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MESOGENIC ANTHRAQUINONE DERIVATIVES

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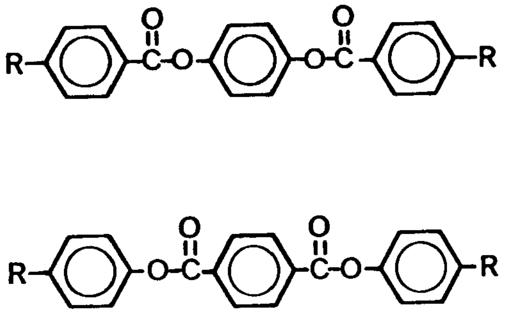
Abstract: Anthraquinone-2.6-diesters and anthraquinone-2.6-diamides are described. The diester derivatives exhibit wide-range nematic phases, while the diamides do not.

Examples of diester derivatives (I) of hydroquinone and terephthalic acid exhibiting mesomorphic behaviour are well documented in the literature.[1]

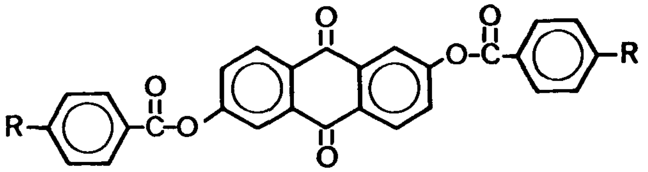


I

R= Alkyl, alkoxy.

When the central benzene ring in those rod-like disubstituted derivatives is replaced by a cyclohexane, bicyclo-octane or cubane unit, the mesogenic properties are still preserved.[2]

We report here, the mesomorphic properties of some 2.6-dibenzoyloxy-anthraquinone derivatives (II).



II

R = C_5H_{11} , C_6H_{13} , C_7H_{15} , C_8H_{17} , $C_5H_{11}O$, $C_8H_{17}O$.

Compounds (II) were readily obtained by reacting the 2.6-dihydroxy-anthraquinone with the corresponding benzoyl chloride in pyridine in the usual manner. The crude product was then recrystallized and purified by column chromatography. Their structures were confirmed by spectroscopic methods.

The phase transitions of compounds (II) were determined by a Mettler DTA 2000 B apparatus and observed by a microscope equipped with a Mettler FP 52 hot stage and Mettler FP 5 melting point apparatus. All compounds exhibit wide-range nematic phases. The results are summarized in Table 1.

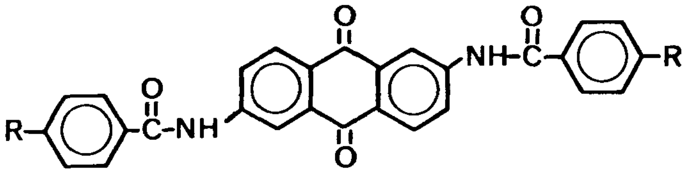
TABLE 1

Transition temperatures of compounds (II)

R	Tm (°C)	S-N (°C)	N-I (°C)
C_5H_{11}	167	-	299.4
C_6H_{13}	156	-	269
C_7H_{15}	143	-	267
C_8H_{17}	143.3	146.4	252
OC_5H_{11}	177	-	317
OC_8H_{17}	166.5	(153)	280

The even-odd effect of nematic-isotropic transition temperature with respect to the alkyl chain length is also observed in this case. With longer alkyl and alkoxy substituents smectic phases appear.

It is interesting to note that all the corresponding 2.6-dibenzamido-anthraquinone derivatives (III)



III

are not mesogenic and have very high melting points. Studies with hot stage microscopy and DTA, in the cooling mode, did not show any mesogenic transition. In Table 2 are given the thermal data of compounds (III).

TABLE 2

Transition temperatures of compounds (III)

R	Tm (°C)
C_6H_{13}	364.0
C_7H_{15}	357.5
C_8H_{17}	350.0

REFERENCES

[1] See for example: J.A. Castellano and K.J. Harrison in *The Physics and Chemistry of Liquid Crystal Devices*, ed. G.J. Sprokel (Plenum, New York, 1980), p.263-287; D. Demus and H. Zaschke, *Mol. Cryst. Liq. Cryst.*, *63*, 129 (1981).

[2] G.W. Gray, N.A. Langley, and K.J. Toyne, *Mol. Cryst. Liq. Cryst. Letts.*, *64*, 239 (1981) and the references cited therein.