

2001 - 0062829
2001 07 07

10

가 가 , , , 가 , , , 가 .

가 가 , , , 가 .

1

1 ,

2 ,

가

, (c)

, (b)

. (a)

, (d)PET

()

가

가

(FPC)

가

FPC

가

가

FPC

,가

가

FPC

가

가

, FPC

가

가

()

가

(脆性)

, (55 - 030207 , 55
 - 041422) ,
 (54 - 145794 , 59 - 160140 , 03 - 170547 , 03 - 186
 847 , 61 - 118424)가 .

FPC
 250 FPC
 가 , 가 .

, - 2
 , 2
 (59 - 108031) .
 가 .

, 59 - 108031 , - 2
 , - 2
 - 2
 2 가가 가 .

()
 , / , / , 2
 ,
 , 가 .

, 가
 , 가
 , (UV) 가
 , 60 μ m 40 μ m
 , 50 70 μ m
 , UV 가
 ,
 가 .

, 가 , 가 UV .

, ,
 , 가 ,
 ,
 , 가 , 가 ,
 가 .

2

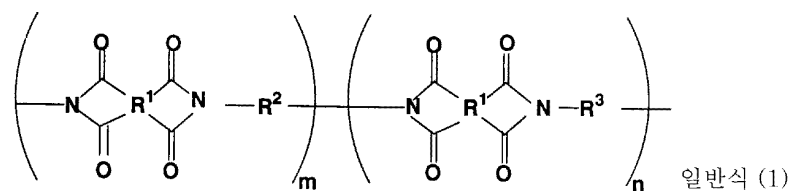
가

가

2

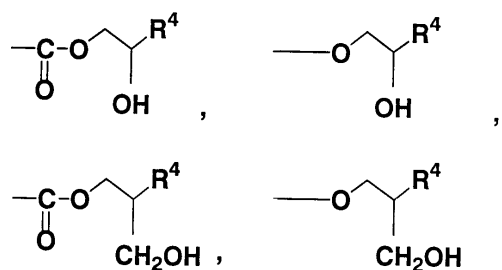
3

(1)



일반식 (1)

(, R1 4가 , R3 2가 , R2 ,



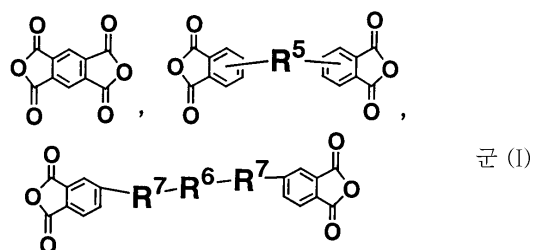
(R4 , , - 2 , - 3 1
 , 1가 .) 1 4 2가 , m 1
 , n 0 .)

1 % .

(l) R^1 , 1 3, 1 2 4가 .

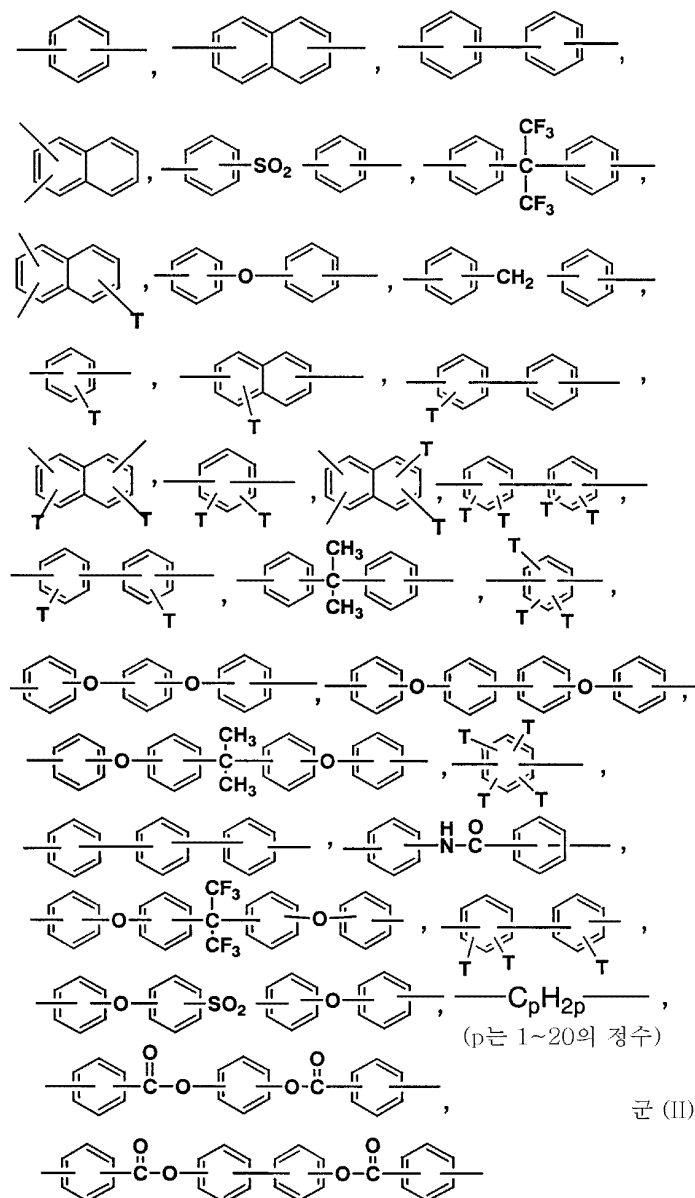
$$(1) \quad R^3, \quad /$$

(1) R^1 가, ()



군 (I)

(R⁵ , -C₆H₄ -, -C(CF₃)₂ -, -CO -, -O -, , R⁶) ()

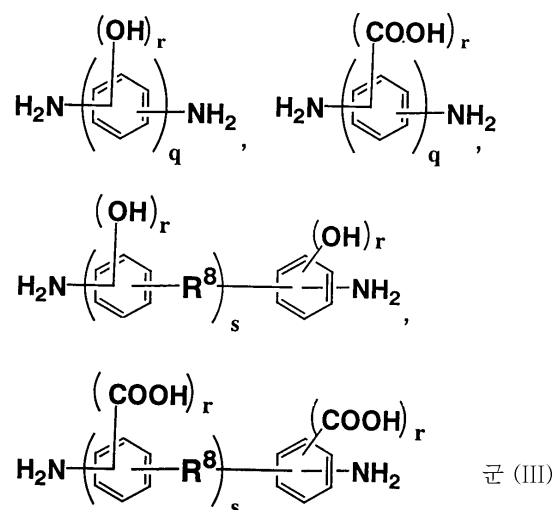


(T, H, F, Cl, Br, I, MeO-, 1 20)

27) , R⁷ - O -, - COO - .)

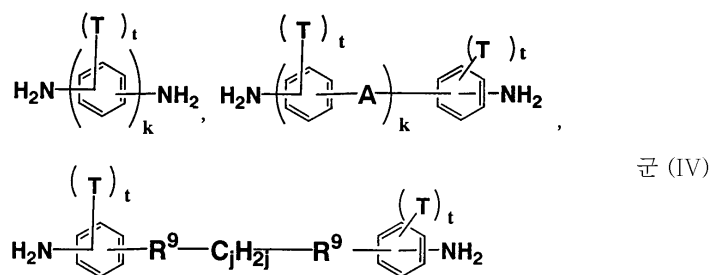
2 10 % 2

(1) R2가, ()



(, q s 1 3 , r 1 4 , R⁸ -O-, -S-, -CO-, -CH₂-, -SO₂-, -C(CH₃)₂-, -C(CF₃)₂-, -O-CH₂-C(CH₃)₂-CH₂-O-
2가 .)

