

The invention is concerned with derivatives of alkoxy-alkoxy-substituted nitrogen heterocycles, liquid crystalline
5 mixtures which contain such compounds and their use for electro-optical purposes.

Liquid crystals are used primarily as dielectrics in display devices, since the optical properties of such substances can be
10 influenced by an applied voltage. Electro-optical devices based on liquid crystals will be well-known to a person skilled in the art and can be based on various effects. Examples of such devices are cells having dynamic scattering, DAP cells (deformation of aligned phases), guest/host cells having a "twisted nematic"
15 structure, STN cells ("super twisted nematic"), SBE cells ("super birefringence effect") and OMI cells ("optical mode interference"). The most common indicating devices are based on the Schadt-Helfrich effect and have a twisted nematic structure.

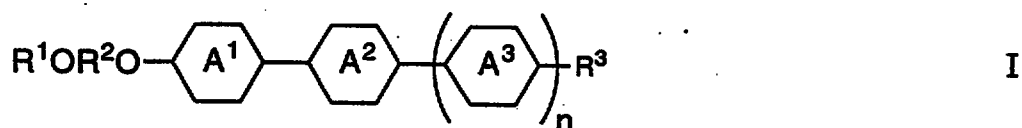
20 Electro-optical devices which use liquid crystals, such as, for example, TN, STN and TN-TFT ("twisted nematic thin film transistor) cells, have a series of disadvantages, such as, for example, long switching times or a severe contrast viewing angle dependence, which means that they are not suitable for complicated, highly informative display devices, such as, for example,
25 video-compatible projection systems for television screens. Ferroelectric electro-optical devices, such as, for example, SSF (surface stabilized ferroelectric) cells or SBF (surface bistabilized ferroelectric) cells, can indeed have very rapid switching
30 times, but it has not hitherto been possible to produce grey stages which are required for the simple production of colours; a further disadvantage of the prior art ferroelectric devices are the so-called "ghost effects", which occur as a result of static electrical charge and which can lead to distortion of the
35 displayed information. In contrast thereto, DHF (deformed helix ferroelectric) cells are distinguished by an outstanding viewing angle, rapid switching times, grey stages, a planar optics and a good contrast. Moreover, by virtue of dc-free bipolar control, DHF

cells are free from "ghost effects". For these cells to function in an optimal manner, ferroelectric mixtures having a very large operating angle and a low viscosity are required in order to produce a sufficient optical contrast with very short switching times and low voltages. Electroclinical electro-optical devices have analogous requirements.

The liquid crystal materials must have a good chemical and thermal stability and a good stability towards electric fields and electromagnetic radiation. Further, the liquid crystal materials should have a low viscosity and in the cells should give short response times and a high contrast. Furthermore, at usual operating temperatures from about -30°C to about $+80^{\circ}\text{C}$, especially from about -20°C to about $+60^{\circ}\text{C}$, they should have a suitable mesophase, for example a broad smectic mesophase for the cells referred to above. Moreover, it is important that the components have a good miscibility with one another, since liquid crystals are usually used as mixtures of several components.

The object of the invention is to provide stable liquid crystalline compounds for DHF applications having low viscosity and which bring about a large operating angle in mixtures.

The present invention is concerned with compounds of the general formula



wherein

- 30 R^1 signifies straight-chain alkyl or alkenyl with 1 to 8 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen;
- R^2 signifies straight-chain alkylene which 2

to 8 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen;
 5 R³ signifies straight-chain alkyl, alkoxy, alkanoyloxy, alkenyl, alkenyloxy or alkenoyloxy with 4 to 12 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen and in which one or more non-adjacent methylene groups can be replaced by -O-; and
 10 A¹, A² and A³ each independently signify 1,4-phenylene which is unsubstituted or mono- or multiply-substituted with halogen or pyridine-2,5-diyl or pyrimidine-2,5-diyl and A³ also signifies trans-1,4-cyclohexylene; and
 15 n is 0 or 1;

20 with the proviso that at least one of rings A¹, A² or A³ signifies pyridine-2,5-diyl or pyrimidine-2,5-diyl; and R³ represents alkenyl, alkenyloxy, alkanoyloxy or alkenoyloxy when n = 0 and A² is pyrimidine-2,5-diyl.

25 It has surprisingly been found that the compounds in accordance with the invention have extremely favourable mesophases, large operating angles and short response times for ferroelectric applications and especially in DHF cells having dc-free control.

30 In liquid crystal mixtures a significant increase of the Sc-SA, Sc-N or N-I phase transition is brought about and the melting point is lowered significantly upon admixing the compounds of general formula I in accordance with the invention, which leads to a broad smectic mesophase. Moreover, the spontaneous polar-
 35 ization is increased. The compounds in accordance with the invention often have broad smectic C mesophases with amazingly low viscosity and a very large operating angle. This means that by admixing such compounds the switching times of basic

mixtures can be lowered considerably and the spontaneous polarization and the operating angle can be increased. In spite of their nematic or smectic A phase the compounds in accordance with the invention, which contain two or three rings, have been found to be excellent components for S_C mixtures, since they do not usually lower the S_C phase transition. In this manner there result phases which can perform in an optimal manner and which are thus extraordinarily well suited for DHF applications having dc-free control.

The term "saturated alkyl or alkenyl with 1 to 8 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen" embraces in the scope of the present invention groups such as, for example, methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, fluoromethyl, difluoromethyl, trifluoromethyl, chloro-difluoromethyl, 2-fluoroethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, perfluoroethyl, perfluoropropyl, 2-propenyl, 3-butenyl, 4-pentenyl, 5-hexenyl, 6-heptenyl, 7-octenyl, (E)-but-2-enyl, 2-E-chlorovinyl, 2-E-fluorovinyl, 2-E-difluorovinyl, 2-E-dichlorovinyl and the like. Especially preferred groups have 3 to 6 carbon atoms and are unsubstituted.

The term "straight-chain alkylene with 2 to 8 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen" signifies in the scope of the present invention groups such as, for example, 1,2-ethylene, 1,3-propylene, 1,4-butylene, 1,5-pentylene, 1,6-hexylene, 1,7-heptylene, 1,8-octylene and the like. Especially preferred groups have 2 to 4 carbon atoms.

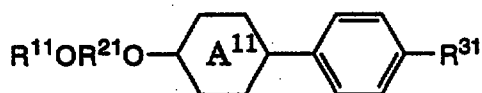
The term "saturated alkyl, alkoxy, alkanoyloxy, alkenyl, alkenyloxy or alkenoyloxy with 4 to 12 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen and in which one or more non-adjacent methylene groups can be replaced by -O-" embraces in the scope of the present invention groups which can be mono- or multiply-substituted with halogen, especially with fluorine, such as, for example, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, butyloxy, pentyloxy, hexyloxy, heptyloxy, octyloxy, nonyloxy, decyloxy,

undecyloxy, dodecyloxy, hexanoyloxy, heptanoyloxy, octanoyloxy, nonanoyloxy, decanoyloxy, undecanoyloxy, dodecanoyloxy, 3-butenyl, 4-pentenyl, 5-hexenyl, 6-heptenyl, 7-octenyl, 8-nonenyl, 9-decenyl, 10-undecenyl, 3-butenyloxy, 4-pentenyl, 5-hexenyl, 6-heptenyl, 7-octenyl, 8-nonenyl, 9-decenyl, 10-undecenyl, (E)-hex-2-enyloxy, (E)-hept-2-enyloxy, (E)-oct-2-enyloxy, (E)-non-2-enyloxy, (E)-dec-2-enyloxy, (E)-undec-2-enyloxy, (E)-dodec-2-enyloxy, (E)-hex-2-enyloxy, (E)-hept-2-enyloxy, (E)-oct-2-enyloxy, (E)-non-2-enyloxy, (E)-dec-2-enyloxy, (E)-undec-2-enyloxy, (E)-dodec-2-enyloxy, (Z)-hex-3-enyloxy, (Z)-hept-3-enyloxy, (Z)-oct-3-enyloxy, (Z)-non-3-enyloxy, (Z)-dec-3-enyloxy, (Z)-undec-3-enyloxy, (Z)-dodec-3-enyloxy, 4-[ethoxy]butyloxy, 4-[propyloxy]butyloxy, 4-[pentyloxy]butyloxy, 4-[hexyloxy]butyloxy, 4-[3-butenyloxy]butyloxy, 4-[4-pentenyl]butyloxy, 4-[5-hexenyl]butyloxy, 4-[(E)-but-2-enyloxy]butyloxy, and the like. Especially preferred groups have 2 to 8 carbon atoms and are unsubstituted.

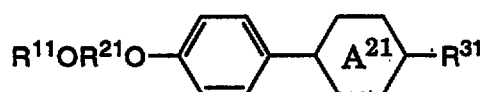
The term "1,4-phenylene which is unsubstituted or mono- or multiply-substituted with halogen" embraces in the scope of the present invention 1,4-phenylene, 2-fluoro- or 3-fluoro-1,4-phenylene, 2,3-difluoro- or 2,6-difluoro-1,4-phenylene and the like, but especially 1,4-phenylene or 2,3-difluoro-1,4-phenylene.

The term "halogen" embraces in the scope of the present invention fluorine, chlorine, bromine and iodine, but especially fluorine.

Preferred compounds of formula I are compounds of the general formulae

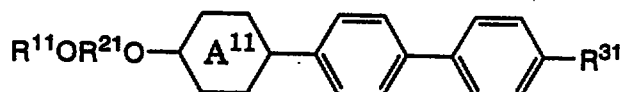


I-A

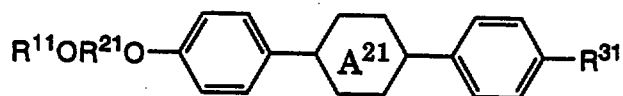


I-B

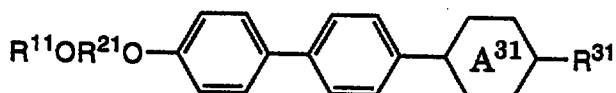
6



I-C



I-D



I-E

5 wherein

R^{11} signifies straight-chain, unsubstituted alkyl or alkenyl with 3 to 6 carbon atoms;
 R^{21} signifies straight-chain, unsubstituted alkylene with 2 to 4 carbon atoms;
 A^{11}, A^{21}, A^{31} signify pyridine-2,5-diyl or pyrimidine-2,5-diyl; and
 R^{31} signifies straight-chain, unsubstituted alkyl, alkenyl, alkoxy, alkenyloxy, alkanoyloxy or alkenoyloxy with 6 to 10 carbon atoms.

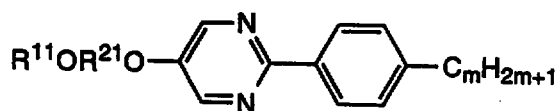
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Especially preferred are those compounds of formulae I-A, I-B, I-C and I-E in which the pyridine ring or the pyrimidine ring is linked in the 5-position with the $R^{11}OR^{21}O$ - residue or the R^{31} residue.

