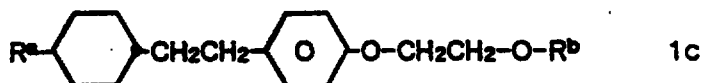
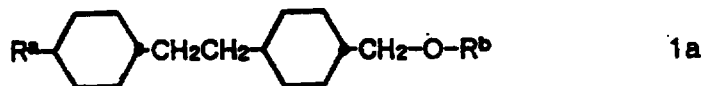


Description

The invention relates to new ethane derivatives chosen from the formulae 1a and 1c



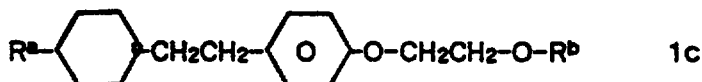
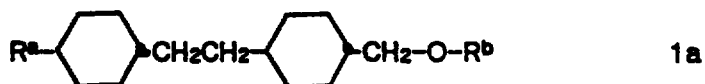
wherein

- 5 R^a is straight-chain alkyl having 1-8 C atoms and
 R^b is straight-chain alkyl having 1-8 C atoms, wherein one or two non-adjacent and in each case non-terminal CH_2 group(s) can also be replaced by -O-,
and liquid-crystalline phases comprising compounds of the
10 formula 1a or 1c and the use thereof as components of liquid-crystalline phases.

The compounds of the formulae 1a and 1c have a high chemical stability and only a low conductivity. They are colourless and readily miscible with all the usual
15 liquid crystals. Their use leads to broader mesophase ranges and a reduced viscosity. The compounds of the formulae 1a and 1c according to the invention are thus particularly suitable for liquid-crystalline phases for electro-optical display devices, such as, for example, TN
20 cells or guest-host cells.

Although the compounds of the formula 1a are included in the broad, general formula of EP-A-0 058 981, no compounds wherein two 6-membered rings are bonded via an ethylene group are described therein. Furthermore, the
25 person skilled in the art could not obtain any indication from EP-A-0 058 981 that the compounds according to the invention lead to liquid-crystalline media with improved properties for electro-optical displays.

The invention accordingly relates to ethane
30 derivatives chosen from the formulae 1a and 1c



wherein

R^a is straight-chain alkyl having 1-8 C atoms and

R^b is straight-chain alkyl having 1-8 C atoms, wherein one or two non-adjacent and in each case non-terminal CH_2

5 group(s) can also be replaced by -O-.

The invention furthermore relates to the use of the compounds of the formulae 1a and 1c as components of liquid-crystalline phases.

The invention also relates to liquid-crystalline
10 phases having at least two liquid-crystalline components, characterized in that they comprise at least one compound of the formulae [sic] 1a or 1c, and to a liquid-crystal display element, characterized in that it comprises a liquid-crystalline phase according to Claim 8, in
15 particular an electro-optical display element, characterized in that it comprises a liquid-crystalline phase according to Claim 8 as the dielectric.

R^a is preferably straight-chain alkyl having two to 5 C atoms.

20 R^b in the compounds of the component formulae [sic] 1a is preferably straight-chain alkyl having 1 to 5, in particular 1 to 3, C atoms. In the compounds of the component formula 1c, R^b is preferably straight-chain alkyl having 1 to 3 C atoms, particularly preferably
25 methyl or ethyl. If R^b is an alkyl group wherein one or two non-adjacent and in each case non-terminal CH_2 groups are also replaced by -O-, radicals of the formula - CH_2 - CH_2 -O-alkyl or - CH_2 - CH_2 -O- CH_2CH_2 -O-alkyl are preferred. Compounds of the formulae 1a/c having such
30 radicals are likewise preferred.

The compounds of the formulae 1a/c can be prepared by etherification of corresponding hydroxy compounds. Corresponding hydroxy compounds are either known

or can be prepared in a manner which is known per se.

For the etherification, the hydroxy compound can first be converted into a corresponding metal derivative, for example into the corresponding alkali metal alcoholate or phenolate by treatment with Na, K, NaH, KH or K_2CO_3 . This product can then be reacted, for example, with an alkyl halide or sulphonate or a dialkyl sulphate, expediently in the presence of an inert solvent, such as acetone, 1,2-dimethoxyethane, tetrahydrofuran, dimethylformamide or dimethyl sulphoxide, at temperatures between about 20 and 100°.