(1) R^{3가}, ()



(, T , H, F, Cl, Br, I, CH₃O-, 1 20 ,

A -C(=O)-, -SO₂-, -O-, -S-, -(CH₂)_m-,

-NHCO-, -C(CH₃)₂-, -C(CF₃)₂-,

-C(=O)O-, -O-CH₂-C(CH₃)₂-CH₂-O-

,

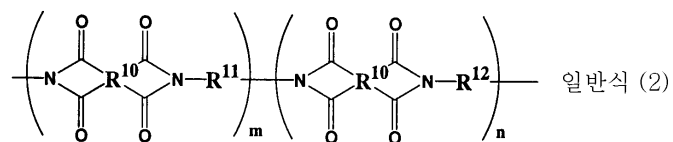
R⁹ -O-, -C(=O)O-, -O(O=)C-, -SO₂-,

-C(=O)-, -S-, -C(CH₃)₂- ,

k 0 4, t 1 4, j 1 20)

.

(2)



(, R¹⁰ 4가 , R¹¹ / 2가 , R¹² 2가 ,
m 1 , n 0 .)

- 3 , 2 , - 2 .

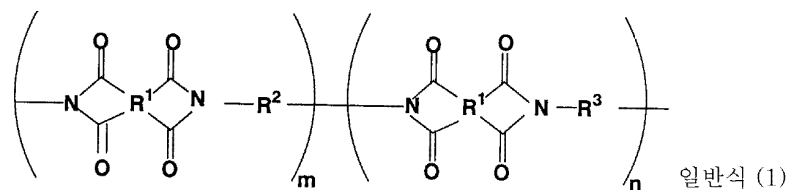
(2) Tg , 350 .

(2) , 2 , ,
가 , .

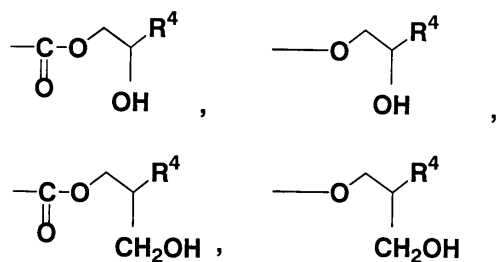
가 , 80 400 .

, 가 , 0.09 0.0001 MPa .

, (A) (1)



(, R¹ 4가 , R³ , 2가 , R² ,

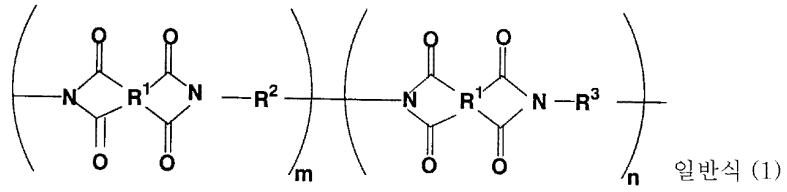
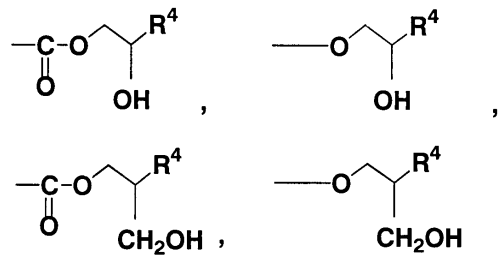


(R⁴ , , - 2 , - 3
, 1가 .) 1 4 2가 , m 1
, n 0 .)

,

(B) / .

(A) (1)

(, R¹ 4가 , R³ , 2가 , R² ,

(R⁴ , , - 2 , - 3
 , 1가 .) 1 4 2가 , m 1
 , n 0 .)

(B) /

(C) - .

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, .

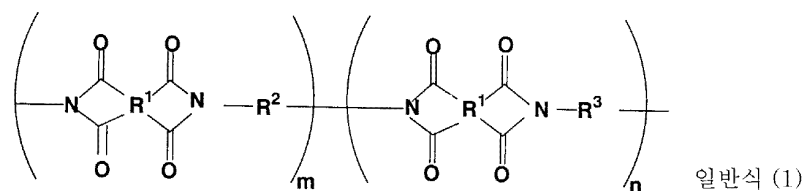
. .

, .

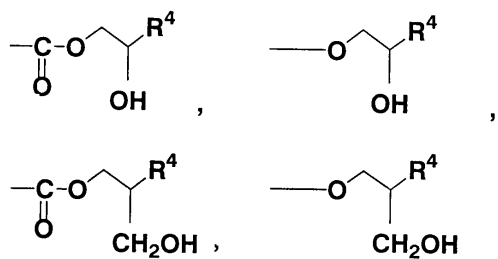
. .

가

가 가 , , , , , 가 , 가 .

$$, \quad (1)$$


(, R1 4가 , R2 , 2가 , R2 ,



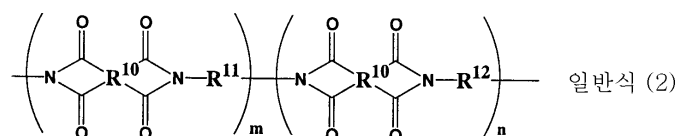
(R4 , , - 2 , - 3 1
, 1가 .) | 4 2가 , m 1
, n 0 . m/m+n="0.01 " 1 , , 0.05 1 , , 0.1 1
.)

10 % , 1 % , 5 % , 1 % , 1 %

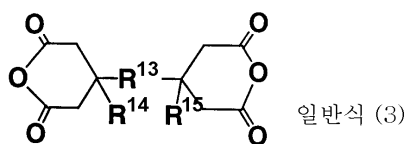
(1)

가²

(2)

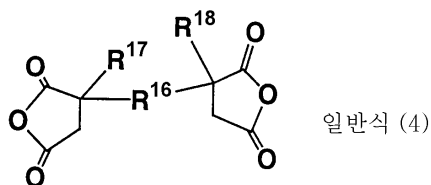

$$\left(\begin{array}{c} R^{10} \\ m-1 \end{array} , 47 \right) , R^{11} \quad / \quad \begin{array}{c} 27 \\ R^{12} \end{array} \quad \begin{array}{c} 27 \\ \text{가} \end{array} ,$$

