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Influence of different linkages on the mesomorphic properties of aromatic ring system liquid crystals

Uhood J. Al-Hamdani, Nezar L. Shihabaldain, Duaa S. Al-Mayah, and Ahmed M. Jassem

Department of Chemistry, College of Education for Pure Sciences, Basrah University, Basrah, Iraq

ABSTRACT

In order to study the effect of the central linkage on the mesomorphic behaviour of aromatic ring liquid crystals we have synthesized two homologues groups, group A includes compounds **1a-d** and group B includes compounds **2a-e**. Group A has azo, azomethine, azo-ester, and azomethine-ester central linkages whereas the group B has azomethine, ether-azomethine, heterocyclic, and methylene-azomethine central linkages. The synthesized compounds were identified and characterized by elemental analyses and spectroscopic methods (proton nuclear magnetic resonance and Fourier transform infrared). The mesomorphic properties were investigated by polarizing optical microscopy (POM) with a heating stage and differential scanning calorimetry (DSC) thermograms with an aim to investigate the influence of different types of linkages on the mesomorphic properties in such aromatic ring systems. The results revealed that the change of the central linkages has a crucial effect on the mesomorphic properties when compared to the influence of different types of linkages. We found that the synthesised compounds (**1a-d**) showed smectic phase with different thermal ranges, while the synthesised compounds (**2a-e**) showed nematic phase except the compounds **2c-e** which did not exhibit any liquid crystalline phase.

KEYWORDS

Aromatic ring liquid crystals; azo; azomethine; ester; linking groups

Introduction

Nowadays, thermotropic liquid crystal materials offer foreseeable applications as they are the basis of displays in mobile telecommunication, storage units, biomedical diagnosis, and computing devices [1–4]. The thermotropic liquid crystal molecules that are used in these devices almost have a rod-like shape [5]. The rod- or disk–like shaped molecules used to be a fundamental prerequisite for conventional formation of thermotropic liquid crystal molecules due to the steric packing considerations which play an important role in this interesting state of soft matter [6]. In the rod-like liquid crystal molecules with linear structure, these molecules are required to have certain rigid structures [7].

Generally, a proper selection of different building blocks such as core moieties, linking groups and terminal substituents is an effective strategy for designing liquid crystal

CONTACT Ahmed M. Jassem ahmed.majedd@uobasrah.edu.iq Department of Chemistry, College of Education for Pure Sciences, Basrah University, Basrah, Iraq.