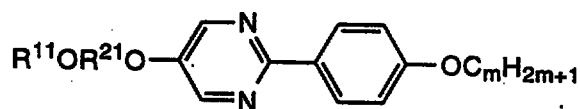
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Compounds having two rings are especially preferred, with examples of preferred compounds of formula I-A being:

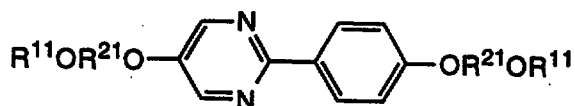
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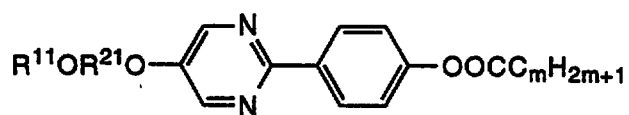
I-A-1



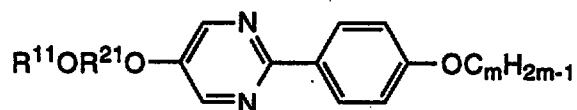
I-A-2



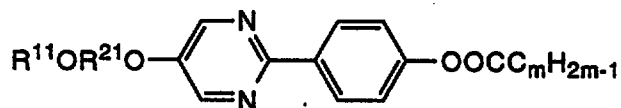
I-A-3



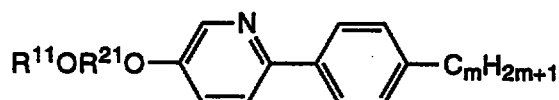
I-A-4



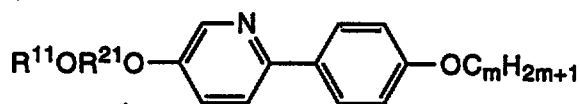
I-A-5



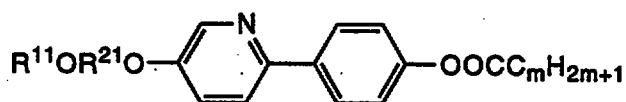
I-A-6



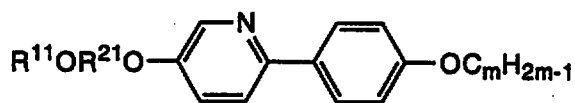
I-A-7



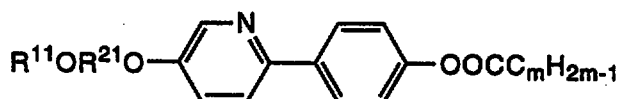
I-A-8



I-A-9

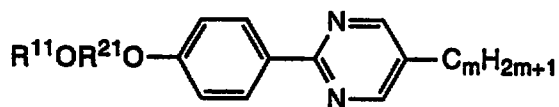


I-A-10

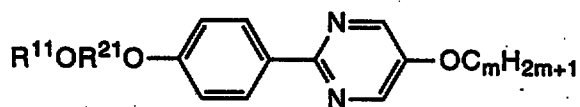


I-A-11

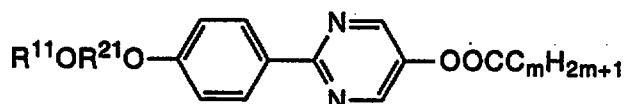
and preferred compounds of formula I-B being:



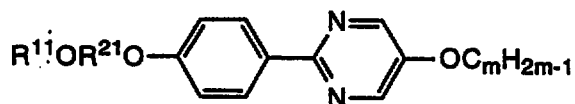
I-B-1



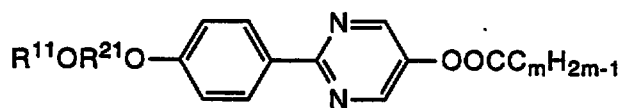
I-B-2



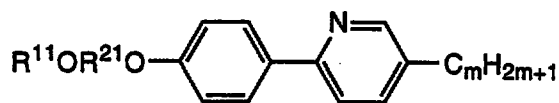
I-B-3



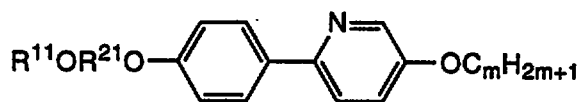
I-B-4



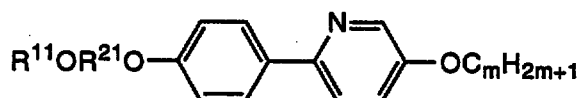
I-B-5



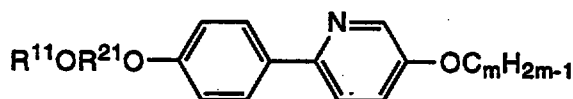
I-B-6



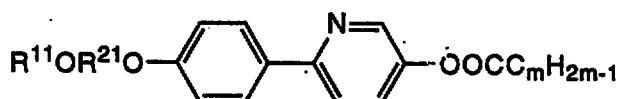
I-B-7



I-B-8



I-B-9



I-B-10

wherein m signifies a whole number of 4 to 8 and the remaining symbols have the significances set forth above.

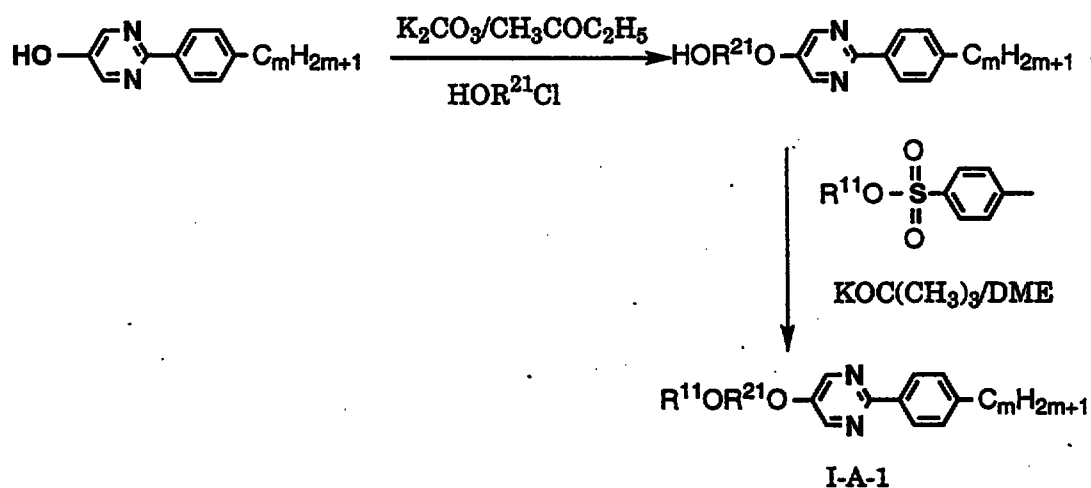
Particularly preferred compounds of formulae I, I-A to I-E, I-A-1-11 and I-B-1-10 are those in which the residues R² and, respectively, R²¹ signify 1,4-butylene.

The compounds of general formula I in accordance with the invention are readily accessible synthetically and can be produced in a manner known per se from correspondingly substituted phenols or 5-hydroxypyridines or 5-hydroxypyrimidines and an alcohol, an alkyl halide or an acid. The Mitsunobu alkylation can be carried out, for example, in the presence of diethyl azodicarboxylate in tetrahydrofuran or DMF. The Williams alkylation can be effective, for example, in the presence of a base such as potassium carbonate in ethyl methyl ketone or DMF. The esterification can be effected, for example, in the presence of N,N'-dicyclohexylcarbodiimide (DCC) and 4-(dimethylamino)pyridine (DMAP) in dichloromethane or another suitable solvent such as e.g.

chloroform. The starting materials are known and in part are commercially available, or they can be prepared as illustrated e.g. in the following Schemes 1 to 5. These reactions are all effected in a manner known per se.

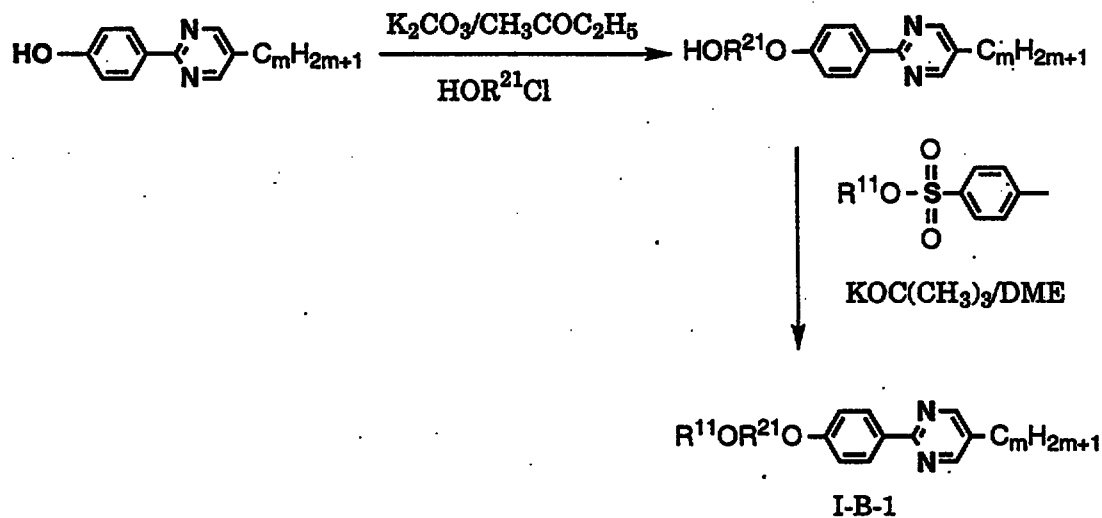
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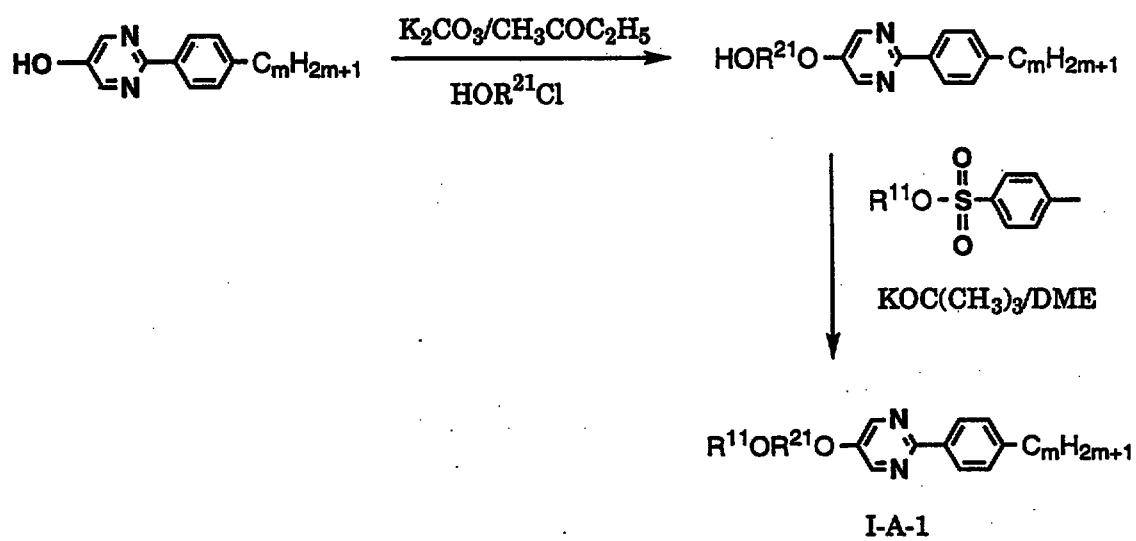
Scheme 1