$$\begin{aligned}
 & \quad \quad \quad 2 \quad \quad \quad , \quad 2 \\
 & \quad \quad \quad 2 \quad \quad \quad , 2,2 - \quad (4 - \quad \quad \quad) \quad \quad \quad - 3,3',4,4' - \quad \quad \quad 2 \quad \quad \quad , \\
 & \quad \quad \quad 2 \quad \quad \quad , 1,2,3,4 - \quad \quad \quad 2 \quad \quad \quad , 1,3 - \quad \quad \quad - 1,2,3,4 - \quad \quad \quad 2 \quad \quad \quad , \\
 & \quad \quad \quad , 1,2,3,4 - \quad \quad \quad 2 \quad \quad \quad , 2,3,5 - \quad \quad \quad 2 \quad \quad \quad , 3,5,6 - \quad \quad \quad \\
 & \quad \quad \quad - 2 - \quad 2 \quad \quad \quad , 2,3,4,5 - \quad \quad \quad 2 \quad \quad \quad , 5 - (2,5 - \quad \quad \quad) - \\
 & 3 - \quad \quad \quad - 3 - \quad \quad \quad - 1,2 - \quad \quad \quad 2 \quad \quad \quad , \quad \quad \quad [2,2,2] - \quad \quad \quad - 7 - \quad \quad \quad - 2,3,5,6 - \quad \quad \quad - \quad \quad \quad 2 \\
 & \quad \quad \quad 2 \quad \quad \quad ; \quad \quad \quad , 2 \quad \quad \quad , 3,3',4,4' - \quad \quad \quad \\
 & \quad \quad \quad 2 \quad \quad \quad , 3,3',4,4' - \quad \quad \quad 2 \quad \quad \quad , 1,4,5,8 - \quad \quad \quad 2 \quad \quad \quad , 2, 3,6,7 \\
 & - \quad \quad \quad 2 \quad \quad \quad , 3,3',4,4' - \quad \quad \quad 2 \quad \quad \quad , 3,3',4,4' - \quad \quad \quad 2 \quad \quad \quad , 2, 3,6,7 \\
 & \quad \quad \quad 2 \quad \quad \quad , 3,3',4,4' - \quad \quad \quad 2 \quad \quad \quad , 1,2,3,4 - \quad \quad \quad 2 \quad \quad \quad , 4,4' - \\
 & \quad \quad \quad (3,4 - \quad \quad \quad) \quad \quad \quad 2 \quad \quad \quad , 4,4' - \quad \quad \quad (3,4 - \quad \quad \quad) \quad \quad \quad 2 \quad \quad \quad , 4,4 - \\
 & (3,4 - \quad \quad \quad) \quad \quad \quad 2 \quad \quad \quad , 3,3',4,4' - \quad \quad \quad 2 \quad \quad \quad , 3,3',4,4' - \quad \quad \quad \\
 & \quad \quad \quad 2 \quad \quad \quad , \quad \quad \quad (\quad \quad \quad) \quad \quad \quad , p - \quad \quad \quad - \quad \quad \quad (\quad \quad \quad)^2 \quad \quad \quad , m - \\
 & - \quad \quad \quad (\quad \quad \quad)^2 \quad \quad \quad , \quad \quad \quad (\quad \quad \quad) - 4,4' - \quad \quad \quad 2 \quad \quad \quad , \quad \quad \quad (\quad \quad \quad) - \\
 & 4,4' - \quad \quad \quad 2 \quad \quad \quad 2 \quad \quad \quad ; 1, 3,3a,4,5,9b - \quad \quad \quad - 2,5 - \quad \quad \quad - 3 - \\
 & - \quad \quad \quad [1,2 - c] \quad \quad \quad - 1,3 - \quad \quad \quad , 1,3, 3a,4,5,9b - \quad \quad \quad - 5 - \quad \quad \quad - 5 - (\quad \quad \quad - 2,5 - \quad \quad \quad - 3 - \\
 &) - \quad \quad \quad [1,2 - c] \quad \quad \quad - 1,3 - \quad \quad \quad , 1,3,3a,4,5,9b - \quad \quad \quad - 8 - \quad \quad \quad - 5 - (\quad \quad \quad - 2,5 - \quad \quad \quad - 3 - \\
 &) - \quad \quad \quad [1,2 - c] \quad \quad \quad - 1,3 - \quad \quad \quad , \quad \quad \quad (3) \quad \quad \quad , \quad \quad \quad
 \end{aligned}$$

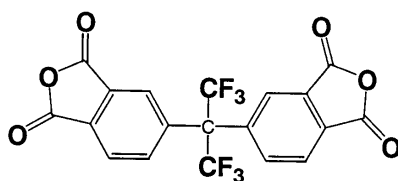


(R^{13} 27a , R^{14} R^{15} .)

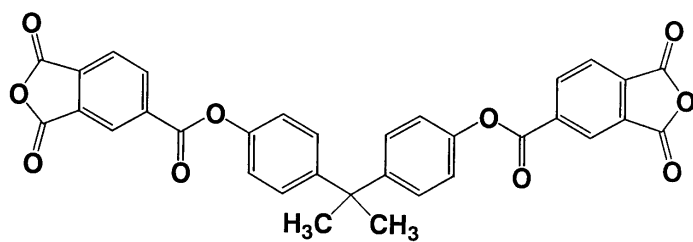
(4) $\mathcal{C}_1$ is a $\mathcal{C}_2$ -subalgebra of $\mathcal{C}_1$, and


$$(R^{16}, R^{17}, R^{18}).$$

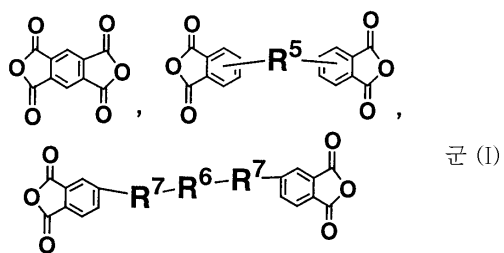
가 , 2,2' -



2,2 - (4 -) - 3,3',4,4' - 2 ;

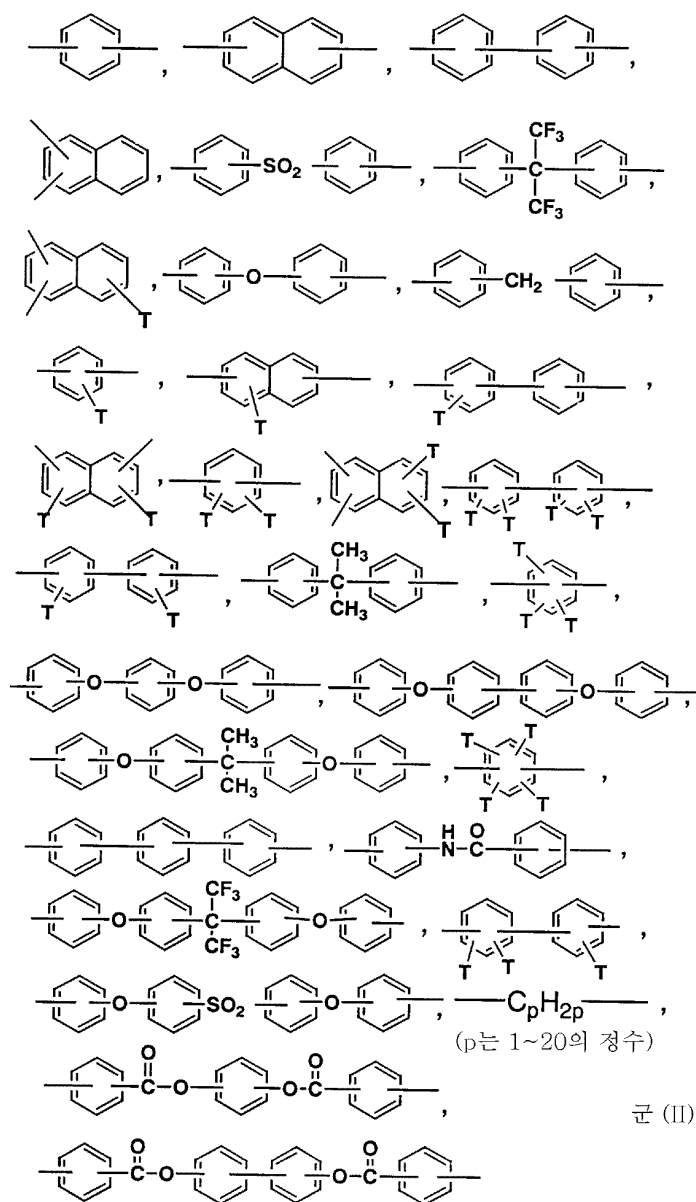


가 2 2 2 2 2 (I)



(R⁵ , -C₆H₄ -, -C(CF₃)₂ -, -CO -, -O -, , R⁶ ()
 , R⁷ -O -, -COO -, .)

