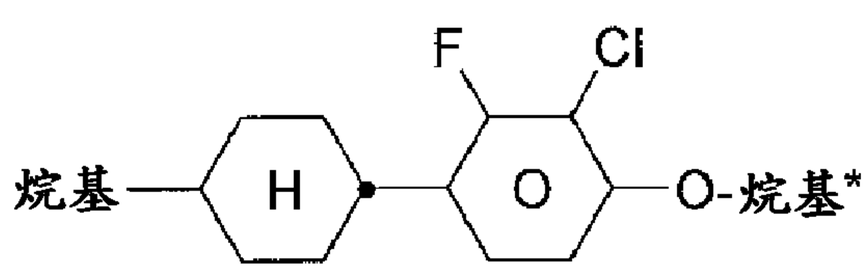
IIA-3



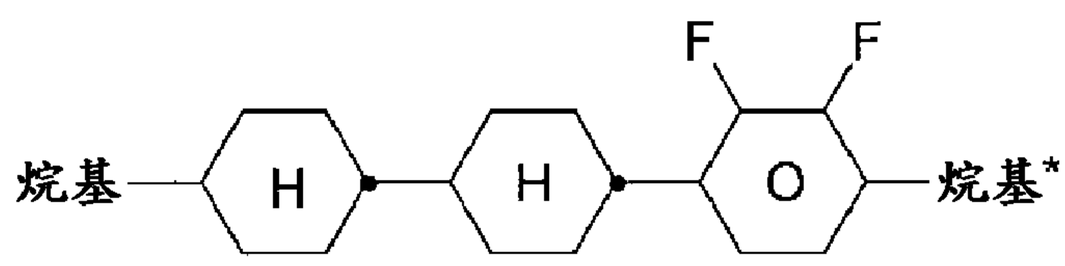
IIA-4



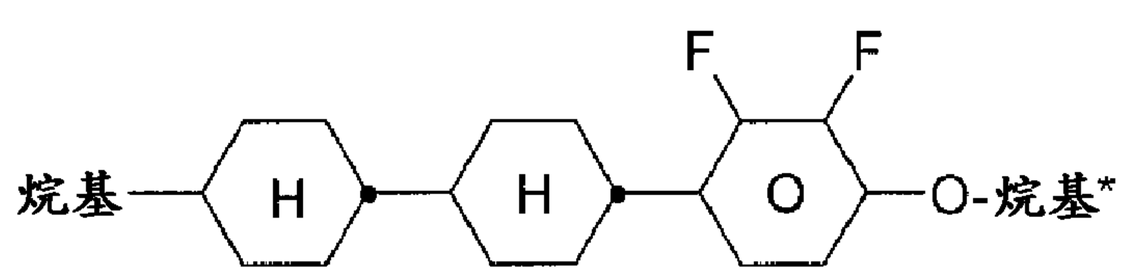
IIA-5



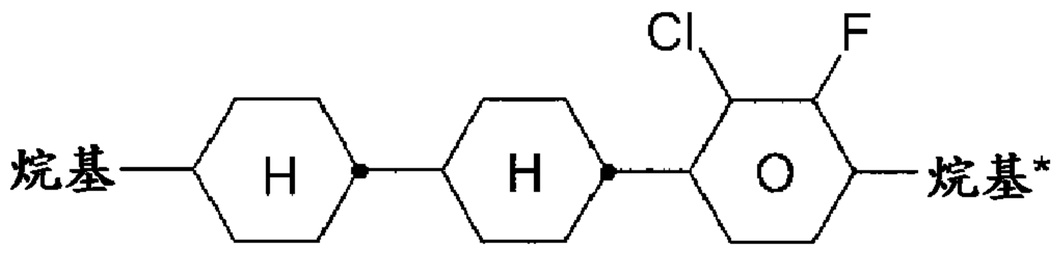
IIA-6



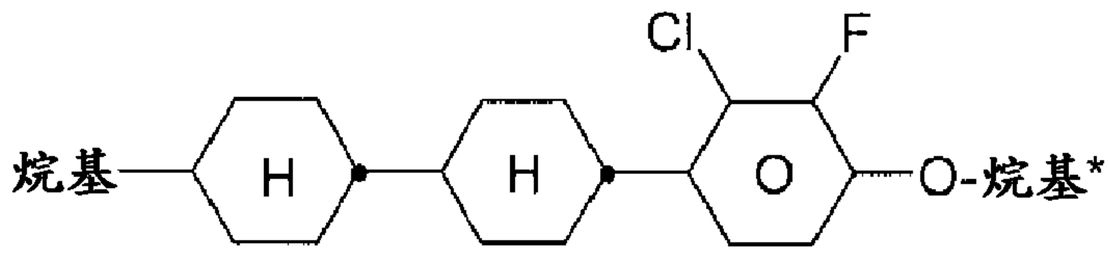
IIA-7



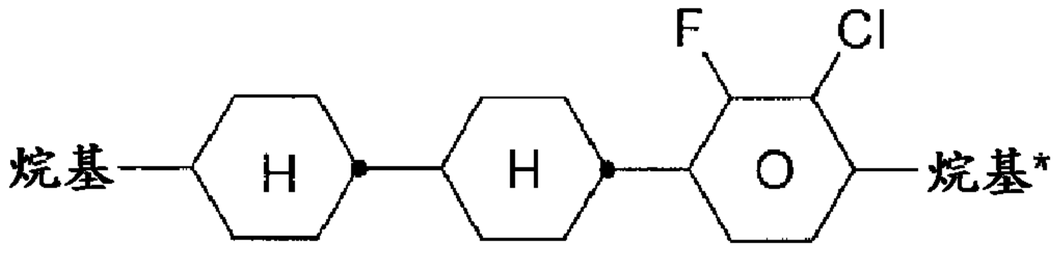
IIA-8



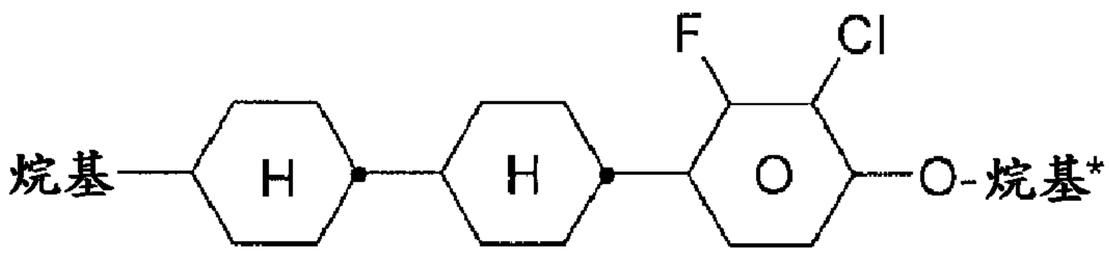
IIA-9