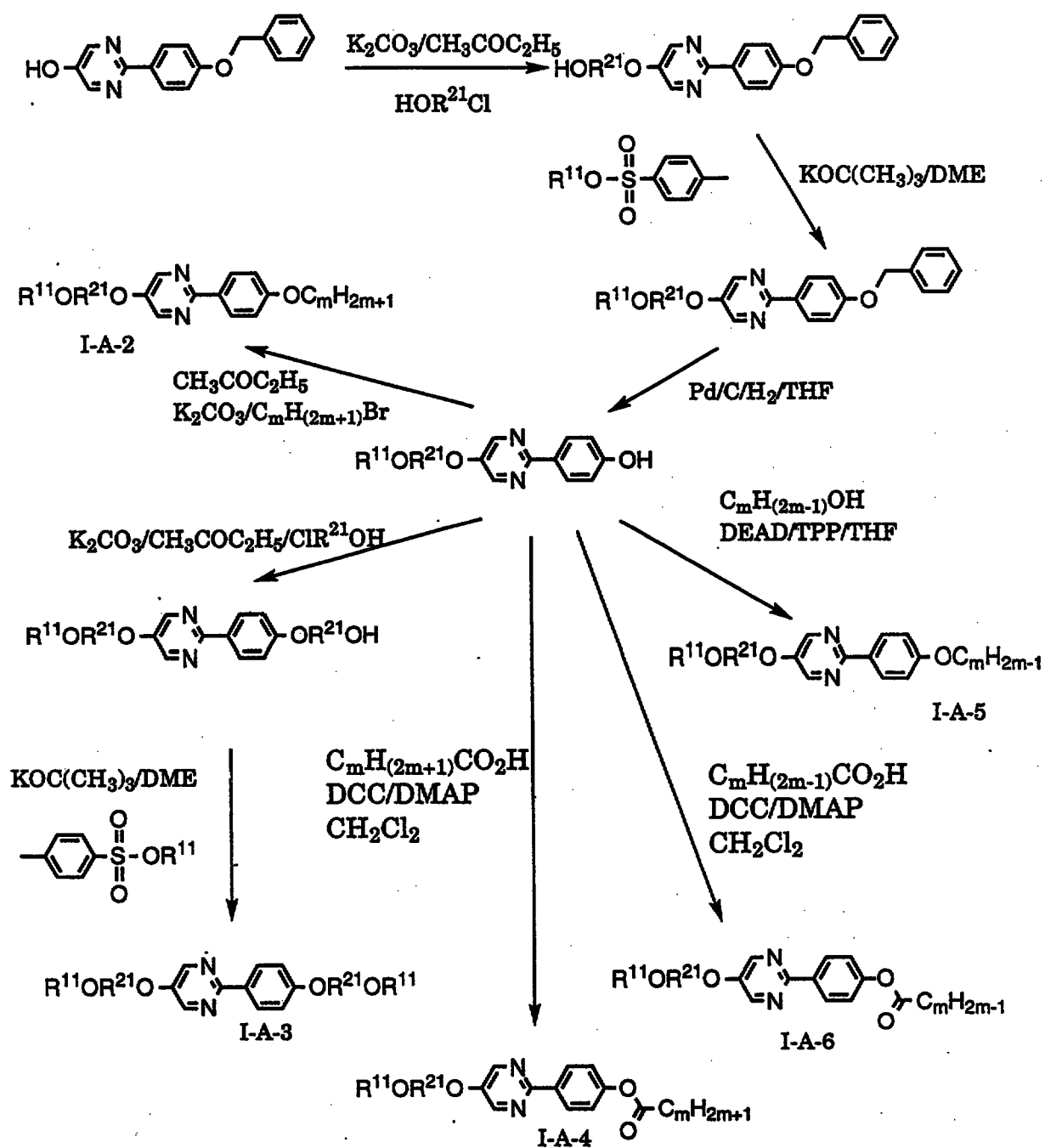
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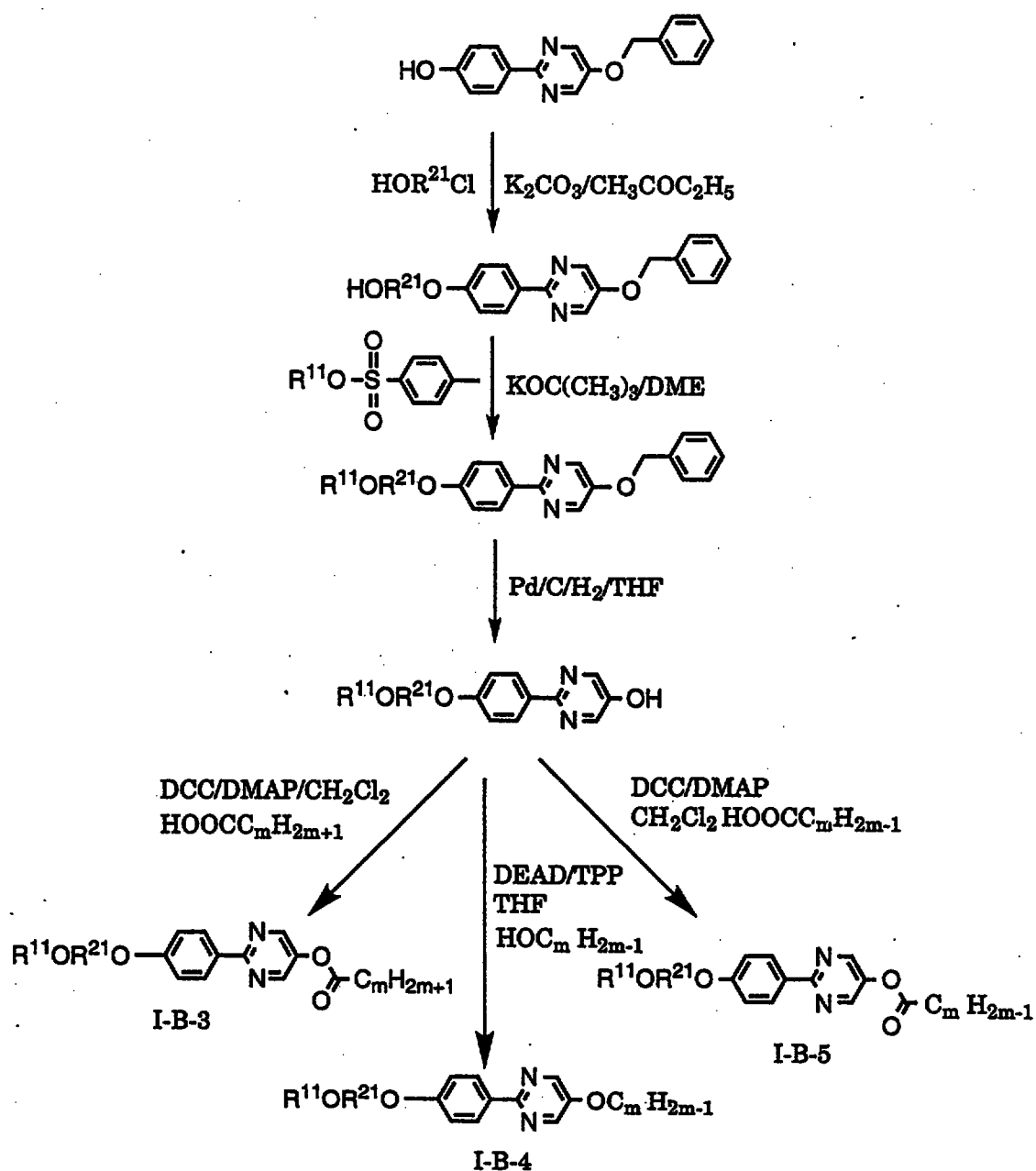
Scheme 2



Scheme 3

Scheme 4



Scheme 5

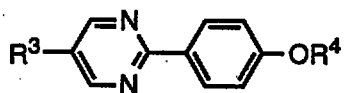
5 The symbols used in Schemes 1-5 have the significances set forth above.

10 The compounds of formula I can be used in the form of mixtures with one another and/or with other liquid crystal components.

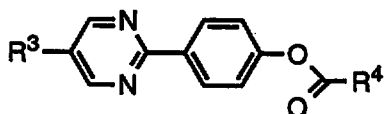
The liquid crystalline mixtures in accordance with the invention contain at least two components, of which at least one

component is a compound of formula I. A second component and any additional components can be further compounds of formula I or other known liquid crystalline compounds.

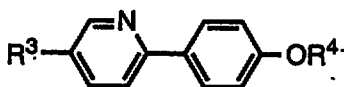
- 5 Such liquid crystal components are preferably achiral compounds of the general formulae



II

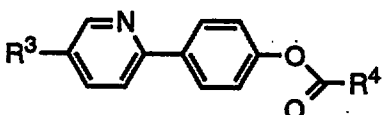


III

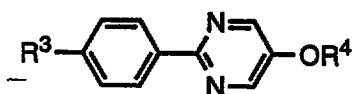


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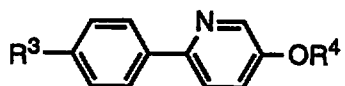
IV



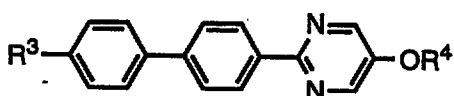
V



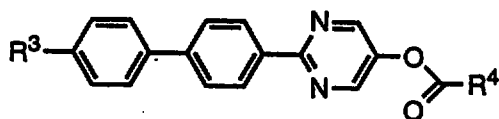
VI



VII



VIII



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IX

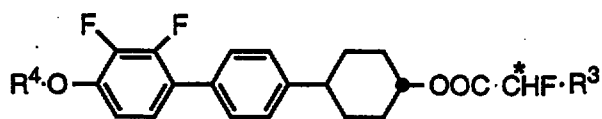
wherein

R^3 signifies alkyl or alkoxy; and
 R^4 signifies alkyl or alkenyl.

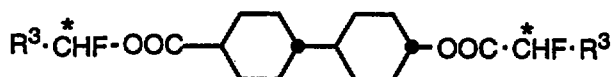
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However, in each instance at least one chiral component must be present in the mixture; i.e. a chiral dopant must, if necessary, be

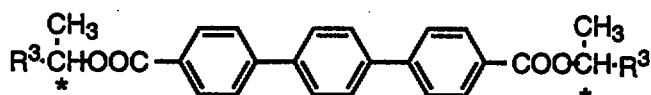
added. Especially suitable for this purpose are chiral dopants of the general formulae



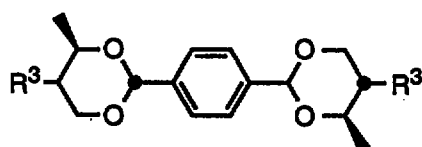
X



XI



XII



XIII

wherein R^3 and R^4 have the foregoing significances.

The term "alkyl" in connection with the compounds of formulae II to XIII embraces straight-chain or branched alkyl groups with 1 to 12 carbon atoms, preferably straight-chain alkyl groups with 6 to 12 carbon atoms such as hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl.

The term "alkoxy" embraces ether groups in which the alkyl residue is as defined hereinbefore.

The term "alkenyl" embraces in connection with the compounds of formulae II-XIII alkenyl groups with 3 to 15 carbon atoms, such as 2E-alkenyl, 3Z-alkenyl, 4E-alkenyl and alkenyl having a terminal double bond. The terms "2E-alkenyl", "3Z-alkenyl" and "4E-alkenyl" embrace preferably straight-chain alkenyl groups with 3 to 9, 4 to 9 or, respectively 5 to 9 carbon atoms in which the double bond is situated in the 2, 3 or, respectively, 4 position, with E and Z denoting the configuration of the double bond. Such groups are, for example, 2E-butenyl, 2E-pentenyl, 2E-hexenyl, 2E-heptenyl, 2E-octenyl, 2E-nonenyl,

3-butenyl, 3Z-pentenyl, 3Z-hexenyl, 3Z-heptenyl, 3Z-octenyl, 3Z-nonenyl, 4-pentenyl, 4E-hexenyl, 4E-heptenyl, 4E-octenyl, 4E-nonenyl, 5-hexenyl, 6-heptenyl, 7-octenyl, 8-nonenyl and the like.

5 Having regard to the good solubility of the compounds of formula I and having regard to their good miscibility with one another, the content of compounds of formula I in the mixtures in accordance with the invention can be relatively high and can be up to about 85 wt.%. In general, a content of about 1-50, especially
10 5-30, wt.% of compounds of formula I is preferred.

The production of the liquid crystalline mixtures and of the electro-optical devices can be effected in a manner known per se.

15 The invention is illustrated in more detail by the following Examples. In the Examples C signifies a crystalline phase, N signifies a nematic phase, Ch signifies a chiral nematic phase, S signifies a smectic phase and I signifies the isotropic phase; moreover, the following abbreviations are used:

20 DME Dimethoxyethane
TPP Triphenylphosphine.

Example 1

25 A suspension of 0.40 g of 5-(4-hydroxybutyloxy)-2-(4-nonylphenyl)pyrimidine and 0.76 g of propyl 4-toluene-sulphonate in 25 ml of 1,2-dimethoxyethane (DME) was treated with 0.36 g of potassium tert.-butoxide within 5 minutes at 0°C while gassing with nitrogen. The reaction mixture was stirred at room
30 temperature overnight, poured into 50 ml of water and then extracted three times with 50 ml of ethyl acetate each time. The organic phases were combined, washed twice with concentrated sodium chloride solution, dried over magnesium sulphate, filtered and the filtrate was concentrated. Chromatography of
35 the residue on silica gel with hexane/ethyl acetate (vol. 9:1) and recrystallization from ethyl alcohol gave 0.18 g of pure 5-(4-[propyloxy]butyloxy)-2-(4-nonylphenyl)pyrimidine; m.p. (C-Sc) 37°C, phase transition (Sc-SA) 45°C, cl.p. (SA-I) 58°C.