The liquid-crystalline phases according to the invention comprise 2 to 25, preferably 3 to 15, components, at least one of which is a compound of the formulae 1a/c. The other constituents are preferably chosen from the nematic or nematogenic substances, in particular the known substances, from the classes comprising azoxybenzenes, benzyldeneanilines, biphenyls, terphenyls, phenyl- or cyclohexylbenzoates, phenyl or cyclohexyl cyclohexanecarboxylates, phenylcyclohexanes, cyclohexylbiphenyls, cyclohexylcyclohexanes, cyclohexylnaphthalenes, 1,4-biscyclohexylbenzenes, 4,4'-biscyclohexylbiphenyls, phenyl- or cyclohexylpyrimidines, phenyl- or cyclohexyldioxanes, optionally halogenated stilbenes, benzyl phenyl ethers, tolans and substituted cinnamic acids.

The most important compounds which are suitable as constituents of such liquid-crystalline phases can be characterized by the formula VI

30



VI

wherein L and E are each a carbo- or heterocyclic ring system from the group formed by 1,4-disubstituted benzene and cyclohexane rings, 4,4'-disubstituted biphenyl, phenylcyclohexane and cyclohexylcyclohexane systems, 2,5-disubstituted pyrimidine and 1,3-dioxane rings, 2,6-disubstituted naphthalene, di- and tetrahydronaphthalene, quinazoline and tetrahydroquinazoline,

5	G is	-CH=CH-	-N(O)=N-
		-CH=CY	-CH=N(O)-
		-C≡C-	-CH ₂ -CH ₂ -
		-CO-O-	-CH ₂ -O-
		-CO-S-	-CH ₂ -S-
		-CH=N-	-COO-Phe-COO

or a C-C single bond, Y is halogen, preferably chlorine, or -CN, and R³ and R⁴ are alkyl, alkoxy, alkanoyloxy or alkoxycarbonyloxy having up to 18, preferably up to 8, carbon atoms, or one of these radicals is also CN, NC, NO₂, CF₃, F, Cl or Br.

In most of these compounds, R³ and R⁴ differ from one another, one of these radicals usually usually [sic] being an alkyl or alkoxy group. However, other variants of the proposed substituents are also customary. Many such substances or else mixtures thereof are commercially obtainable. All of these substances can be prepared by methods which are known per se.

The liquid-crystalline phases according to the invention comprise about 0.1 to 99, preferably 1 to 30% of one or more compounds of the formula 1.

The liquid-crystalline phases according to the invention are prepared in a manner which is customary per se. As a rule, the components are dissolved in one another, expediently at elevated temperature.

The liquid-crystalline phases according to the invention can be modified by suitable states [sic] such that they can be used in all the types of liquid-crystal display elements which have been disclosed to date.

Such additives are known to the person skilled in the art and are described in detail in the literature. For example, it is possible to add conductive salts, preferably ethyldimethyldodecylammonium 4-hexyloxybenzoate, tetrabutylammonium tetraphenylboranate or complex salts of crown ethers (cf. for example, I. Haller et al., Mol. Cryst. Liq. Cryst. Volume 24, pages 249-258 (1973)) to improve the conductivity, dichroic dyestuffs for the preparation of coloured guest-host systems or substances for modifying the dielectric anisotropy, the

viscosity and/or the orientation of the nematic phases. Such substances are described, for example, in DE-A 22 09 127, 22 40 864, 23 21 632, 23 38 281, 24 50 088, 26 37 430, 28 53 728 and 29 02 177.

5 The following examples are intended to illustrate the invention without limiting it. m.p. = melting point, C.P. = clear point. Percentage data above and below are percentages by weight; all the temperatures are stated in degrees Celsius. "Customary working up" means: water is
10 added, the mixture is extracted with methylene chloride, the organic phase is separated off and dried and the product is purified by crystallization, distillation and/or chromatography.

Example 1

15 A solution of 25.7 g of 1-(trans-4-n-propylcyclohexyl)-2-(trans-4-hydroxymethylcyclohexyl)ethane [obtainable by reduction of the carboxylic acid accessible by hydrolysis from 1-(trans-4-n-propylcyclohexyl)-2-(trans-4-cyanocyclohexyl)ethane (DE-A 31 00 142) with
20 lithiumaluminiumhydride] in 200 ml of tetrahydrofuran is added dropwise to a mixture of 22 g of n-butyliodide and 4.8 g of NaH in 250 ml of tetrahydrofuran at 50°, while stirring, and the mixture is stirred at 50° for a further 4 hours. Customary working up gives 1-(trans-4-n-propyl-
25 cyclohexyl)-2-[trans-4-(2-oxa-hexyl)cyclohexyl]ethane.