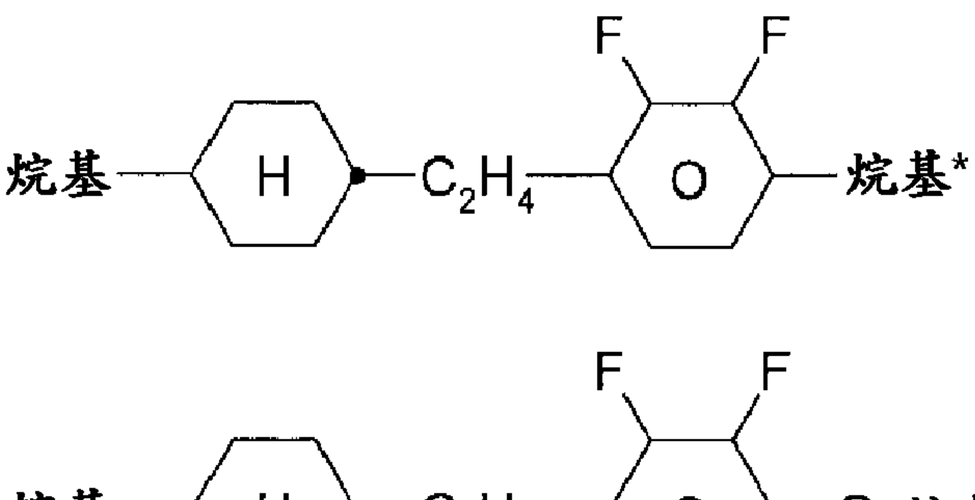
IIA-10



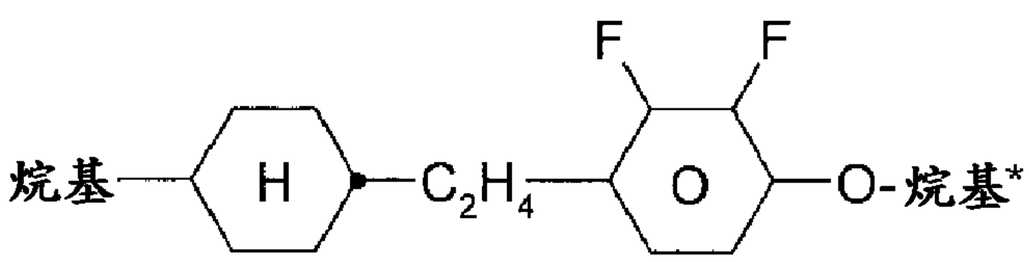
IIA-11



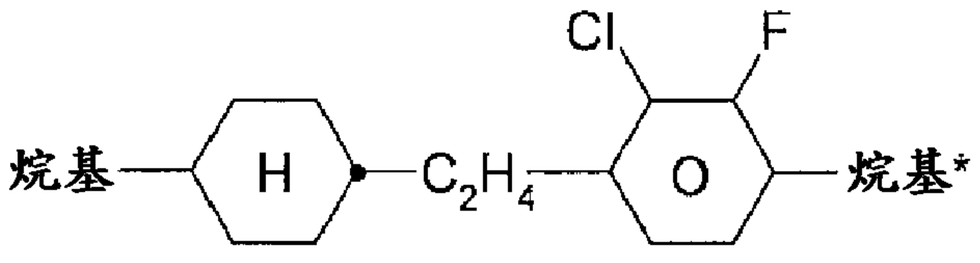
IIA-12



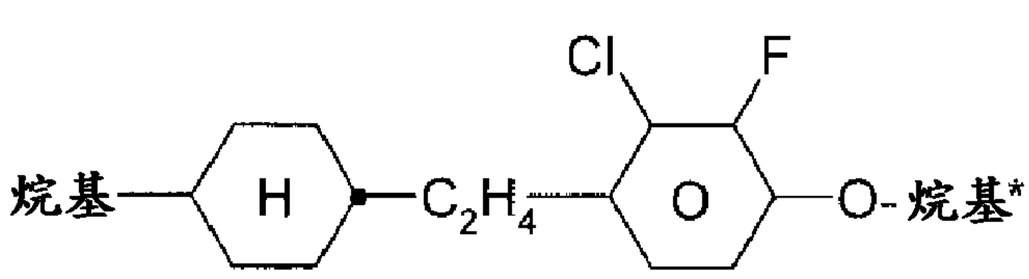
IIA-13



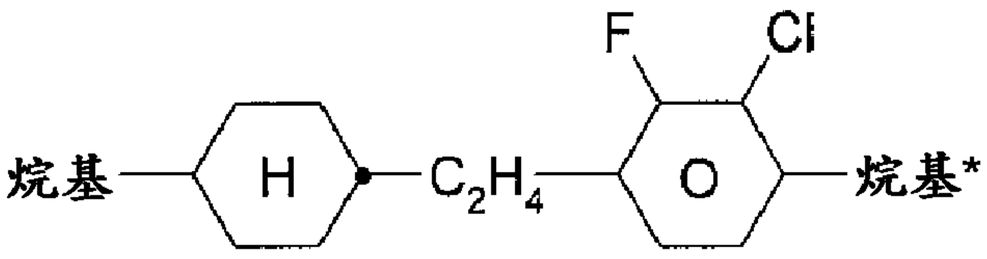
IIA-14



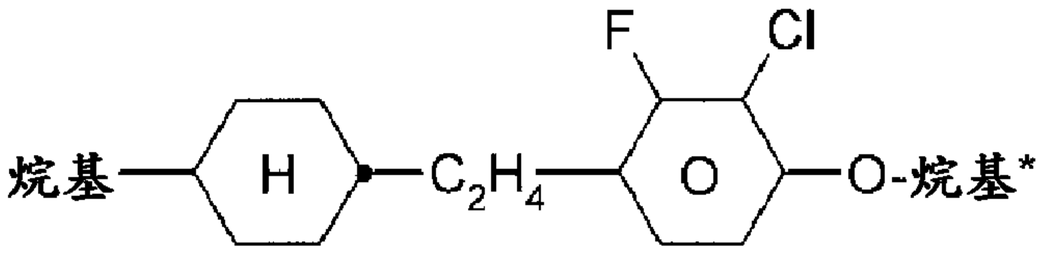
IIA-15



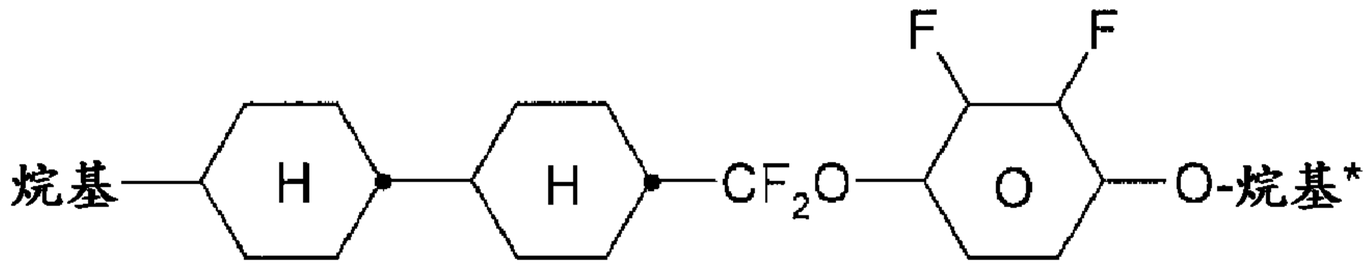
IIA-16



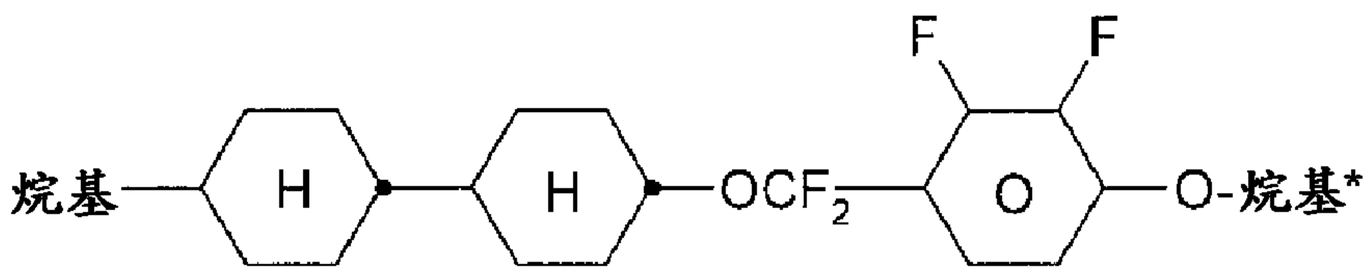