The 5-(4-hydroxybutyloxy)-2-(4-nonylphenyl)pyrimidine used as the starting material was prepared as follows:

- 5 a) A solution of 1.5 g of 5-hydroxy-2-(4-nonylphenyl)-pyrimidine and 2.7 g of 4-chloro-1-butanol in 25 ml of ethyl methyl ketone was treated with 2.8 g of finely powdered potassium carbonate and the mixture was heated under slight reflux overnight. The suspension was filtered and the filtrate
10 was concentrated in a vacuum. Chromatography of the residue on silica gel with hexane/ethyl acetate (vol. 1:1) and recrystallization from ethyl alcohol gave 0.7 g of 5-(4-hydroxybutyloxy)-2-(4-nonylphenyl)pyrimidine with melting point 99°C.

- 15 The following compounds can be prepared in an analogous manner:

- 20 5-(4-[Methoxy]butyloxy)-2-(4-hexylphenyl)pyrimidine;
5-(4-[ethoxy]butyloxy)-2-(4-hexylphenyl)pyrimidine;
5-(4-[propyloxy]butyloxy)-2-(4-hexylphenyl)pyrimidine;
5-(4-[butyloxy]butyloxy)-2-(4-hexylphenyl)pyrimidine;
5-(4-[pentyloxy]butyloxy)-2-(4-hexylphenyl)pyrimidine;
5-(4-[hexyloxy]butyloxy)-2-(4-hexylphenyl)pyrimidine;
5-(4-[methoxy]butyloxy)-2-(4-heptylphenyl)pyrimidine;
25 5-(4-[ethoxy]butyloxy)-2-(4-heptylphenyl)pyrimidine;
5-(4-[propyloxy]butyloxy)-2-(4-heptylphenyl)pyrimidine;
5-(4-[butyloxy]butyloxy)-2-(4-heptylphenyl)pyrimidine;
5-(4-[pentyloxy]butyloxy)-2-(4-heptylphenyl)pyrimidine;
5-(4-[hexyloxy]butyloxy)-2-(4-heptylphenyl)pyrimidine;
30 5-(4-[methoxy]butyloxy)-2-(4-octylphenyl)pyrimidine;
5-(4-[ethoxy]butyloxy)-2-(4-octylphenyl)pyrimidine;
5-(4-[propyloxy]butyloxy)-5-(4-octylphenyl)pyrimidine;
5-(4-[butyloxy]butyloxy)-2-(4-octylphenyl)pyrimidine;
5-(4-[pentyloxy]butyloxy)-2-(4-octylphenyl)pyrimidine;
35 5-(4-[hexyloxy]butyloxy)-2-(4-octylphenyl)pyrimidine;
5-(4-[methoxy]butyloxy)-2-(4-nonylphenyl)pyrimidine;
5-(4-[ethoxy]butyloxy)-2-(4-nonylphenyl)pyrimidine;
5-(4-[butyloxy]butyloxy)-2-(4-nonylphenyl)pyrimidine;

- 5-(4-[pentyloxy]butyloxy)-2-(4-nonylphenyl)pyrimidine;
 5-(4-[hexyloxy]butyloxy)-2-(4-nonylphenyl)pyrimidine;
 5-(2-[pentyloxy]ethoxy)-2-(4-nonylphenyl)pyrimidine, m.p.
 (C-I) 52°C, cl.p. (SC-I) 41°C;
- 5 5-(3-[butyloxy]propyloxy)-2-(4-nonylphenyl)pyrimidine, m.p.
 (C-SA) 22°C, cl.p. (SA-I) 32°C;
 5-(5-[ethoxy]pentyloxy)-2-(4-nonylphenyl)pyrimidine, m.p.
 (C-SA) 53°C, cl.p. (SA-I) 59°C;
 5-(6-[methoxy]hexyloxy)-2-(4-nonylphenyl)pyrimidine, m.p.
 10 (C-SA) 55°C, cl.p. (SA-I) 76°C;
- 2-(4-hexylphenyl)-5-(2-[pentyloxy]ethoxy)pyridine;
 2-(4-hexylphenyl)-5-(3-[butyloxy]propyloxy)pyridine;
 2-(4-hexylphenyl)-5-(4-[propyloxy]butoxy)pyridine;
 2-(4-hexylphenyl)-5-(5-[ethoxy]pentyloxy)pyridine;
 15 2-(4-hexylphenyl)-5-(6-[methoxy]hexyloxy)pyridine;
 2-(4-heptylphenyl)-5-(2-[pentyloxy]ethoxy)pyridine;
 2-(4-heptylphenyl)-5-(3-[butyloxy]propyloxy)pyridine;
 2-(4-heptylphenyl)-5-(4-[propyloxy]butoxy)pyridine;
 2-(4-heptylphenyl)-5-(5-[ethoxy]pentyloxy)pyridine;
 20 2-(4-heptylphenyl)-5-(6-[methoxy]hexyloxy)pyridine;
 2-(4-octylphenyl)-5-(2-[pentyloxy]ethoxy)pyridine;
 2-(4-octylphenyl)-5-(3-[butyloxy]propyloxy)pyridine;
 2-(4-octylphenyl)-5-(4-[propyloxy]butoxy)pyridine;
 2-(4-octylphenyl)-5-(5-[ethoxy]pentyloxy)pyridine;
 25 2-(4-octylphenyl)-5-(6-[methoxy]hexyloxy)pyridine;
 2-(4-nonylphenyl)-5-(2-[pentyloxy]ethoxy)pyridine;
 2-(4-nonylphenyl)-5-(3-[butyloxy]propyloxy)pyridine;
 2-(4-nonylphenyl)-5-(4-[propyloxy]butoxy)pyridine;
 2-(4-nonylphenyl)-5-(5-[ethoxy]pentyloxy)pyridine;
 30 2-(4-nonylphenyl)-5-(6-[methoxy]hexyloxy)pyridine;
 2-(4-hexylphenyl)-5-(2-[hexyloxy]ethoxy)pyridine;
 2-(4-hexylphenyl)-5-(2-[heptyloxy]ethoxy)pyridine;
 2-(4-hexylphenyl)-5-(2-[octyloxy]ethoxy)pyridine;
 2-(4-heptylphenyl)-5-(2-[hexyloxy]ethoxy)pyridine;
 35 2-(4-heptylphenyl)-5-(2-[heptyloxy]ethoxy)pyridine;
 2-(4-heptylphenyl)-5-(2-[octyloxy]ethoxy)pyridine;
 2-(4-octylphenyl)-5-(2-[hexyloxy]ethoxy)pyridine;
 2-(4-octylphenyl)-5-(2-[heptyloxy]ethoxy)pyridine;

- 2-(4-octylphenyl)-5-(2-[octyloxy]ethoxy)pyridine;
 2-(4-nonylphenyl)-5-(2-[hexyloxy]ethoxy)pyridine;
 2-(4-nonylphenyl)-5-(2-[heptyloxy]ethoxy)pyridine;
 2-(4-nonylphenyl)-5-(2-[octyloxy]ethoxy)pyridine;
 5 2-(4-hexylphenyl)-5-(4-[butyloxy]butyloxy)pyridine;
 2-(4-hexylphenyl)-5-(4-[pentyloxy]butyloxy)pyridine;
 2-(4-hexylphenyl)-5-(4-[hexyloxy]butyloxy)pyridine;
 2-(4-heptylphenyl)-5-(4-[butyloxy]butyloxy)pyridine;
 2-(4-heptylphenyl)-5-(4-[pentyloxy]butyloxy)pyridine;
 10 2-(4-heptylphenyl)-5-(4-[hexyloxy]butyloxy)pyridine;
 2-(4-octylphenyl)-5-(4-[butyloxy]butyloxy)pyridine;
 2-(4-octylphenyl)-5-(4-[pentyloxy]butyloxy)pyridine;
 2-(4-octylphenyl)-5-(4-[hexyloxy]butyloxy)pyridine;
 2-(4-nonylphenyl)-5-(4-[butyloxy]butyloxy)pyridine;
 15 2-(4-nonylphenyl)-5-(4-[pentyloxy]butyloxy)pyridine;
 2-(4-nonylphenyl)-5-(4-[hexyloxy]butyloxy)pyridine;
 5-hexyl-2-(4-[2-(pentyloxy)ethoxy]phenyl)pyridine;
 5-hexyl-2-(4-[3-(butyloxy)propyloxy]phenyl)pyridine;
 5-hexyl-2-(4-[4-(propyloxy)butoxy]phenyl)pyridine;
 20 5-hexyl-2-(4-[5-(ethoxy)pentyloxy]phenyl)pyridine;
 5-hexyl-2-(4-[6-(methoxy)hexyloxy]phenyl)pyridine;
 5-heptyl-2-(4-[2-(pentyloxy)ethoxy]phenyl)pyridine;
 5-heptyl-2-(4-[3-(butyloxy)propyloxy]phenyl)pyridine;
 5-heptyl-2-(4-[4-(propyloxy)butoxy]phenyl)pyridine;
 25 5-heptyl-2-(4-[5-(ethoxy)pentyloxy]phenyl)pyridine;
 5-heptyl-2-(4-[6-(methoxy)hexyloxy]phenyl)pyridine;
 5-octyl-2-(4-[2-(pentyloxy)ethoxy]phenyl)pyridine;
 5-octyl-2-(4-[3-(butyloxy)propyloxy]phenyl)pyridine;
 5-octyl-2-(4-[4-(propyloxy)butoxy]phenyl)pyridine, m.p.
 30 (C-S₄) 9°C, S₄-S₃ 12°C, S₃-S₂ 16°C, S₂-S_C 53°C, cl.p. (S_C-I) 60°C;
 5-octyl-2-(4-[5-(ethoxy)pentyloxy]phenyl)pyridine;
 5-octyl-2-(4-[6-(methoxy)hexyloxy]phenyl)pyridine;
 5-nonyl-2-(4-[2-(pentyloxy)ethoxy]phenyl)pyridine;
 5-nonyl-2-(4-[3-(butyloxy)propyloxy]phenyl)pyridine;
 35 5-nonyl-2-(4-[5-(ethoxy)pentyloxy]phenyl)pyridine;
 5-nonyl-2-(4-[6-(methoxy)hexyloxy]phenyl)pyridine;
 5-hexyl-2-(4-[2-(butyloxy)ethoxy]phenyl)pyridine;
 5-hexyl-2-(4-[2-(pentyloxy)ethoxy]phenyl)pyridine;

- 5-hexyl-2-(4-[2-(hexyloxy)ethoxy]phenyl)pyridine;
 5-hexyl-2-(4-[2-(heptyloxy)ethoxy]phenyl)pyridine;
 5-hexyl-2-(4-[2-(octyloxy)ethoxy]phenyl)pyridine;
 5-heptyl-2-(4-[2-(butyloxy)ethoxy]phenyl)pyridine;
 5 5-heptyl-2-(4-[2-(pentyloxy)ethoxy]phenyl)pyridine;
 5-heptyl-2-(4-[2-(hexyloxy)ethoxy]phenyl)pyridine;
 5-heptyl-2-(4-[2-(heptyloxy)ethoxy]phenyl)pyridine;
 5-heptyl-2-(4-[2-(octyloxy)ethoxy]phenyl)pyridine;
 5-octyl-2-(4-[2-(butyloxy)ethoxy]phenyl)pyridine;
 10 5-octyl-2-(4-[2-(pentyloxy)ethoxy]phenyl)pyridine;
 5-octyl-2-(4-[2-(hexyloxy)ethoxy]phenyl)pyridine;
 5-octyl-2-(4-[2-(heptyloxy)ethoxy]phenyl)pyridine;
 5-octyl-2-(4-[2-(octyloxy)ethoxy]phenyl)pyridine;
 5-nonyl-2-(4-[2-(butyloxy)ethoxy]phenyl)pyridine;
 15 5-nonyl-2-(4-[2-(pentyloxy)ethoxy]phenyl)pyridine;
 5-nonyl-2-(4-[2-(hexyloxy)ethoxy]phenyl)pyridine;
 5-nonyl-2-(4-[2-(heptyloxy)ethoxy]phenyl)pyridine;
 5-nonyl-2-(4-[2-(octyloxy)ethoxy]phenyl)pyridine;
 5-hexyl-2-(4-[4-(butyloxy)butoxy]phenyl)pyridine;
 20 5-hexyl-2-(4-[4-(pentyloxy)butoxy]phenyl)pyridine;
 5-hexyl-2-(4-[4-(hexyloxy)butoxy]phenyl)pyridine;
 5-heptyl-2-(4-[4-(butyloxy)butoxy]phenyl)pyridine;
 5-heptyl-2-(4-[4-(pentyloxy)butoxy]phenyl)pyridine;
 5-heptyl-2-(4-[4-(hexyloxy)butoxy]phenyl)pyridine;
 25 5-octyl-2-(4-[4-(butyloxy)butoxy]phenyl)pyridine;
 5-octyl-2-(4-[4-(pentyloxy)butoxy]phenyl)pyridine;
 5-octyl-2-(4-[4-(hexyloxy)butoxy]phenyl)pyridine;
 5-nonyl-2-(4-[4-(butyloxy)butoxy]phenyl)pyridine;
 5-nonyl-2-(4-[4-(pentyloxy)butoxy]phenyl)pyridine;
 30 5-nonyl-2-(4-[4-(hexyloxy)butoxy]phenyl)pyridine;
 5-(4-[methoxy]butyloxy)-2-(4-pentyl-4'-biphenyl)-
 pyrimidine;
 5-(4-[ethoxy]butyloxy)-2-(4-pentyl-4'-biphenyl)pyrimidine;
 5-(4-[propoxy]butyloxy)-2-(4-pentyl-4'-biphenyl)pyrimidine;
 35 5-(4-[butyloxy]butyloxy)-2-(4-pentyl-4'-biphenyl)-
 pyrimidine;
 5-pentyl-2-(4-(4-[methoxy]butyloxy)-4'-biphenyl)-
 pyrimidine;