The following are prepared analogously:

1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]ethane
1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxabutyl)-
30 cyclohexyl]ethane
1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]ethane
1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]ethane
35 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]ethane
1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]ethane

- 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2-oxapentyl) -
cyclohexyl] ethane
- 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2-oxahexyl) -
cyclohexyl] ethane
- 5 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2-oxaheptyl) -
cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxapropyl) -
cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxabutyl) -
10 cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxapentyl) -
cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxahexyl) -
cyclohexyl] ethane
- 15 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxaheptyl) -
cyclohexyl] ethane
- 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxapropyl) -
cyclohexyl] ethane
- 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxabutyl) -
20 cyclohexyl] ethane
- 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxapentyl) -
cyclohexyl] ethane
- 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxahexyl) -
cyclohexyl] ethane
- 25 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxaheptyl) -
cyclohexyl] ethane
- 1- (trans-4-propylcyclohexyl) -2- [trans-4- (2,5-dioxahexyl) -
cyclohexyl] ethane
- 1- (trans-4-propylcyclohexyl) -2- [trans-4- (2,5-dioxa-
30 heptyl) cyclohexyl] ethane
- 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2,5-dioxahexyl) -
cyclohexyl] ethane
- 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2,5-dioxaheptyl) -
cyclohexyl] ethane
- 35 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2,5-dioxahexyl) -
cyclohexyl] ethane

1-(trans-4-butylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]ethane

1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2,5-dioxahexyl)-cyclohexyl]ethane

- 5 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)cyclohexyl]ethane

Example 2

A mixture of 26 g of p-[2-(trans-4-n-butylcyclohexyl)ethyl]phenol (DE-A 32 01 721), 6.9 g of K_2CO_3 ,
10 16.5 g of 2-bromoethyl methyl ether and 250 ml of dimethylformamide is heated at 80° for 16 hours, while stirring, and is then cooled and worked up in the customary manner. 1-(trans-4-n-Butylcyclohexyl)-2-[p-(1,4-dioxapentyl)-phenyl]ethane is obtained.

- 15 The following are prepared analogously:

1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phenyl]ethane

- 20 1-(trans-4-butylcyclohexyl)-2-[p-(1,3-dioxapentyl)-phenyl]ethane

1-(trans-4-ethylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

- 25 1-(trans-4-ethylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phenyl]ethane

1-(trans-4-propylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

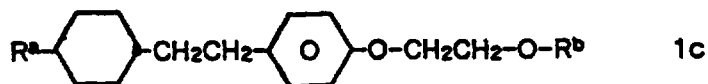
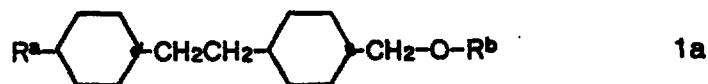
1-(trans-4-propylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phenyl]ethane

- 30 1-(trans-4-pentylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

1-(trans-4-pentylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phenyl]ethane

Patent claims

1. Ethane derivatives chosen from the formulae 1a and 1c



wherein

- 5 R^a is straight-chain alkyl having 1-8 C atoms and
 R^b is straight-chain alkyl having 1-8 C atoms, wherein
one or two non-adjacent and in each case non-terminal CH_2
group(s) can also be replaced by -O-.
2. Ethane derivatives according to Claim 1, wherein
- 10 R^a is straight-chain alkyl having 2-5 C atoms.
3. Ethane derivatives of the component formula 1a
according to Claim 1 or 2, wherein
 R^b is straight-chain alkyl having 1-5, in particular
1-3, C atoms.
- 15 4. Ethane derivatives of the component formula 1c
according to Claim 1 or 2, wherein
 R^b is straight-chain alkyl having 1-3 C atoms, in
particular methyl or ethyl.
5. Ethane derivatives of the component formula 1a
20 according to Claim 1, 2 or 3, chosen from the following
compounds:
- 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxapropyl)-
cyclohexyl]ethane
- 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxabutyl)-
25 cyclohexyl]ethane
- 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxapentyl)-
cyclohexyl]ethane
- 1-(trans-4-n-propylcyclohexyl)-2-[trans-4-(2-oxahexyl)-
cyclohexyl]ethane
- 30 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-
cyclohexyl]ethane
- 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2-oxapropyl)-
cyclohexyl]ethane