IIA-17



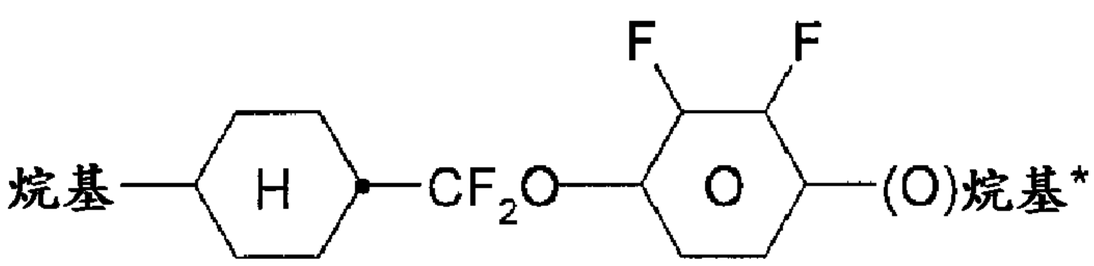
IIA-18



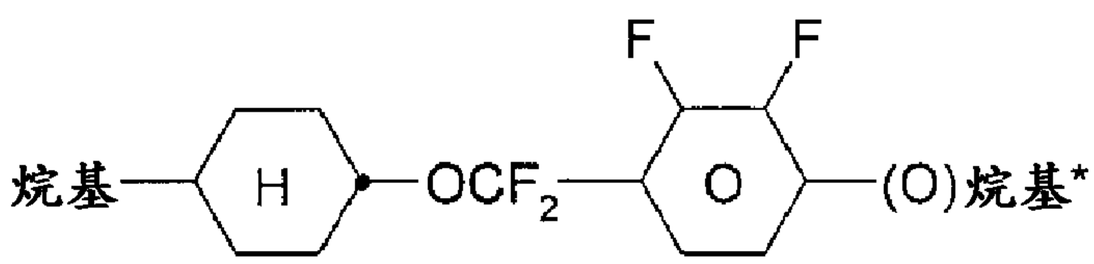
IIA-19



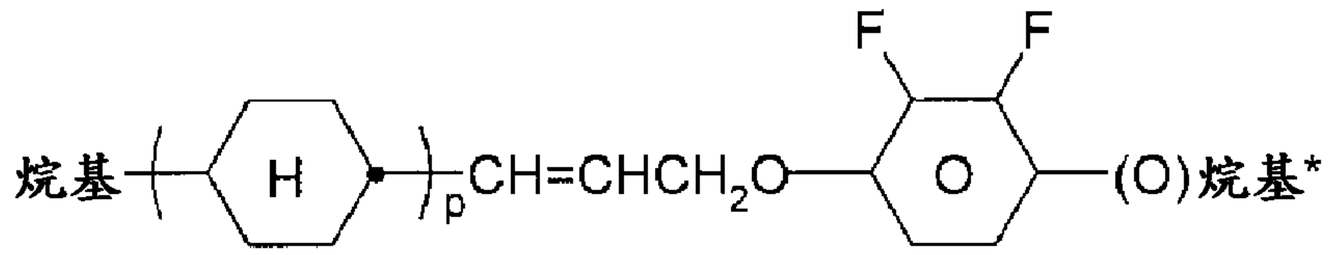
IIA-20



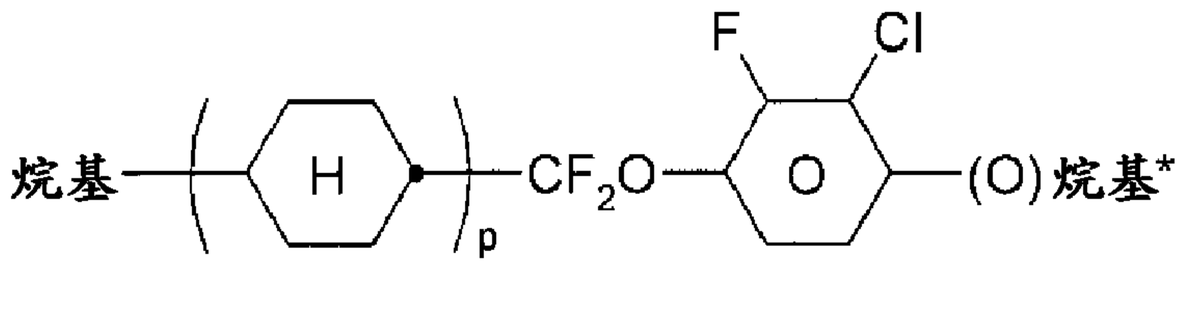
IIA-21



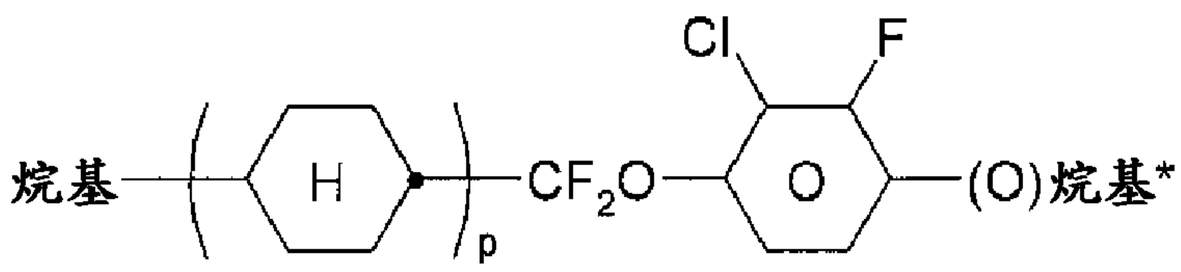
IIA-22



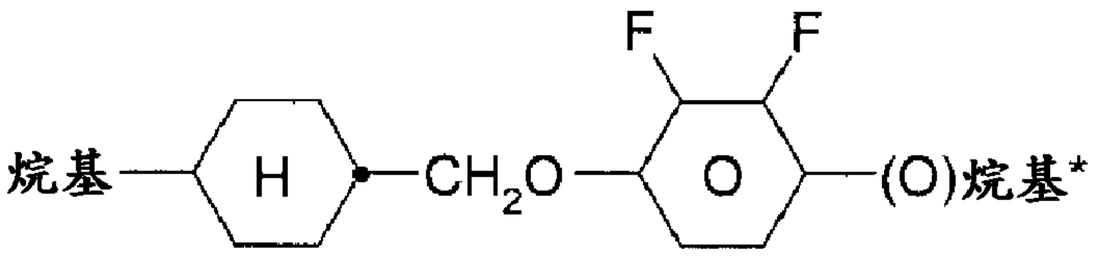
IIA-23



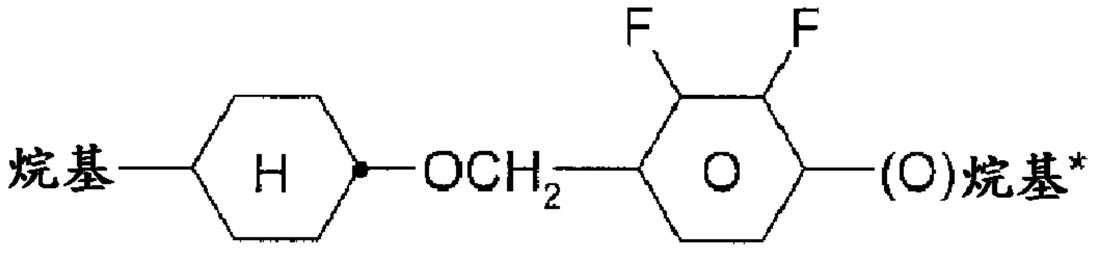