- 5-pentyl-2-(4-(4-[ethoxy]butyloxy)-4'-biphenyl)pyrimidine;
 5-pentyl-2-(4-(4-[propyloxy]butyloxy)-4'-biphenyl)-
 pyrimidine;
 5-pentyl-2-(4-(4-[butyloxy]butyloxy)-4'-biphenyl)-
 5 pyrimidine;
 5-(4-pentylphenyl)-2-(4-[4-(methoxy)butyloxy]phenyl)-
 pyrimidine;
 5-(4-pentylphenyl)-2-(4-[4-(ethoxy)butyloxy]phenyl)-
 pyrimidine;
 10 5-(4-pentylphenyl)-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 pyrimidine;
 5-(4-pentylphenyl)-2-(4-[4-(butyloxy)butyloxy]phenyl)-
 pyrimidine;
 2-(4-pentylphenyl)-5-(4-[4-(methoxy)butyloxy]phenyl)-
 15 pyrimidine;
 2-(4-pentylphenyl)-5-(4-[4-(ethoxy)butyloxy]phenyl)-
 pyrimidine;
 2-(4-pentylphenyl)-5-(4-[4-(propyloxy)butyloxy]phenyl)-
 pyrimidine;
 20 2-(4-pentylphenyl)-5-(4-[4-(butyloxy)butyloxy]phenyl)-
 pyrimidine;
 5-(4-pentylphenyl)-2-(4-[4-(butyloxy)butyloxy]phenyl)-
 pyridine;
 2-(4-pentylphenyl)-5-(4-[4-(butyloxy)butyloxy]phenyl)-
 25 pyridine;
 5-pentyl-2-(4-(4-[butyloxy]butyloxy)-4'-biphenyl)pyridine;
 5-(4-[butyloxy]butyloxy)-2-(4-pentyl-4'-biphenyl)pyridine.

Example 2

30

A solution of 0.2 g of 4-(5-[4-(propyloxy)butyloxy]-
 pyrimidin-2-yl)phenol and 0.15 g of 1-bromooctane in 25 ml of
 ethyl methyl ketone was treated with 0.4 g of finely powdered
 potassium carbonate and the mixture was heated under slight
 35 reflux overnight. The suspension was filtered and the filtrate
 was concentrated in a vacuum. Chromatography of the residue on
 silica gel with hexane/ethyl acetate (vol. 9:1) gives 0.14 g of 2-

(4-octyloxyphenyl)-5-(4-[propyloxy]butyloxy)pyrimidine; m.p. (C-N) 76°C, phase transition (S_C-N) 70°C, cl.p. (N-I) 77°C.

The 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenol used
5 as the starting material was prepared as follows:

a) A solution of 5.0 g of 5-hydroxy-2-(4-benzyloxyphenyl)-
pyrimidine and 2.3 g of 4-chloro-1-butanol in 100 ml of ethyl
methyl ketone was treated with 9.9 g of finely powdered
10 potassium carbonate and the mixture was heated under slight
reflux overnight. The suspension was filtered and the filtrate
was concentrated in a vacuum. Chromatography of the residue on
silica gel with hexane/ethyl acetate (vol. 1:1) gave 1.6 g of 2-(4-
benzyloxyphenyl)-5-(4-hydroxybutyloxy)pyrimidine with m.p.
15 114°C.

b) A suspension of 1.2 g of 2-(4-benzyloxyphenyl)-5-(4-
hydroxybutyloxy)pyrimidine and 2.4 g of propyl 4-toluene-
sulphonate in 25 ml of 1,2-dimethoxyethane was treated with
20 1.2 g of potassium tert.-butylate within 5 minutes at 0°C while
gassing with nitrogen. The reaction mixture was stirred at room
temperature overnight, poured into 50 ml of water and then
extracted three times with 50 ml of ethyl acetate each time.
The organic phases were combined, washed twice with concen-
25 trated sodium chloride solution, dried over magnesium sulphate,
filtered and the filtrate was concentrated. Chromatography of
the residue on silica gel with hexane/ethyl acetate (vol. 1:1) and
recrystallization from ethyl acetate gave 0.8 g of pure 2-(4-
benzyloxyphenyl)-5-(4-[propyloxy]butyloxy)pyrimidine with m.p.
30 115°C.

c) A mixture of 0.8 g of 2-(4-benzyloxyphenyl)-5-(4-propyl-
oxybutyloxy)pyrimidine, 2 drops of acetic acid and 50 ml of ethyl
acetate was treated with 0.3 g of palladium on active charcoal
35 (10%) and hydrogenated at normal pressure and room temperature
until the hydrogen uptake came to a standstill. The inorganic
material was filtered off over Celite and the filtrate was
concentrated. Recrystallization of the crude product from hexane

gave 0.6 g of pure 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)-phenol with m.p. 103°C.

The following compounds can be prepared in an analogous
5 manner:

- 2-(4-[Hexyloxy]phenyl)-5-(4-propyloxybutyloxy)pyrimidine;
2-(4-[heptyloxy]phenyl)-5-(4-propyloxybutyloxy)pyrimidine;
2-(4-[nonyloxy]phenyl)-5-(4-propyloxybutyloxy)pyrimidine,
10 m.p. (C-Sc) 67°C, Sc-N 70°C, cl.p. (N-I) 77°C;
2-(4-[decyloxy]phenyl)-5-(4-[propyloxy]butyloxy)pyrimidine,
m.p. (C-N) 72°C, Sc-N, 71°C, cl.p. (N-I) 78°C;
2-(4-[undecyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-
pyrimidine, m.p. (C-Sc) 64°C, Sc-N, 72°C, cl.p. (N-I) 76°C;
15 2-(4-[dodecyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-
pyrimidine, m.p. (C-Sc) 70°C, Sc-N, 72°C, cl.p. (N-I) 77°C;
2-(4-[hexyloxy]phenyl)-5-(4-[butyloxy]butyloxy)pyrimidine;
2-(4-[heptyloxy]phenyl)-5-(4-[butyloxy]butyloxy)pyrimidine;
2-(4-[nonyloxy]phenyl)-5-(4-[butyloxy]butyloxy)pyrimidine;
20 2-(4-[decyloxy]phenyl)-5-(4-[butyloxy]butyloxy)pyrimidine;
2-(4-[undecyloxy]phenyl)-5-(4-[butyloxy]butyloxy)-
pyrimidine;
2-(4-[dodecyloxy]phenyl)-5-(4-[butyloxy]butyloxy)-
pyrimidine;
25 2-(4-[hexyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)pyrimidine;
2-(4-[heptyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)-
pyrimidine;
2-(4-[nonyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)pyrimidine;
2-(4-[decyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)pyrimidine;
30 2-(4-[undecyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)-
pyrimidine;
2-(4-[dodecyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)-
pyrimidine;
2-(4-[hexyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)pyrimidine;
35 2-(4-[heptyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)pyrimidine;
2-(4-[nonyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)pyrimidine;
2-(4-[decyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)pyrimidine;
2-(4-[undecyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)-

pyrimidine;

2-(4-[dodecyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)-

pyrimidine;

- 2-(4-[hexyloxy]phenyl)-5-(2-[pentyloxy]ethoxy)pyrimidine;
- 5 2-(4-[heptyloxy]phenyl)-5-(2-[pentyloxy]ethoxy)pyrimidine;
- 2-(4-[octyloxy]phenyl)-5-(2-[pentyloxy]ethoxy)pyrimidine;
- 2-(4-[nonyloxy]phenyl)-5-(2-[pentyloxy]ethoxy)pyrimidine;
- 2-(4-[decyloxy]phenyl)-5-(2-[pentyloxy]ethoxy)pyrimidine;
- 2-(4-[undecyloxy]phenyl)-5-(2-[pentyloxy]ethoxy)pyrimidine;
- 10 2-(4-[dodecyloxy]phenyl)-5-(2-[pentyloxy]ethoxy)pyrimidine;
- 2-(4-[hexyloxy]phenyl)-5-(2-[hexyloxy]ethoxy)pyrimidine;
- 2-(4-[heptyloxy]phenyl)-5-(2-[hexyloxy]ethoxy)pyrimidine;
- 2-(4-[octyloxy]phenyl)-5-(2-[hexyloxy]ethoxy)pyrimidine;
- 2-(4-[nonyloxy]phenyl)-5-(2-[hexyloxy]ethoxy)pyrimidine;
- 15 2-(4-[decyloxy]phenyl)-5-(2-[hexyloxy]ethoxy)pyrimidine;
- 2-(4-[undecyloxy]phenyl)-5-(2-[hexyloxy]ethoxy)pyrimidine;
- 2-(4-[dodecyloxy]phenyl)-5-(2-[hexyloxy]ethoxy)pyrimidine;
- 2-(4-[hexyloxy]phenyl)-5-(2-[heptyloxy]ethoxy)pyrimidine;
- 2-(4-[heptyloxy]phenyl)-5-(2-[heptyloxy]ethoxy)pyrimidine;
- 20 2-(4-[octyloxy]phenyl)-5-(2-[heptyloxy]ethoxy)pyrimidine;
- 2-(4-[nonyloxy]phenyl)-5-(2-[heptyloxy]ethoxy)pyrimidine;
- 2-(4-[decyloxy]phenyl)-5-(2-[heptyloxy]ethoxy)pyrimidine;
- 2-(4-[undecyloxy]phenyl)-5-(2-[heptyloxy]ethoxy)pyrimidine;
- 2-(4-[dodecyloxy]phenyl)-5-(2-[heptyloxy]ethoxy)pyrimidine;
- 25 2-(4-[hexyloxy]phenyl)-5-(6-[methoxy]hexyloxy)pyrimidine;
- 2-(4-[heptyloxy]phenyl)-5-(6-[methoxy]hexyloxy)pyrimidine;
- 2-(4-[octyloxy]phenyl)-5-(6-[methoxy]hexyloxy)pyrimidine;
- 2-(4-[nonyloxy]phenyl)-5-(6-[methoxy]hexyloxy)pyrimidine;
- 2-(4-[decyloxy]phenyl)-5-(6-[methoxy]hexyloxy)pyrimidine;
- 30 2-(4-[undecyloxy]phenyl)-5-(6-[methoxy]hexyloxy)-

pyrimidine;

2-(4-[dodecyloxy]phenyl)-5-(6-[methoxy]hexyloxy)-

pyrimidine;

- 2-(4-[hexyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)pyrimidine;
- 35 2-(4-[heptyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)pyrimidine;
- 2-(4-[octyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)pyrimidine;
- 2-(4-[nonyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)pyrimidine;
- 2-(4-[decyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)pyrimidine;

- 2-(4-[undecyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)pyrimidine;
 2-(4-[dodecyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)pyrimidine;
 2-(4-[hexyloxy]phenyl)-5-(6-[propyloxy]hexyloxy)pyrimidine;
 2-(4-[heptyloxy]phenyl)-5-(6-[propyloxy]hexyloxy)-
 5 pyrimidine;
 2-(4-[octyloxy]phenyl)-5-(6-[propyloxy]hexyloxy)pyrimidine;
 2-(4-[nonyloxy]phenyl)-5-(6-[propyloxy]hexyloxy)pyrimidine;
 2-(4-[decyloxy]phenyl)-5-(6-[propyloxy]hexyloxy)pyrimidine;
 2-(4-[undecyloxy]phenyl)-5-(6-[propyloxy]hexyloxy)-
 10 pyrimidine;
 2-(4-[dodecyloxy]phenyl)-5-(6-[propyloxy]hexyloxy)-
 pyrimidine;
 2-(4-[hexyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)pyrimidine;
 2-(4-[heptyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)pyrimidine;
 15 2-(4-[octyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)pyrimidine;
 2-(4-[nonyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)pyrimidine;
 2-(4-[decyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)pyrimidine;
 2-(4-[undecyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)-
 pyrimidine;
 20 2-(4-[dodecyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)-
 pyrimidine.

