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# Molecular Crystals and Liquid Crystals

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# New Optically Active Dopants for Liquid Crystal Mixtures—(S)-1-Phenylethylamine Derivatives

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NEW OPTICALLY ACTIVE DOPANTS FOR LIQUID CRYSTAL MIXTURES - (S)-1-PHENYLETHYLAMINE DERIVATIVES\*

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Abstract: Several new optically active dopants for liquid crystal mixtures - (S)-l-phenylethylamines - and their helical twisting powers are reported.

Chiral nematics or mixtures of nematic liquid crystals with optically active additives (mesogenic or non-mesogenic) are potentially useful for application in electro-optical devices or in surface thermography. They are of higher chemical and photochemical stability than cholesterol derivatives and they exhibit similar pitch values. Nematic esters, cyanobiphenyls or Schiff-bases incorporating the (S)-2-methylbutyl group (or its homologues) and some non-mesogenic compounds, eg, derivatives of 2-naphthoxy- $\alpha$ -substituted acetic acids, derivatives of menthol or dibenzodiazocines are of greatest interest.

In this paper several new derivatives of (S)-(-)-1-phenylethylamine such as amides, Schiff-bases and benzyl derivatives are reported which are very effective optically active dopants in nematic liquid crystals. The synthesized compounds, their melting (or boiling) points, specific

Part of this work was presented at IV International Conference on Liquid Crystals for Socialist Countries, Tbilisi, 5th-8th October 1981.

rotations  $\alpha_D^{20}$  and helical twisting powers  $A_m$  are listed in the Table. Schiff-bases (compounds 5-9) and some amides (2-4) have relatively high helical twisting powers - about four times higher than cholesteryl nonanoate (0.13  $\mu m^{-1} mol~\%^{-1}).^5$  Amines (10, 11) and N-(S)-1-phenylethyl 4-decylbenzamide (1) are somewhat less effective. Some of these compounds (for example 6) can be used in mixtures with 4-cyano-4'-n-pentyl-biphenyl (CB5) (2-10%) to give selective light reflection. It should be noticed that 4-(4'-octylphenylbenzoyloxy)benzyl-idene-(S)-1-phenylethylamine (9) gives a monotropic smectic phase.

#### EXPERIMENTAL

All the compounds were prepared by standard procedures from (S)-(-)-1-phenylethylamine (Fluka AG,  $\alpha_D^{20}=40\pm5^\circ$ , c = 10 in ethanol) and the appropriate acyl chloride (compounds 1-4) or 4-substituted benzaldehyde<sup>6</sup> (compounds 5-9). Amines 10 and 11 were obtained from appropriate anils by reduction with sodium borohydride in methanol. They solidified at room temperature after standing.

4-Alkoxybenzaldehydes were prepared by catalytic alkylation in a two phase system from the alkyl bromide and 4-hydroxy-benzaldehyde in chlorobenzene in the presence of 20% aqueous KOH and a catalytic amount of tetrabutylammonium bromide; the average yield was about 80%.

The purity of all the final products was checked by tlc; their structures were confirmed by elemental analysis and by IR spectroscopy.

Pitch measurements of the compounds under investigation in mixtures with CB5 were made by the Grandjean-Cano method. Helical twisting power  $A_m$  was calculated from the formula  $1/P = A_m c_m$  where P is pitch ( $\mu m$ ) and  $c_m$  is molar concentration (%) of optically active compound (0.5-3 mol %) in CB5. Specific rotations were measured using chloroform solutions.

#### ACKNOWLEDGEMENT

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TABLE

No	Formula	(2 <sub>0</sub> ) dw	$\alpha_{\mathrm{D}}^{20}$ (°c)	$A_{\rm m} \left[ \frac{1}{\mu { m m mol} \ { m \chi}} \right]$
- 1	$C_{10}H_{21}$ Conhch (CH <sub>3</sub> )	74–75	6.0+	0.32
2	C10H210-CH=CHCONHCH(CH3)-	102-103	+1.3	0.42
е	$C_5H_{11}$ $C_0O$ $C_0O$ $C_0O$	159.5	+1.5	0.49
7	$C_7H_1s$ CONHCH (CH 3)	162–163	+3.4	0.56
Ŋ	$C_{12}H_{25}O$ CH=NCH(CH <sub>3</sub> )	41	+6.7	0.45
9	$C_5H_{11}$ CH=NCH(CH <sub>3</sub> )	94–95	8.6+	0.53
7	$C_8H_{170}$ CH=NCH(CH <sub>3</sub> )	82	+10.0	0.52
∞	$C_{10}H_{21}O$ CH=CHCOO CH=NCH(CH <sub>3</sub> )	78–79	0.9+	0.53
6	C <sub>8</sub> H <sub>1</sub> 7 COCO CH=NCH (CH <sub>3</sub> )	K 110 I (84) S	+5.7	99*0
10	$C_8H_170$ CH <sub>2</sub> NHCH (CH <sub>3</sub> )	185/1 mm Hg	-4.2	0.26
11	C <sub>5</sub> H <sub>11</sub> CH <sub>2</sub> NHCH (CH <sub>3</sub> )	170/0.1 mm Hg	-4.3	0.36

boiling point

### REFERENCES

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- G Chilaya, Rev Phys Appl, 16, 193 (1981).
- GW Gray and DG McDonnell, Mol Cryst Liq Cryst, 48, 37 (1978).
- GW Gray and DG McDonnell, Mol Cryst Liq Cryst, 37, 189 (1976).
- P Keller, L Liebert, and L Strzelecki, J Phys (Paris), 37, 27 (1976).
- E Białecka-Florjańczyk, A Adamczyk, A Kołodziejczyk, K Łazowski, and M Chlebuś, IV International Conference of Socialist Countries on Liquid Crystals, Tbilisi, 5th-8th October 1981.
- H Finkelmann, J Koldehoff, and H Ringsdorf, Angew Chem, 90, 992 (1978).
- E Białecka-Florjańczyk, Polish Patent Announcement, WTU 1982.