IIA-24



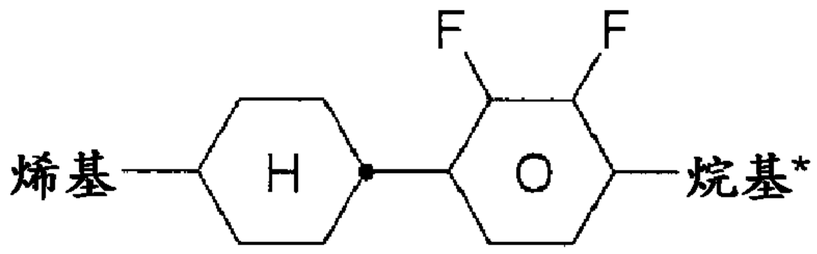
IIA-25



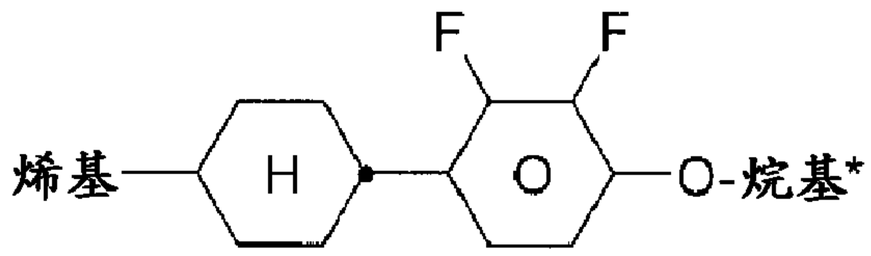
IIA-26



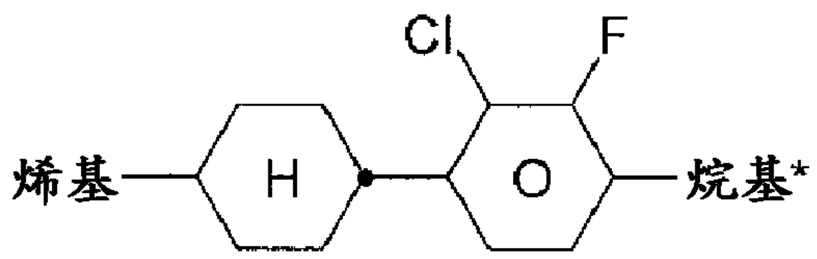
IIA-27



IIA-28



IIA-29



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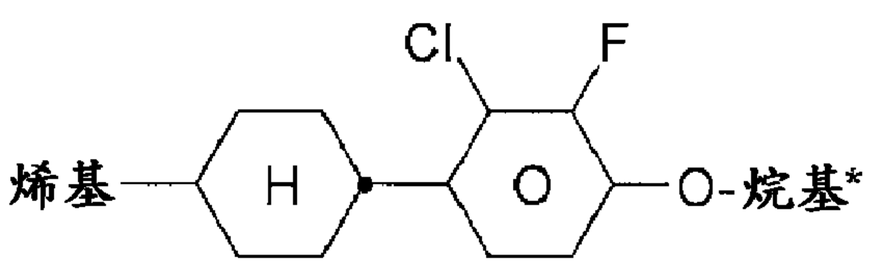

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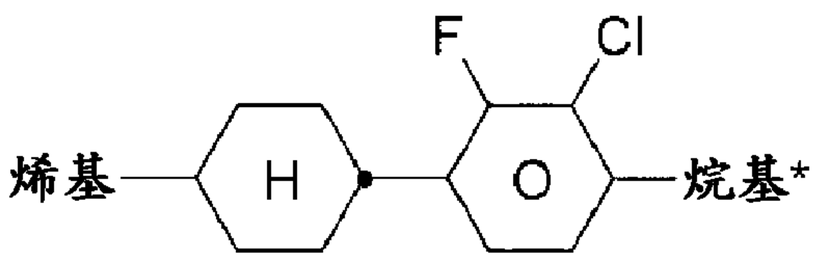