Example 3

- 25 A suspension of 0.1 g of 2-(4-[4-hydroxybutyloxy]phenyl)-
 5-(4-[propyloxy]butyloxy)pyrimidine and 0.19 g of propyl 4-
 toluene-sulphonate in 25 ml of 1,2-dimethoxyethane was treated
 with 0.09 g of potassium tert.-butylate within 5 minutes at 0°C
 while gassing with nitrogen. The reaction mixture was stirred at
 30 room temperature overnight, poured into 50 ml of water and then
 extracted three times with 50 ml of ethyl acetate each time.
 The organic phases were combined, washed twice with concen-
 trated sodium chloride solution, dried over magnesium sulphate,
 filtered and the filtrate was concentrated. Chromatography of
 35 the residue on silica gel with hexane/ethyl acetate (vol. 9:1) and
 recrystallization from ethyl alcohol gave 0.04 g of pure 2-(4-
 [(propyloxy)butyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-
 pyrimidine; m.p. (C-I) 82°C.

The 2-(4-[4-hydroxybutyloxy]phenyl)-5-(4-[propyloxy]-butyloxy)pyrimidine used as the starting material was prepared as follows:

5

a) A solution of 0.2 g of 4-(5-[4-(propyloxy)butyloxy]-pyrimidin-2-yl)phenol and 0.36 g of 4-chloro-1-butanol in 25 ml of ethyl methyl ketone was treated with 0.37 g of finely powdered potassium carbonate and the mixture was heated under slight
10 reflux overnight. The suspension was filtered and the filtrate was concentrated in a vacuum. Chromatography of the residue on silica gel with hexane/ethyl acetate (vol. 1:1) and recrystallization from ethyl alcohol gave 0.1 g of 2-(4-[4-hydroxybutyloxy]phenyl)-5-(4-[propyloxy]butyloxy)pyrimidine.

15

The following compounds can be prepared in an analogous manner:

20 2-(4-[(Pentyloxy)butyloxy]phenyl)-5-(4-[propyloxy]butyloxy)pyrimidine;

2-(4-[(heptyloxy)butyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine;

2-(4-[(nonyloxy)butyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine;

25 2-(4-[(propyloxy)butyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)-pyrimidine;

2-(4-[(propyloxy)butyloxy]phenyl)-5-(4-[heptyloxy]butyloxy)-pyrimidine;

30 2-(4-[(propyloxy)butyloxy]phenyl)-5-(4-[nonyloxy]butyloxy)-pyrimidine;

2-(6-[(methoxy)hexyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine;

2-(6-[(ethoxy)hexyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine;

35 2-(6-[(propyloxy)hexyloxy]phenyl)-5-(4-[propyloxy]butyloxy)pyrimidine;

2-(6-[(butyloxy)hexyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine;

2-(4-[(propyloxy)butyloxy]phenyl)-5-(6-[methoxy]hexyloxy)-pyrimidine;

2-(4-[(propyloxy)butyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)-pyrimidine;

5 2-(4-[(propyloxy)butyloxy]phenyl)-5-(6-[propyloxy]-hexyloxy)pyrimidine;

2-(4-[(propyloxy)butyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)-pyrimidine;

10 2-(2-[(propyloxy)ethoxy]phenyl)-5-(2-[propyloxy]ethoxy)-pyrimidine;

2-(2-[(butyloxy)ethoxy]phenyl)-5-(2-[butyloxy]ethoxy)-pyrimidine;

2-(2-[(pentyloxy)ethoxy]phenyl)-5-(2-[pentyloxy]ethoxy)-pyrimidine;

15 2-(2-[(hexyloxy)ethoxy]phenyl)-5-(2-[hexyloxy]ethoxy)-pyrimidine;

2-(2-[(heptyloxy)ethoxy]phenyl)-5-(2-[heptyloxy]ethoxy)-pyrimidine;

20 2-(2-[(octyloxy)ethoxy]phenyl)-5-(2-[octyloxy]ethoxy)-pyrimidine;

2-(6-[(methoxy)hexyloxy]phenyl)-5-(6-[methoxy]hexyloxy)-pyrimidine;

2-(6-[(ethoxy)hexyloxy]phenyl)-5-(6-[ethoxy]hexyloxy)-pyrimidine;

25 2-(6-[(propyloxy)hexyloxy]phenyl)-5-(6-[propyloxy]-hexyloxy)pyrimidine;

2-(6-[(butyloxy)hexyloxy]phenyl)-5-(6-[butyloxy]hexyloxy)-pyrimidine.

30

Example 4

0.16 g of N,N'-dicyclohexylcarbodiimide was added within 5 minutes while stirring to a solution of 0.2 g of 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenol, 0.1 g of octanoic acid and 0.05 g of 4-(dimethylamino)pyridine in 25 ml of dichloromethane. The reaction mixture was stirred overnight, filtered and then concentrated. Chromatography of the residue of silica gel with hexane/ethyl acetate (vol. 9:1) and recrystallization

from ethyl alcohol of the fractions which were pure according to thin-layer chromatography gave 0.08 g of 4-(5-[4-(propyloxy)-butyloxy]pyrimidin-2-yl)phenyl octanoate; m.p. (C-N) 62°C, phase transition (S_C-N) 61°C, cl.p. (N-I) 63°C.

5

The following compounds can be prepared in an analogous manner:

- 4-(5-[4-(Propyloxy)butyloxy]pyrimidin-2-yl)phenyl
 10 hexanoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl
 heptanoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl
 nonanoate;
 15 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl
 decanoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl
 undecanoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl
 20 dodecanoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl hexanoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl
 heptanoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl nonanoate;
 25 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl decanoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl
 undecanoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl
 dodecanoate;
 30 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl
 hexanoate;
 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl
 heptanoate;
 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl
 35 nonanoate;
 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl
 decanoate;
 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl

- undecanoate;
 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl
 dodecanoate;
 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl hexanoate;
 5 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl
 heptanoate;
 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl nonanoate;
 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl decanoate;
 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl
 10 undecanoate;
 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl
 dodecanoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-hex-
 2-enoate;
 15 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-hept-
 2-enoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-oct-
 2-enoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-non-
 20 2-enoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-dec-
 2-enoate;
 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-
 undec-2-enoate;
 25 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-
 dodec-2-enoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-hex-2-
 enoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-hept-
 30 2-enoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-oct-2-
 enoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-non-2-
 enoate;
 35 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-dec-2-
 enoate;
 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-undec-
 2-enoate;

- 4-(5-[4-(butyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-dodec-2-enoate;
- 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-hex-2-enoate;
- 5 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-hept-2-enoate;
- 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-oct-2-enoate;
- 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-non-2-enoate;
- 10 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-dec-2-enoate;
- 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-undec-2-enoate;
- 15 4-(5-[4-(pentyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-dodec-2-enoate;
- 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-hex-2-enoate;
- 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-hept-2-enoate;
- 20 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-oct-2-enoate;
- 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-non-2-enoate;
- 25 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-dec-2-enoate;
- 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-undec-2-enoate;
- 4-(5-[4-(hexyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-dodec-2-enoate;
- 30 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (Z)-oct-3-enoate;
- 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-oct-4-enoate;
- 35 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (Z)-oct-5-enoate;
- 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl (E)-oct-6-enoate;

4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenyl oct-7-enoate.

Example 5

5

0.08 g of diethyl azodicarboxylate was added within 5 minutes while stirring to a solution of 1.0 g of 4-(5-[4-(propyloxy)butyloxy]pyrimidin-2-yl)phenol, 0.05 g of (E)-oct-2-en-1-ol and 0.05 g of triphenylphosphine in 25 ml of tetra-
 10 hydrofuran. The reaction mixture was stirred overnight, treated with 1 g of silica gel and then concentrated. Chromatography of the residue on silica gel with hexane/ethyl acetate (vol. 9:1) and recrystallization from ethyl alcohol of the fractions which were pure according to thin-layer chromatography gave 0.05 g of 2-(4-
 15 [(E)-oct-2-enyloxy]phenyl)-5-(4-[propyloxy]butyloxy)pyrimidine; m.p. (C-Sc) 75°C, phase transition (Sc-N) 77°C, cl.p. (N-I) 79°C.

The following compounds can be prepared in an analogous manner:

20

2-(4-[(E)-Hex-2-enyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine;

2-(4-[(E)-hept-2-enyloxy]phenyl)-5-(4-[propyloxy]-butyloxy)pyrimidine;

25 2-(4-[(E)-non-2-enyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine;

2-(4-[(E)-dec-2-enyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine;

30 2-(4-[(E)-undec-2-enyloxy]phenyl)-5-(4-[propyloxy]-butyloxy)pyrimidine;

2-(4-[(E)-dodec-2-enyloxy]phenyl)-5-(4-[propyloxy]-butyloxy)pyrimidine;

2-(4-[(E)-hex-2-enyloxy]phenyl)-5-(4-[butyloxy]butyloxy)-pyrimidine;

35 2-(4-[(E)-hept-2-enyloxy]phenyl)-5-(4-[butyloxy]-butyloxy)pyrimidine;

2-(4-[(E)-oct-2-enyloxy]phenyl)-5-(4-[butyloxy]butyloxy)-pyrimidine;

2-(4-[(E)-non-2-enyloxy]phenyl)-5-(4-[butyloxy]butyloxy)-
pyrimidine;

2-(4-[(E)-dec-2-enyloxy]phenyl)-5-(4-[butyloxy]butyloxy)-
pyrimidine;

5 2-(4-[(E)-undec-2-enyloxy]phenyl)-5-(4-[butyloxy]-
butyloxy)pyrimidine;

2-(4-[(E)-dodec-2-enyloxy]phenyl)-5-(4-[butyloxy]-
butyloxy)pyrimidine;

10 2-(4-[(E)-hex-2-enyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)-
pyrimidine;

2-(4-[(E)-hept-2-enyloxy]phenyl)-5-(4-[pentyloxy]-
butyloxy)pyrimidine;

2-(4-[(E)-oct-2-enyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)-
pyrimidine;

15 2-(4-[(E)-non-2-enyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)-
pyrimidine;

2-(4-[(E)-dec-2-enyloxy]phenyl)-5-(4-[pentyloxy]butyloxy)-
pyrimidine;

20 2-(4-[(E)-undec-2-enyloxy]phenyl)-5-(4-[pentyloxy]-
butyloxy)pyrimidine;

2-(4-[(E)-dodec-2-enyloxy]phenyl)-5-(4-[pentyloxy]-
butyloxy)pyrimidine;

2-(4-[(E)-hex-2-enyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)-
pyrimidine;

25 2-(4-[(E)-hept-2-enyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)-
pyrimidine;

2-(4-[(E)-oct-2-enyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)-
pyrimidine;

30 2-(4-[(E)-non-2-enyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)-
pyrimidine;

2-(4-[(E)-dec-2-enyloxy]phenyl)-5-(4-[hexyloxy]butyloxy)-
pyrimidine;

2-(4-[(E)-undec-2-enyloxy]phenyl)-5-(4-[hexyloxy]-
butyloxy)pyrimidine;

35 2-(4-[(E)-dodec-2-enyloxy]phenyl)-5-(4-[hexyloxy]-
butyloxy)pyrimidine;

2-(4-[(Z)-oct-3-enyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-
pyrimidine, m.p. (C-I) 71°C, cl.p. (Sc-I) 59°C;

2-(4-[(E)-oct-4-enyloxy]phenyl)-5-(4-[propyloxy]-butyloxy)pyrimidine, m.p. (C-I) 88°C, S_C-N, 72°C, cl.p. (N-I) 75°C;

2-(4-[(Z)-oct-5-enyloxy]phenyl)-5-(4-[propyloxy]-butyloxy)pyrimidine, m.p. (C-I) 76°C, S_C-N, 64°C, cl.p. (N-I) 65°C;

5 2-(4-[(E)-oct-6-enyloxy]phenyl)-5-(4-[propyloxy]-butyloxy)pyrimidine, m.p. (C-I) 70°C, S_C-N, 64°C, cl.p. (N-I) 77°C;

2-(4-[7-octenyloxy]phenyl)-5-(4-[propyloxy]butyloxy)-pyrimidine.