2가



(T, H, F, Cl, Br, I, MeO-, 1-20)

2 2 10 %

가 , 가 ,

2,4 - , 3,3' - - 4,4' -

4,4' - - 3,3' - , 4,4' - - 2,2' - , 4, 4' - - 2,2',5,

5' - , 3,3' - - 4,4' - , 4,4' -

- 3,3' - , 4,4' - - 2,2' - , 2,2' - 「 3 - - 4 -

」 , 2,2 - [4 - - 3 -] , 2,2 - 「 3 - - 4 -]

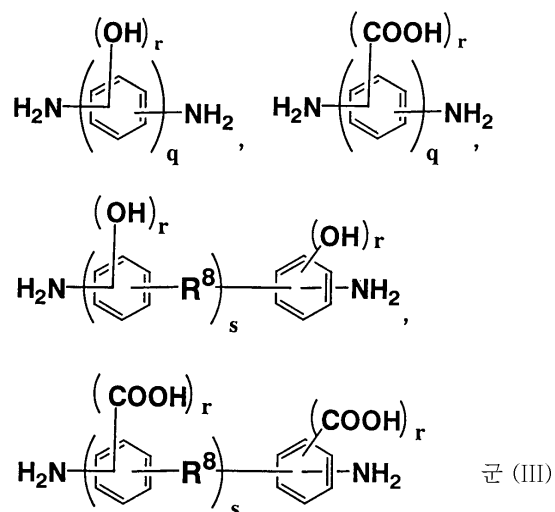
4,4' - - 2,2',5,5' - , 3,3

' - - 4,4' - , 4,4' - - 3,3' - , 4,4' - - 2,2' -

4,4' - - 2,2',5,5' -

3,3' - - 4,4' - , 4, 4' - - 3,3' - , 4,4' - - 2,2' -

(4 - , 4,4' - - 2,2',5,5' - , 2,2 - [4 -
 - 3 -)] () , 4,4' - (4 -
 - 3 -) [()] , 3,5 - , 2,2 - 「 4 - (4 - - 3 -
)] , 4,4' - , 4,4' - - 3,3' - , 4,4' - - 2,2' - , 3,3 -
 , 4,4' - - 2,2',5,5' - , 3,3' - - 4,4' -
 , 4,4' - - 3,3' - , 4,4' - - 2,2' - , 2,2' -
 「 3 - - 4 - 」 , 2,2 - [4 - - 3 -] , 2,2 - 「 3 - - 4 -
] , 4, 4' - - 2,2',5,5' -
 , 3,3' - - 4,4' - , 4,4' - - 3,3' -
 , 4,4' - - 2,2' - , 4, 4' - - 2,2',5,5' -
 , 3,3' - - 4,4' - , 4,4' - - 3,3' -
 , 4,4' - - 2,2' - , 4,4' - - 2,2',5,5' -
 , 2,2 - [4 - (4 - - 3 -)] 「 () 」
 , 4,4' - (4 - - 3 -) () , 2,2 - 「 4 -
 (4 - - 3 -)] [()] ()



(, q s 1 3 , r 1 4 , R⁸ - O -, - S -, - CO -, - CH₂ -, - SO₂ -, - C(CH₃)₂ -, -
 C(CF₃)₂ -, - O - CH₂ - C(CH₃)₂ - CH₂ - O -
 2가 .) ()

(1) R3 ,

, 4,4' - , 4,4' - , 4,4' - , 4,4' - , 4,4' - ,

[4 - (3 -)] , 1,5 - , 3,3 - - 4,4' - , 5 - - 1 - (

4' -) - 1,3,3 - , 6 - - 1 - (4' -) - 1,3,3 - , 4,4' -

, 3,5 - - 3' - , 3,5 - - 4' - , 3,4'

- , 2,7 - , 2,2 - (4 -) , 4,4' - - (2

-), 2,2',5,5' - - 4,4' - , 2,2' - - 4,4' - - 5,5' -

, 3,3' - - 4,4' - , 4,4' - - 2,2' - () , 2,2 - « 4 - (

4 -)] , 2,2 - « 4 - (4 -)] , 1,4 - (4 -

) , 4,4' - (4 -) - , 1,3' - (4 -) , 9,9 - (4 -)

, 4,4' - (p -) , 4,4, - (m -) , 2,2' - « 4 - (4 -

- 2 -)] , 4,4' - [4 - (4 - - 2 -)]

- ;²

; 1,1 - , 1,3 - ,

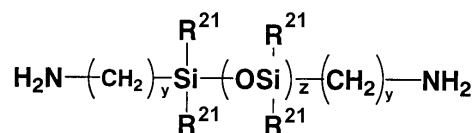
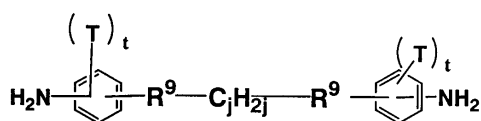
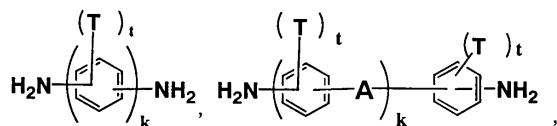
, , , 4,4 - , 1,4 -

, , - 4,7 -

, [6,2,1,0^{2.7}] - , 4,4' - ()



(R^{19} , -O-, -COO-, -OCO-, -CONH-, -CO- 2가, R^{20} , 17가.)


$$(R^{21}, \quad 1 \quad 12, \quad y \quad 1 \quad 3, \quad z \quad 1 \quad 20 \quad .)$$


군 (IV)

(, T , H, F, Cl, Br, I, CH₃O -, 1 20 ,

A - C(=O) -, - SO₂ -, - O -, - S -, - (CH₂)_m -,

-NHCO-, -C(CH₃)₂-, -C(CF₃)₂-,

$$-\text{C}(=\text{O})\text{O}-, -\text{O}-\text{CH}_2-\text{C}(\text{CH}_3)_2-\text{CH}_2-\text{O}-$$

,

$$R^9 - O -, - C(=O)O -, " - O(O=)C -, " - SO_2 -,$$
$$-\text{C}(=\text{O})-, -\text{S}-, -\text{C}(\text{CH}_3)_2-$$
$$k \quad 0 \quad 4, t \quad 1 \quad 4, j \quad 1 \quad 20 \quad)$$
$$r_{4-(3-\frac{1}{2})} = 1, \quad \dots$$

(-1 , -2) 가 -1 가
가 2 가 -2 가 ,

2 2 $(2 - 1 2 - 2)$ 가 , $2 - 1$ 가 , 2
 -2 가 , , 2 2
 2 -2 가 , -1 -2 가 , $2 - 1$ 가 ,

가 , 가 , 2

, 2 100:90 90:100
 , 100:99 99:100 , - 20 90 가
 . 30 24 .

5,000 1,000,000 . 5,000 ,

[illegible]

가
0.09 0.0001 MPa , , 0.08 0.000
1 MPa, , 0.07 0.001 MPa .

가 가 가
가 , 2 3 가
가 가
가 가

가 , 350 (Tg)가

, N,N- , N,N- , N,N-
, N,N- , N- - 2 - , N- - 2 -
가 가
가 가

, 2 - 2 - 3

2 가
828() , 180S65()
, 157S70() A , 1032H60()
, ESN375 , 1031S(), YGD414S()
, EPPN502H(), VG310IL(), NC7000(
, TETRAD - X, TETRAD - C(가)
KRM - 2110, SP - 170

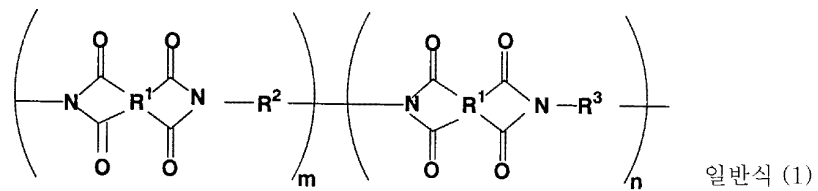
- 2 가
가

- 3 가
가

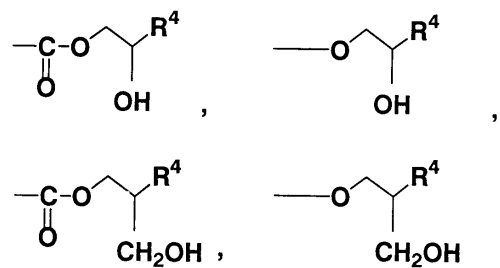
가 , 40 130 가 -
2 - 3 , - 2 . - 3
가 , 40 100 ,
50 , 90 . 8 . , , , , ,
가 , , , , , ,
 , , . , 가

