



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : C07D 213/26, C09K 19/34 C07D 239/26, 239/34	A3	(11) International Publication Number: WO 91/09016 (43) International Publication Date: 27 June 1991 (27.06.91)									
(21) International Application Number: PCT/EP90/02071 (22) International Filing Date: 3 December 1990 (03.12.90) (30) Priority data: <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">8927779.2</td> <td style="width: 30%;">8 December 1989 (08.12.89)</td> <td style="width: 40%;">GB</td> </tr> <tr> <td>8927780.0</td> <td>8 December 1989 (08.12.89)</td> <td>GB</td> </tr> <tr> <td>P 40 02 860.7</td> <td>1 February 1990 (01.02.90)</td> <td>DE</td> </tr> </table> (71) Applicant (for all designated States except US): MERCK PATENT GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG[DE/DE]; Frankfurter Str. 250, D-6100 Darmstadt (DE). (72) Inventors; and (75) Inventors/Applicants (for US only): COATES, David [GB/GB]; 87 Sopwith Crescent, Merley, Wimborne, Dorset BH 21 3SW (GB). SMITH, Graham [GB/GB]; 10 Henbury Close, Canford Heath, Poole, Dorset BH17 8AX (GB). GREENFIELD, Simon [GB/GB]; 2 Blackbird Close, Creekmoor, Poole BH17 7YA (GB). KRAUSE, Joachim [DE/DE]; Samuel Morse-Str. 14, D-6110 Dieburg (DE). HITTICH, Reinhard [DE/DE]; Am Kirchberg 11, D-6101 Modautal (DE). POETSCH, Eike [DE/DE]; Am Buchwald 4, D-6109 Mühlthal 6 (DE). RIEGER, Bernhard [DE/DE]; Hauptstr. 31a, D-6115 Münster (DE).			8927779.2	8 December 1989 (08.12.89)	GB	8927780.0	8 December 1989 (08.12.89)	GB	P 40 02 860.7	1 February 1990 (01.02.90)	DE
8927779.2	8 December 1989 (08.12.89)	GB									
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(74) Common Representative: MERCK PATENT GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG; Frankfurter Str. 250, D-6100 Darmstadt (DE). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 22 August 1991 (22.08.91)											
(54) Title: HALOPHENYL SUBSTITUTED HETEROCYCLIC DERIVATIVES (I)											
(57) Abstract The invention relates to halophenyl substituted heterocyclic derivatives of formula (I) wherein R¹, -A¹-, -A²-, Z, L¹, Hal, m and n have the meaning given in Claim 1, and to their use as components of liquid crystalline media for electro-optical displays.											

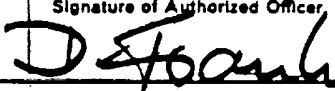
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INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 90/02071

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁵ : C 07 D 213/26, C 09 K 19/34, C 07 D 239/26, C 07 D 239/34		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC ⁵	C 07 D 213/00, C 07 D 239/00, C 09 K 19/00	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	Chemical Abstracts, vol 110, no. 24, 12 June 1989, (Columbus, Ohio, US), see page 722, abstract 223265f, & JP, A, 63280063 (DAINIPPON INK AND CHEMICALS, INC.) 17 November 1988 --	1-11
X	JP, A, 6210083 (CHISSO CORP.) 19 January 1987 see claims; page 4, table I, compounds 1,2,3 --	1,9-11
X	GB, A, 1247361 (I.C.I.) 22 September 1971 see examples 2,3 --	1
X	WO, A, 8704158 (MERCK PATENT GmbH) 16 July 1987 see claims cited in the application -- ./.	1-11
¹⁰ Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "A" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
29th January 1991		12.07.91
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		 Mme Dagmar FRANK

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, " with indication, where appropriate, of the relevant passages	Relevant to Claim No.
Y	EP, A, 0123907 (CHISSO CORP.) 7 November 1984 see page 9, table I; claims cited in the application --	1-11
Y	EP, A, 0194153 (CHISSO CORP.) 10 September 1986 see page 24, table 4; claims cited in the application --	1-11
Y	EP, A, 0240320 (CHISSO CORP.) 7 October 1987 see the whole document cited in the application -----	1-11

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE¹

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING²

This International Searching Authority found multiple inventions in this international application as follows:

- | | |
|---------------------------|------------------------------|
| 1. Claims 1-11 (partly) | 3. Claims 1-5, 9-11 (partly) |
| 2. Claims 1,9-11 (partly) | 4. Claims 1,9-11 (partly) |

For further information please see form PCT/ISA 206 dated 13-02-91.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

1-11 (partly)

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

EP 9002071

SA 42266

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 25/06/91
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP-A- 6210083	19-01-87	US-A- 4774020	27-09-88
GB-A- 1247361	22-09-71	None	
WO-A- 8704158	16-07-87	DE-A- 3600052	09-07-87
		EP-A- 0252961	20-01-88
		US-A- 4913837	03-04-90
EP-A- 0123907	07-11-84	JP-C- 1419822	14-01-88
		JP-A- 59184165	19-10-84
		JP-B- 62028136	18-06-87
		JP-C- 1419824	14-01-88
		JP-A- 59216876	06-12-84
		JP-B- 62028137	18-06-87
		JP-A- 60054371	28-03-85
		US-A- 4581155	08-04-86
EP-A- 0194153	10-09-86	JP-A- 61204168	10-09-86
		JP-A- 61233672	17-10-86
		JP-A- 61246167	01-11-86
		JP-B- 2032276	19-07-90
		JP-A- 62019568	28-01-87
		JP-A- 62148469	02-07-87
		US-A- 4684477	04-08-87
EP-A- 0240320	07-10-87	JP-A- 62234066	14-10-87
		US-A- 4772416	20-09-88