10. Example 6

0.08 g of N,N'-dicyclohexylcarbodiimide was added within 5 minutes while stirring to a solution of 1.0 g of 5-hydroxy-2-(4-[4-(propyloxy)butyloxy]phenyl)pyrimidine, 0.05 g of octanoic
15 acid and 0.05 g of 4-(dimethylamino)pyridine in 25 ml of dichloromethane. The reaction mixture was stirred overnight, filtered and the filtrate was concentrated. Chromatography of the residue on silica gel with hexane/ethyl acetate (vol. 9:1) and recrystallization of the fractions which were pure according to
20 thin-layer chromatography gave 0.05 g of 2-(4-[4-(propyloxy)-butyloxy]phenyl)pyrimidin-5-yl octanoate; m.p. (C-S_C) 66°C, phase transition (S_C-N) 67°C, cl.p. (N-I) 76°C.

The 5-hydroxy-2-(4-[4-(propyloxy)butyloxy]phenyl)-
25 pyrimidine used as the starting material is prepared as follows:

a) A solution of 1.1 g of 4-(5-benzyloxypyrimidin-2-yl)phenol and 2.2 g of 4-chloro-1-butanol in 25 ml of ethyl methyl ketone was treated with 2.2 g of finely powdered potassium carbonate
30 and the mixture was heated under slight reflux overnight. The suspension was filtered and the filtrate was concentrated in a vacuum. Chromatography of the residue on silica gel with hexane/ethyl acetate (vol. 1:1) gave 0.5 g of 5-benzyloxy-2-(4-[4-hydroxybutyloxy]phenyl)pyrimidine with m.p. 133°C.

35 b) A suspension of 0.5 g of 5-benzyloxy-2-(4-[4-hydroxybutyloxy]phenyl)pyrimidine and 1.0 g of propyl 4-toluene-sulphonate in 25 ml of 1,2-dimethoxyethane was treated with 0.5 g of

potassium tert.-butylate within 5 minutes at 0°C while gassing with nitrogen. The reaction mixture was stirred at room temperature overnight, poured into 50 ml of water and then the precipitate was filtered off. Recrystallization of the crude product
 5 from ethyl alcohol gave 0.3 g of pure 5-benzyloxy-2-(4-[4-(propyloxy)butyloxy]phenyl)pyrimidine with a m.p. of 101-102°C.

c) A mixture of 0.3 g of 5-benzyloxy-2-(4-[4-(propyloxy)-butyloxy]phenyl)pyrimidine, 2 drops of acetic acid and 25 ml of
 10 ethyl acetate was treated with 0.03 g of palladium on active charcoal (10%) and hydrogenated at normal pressure and room temperature until the hydrogen uptake came to a standstill. The inorganic material was filtered off over Celite and the filtrate was concentrated. Recrystallization of the crude product from
 15 hexane gave 0.22 g of pure 5-hydroxy-2-(4-[4-(propyloxy)-butyloxy]phenyl)pyrimidine with m.p. 79-80°C.

The following compounds can be prepared in an analogous manner:

20

2-(4-[4-(Propyloxy)butyloxy]phenyl)pyrimidin-5-yl hexanoate;

2-(4-[4-(propyloxy)butyloxy]phenyl)pyrimidin-5-yl heptanoate;

25

2-(4-[4-(propyloxy)butyloxy]phenyl)pyrimidin-5-yl nonanoate;

2-(4-[4-(propyloxy)butyloxy]phenyl)pyrimidin-5-yl decanoate;

30

2-(4-[4-(propyloxy)butyloxy]phenyl)pyrimidin-5-yl undecanoate;

2-(4-[4-(propyloxy)butyloxy]phenyl)pyrimidin-5-yl dodecanoate;

35

2-(4-[2-(pentyloxy)ethoxy]phenyl)pyrimidin-5-yl hexanoate;

2-(4-[2-(pentyloxy)ethoxy]phenyl)pyrimidin-5-yl heptanoate;

2-(4-[2-(pentyloxy)ethoxy]phenyl)pyrimidin-5-yl octanoate;

2-(4-[2-(pentyloxy)ethoxy]phenyl)pyrimidin-5-yl nonanoate;

2-(4-[2-(pentyloxy)ethoxy]phenyl)pyrimidin-5-yl decanoate;

2-(4-[2-(pentyloxy)ethoxy]phenyl)pyrimidin-5-yl

undecanoate;

2-(4-[2-(pentyloxy)ethoxy]phenyl)pyrimidin-5-yl

dodecanoate;

2-(4-[6-(methoxy)hexyloxy]phenyl)pyrimidin-5-yl hexanoate;

5 2-(4-[6-(methoxy)hexyloxy]phenyl)pyrimidin-5-yl

heptanoate;

2-(4-[6-(methoxy)hexyloxy]phenyl)pyrimidin-5-yl octanoate;

2-(4-[6-(methoxy)hexyloxy]phenyl)pyrimidin-5-yl nonanoate;

2-(4-[6-(methoxy)hexyloxy]phenyl)pyrimidin-5-yl decanoate;

10 2-(4-[6-(methoxy)hexyloxy]phenyl)pyrimidin-5-yl

undecanoate;

2-(4-[6-(methoxy)hexyloxy]phenyl)pyrimidin-5-yl

dodecanoate.

15

Example 7

0.08 g of diethyl azodicarboxylate is added within 5 minutes while stirring to a solution of 1.0 g of 5-hydroxy-2-(4-[4-(propyloxy)butyloxy]phenyl)pyrimidine, 0.05 g of (E)-oct-2-en-
20 1-ol and 0.05 g of triphenylphosphine in 25 ml of tetrahydrofuran. The reaction mixture is stirred overnight, treated with 1 g of silica gel, filtered and the filtrate is concentrated. Chromatography of the residue on silica gel with hexane/ethyl acetate (vol. 9:1) and recrystallization from ethyl alcohol of the fractions
25 which are pure according to thin-layer chromatography gives 5-[(E)-oct-2-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-pyrimidine.

30 The following compounds can be prepared in an analogous manner:

5-[(E)-Hex-2-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-pyrimidine;

35 5-[(E)-hept-2-enyloxy]-2-(4-[4-(propyloxy)butyloxy]-phenyl)pyrimidine;

5-[(E)-non-2-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-pyrimidine;

5-[(E)-dec-2-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-

- pyrimidine;
 5-[(E)-undec-2-enyloxy]-2-(4-[4-(propyloxy)butyloxy]-phenyl)pyrimidine;
 5-[(E)-dodec-2-enyloxy]-2-(4-[4-(propyloxy)butyloxy]-phenyl)pyrimidine;
 5-[(E)-hex-2-enyloxy]-2-(4-[4-(butyloxy)butyloxy]phenyl)-pyrimidine;
 5-[(E)-hept-2-enyloxy]-2-(4-[4-(butyloxy)butyloxy]phenyl)-pyrimidine;
 10 5-[(E)-oct-2-enyloxy]-2-(4-[4-(butyloxy)butyloxy]phenyl)-pyrimidine;
 5-[(E)-non-2-enyloxy]-2-(4-[4-(butyloxy)butyloxy]phenyl)-pyrimidine;
 5-[(E)-dec-2-enyloxy]-2-(4-[4-(butyloxy)butyloxy]phenyl)-pyrimidine;
 15 5-[(E)-undec-2-enyloxy]-2-(4-[4-(butyloxy)butyloxy]-phenyl)pyrimidine;
 5-[(E)-dodec-2-enyloxy]-2-(4-[4-(butyloxy)butyloxy]-phenyl)pyrimidine;
 20 5-[(E)-hex-2-enyloxy]-2-(4-[4-(pentyloxy)butyloxy]phenyl)-pyrimidine;
 5-[(E)-hept-2-enyloxy]-2-(4-[4-(pentyloxy)butyloxy]-phenyl)pyrimidine;
 5-[(E)-oct-2-enyloxy]-2-(4-[4-(pentyloxy)butyloxy]phenyl)-pyrimidine;
 25 5-[(E)-non-2-enyloxy]-2-(4-[4-(pentyloxy)butyloxy]phenyl)-pyrimidine;
 5-[(E)-dec-2-enyloxy]-2-(4-[4-(pentyloxy)butyloxy]phenyl)-pyrimidine;
 30 5-[(E)-undec-2-enyloxy]-2-(4-[4-(pentyloxy)butyloxy]-phenyl)pyrimidine;
 5-[(E)-dodec-2-enyloxy]-2-(4-[4-(pentyloxy)butyloxy]-phenyl)pyrimidine;
 5-[(E)-hex-2-enyloxy]-2-(4-[4-(hexyloxy)butyloxy]phenyl)-pyrimidine;
 35 5-[(E)-hept-2-enyloxy]-2-(4-[4-(hexyloxy)butyloxy]phenyl)-pyrimidine;
 5-[(E)-oct-2-enyloxy]-2-(4-[4-(hexyloxy)butyloxy]phenyl)-

- pyrimidine;
 5-[(E)-non-2-enyloxy]-2-(4-[4-(hexyloxy)butyloxy]phenyl)-
 pyrimidine;
 5-[(E)-dec-2-enyloxy]-2-(4-[4-(hexyloxy)butyloxy]phenyl)-
 5 pyrimidine;
 5-[(E)-undec-2-enyloxy]-2-(4-[4-(hexyloxy)butyloxy]-
 phenyl)pyrimidine;
 5-[(E)-dodec-2-enyloxy]-2-(4-[4-(hexyloxy)butyloxy]-
 phenyl)pyrimidine;
 10 5-[(Z)-hex-3-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 pyrimidine;
 5-[(Z)-hept-3-enyloxy]-2-(4-[4-(propyloxy)butyloxy]-
 phenyl)pyrimidine;
 5-[(Z)-oct-3-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 15 pyrimidine;
 5-[(Z)-non-3-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 pyrimidine;
 5-[(Z)-dec-3-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 pyrimidine;
 20 5-[(Z)-undec-3-enyloxy]-2-(4-[4-(propyloxy)butyloxy]-
 phenyl)pyrimidine;
 5-[(Z)-dodec-3-enyloxy]-2-(4-[4-(propyloxy)butyloxy]-
 phenyl)pyrimidine;
 5-[(E)-oct-4-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 25 pyrimidine;
 5-[(Z)-oct-5-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 pyrimidine;
 5-[(E)-oct-6-enyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 pyrimidine;
 30 5-[7-octenyloxy]-2-(4-[4-(propyloxy)butyloxy]phenyl)-
 pyrimidine.

Example 8

- 35 In order to investigate the properties of the compounds of
 formula I, a basic mixture (BM) is prepared and is admixed with in
 each case 15% of a compound of formula I. The phase transition
 temperatures of these mixtures are determined, with the

crystallization temperature T_c being determined from conductivity data. The switching times are measures at 25°C (10 Vpp/ μ , time from the start of the pulse to maximum stream). The measurement values are compiled in Table 1.