가 . , 2

, 4,4' -

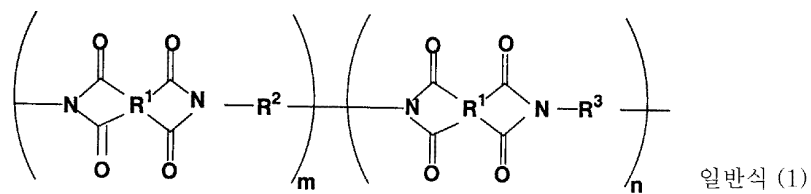
$$, (A) \quad (1)$$


(, R1 4가 , R3 , 2가 , R2 ,

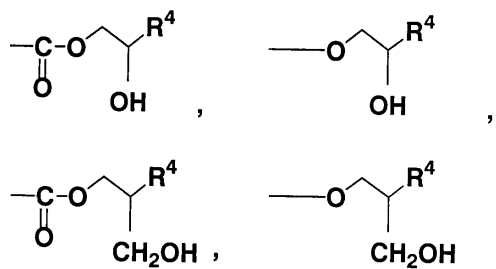


(R4 , , - 2 , - 3 1
 , 1가 .) 1 4 2가 , m 1 , n 0
 .)

$$(B) \quad \frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) e^{-x^2} dx = \frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) e^{-x^2} dx, \quad (1)$$



(, R1 4가 , R3 , 2가 , R2 ,



(R4, , - 2, - 3 1
, 1가 .) 1 4 2가 , m 1 , n 0
.)

(B) $\frac{1}{\sqrt{2}}$,

(C) - .

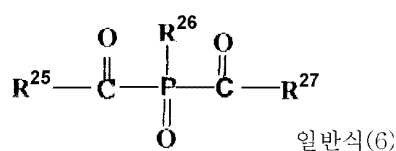
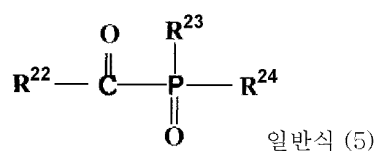
$$(B) \quad \frac{d}{dt} \left(\frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x}, \quad (A)$$

가

(B)

(5)

(6)



(R^{22} , R^{25} , R^{27} , $-C_6H_5$, $-C_6H_4(CH_3)$, $-C_6H_2(CH_3)_3$, $-C(CH_3)_3$, $-C_6H_3Cl_2$, R^{23} , R^{24} , R^{26} , $-C_6H_5$, $-C_6H_4(CH_3)$, $-C_6H_2(CH_3)_3$.)

(5) 2 가 (6) 4 a (開裂)

2 가

2 가
-1-
-1-
-2-
-2-

0.3 20 100 0.1 50
0.1 50
가 1

가 2 3
4,4'-(t-) 3,3'
4,4'- 3,5- ()-N- 4- 3
5- ()-N- 4- 3,5- ()-N- 4-
3,3'-(7-) 3,3'-[7-()],
2- 1- 4-()]-2- 1- 2,4- 2,4-
2,4- 3,5- 3,5- 3,5- 1- 2-
() 1- 5-
2- 1,2- 1- 5- 1H- 9- 10-
3- 2,6-(p-)-4- 2,6-(p-)-4-
2,6-(p-)-4- 2,6-(p-)-4-
4,6- 7- 7- 4- 7- 3-(1-
() 3-(2-)-7- 3-(2-)-7-
2-(p-) 2-(p-) 4-(p-)
2-(p-) 2-(p-) 3,3- 3H-

100 , 0.1 50 , 0.3 20
 . 0.1 50 , ,
 가 , 1 , 가
 .
 , ,
 .
 , 4 - , 4 - , 4 -
 , 4 - , 4 - , N - , N - - N -
 , N - (4 -) , 4 - , (3 -)
 3 - , (3 -) ,
 , (3 -) ,
 (3 -) , , α - , t - , t -
 , t - , t - , t -
 , t - , t -
 - t - , 2,5 - - 2,5 - () , 3,3',4,4' - - (t -)
) , 3,3',4,4' - (t -) , 3,3',4,4' - - (t -)
 , 2,6 - (p -) - 4 - , 2,6 - (p -) - 4 - , 2,6 -
 (p -) - 4 - , 2,6 - (p -) - 4 - , 3,5 - (p -)
) - 1 - 4 - , 3,5 - (p -) - 4 - , 3,5 - (p -) - N - - 4 -
 , 3,5 - (p -) - N - - 4 - , 2,6 - (p -) - 4 - , 2
 , 6 - (m -) - 4 - , 2,6 - (m -) - 4 - , 2,6 - (m -)
) - 4 - , 3,5 - (m -) - N - - 4 - , 3,5 - (m -) -
 4 - , 3,5 - (m -) - N - - 4 - , 3,5 - (m -) - N - - 4 -
 , 2,6 - (p -) - 4 - , 2,6 - (p -) - 4 -
 , 2,6 - (p -) - 4 - , 3,5 - (p -) - N - - 4 - , 4,4'
 - , 3,3' - , 3,4' - , 4,3' - , 1,3 - - 1,2,3 - - 2
 - (o -) , 1,3 - - 1,2,3 - - 2 - (o - n -) , 1,3 - - 1,2,3 -
 - 2 - (o -) , 1,3 - - 1,2,3 - - 2 - (o -) , 1,3 -
 - 1,2,3 - - (o -) , 1,3 - - 1,2,3 - - 2 - (o -) , 1,3 -
 (p -) - 1,2,3 - - 2 - (o -) , 1,3 - (p -) - 1,2,3 - - 2 -
 (o -) , 1 - (p -) - 3 - (p -) - 1,2,3 - - 2 - (o -)
) , , , .

100 , 0.1 50 0.3 20
 가 . 0.1 50 , ,
 가 , 1 , 가
 .

가 , (C) , (B) ,

(C) - , 1,6 - , ,

, 1,6

-

,

, β -

, β -

, 3 - -2 -

, β -

, 1,3 -

, 2 - 1,3 , 2,2 - [4 - ()] , 2,2 - [4 - (

)] , 2,2 - 「4 - () 」 , 2,2 - 「4 -

) 」 , 2,2 - [4 - ()] , 2 - 1 - 3 -

, 1 - -2 -

, 1,4 - , 3 - -1,5 - , 1,6 - , 1,9

- , 2,4 - -1,5 - , 1,4 - , 2,2 - 가 [4 - (

)] , 2,2 - 「4 - () 」 , 2,4 - -1,5 -

(),

, 1,3,5 - -s -

1,3,5 - , 1,3 - -2 -

, 4,4' - , 4,4' -

가 , 2 100
 , 1 200 , 3 150 가 . 1 200
 ,
가 ,
가 . , 1
가 .

가

$N, N -$

$- 2 -$

$, N -$

$- 2 -$

$, N -$

$- 2 -$

$, N, N$

$- \varepsilon -$

$\gamma -$

가

가

(流延)

PET

(16)

(14)

(12)

1

2

3

180

150

30

15

가

2

FPC

(a)(b)

(CCL)

PET

(16)

(12)

(22)

(1

8)가

CCL

(

)

2

3

180

150

2 (c)

(26)

2 (d)

1

2

0.1 50 %

0.1 30 %

N

-2-

N,N-

N,N-

N

2-

3-

1-

4-

-1-

5-

1-

6-

-1-

3-

-2,2-

-1-

2-

3-

-1-

2-

2-

-n-

N,N-

-2-

2-(2-

)

2-(2-

)

1-

-2-

1-

-2-

N-

N-

N-n-

N-t-

N-

N-

3-

-1,2-

N

-t-

2-

3-

-1-

4-

-1-

6-

-1-

1-

-2-

2-

-2,2-

-1-

1-

2-

-1-

N-(2-

)

2-

-2-

-1,3-

2-

-2-

-1,3-

3-

2-

-2-

-1,3-

, 2 - , 3 - , 2 -

, 가 , .