- 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2-oxabutyl) -
cyclohexyl] ethane
- 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2-oxapentyl) -
cyclohexyl] ethane
- 5 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2-oxahexyl) -
cyclohexyl] ethane
- 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2-oxaheptyl) -
cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxapropyl) -
cyclohexyl] ethane
- 10 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxabutyl) -
cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxapentyl) -
cyclohexyl] ethane
- 15 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxahexyl) -
cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2-oxaheptyl) -
cyclohexyl] ethane
- 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxapropyl) -
cyclohexyl] ethane
- 20 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxabutyl) -
cyclohexyl] ethane
- 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxapentyl) -
cyclohexyl] ethane
- 25 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxahexyl) -
cyclohexyl] ethane
- 1- (trans-4-pentylcyclohexyl) -2- [trans-4- (2-oxaheptyl) -
cyclohexyl] ethane
- 1- (trans-4-propylcyclohexyl) -2- [trans-4- (2,5-dioxahexyl) -
cyclohexyl] ethane
- 30 1- (trans-4-propylcyclohexyl) -2- [trans-4- (2,5-dioxa-
heptyl) cyclohexyl] ethane
- 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2,5-dioxahexyl) -
cyclohexyl] ethane
- 35 1- (trans-4-ethylcyclohexyl) -2- [trans-4- (2,5-dioxaheptyl) -
cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2,5-dioxahexyl) -
cyclohexyl] ethane
- 1- (trans-4-butylcyclohexyl) -2- [trans-4- (2,5-dioxaheptyl) -

cyclohexyl]ethane

1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]ethane

5 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2,5-dioxahexyl)-cyclohexyl]ethane

6. Ethane derivatives of the component formula 1a according to Claim 1, 2 or 4, chosen from the following compounds:

10 1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxapentyl)-phenyl]ethane

15 1-(trans-4-ethylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

1-(trans-4-ethylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

20 1-(trans-4-propylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

1-(trans-4-propylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

1-(trans-4-pentylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

25 1-(trans-4-pentylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane

7. Use of the compounds according to one of Claims 1 to 6 as components of liquid-crystalline phases.

8. Liquid-crystalline phase with at least two
30 liquid-crystalline compounds, characterized in that it comprises at least one compound according to one of Claims 1 to 6.

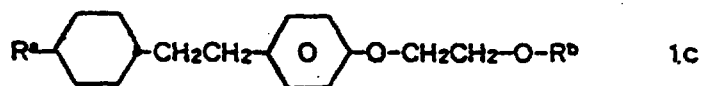
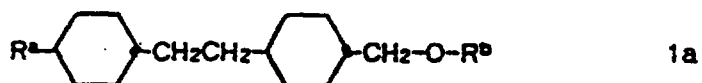
9. Liquid-crystal display element, characterized in that it comprises a liquid-crystalline phase according to
35 Claim 8.

10. Electro-optical display element, characterized in that it comprises a liquid-crystalline phase according to Claim 8 as the dielectric.

[As printed]

Claims

1. Ethane derivatives chosen from the formulae 1a and 1c



wherein

- R^a is straight-chain alkyl having 1-8 C atoms and
 R^b is straight-chain alkyl having 1-8 C atoms, wherein one or two non-adjacent and in each case non-terminal CH_2 group(s) can also be replaced by -O-.
2. Ethane derivatives according to Claim 1, wherein
 R^a is straight-chain alkyl having 2-5 C atoms.
3. Ethane derivatives of the component formula 1a according to Claim 1 or 2, wherein
 R^b is straight-chain alkyl having 1-5, in particular 1-3, C atoms.
4. Ethane derivatives of the component formula 1c according to Claim 1 or 2, wherein
 R^b is straight-chain alkyl having 1-3 C atoms, in particular methyl or ethyl.