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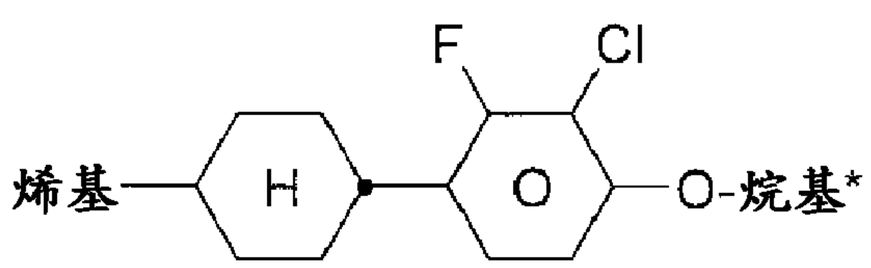

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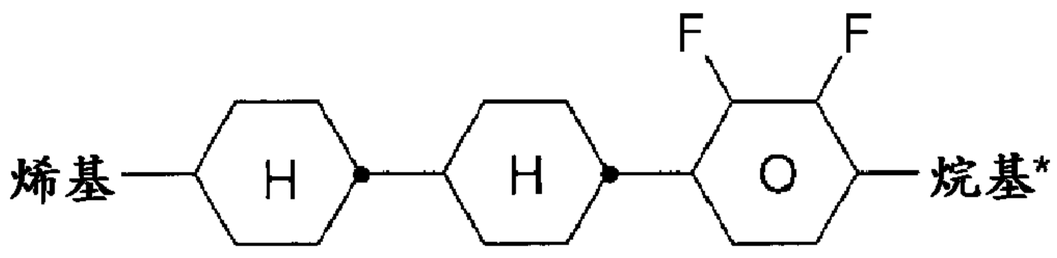

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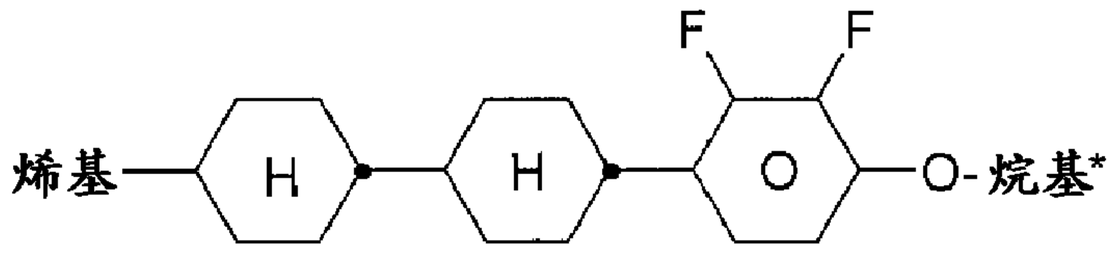
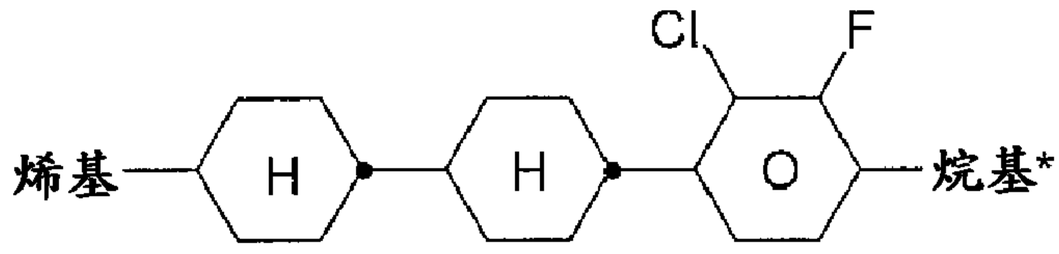
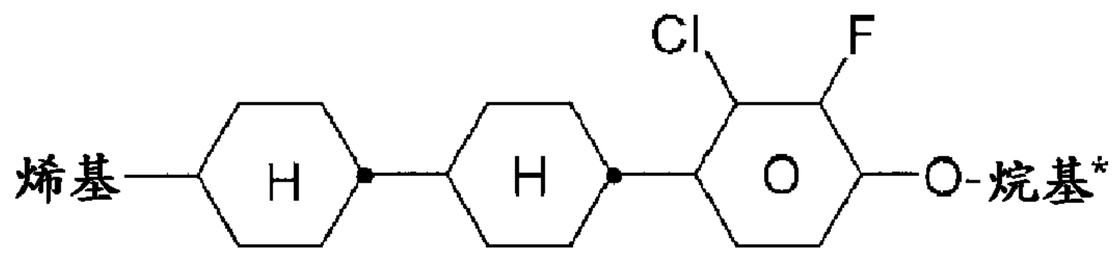


