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Evaluation of the Effect of Citronellol Group on Functionalized Mesogenic Materials by Capillary GC

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Abstract: In this paper, the effects of functionalization with terpenes on two new liquid-crystalline stationary phases for gas chromatography (GC) are described. Citronellol was used as the terminal group in the first material, and tetrahydrogeraniol was used with a second material. Inverse GC showed that the new materials have wide liquid-crystalline ranges (mesophases), 371–500 and 395–501 K, respectively. Moreover, they show good thermal stability up to 523 K and good potential as stationary phases for capillary GC. To clarify the effects of the liquid crystal structures and functional groups on retention and separation, the chromatographic behaviors of the two stationary phases were compared by eluting alkylbenzenes, polycyclic aromatic hydrocarbons, aromatic compounds, and terpenoids. The selectivities for a wide range of analytes achieved using the citronellol column were significantly better than those obtained using the tetrahydrogeraniol column. The columns showed different retention behaviors and fine resolutions for some of the main constituents of essential oils. Introduction of the double bond of citronellol greatly improved the polarization interactions involved in the shape recognition of the liquid-crystalline state for isomers. The new citronellol liquid-crystalline stationary phase, therefore, has a high affinity for natural compounds.

Keywords : Capillary gas chromatography, Terpenoid liquid crystal, Stationary phase