(良溶媒) (貧溶媒)

00 가 , 20 2

80 120 30 60 가 , 1000 8000

2000 4000 , 5 30

30W/cm

, 20 200 가

()

ESDA 2,2 - (4 -) - 3,3',4'4' - 2 ,

6FDA , 2,2' - 2 ,

BAPS - M , [4 - (3 -)] ,

DMAc , N,N - ,

DMF , N,N - .

((Tg))

DSC CELL SCC - 41() , 10 / 40

0 .

()

Waters CPC(gel permeation chromatography)

- 806 M, 2 , 60 , : RI, : 1 ml/ , : DMF(0.03 M, 0.03M), : 0.2 wt%, : 20 μ l, :

()

(DMF) PET , 100 10 , 130 10 가 , PET , 150 60 , 200 60 , 250 60 가 , 5 μ m .

DMF , PET , 100 30 가 , PET , 80 670 Pa 12 가 , 5 μ m . IR , / .

/ 100% , / 가 % 가 .

(1)

< 가 >

2000 ml BAPS - M 43.05 g(0.1) , DMF 300g , ESDA 115.3 g (0.2 0) 가 , 30 . 15.2 g(0.1) DMF 150g 가 , 30 . (Mw) , 6 , , 15 0 10 , 160 10 , 170 10 , 180 10 , 190 10 , 210 30 , 670 Pa 가 . , 160 g 가 Mw 6.5 , Tg 190 , 100% .

< >

25 g 가 33 g 2 66 g , 2.85 g(25) .

< (1 - 1) >

100 g , , 4,4' - (DDS) 0.5 g, (2,4,6 -) - (6) R²³ = " , R²³ . R²⁶ = ") 0.5 g (1.2), () 30 g, 828 3 g 가 (1 - 1) .

< >

(1 - 1) PET , 45 5 , , , 65 5 80 30 , 35 μ m .

< >

/ λ /50 μ m () , 120 , 10 N/cm
 () . , 3 , ()
 : 400 nm 10 mJ/cm²), 100 3 , 1% ()
 40) , 100 2 , 120 2 , 140 2 160 3
 , 15 N/cm , 100 μ m / 가 .
 , 50 가 NMP 10
 , 100 60 ppm/ . ,
 TMA - 120 3 mm, 10 mm, 3 g, ,
 10 / JIS - 6472 - 1955 .

< (1 - 2) >

가 33 g 66 g , 2.85 g(25)
 25 g 가 가 70 2 가 ,
 100 g 4,4' - (DDS) 0.5 g, (2,4,6 -) -
 0.5 g(1.2), () 25g, 828 3g,
 2g 가 가 (1 - 2) .

< >

280
 , 90 30 , 2 KW H - 2000L/S(
 ,) 1 , 10 cm 0.5m/ 2 ,
 160 , 260 10
 . JIS - D - 0202 100/100 . JIS - C -
 2103 , 25 , 25 $40 \times 10^{15} \Omega \cdot \text{cm}$, 24 $4 \times 10^{15} \Omega \cdot \text{cm}$, JIS - C - 2103
 , 25 3.3, 24 4.0, JIS - C - 2103 , 25 , 0.00
 35, 24 , 0.0050, JIS - C - 2103 , 25 , 260 kV/mm, 24
 , 200 kV/mm , 180 ° 10 .

(2)

< >

1 33 g 669 ,
 1.4g(12) 10 g 가 . 60 30 가 ,
 KRM - 2110 3.4 g(12) 가 , 60 60 가 ,

< (2 - 1) >

100 g DDS 0.5 g, (2,4,6 -) - 0.5g(1.2
), () 30g 가 .

< >

2 - 1 1 .

< >

1
가 . , 14 N/cm , 100 μ m
/ 가 50 가
NMP 10
00 65 ppm/ . , 1

< (2 - 2) >

1 가 33 g 66 g ,
1.4 g(12) 10 g 가 , 60 30 가 ,
KRM - 2110 3.4 g(12) 가 , 60 60 가 ,
100 g 4,4' - (DDS) 0.5
g, (2,4,6 -) - 0.5 g(1.2), () 25 g,
2 g 가 .

< >

1 . ,
260 10 . JIS - D - 0202
100/100 . JIS - C - 2103 , 25 $45 \times 10^{15} \Omega \cdot \text{cm}$, 24
 $3.3 \times 10^{15} \Omega \cdot \text{cm}$, JIS - C - 2103 , 25 3.7, 24 4.6, JIS - C - 2103
, 25 0.0039, 24 0.0060, JIS - C - 2103 , 2
5 , 270 kV/mm, 24 , 190kV/mm . 180 ° 10

(3)

< >

2 100 g KRM - 2110 3 g, 4,4' - ()
0.6 g, 1,0 g, 0.6 g, () 30 g, DDS 0.5 g 가

< >

1

< >

1 , 17 N/cm , 100
 μ m / 가 . ,
50 가 NMP 10
, 100 70 ppm/ .

(4)

< >

2000ml BAPS - M 68.88 g(0.16), DMF 300g , ESDA 115.3 g (0.2
 0) 가 , 30 , , 4,4' - - 3,3' -
 4.32 g(0.02) 가 , 30 , PCR 66M13 26g(0.02) 가 ,
 30 , (Mw) , 5.8
 , 150 10 , 160 10 , 170 10 , 180 10 , 190 10 , 210 30 , 670 Pa 가
 , 202 g 가 Mw 6.2
 , Tg 190 , 100% .

< >

1.0 g(7) 33 g 66 g , 0.5 g
 25 g 가 . 60 2 가 ,

< (4 - 1) >

1g, 0.5 g, 100 g DDS 0.5 g, 3,3' - [7 - ()] 0.3 g,
 () 30 g, 828 3 g 가

< >

1 35 μ m

< >

1 가 , 17 N/cm , 100
 μ m /
 50 가 NMP 10
 , 100 65 ppm/ .

< (4 - 2) >

가 33 g 66 g , 0.5 g
 1.0 g(7) 25 g 가 . 60 2 가
 . 100 g DDS 0.5 g, 3,3' - [7 - ()] 0.3 g,
 1 g, 0.5 g, () 25 g, 82
 8 3g, 2g 가 가 .

< >

1
260 10 , JIS - D - 0202
100/100 . JIS - C - 2103 , 25 $50 \times 10^{15} \Omega \cdot \text{cm}$, 24
 $5.3 \times 10^{15} \Omega \cdot \text{cm}$, JIS - 2103 , 25 3.0, 24 4.7, JIS - C - 2103
, 25 0.0045, 24 , 0.0055, JIS - C - 2103 , 25
, 250 kV/mm, 24 , 200 kV/mm . 180 ° 10

(5)

< >

2000 ml BAPS - M 64.6 g (0.15), DMF 400g , ESDA 115.3 g(0.2
0) 가 , 30 7.6 g(0.
05) DMF 50g 가 , 30 .
(Mw) , 6 300g ,
, 150 10 , 160 g 10 , 170 10 , 180 10 , 190 10 210 30 , 670 Pa
가 . , 85.4 g 가 가 M
w 6.5 , Tg 190 , 100% .

< >

가 33g 66 g , 828 5.3 g(
186) 25g 가 . 80 1 가 ,

< >

100 g DDS 0.5 g, 3,3',4,4' - (t -) 0.5 g,
- 4,4' - 0.5 g, () 30g 가

< >

1

< >

μm / 1 , 14 N/cm , 100
가 NMP 10 가 . 50
, 100 58 ppm/ .