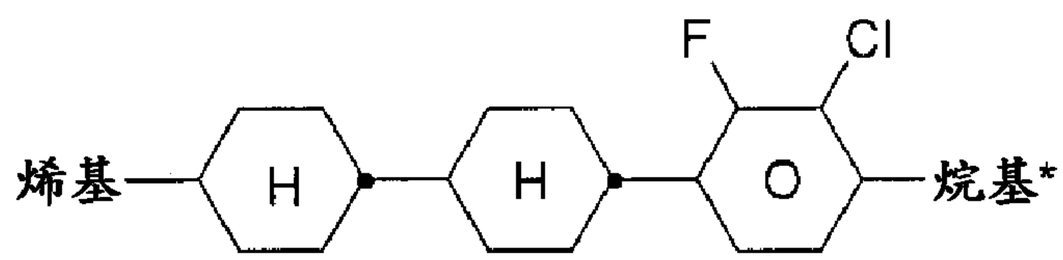
IIA-35



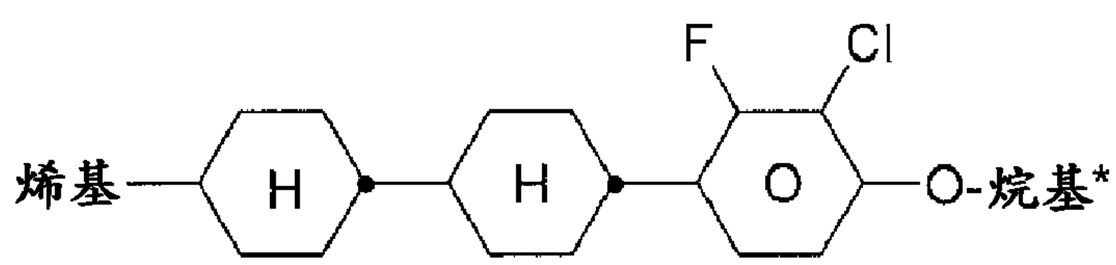
IIA-36



IIA-37



IIA-38



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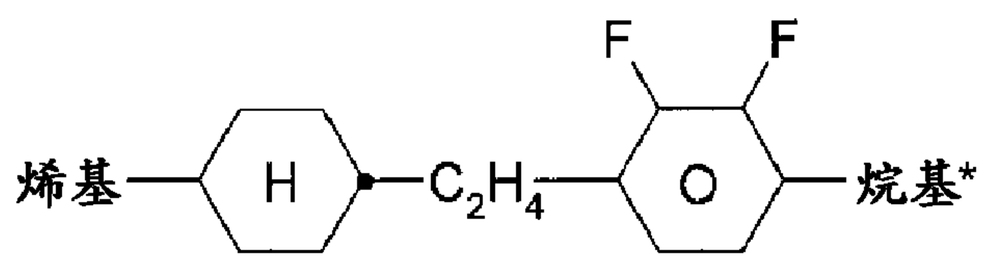
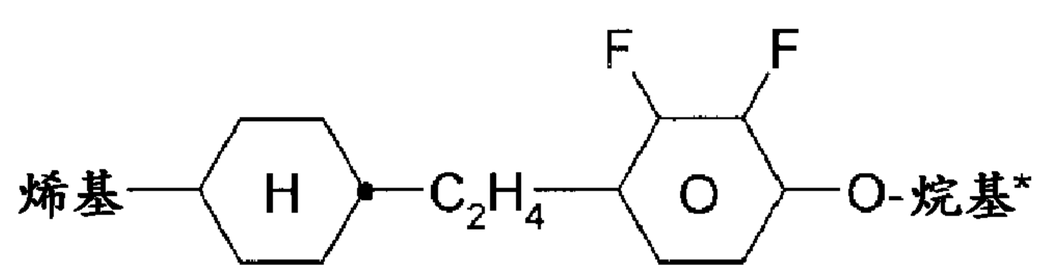