5

Basic Mixture (BM)

	16 wt.%	4-[trans-4-([(R)-2-fluorohexanoyl]oxy)cyclohexyl]-phenyl 2,3-difluoro-4-(octyloxy)benzoate
10	24 wt.%	2-[4-(hexyloxy)phenyl]-5-nonylpyrimidine
	24 wt.%	2-[4-(nonyloxy)phenyl]-5-nonylpyrimidine
	12 wt.%	2-[4-(nonyloxy)phenyl]-5-octylpyrimidine
	12 wt.%	2-[4-(heptyloxy)phenyl]-5-heptylpyrimidine
	12 wt.%	2-[4-(decyloxy)phenyl]-5-octylpyrimidine

15

Table 1

	C/S _x -SC* °C	SC*-SA/N* °C	SA-N	N*-I °C	P _s nC/cm ²	τ μsec	2θ °
Basic mixture	-7.6	60.6	67.7	74.6	19.0	120	52.5
BM +15 wt.% (A)	-4.3	62.1	-	72.8	17.8	155	59.4
BM +15 wt.% (B)	-5.9	57.2	64.5	69.8	16.2	128	49.6
BM +15 wt.% (C)	-4.0	60.1	-	70.7	17.2	165	57.6
BM +15 wt.% (D)	-9.9	43.6	55.6	59.9	12.8	102	39.7
BM +15 wt.% (E)	-9.4	61.6	62.8	72.1	19.0	143	57.4
BM +15 wt.% (F)	-11.0	61.8	-	73.0	17.3	152	58.9
BM +15 wt.% (G)	-	54.0	70.9	73.7	13.0	100	46.6
BM +15 wt.% (H)	-	53.7	66.1	69.2	14.1	106	45.3
BM +15 wt.% (I)	-	52.7	60.2	66.5	16.9	119	49.1
BM +15 wt.% (K)	-	56.1	60.2	67.0	15.7	132	53.0

A: 2-[4-(Octyloxy)phenyl]-5-[4-(propyloxy)butyloxy]pyrimidine

B: 2-(4-Nonylphenyl)-5-[4-(propyloxy)butyloxy]pyrimidine

5 C: 2-{4-[4-(Propyloxy)butyloxy]phenyl}-5-[4-(propyloxy)-
butyloxy]pyrimidine

D: 2-{4-[5-(Propyloxy)pentyl]phenyl}-5-[4-(propyloxy)-
butyloxy]pyrimidine

E: 2-[4-(Octanoyloxy)phenyl]-5-[4-(propyloxy)butyloxy]-
pyrimidine

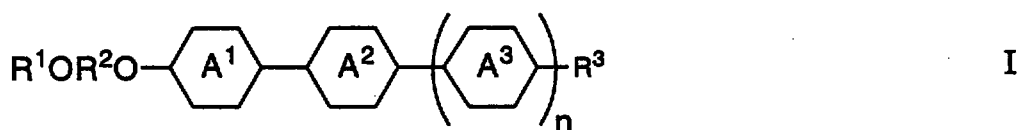
10 F: 2-{4-[4-(Propyloxy)butyloxy]phenyl}-5-(octanoyloxy)-

pyrimidine

- G: 2-(4-Nonylphenyl)-5-[6-(methoxy)hexyloxy]pyrimidine
H: 2-(4-Nonylphenyl)-5-[5-(ethoxy)pentyloxy]pyrimidine
I: 2-(4-Nonylphenyl)-5-[3-(butyloxy)propyloxy]pyrimidine
5 K: 2-(4-Nonylphenyl)-5-[2-(pentyloxy)ethoxy]pyrimidine

Claims

1. Compounds of the general formula



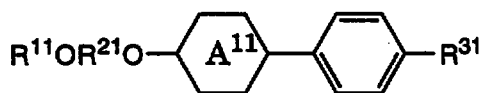
wherein

- R^1 signifies straight-chain alkyl or alkenyl with 1 to 8 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen;
- R^2 signifies straight-chain alkylene which 2 to 8 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen;
- R^3 signifies straight-chain alkyl, alkoxy, alkanoyloxy, alkenyl, alkenyloxy or alkenoyloxy with 4 to 12 carbon atoms which is unsubstituted or mono- or multiply-substituted with halogen and in which one or more non-adjacent methylene groups can be replaced by -O-; and
- A^1, A^2 and A^3 each independently signify 1,4-phenylene which is unsubstituted or mono- or multiply-substituted with halogen, or pyridine-2,5-diyl or pyrimidine-2,5-diyl and A^3 also signifies trans-1,4-cyclohexylene; and
- n is 0 or 1;

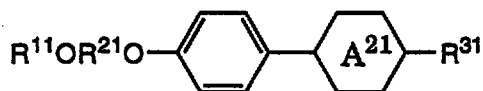
with the proviso that at least one of rings A^1, A^2 or A^3 signifies pyridine-2,5-diyl or pyrimidine-2,5-diyl; and R^3 represents alkenyl, alkenyloxy, alkanoyloxy or alkenoyloxy when $n = 0$ and A^2 is pyrimidine-2,5-diyl.



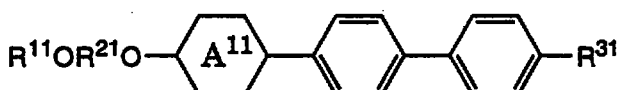
2. Compounds in accordance with claim 1 of the general formulae:



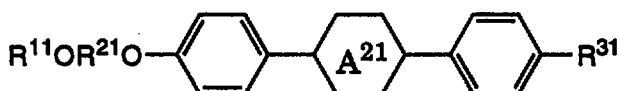
I-A



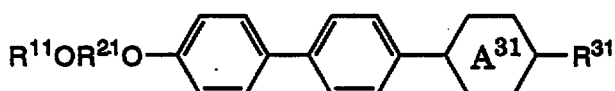
I-B



I-C



I-D



I-E

10 wherein

R¹¹

signifies straight-chain, unsubstituted alkyl or alkenyl with 3 to 6 carbon atoms;

R²¹

signifies straight-chain, unsubstituted alkylene with 2 to 4 carbon atoms;

15

A¹¹, A²¹, A³¹

signify pyridine-2,5-diyl or pyrimidine-2,5-diyl; and

R³¹

signifies straight-chain, unsubstituted alkyl, alkenyl, alkoxy, alkenyloxy, alkanoyloxy or alkenoyloxy with 6 to 10 carbon atoms.

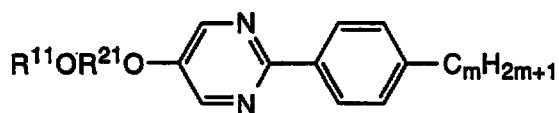
20

3. Compounds in accordance with claim 2, wherein the pyridine ring or the pyrimidine ring is linked in the 5-position with the R¹¹OR²¹O- residue or the R³¹ residue.

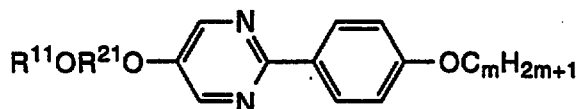
25

4. Compounds in accordance with claim 2 or claim 3 of the general formula

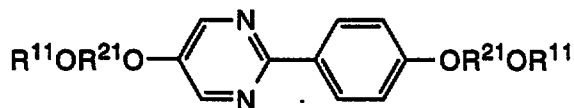




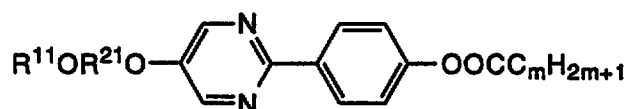
I-A-1



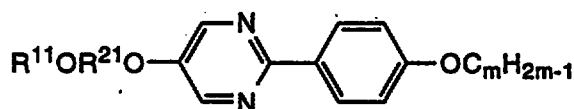
I-A-2



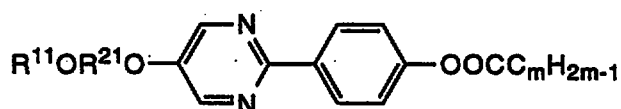
I-A-3



I-A-4



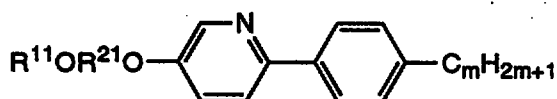
I-A-5



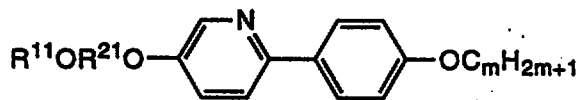
I-A-6

wherein m signifies a whole number of 4 to 8 and R^{11} and R^{21} have the significances set forth in claim 2.

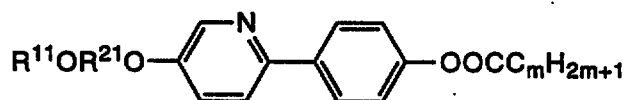
5. Compounds in accordance with claim 2 or claim 3 of the general formula



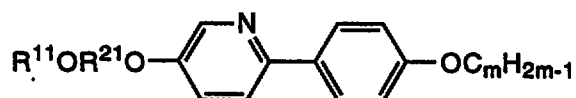
I-A-7



I-A-8

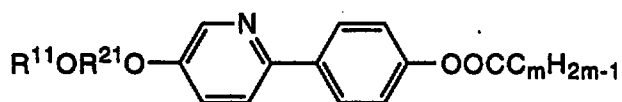


I-A-9



I-A-10



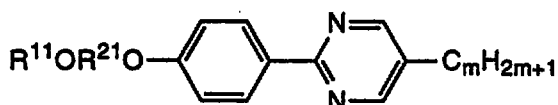


I-A-11

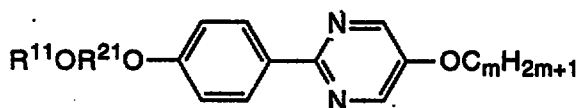
wherein m signifies a whole number of 4 to 8 and R^{11} and R^{21} have the significances set forth in claim 2.

5

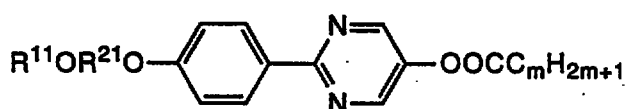
6. Compounds in accordance with claim 2 or claim 3 of the general formula



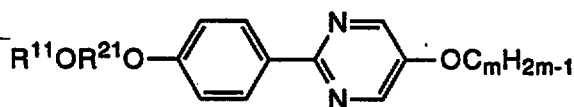
I-B-1



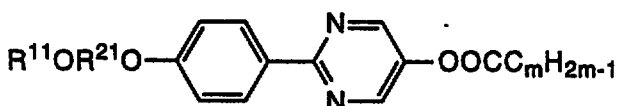
I-B-2



I-B-3



I-B-4



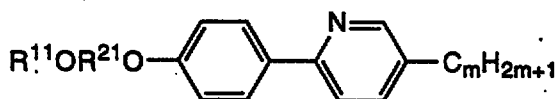
I-B-5

15

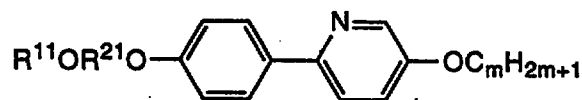
wherein m signifies a whole number of 4 to 8 and R^{11} and R^{21} have the significances set forth in claim 2.

7. Compounds in accordance with claim 2 or claim 3 of the general formula

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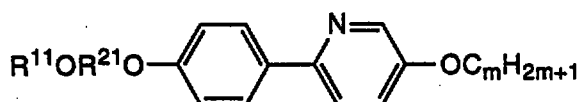


I-B-6

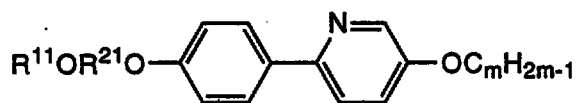


I-B-7

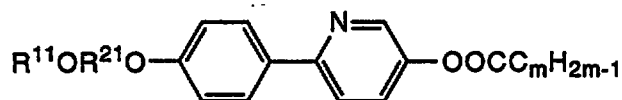




I-B-8



I-B-9



I-B-10

5 wherein m signifies a whole number of 4 to 8 and R^{11} and R^{21} have the significances set forth in claim 2.

8. Compounds in accordance with any one of claims 1 to 7, wherein R^2 and, respectively, R^{21} signify 1,4-butylene.

10

9. Liquid crystalline mixtures containing at least two components, wherein at least one component is a compound of general formula I defined in claim 1.

15 10. The use of compounds of formula I defined in claim 1 for electro-optical devices.

