Molecular Crystals and Liquid Crystals
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gmcl16

Mesomorphic Perhydrophenanthrene Derivatives

Daniel Varech [a] & Jean Jacques [a]
[a] Laboratoire de Chimie des Interactions Moléculaires, College de France, 75235, Paris Cedex, France
Version of record first published: 21 Mar 2007.

To cite this article: Daniel Varech & Jean Jacques (1983): Mesomorphic Perhydrophenanthrene Derivatives, Molecular Crystals and Liquid Crystals, 92:4-5, 141-142

To link to this article: http://dx.doi.org/10.1080/01406568308084531

Mol. Cryst. Liq. Cryst. Vol. 92 (Letters), pp. 141-142
0140-6566/83/9205-0141$18.50/0

Printed in the United States of America

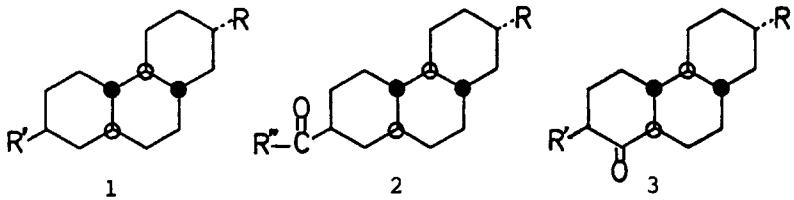
MESOMORPHIC PERHYDROPHENANTHRENE DERIVATIVES

Daniel VARECH and Jean JACQUES
Laboratoire de Chimie des Interactions Moléculaires
COLLEGE de FRANCE, 75235 PARIS Cedex, FRANCE

(Received for Publication July 16, 1983)

Abstract A series of 2α,7β-dialkyl-(4aα, 4bβ, 8aα, 10aβ) tetradecahydro-1,2,3,4,4a,4b,6,7,8,8a,9,10,10a-phenanthrenes have been prepared. Several of these hydrocarbons exhibit a nematic phase over a relatively large temperature range.

Organic compounds with mesomorphic properties though they are devoid of an appreciable permanent or induced electric dipole (i.e. hydrocarbons without Π electrons and/or heteroatoms such as O, N, S, halogens...) have not only an intrinsic theoretical interest, but also a practical one, as solvent for measuring the twisting power of chiral solutes in induced cholesterics [1].



1 2 3

In this letter we describe a few hydrocarbon perhydrophenanthrene derivatives (general formula 1) with nematic behaviour in a relatively wide temperature range. The preparation of these compounds and connected stereochemical problems will be reported fully elsewhere. Our results are summarized in Table I.

Phase transition temperatures were determined by means of polarizing microscopy as well as by differential scanning calorimetry measurements (Perkin-Elmer DSC 2). Enthalpies of

TABLE I

Phase transitions (°C) of compounds 1

R	R'	K				N			I
C_5H_{11}	C_3H_7	•	74.5	*6.9* ,	78.5	*7.4*(*)	•	86.0	*0.14* •
C_5H_{11}	C_4H_9	•	70.0	*4.9*			•	86.5	*0.13* •
C_5H_{11}	C_5H_{11}	•	86.0	*7.8*			•	93	*0.14* •
C_5H_{11}	C_6H_{13}	•	71.0	*5.0*			•	93	*0.14* •
C_5H_{11}	C_7H_{15}	•	68.0	*6.6* ,	74.0	*8.5*(*)	•	95.5	*0.19* •
C_7H_{15}	C_6H_{13}	•	56.5	,	64.5	*6.7*(*)	•	84.0	*0.15* •
C_7H_{15}	C_7H_{15}	•	80.0	*8.9*(*)			•	98.5	*0.19* •
C_7H_{15}	$C_{10}H_{21}$	•	88.0	*14.0* ,	91.0	*15.2*	(•	89.5)	•
C_7H_{15}	$C_{11}H_{23}$	•	91.0	*16.9*(*)			(•	89.0 *0.25*)	•
C_7H_{15}	H	•	38.0	*4.6*					•
C_7H_{15}	*iso*-C_6H_{13}	•	76.0	*9.8* ,	78.5	*11.0*(*)	(•	74.0 *0.12*)	•

transition in Kcal/mol are given in italics.

Compounds marked with (*) exhibit a crystal-crystal polymorphism near the melting point involving some relatively imprecise data for their crystal-mesophase or crystal-isotropic liquid transitions. (It should be observed incidentally that some intermediate ketonic compounds 2 and 3 also exhibit mesomorphic properties).

It has already been noted that structure containing only carbon and hydrogen atoms may exhibit mesomorphic properties : cholesteric and/or smectic A with 3β-alkyl cholestanes [2] and smectic B with perhydroterphenyls [3].

The existence of hydrocarbons 1 with a quite relatively large nematic range underlines the importance of geometrical factors in liquid crystal organisation.

We are grateful to Drs M.J. Brienne and J. Malthête for their help in the characterization of the mesomorphic phases and to Mrs Lacombe for assistance in the chemical part.

References

1) J.P. Berthault, J. Billard and J. Jacques, C.R. Acad. Sciences 284, serie C, 155 (1977).
2) J. Malthête, J. Billard and J. Jacques, Mol. Cryst. Liq. Cryst. (letters) 41, 15 (1977).
3) J. Billard and L. Mamlok, Mol. Cryst. Liq. Cryst. (letters) 41, 217 (1978).