IIA-40



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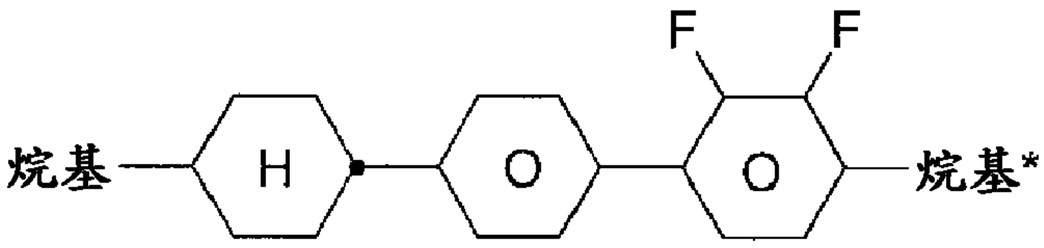
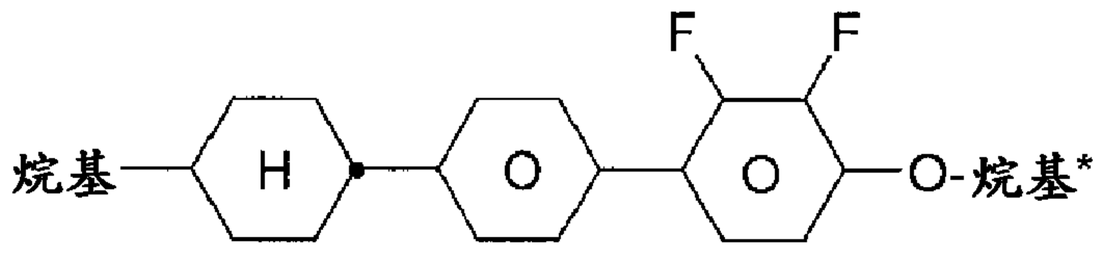
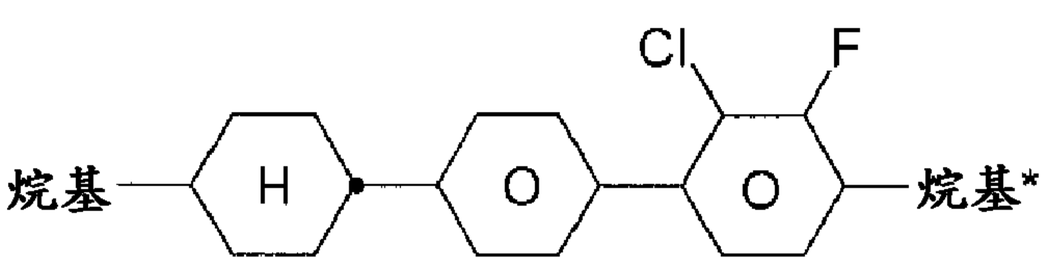


IIB-1



IIB-2



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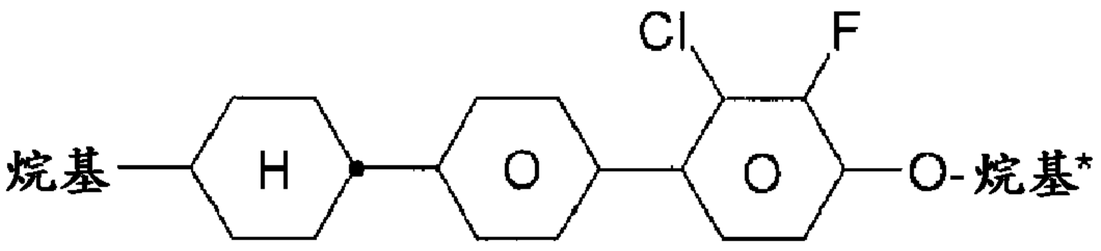

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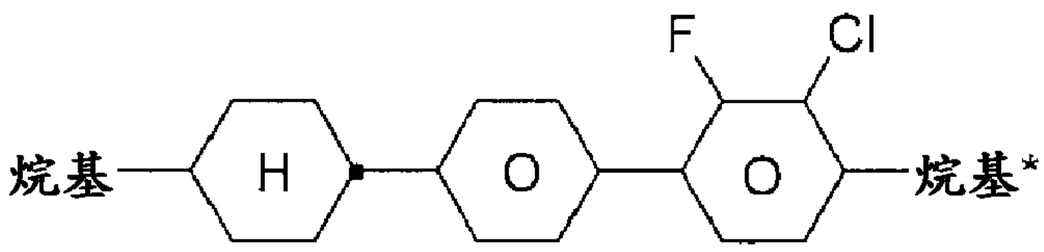
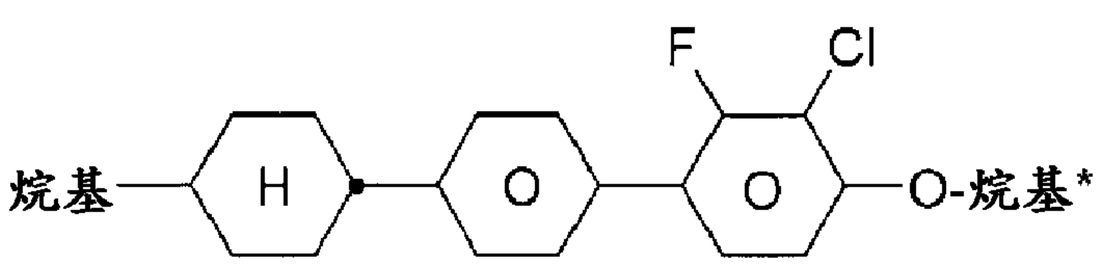
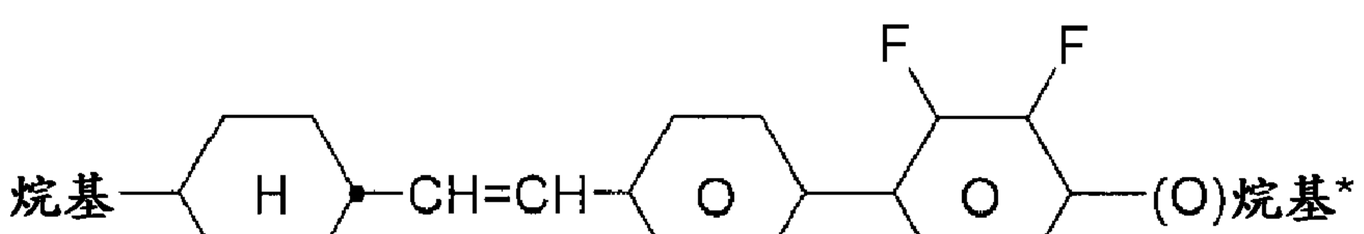