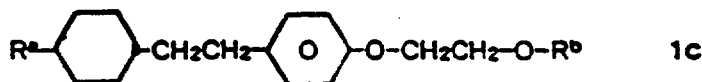
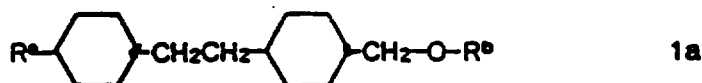
5. Ethane derivatives of the component formula 1a according to Claim 1, 2 or 3, chosen from the following compounds:
- 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]ethane
 - 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]ethane
 - 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]ethane
 - 1-(trans-4-n-propylcyclohexyl)-2-[trans-4-(2-oxahexyl)-cyclohexyl]ethane
 - 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2-oxahexyl)-cyclohexyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxahexyl)-cyclohexyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxahexyl)-cyclohexyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]ethane
 - 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2,5-dioxahexyl)-cyclohexyl]ethane
 - 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2,5-dioxahexyl)-cyclohexyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2,5-dioxahexyl)-cyclohexyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2,5-dioxahexyl)-cyclohexyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]ethane
6. Ethane derivatives of the component formula 1a according to Claim 1, 2 or 4, chosen from the following compounds:
- 1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phenyl]ethane
 - 1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxapentyl)-phenyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane
 - 1-(trans-4-ethylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phenyl]ethane
 - 1-(trans-4-propylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane
 - 1-(trans-4-propylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phenyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[p-(1,4-dioxahexyl)-phenyl]ethane
 - 1-(trans-4-pentylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phenyl]ethane
7. Use of the compounds according to one of Claims 1 to 6 as components of liquid-crystalline phases.
8. Liquid-crystalline phase with at least two liquid-crystalline compounds, characterized in that it comprises at least one compound according to one of Claims 1 to 6.
9. Liquid-crystal display element, characterized in that it comprises a liquid-crystalline phase according to Claim 8.
10. Electro-optical display element, characterized in that it comprises a liquid-crystalline phase according to Claim 8 as the dielectric.



[As printed]

Revendications

1. Dérivés d'éthane choisis parmi les formules 1a et 1c,



où

R^a représente un groupe alkyle en chaîne droite ayant 1-8 atomes de carbone, et

R^b désigne un groupe alkyle en chaîne droite ayant 1-8 atomes de carbone, dans lequel également un ou deux groupe(s) CH₂ non contigu(s) et pour chacun d'eux non terminal peu(ven)t être remplacé(s) par -O-.

2. Dérivés d'éthane selon la revendication 1 dans lesquels R^a désigne un groupe alkyle en chaîne droite ayant 2-5 atomes de carbone.
3. Dérivés d'éthane de formule de référence 1a selon l'une des revendications 1 ou 2, dans lesquels R^b désigne un groupe alkyle en chaîne droite ayant 1-5, en particulier 1-3, atomes de carbone.
4. Dérivés d'éthane de formule de référence 1c selon l'une des revendications 1 ou 2, dans lesquels R^b désigne un groupe alkyle en chaîne droite ayant 1-3 atomes de carbone, en particulier un groupe méthyle ou éthyle.

5. Dérivés d'éthane selon l'une quelconque des revendications 1, 2 ou 3, choisis parmi les composés suivants:

1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]-éthane
 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]-éthane
 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]-éthane
 1-(trans-4-n-propylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-éthylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]-éthane
 1-(trans-4-éthylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]-éthane
 1-(trans-4-éthylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]-éthane
 1-(trans-4-éthylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-éthylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]-éthane
 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]-éthane
 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]-éthane
 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxapropyl)-cyclohexyl]-éthane
 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxabutyl)-cyclohexyl]-éthane
 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxapentyl)-cyclohexyl]-éthane
 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2-oxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-propylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-éthylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-éthylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]-éthane
 1-(trans-4-butylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]-éthane



1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]-éthane
1-(trans-4-pentylcyclohexyl)-2-[trans-4-(2,5-dioxaheptyl)-cyclohexyl]-éthane.

6. Dérivés d'éthane de formule de référence 1a selon l'une quelconque des revendications 1, 2 ou 4, choisis parmi les composés suivants:
1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phényl]-éthane
1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phényl]-éthane
1-(trans-4-butylcyclohexyl)-2-[p-(1,4-dioxapentyl)-phényl]-éthane
1-(trans-4-éthylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phényl]-éthane
1-(trans-4-éthylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phényl]-éthane
1-(trans-4-propylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phényl]-éthane
1-(trans-4-propylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phényl]-éthane
1-(trans-4-pentylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phényl]-éthane
1-(trans-4-pentylcyclohexyl)-2-[p-(1,4-dioxaheptyl)-phényl]-éthane.
7. Utilisation des composés selon l'une quelconque des revendications 1 à 6 comme composants de phases de cristaux liquides.
8. Phase de cristaux liquides ayant au moins deux composés en cristaux liquides, caractérisée en ce qu'elle contient au moins un composé selon l'une quelconque des revendications 1 à 6.
9. Élément d'affichage, caractérisé en ce qu'il contient une phase de cristaux liquides selon la revendication 8.
10. Élément d'affichage électro-optique, caractérisé en ce qu'il contient comme diélectrique une phase de cristaux liquides selon la revendication 8.