(6)

< >

2
가 100 g KRM - 2110 10 g, SP - 170 lg
, 40 5 , 80 5 , 120 5 , 5 μ m
, 1% . 3 , (: 400 nm 10 mJ/cm²), 120 3
50 μ m " (30) , 170 4 가 / ="

(1)

260 10 , JIS - D - 020
2 100/100 . JIS - C - 2103 , 25 0.025 ×
10¹⁵ Ω · cm, 24 0.0001 × 10¹⁵ Ω · cm, JIS - C - 2103 , 25 5.5, 24
7.6, JIS - C - 2103 , 25 , 0.022, 24 , 0.075, JIS - C - 2103
, 25 , 150 kV/mm, 24 , 135 kV/mm
180° 10 ,

(2)

260 10 , JIS - D - 0202
100/100 . JIS - C - 2103 , 25 0.020 × 10¹⁵ Ω · cm, 24
0.0001 × 10¹⁵ Ω · cm, JIS - C - 2103 , 25 5.9, 24 8.0, JIS - C - 21
03 , 25 , 0.035, 24 0.055, JIS - C - 2103
, 25 , 150kV/mm, 24 , 130kV/mm , 180 10

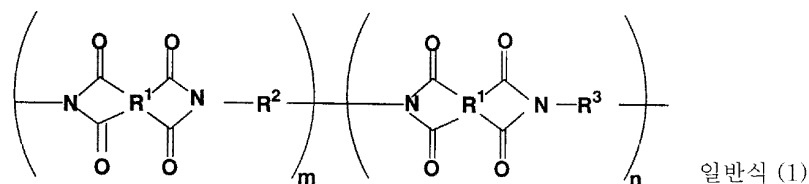
, , , 가 , , , ,

, 가 , , 가 , , 가

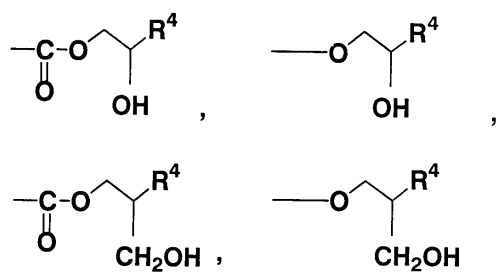
(57)

1.

(1)



(, R1 4가 , R3 2가 , R2 ,



(R⁴ , , - 2 , - 3 1 4 2가 , m 1
 , 1가 .)
 , n O .)

1 % .

2.

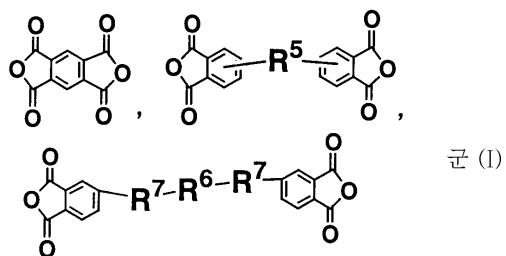
1 , (1) R¹ , 1 3 , 1 2 4가 .

3.

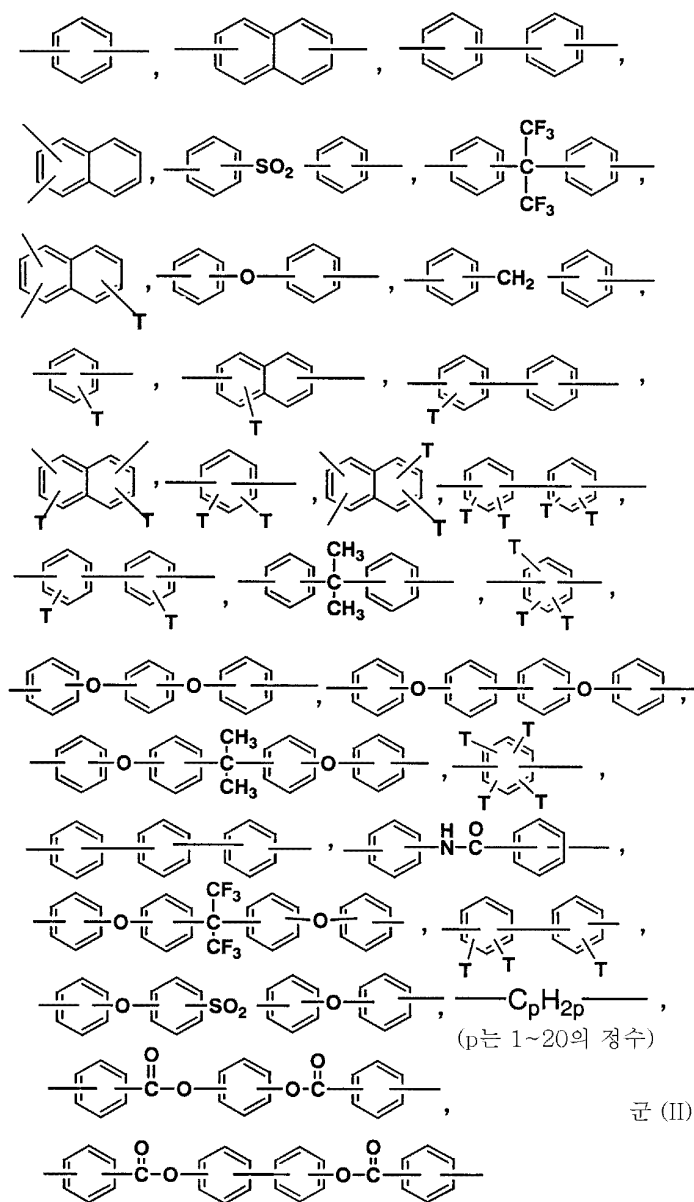
1 , (1) R³ , / .

4.

1 , (1) R¹가, ()



(R⁵ , - C₆H₄ -, - C(CF₃)₂ -, - CO -, - O -, , R₆ ()



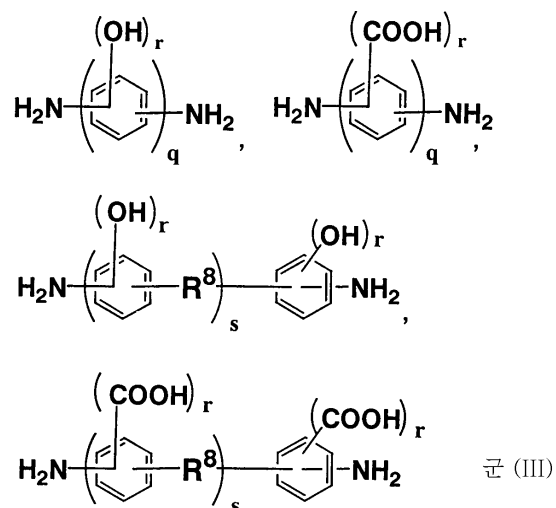
(T, H, F, Cl, Br, I, MeO -, 1 20)

2가, R⁷ - O -, - COO - .)

2 10 % 2

5.

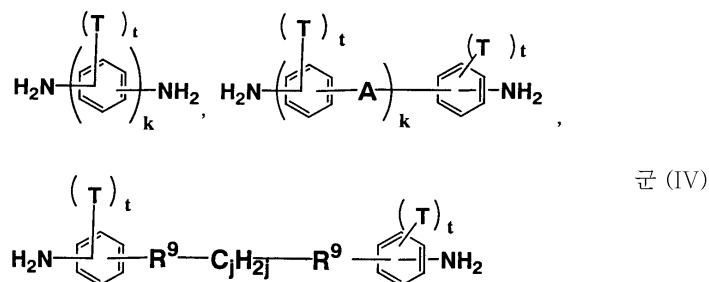
3, (1) R2가, ()



(, q s 1 3 , r 1 4 , R⁸ -O-, -S-, -CO-, -CH₂-, -SO₂-, -C(CH₃)₂-, -C(CF₃)₂-, -O-CH₂-C(CH₃)₂-CH₂-O-
2가 .)

6.