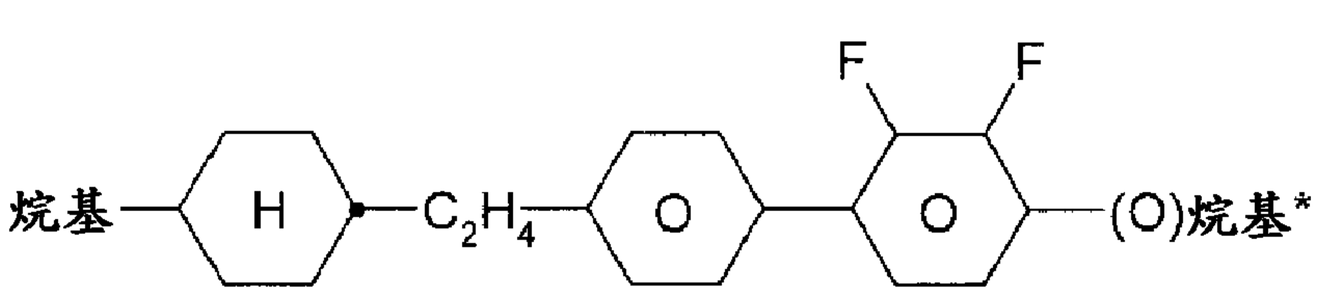
IIB-5



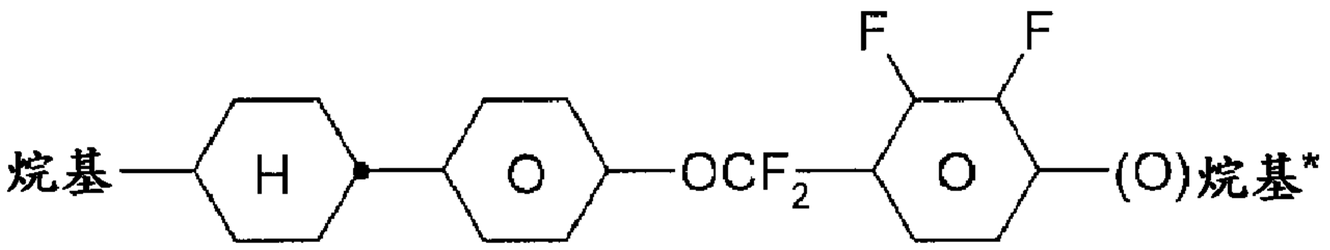
IIB-6



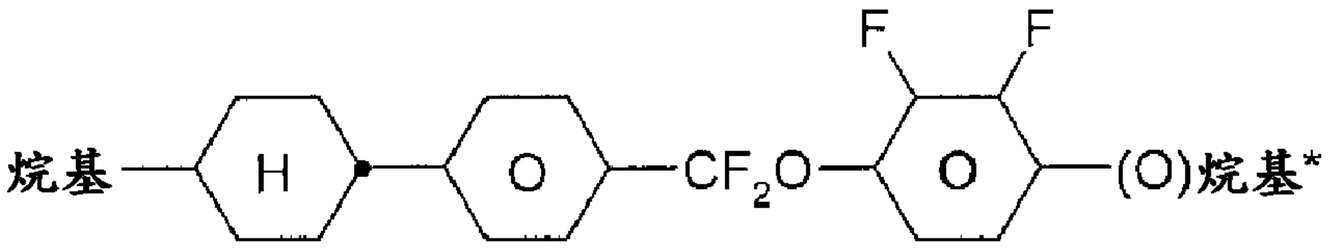
IIB-7



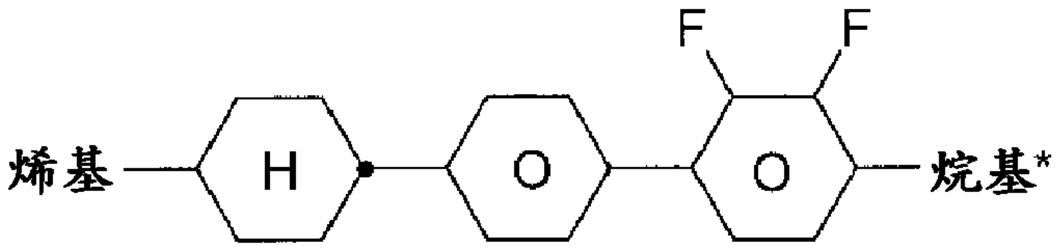
IIB-8



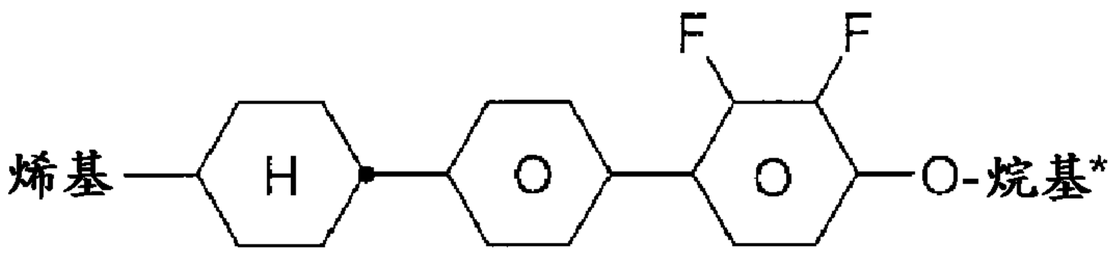
IIB-9



IIB-10



IIB-11



IIB-12

其中烷基及烷基*各自彼此獨立地表示具有1至6個C原子之直鏈烷基，烯基表示具有2-6個C原子之直鏈烯基。

39. 如請求項1至3中任一項之液晶介質，其中該式CC-3-V化合物在整體混合物中之比例為21重量-%或更高。

40. 一種製備如請求項1至39中任一項之液晶介質的方法，其特徵在於，使至少一種式I化合物與具有式M之可聚合化合物及至少一種另外的液晶化合物混合，且添加或不添加一或多種添加劑。

41. 如請求項40之方法，其中該添加劑係選自穩定劑、抗氧化劑、UV吸收劑、奈米粒子、微粒、摻雜劑及自由基引發劑之群。

42. 一種如請求項1至39中任一項之液晶介質的用途，其係用於電光顯示器中。

43. 一種具有主動矩陣式定址之電光顯示器，其特徵在於，該電光

顯示器含有如請求項1至39中任一項之液晶介質作為介電質。

44. 如請求項43之電光顯示器，其中該電光顯示器為VA、PSA、PS-VA、PALC、FFS、PS-FFS、IPS或PS-IPS顯示器。