

This article was downloaded by: [Tomsk State University of Control Systems and Radio]

On: 21 February 2013, At: 11:19

Publisher: Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954

Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



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, Collège 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>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages

whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

MESOMORPHIC PERHYDROPHENANTHRENE DERIVATIVES

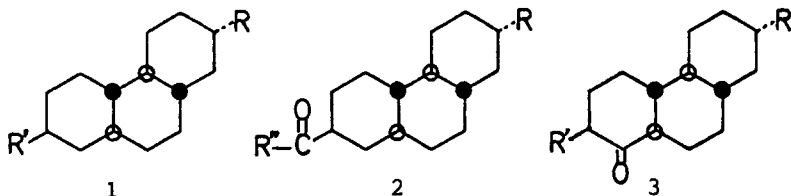
Daniel VARECH and Jean JACQUES

Laboratoire de Chimie des Interactions Moléculaires
 COLLEGE de FRANCE, 75235 PARIS Cedex, FRANCE

(Received for Publication July 16, 1983)

Abstract A series of 2 α ,7 β -dialkyl-(4 $\alpha\alpha$, 4 $\beta\beta$, 8 $\alpha\alpha$, 10 $\alpha\beta$) tetradecahydro-1,2,3,4,4 α ,4 β ,6,7,8,8 α ,9,10,10 α -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⁾.



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 ₅ H ₁₁	C ₃ H ₇	• 74.5 6.9 , 78.5 7.4(*)	• 86.0 0.14	•
C ₅ H ₁₁	C ₄ H ₉	• 70.0 4.9	• 86.5 0.13	•
C ₅ H ₁₁	C ₅ H ₁₁	• 86.0 7.8	• 93 0.14	•
C ₅ H ₁₁	C ₆ H ₁₃	• 71.0 5.0	• 93 0.14	•
C ₅ H ₁₁	C ₇ H ₁₅	• 68.0 6.6 , 74.0 8.5(*)	• 95.5 0.19	•
C ₇ H ₁₅	C ₆ H ₁₃	• 56.5 , 64.5 6.7(*)	• 84.0 0.15	•
C ₇ H ₁₅	C ₇ H ₁₅	• 80.0 8.9(*)	• 98.5 0.19	•
C ₇ H ₁₅	C ₁₀ H ₂₁	• 88.0 14.0 , 91.0 15.2 (• 89.5)		•
C ₇ H ₁₅	C ₁₁ H ₂₃	• 91.0 16.9(*)	(• 89.0 0.25)	•
C ₇ H ₁₅	H	• 38.0 4.6		•
C ₇ H ₁₅	iso-C ₆ H 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 3 β -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).