1 , (1) R³가, ()



(, T , H, F, Cl, Br, I, CH₃O-, 1 20 ,

A -C(=O)-, -SO₂-, -O-, -S-, -(CH₂)_m-,

-NHCO-, -C(CH₃)₂-, -C(CF₃)₂-,

-C(=O)O-, -O-CH₂-C(CH₃)₂-CH₂-O-

,

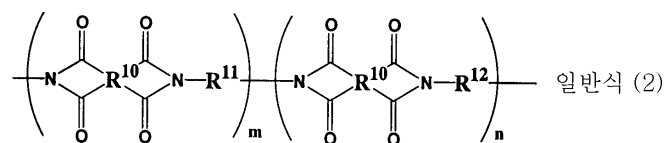
R⁹ -O-, -C(=O)O-, -O(O=)C-, -SO₂-,

-C(=O)-, -S-, -C(CH₃)₂- ,

k 0 4, t 1 4, j 1 20)

7.

(2)



(, R¹⁰ 4가 , R¹¹ / 2가 , R¹² 2가
 , m 1 , n 0 .)
 , 2
 - 3 , - 2

8.

7 , (2) Tg , 350 .

9.

7 8 , (2) , 2 ,
 , 가 ,

10.

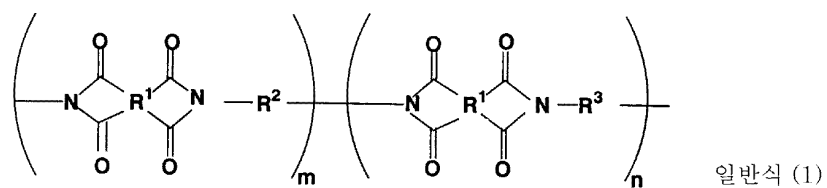
9 , 가 가, 80 400 .

11.

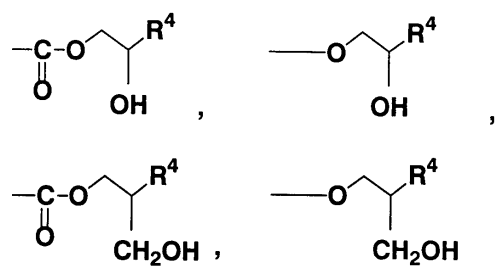
10 , 가 , 0.09 0.0001 MPa .

12.

, (A) (1)



(, R¹ 4가 , R³ , 2가 , R² ,

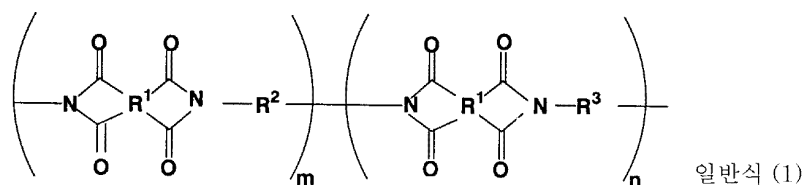


(R⁴ , , - 2 , - 3 1 4 2가 , m 1
 , 1가 .)
 , n 0 .)

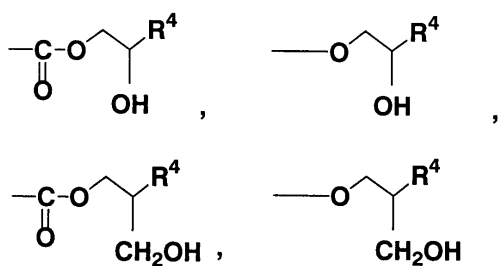
(B) / .

13.

, (A) (1)



(, R¹ 4가 , R³ , 2가 , R² ,



(R⁴ , , - 2 , - 3 1 4 2가 , m 1
 , 1가 .)
 , n 0 .)

(B) /

(C) - .

14.

12 13

15.

12 13

16.

12 13

17.

14 15

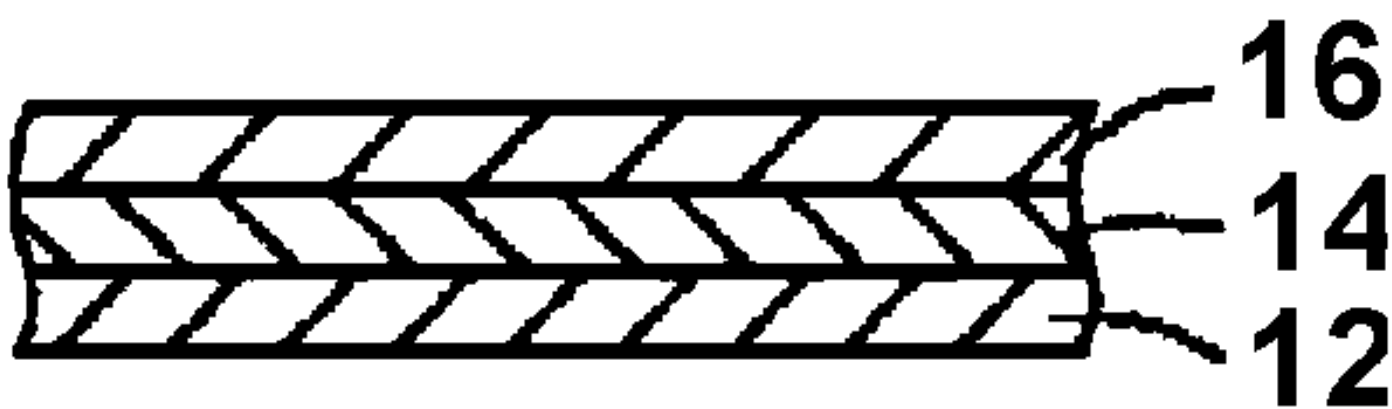
18.

12 13

19.

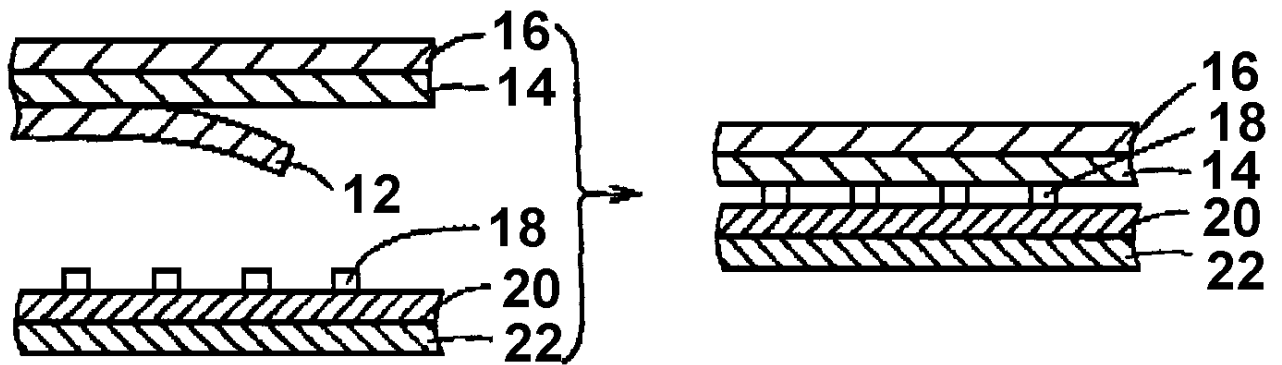
12 13

1

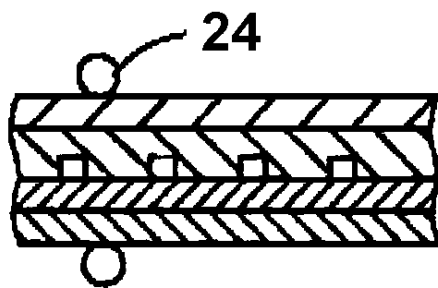


2

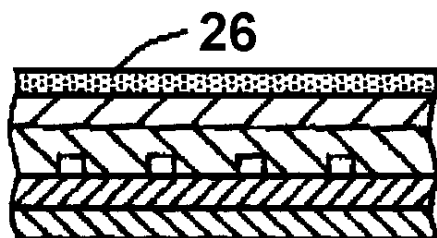
(a)



(b)



(c)



(d)

