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

On: 23 February 2013, At: 03:53

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

A Mesogenic Homologous Series Containing a Phenolic End Group

R. A. Vora ^a & Miss R.S. Gupta ^a

^a Applied Chemistry Department, Faculty of Technology and Engineering,
 M.S. University of Baroda, P.B. No. 51, Baroda, 390 001, India
 Version of record first published: 20 Apr 2011.

To cite this article: R. A. Vora & Miss R.S. Gupta (1979): A Mesogenic Homologous Series Containing a

Phenolic End Group, Molecular Crystals and Liquid Crystals, 56:1, 31-34

To link to this article: http://dx.doi.org/10.1080/01406567908070477

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.

Mol. Cryst. Liq. Cryst. Vol. 56 (Letters), pp. 31-34 0140-6566/79/5601-0031\$04.50/0 © 1979, Gordon and Breach, Science Publishers, Inc. Printed in the United States of America

A MESOGENIC HOMOLOGOUS SERIES CONTAINING A PHENOLIC END GROUP

R.A. VORA AND MISS R.S. GUPTA Applied Chemistry Department, Faculty of Technology and Engineering, M.S. University of Baroda, P.B. No. 51, Baroda 390 001, India

(Submitted for Publication March 14, 1979)

ABSTRACT: The first extensive homologous series of phenolic derivatives exhibiting mesomorphic properties, 4(4'-n-alkoxybenzoyloxy)benzylidene-4"-aminophenols(I), has been synthesized and their mesomorphic behaviour studied.

Very few compounds with free hydroxy and amino groups are reported to be mesomorphic. 1-5 Gray had explained this rarity of mesomorphism in such compounds by suggesting that intermolecular hydrogen bonding raises the melting point above the mesophase-isotropic liquid transition temperature and perhaps also encourages a non-linear molecular arrangement that is incompatible with mesophase formation. Recently Schroeder and Schroeder have reported some mesogenic compounds with terminal hydroxy and amino groups. Here we are reporting the first extensive homologous series having a terminal hydroxy group attached to a benzene moiety.

Thirteen compounds were synthesized by condensing 4-n-alkoxybenzoyloxy-4'-benzaldehydes with p-aminophenol in ethanol. The Schiff bases, 4(4'-n-alkoxybenzoyloxy)benzylidene-4"-aminophenols(I), separated out. These were filtered and recrystallized from ethanol until constant transition temperatures were obtained.

p-n-Alkoxybenzoic acids were prepared by the modified method of Dave and Vora. The p-n-alkoxybenzoyl chlorides obtained by the reaction of p-n-alkoxybenzoic acids and thionyl chloride were condensed with p-hydroxybenzaldehyde in the presence of pyridine to obtain 4-n-alkoxybenzoyloxy-4'-benzaldehydes. The melting points and transition temperatures of all the aldehydes agree well with the reported values. 10

The melting points and transition temperatures of the Schiff bases are reported in Table 1.

The behaviour of the present phenolic homologous series is similar to the normal nematogenic homologous series. The first members of the series exhibit purely nematic mesophases, middle members exhibit both smectic and nematic mesophases, whereas, the last two members are purely smectic. This behaviour is quite interesting as Schroeder and Schroeder have proposed a hypothesis that a phenolic end group is compatible with both nematic and smectic mesomorphism via end-to-end and sidewise hydrogen bonding, respectively.

The structure of the Schiff bases(I), has close similarity with the structures of Steinstrasser's mesomorphic phenol² and the p-phenylene dibenzoates reported by Schroeder and Schroeder.^{7,8} In the present series of Schiff bases(I), the middle groups are ester and azomethine, whereas, in the above mentioned mesomorphic phenols both the middle groups are esters. This indicates, the Schiff bases do indeed conform to the picture that is emerging of the requisite structural characteristics for mesomorphic phenols.

Table 1

Ι

			·	
R=	Transi	Transition temperatures °C		
n-Alkyl group	Smectic	Nematic	Isotropic	
Methyl	-	205	275 (d)	
Ethyl	-	197	275 (d)	
Propyl	-	193	245 (d)	
Butyl	-	194	250 (d)	
Pentyl	-	190	235	
Hexyl	-	178	235	
Heptyl	-	175	215	
Octyl	-	131	216	
Decyl	(142) *	150	205	
Dodecyl	152	160	191	
Tetradecyl	145	175	188	
Hexadecyl	135		194	
Octadecyl	145	-	188	

 $^{^\}star$ Value in the parentheses indicates monotropy.

The transition temperatures of some of these compounds exhibit variations depending on the thermal history. This shows the presence of more than one solid modification.

In some of the nematic mesophases the typical textures are observed which are not focal-conic in nature. The smectic mesophases exhibit focal-conic texture. All these compounds

are being investigated further for their thermal history and detailed characteristics of different textures.

One of us (RSG) thanks University Grant Commission (India) for financial assistance.

REFERENCES:

- D. Vorlander, <u>Z. Phys. Chem. (Leipzig)</u>, 105, 211 (1923);
 126, 470 (1927).
- 2. R. Steinstrasser, <u>Angew. Chem. Int. Ed. Engl.</u>, 11, 633 (1972).
- P. Culling, G.W. Gray and D. Lewis, J. Chem. Soc., 2699 (1960).
- 4. I. Teucher, C.M. Paleos and M.M. Labes, Mol. Cryst. Liq. Cryst., 11, 187 (1970).
- M. Sorai and S. Seki, <u>Bull. Chem. Soc.</u>, <u>Jap.</u>, <u>44</u>, 2887 (1971).
- G.W. Gray, "Molecular Structure and the Properties of Liquid Crystals", Academic Press, New York, 1962, p. 162
- 7. D.C. Schroeder and J.P. Schroeder, <u>J. Am. Chem. Soc.</u>, 96, 4347 (1974).
- 8. D.C. Schroeder and J.P. Schroeder, <u>J. Org. Chem.</u>, <u>41</u> 2566 (1976).
- J.S. Dave and R.A. Vora, "Ordered Fluids and Liquid Crystals", Plenum Press, 1970, p. 477.
- 10. J.S. Dave and G. Kurian, <u>J. Phys.</u>, <u>36Cl</u>, 403 (1975).