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Short Communication

Gas Chromatographic Separation of Polycyclic Aromatic Compounds

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DESCRIPTION

A novel series of side-chain liquid crystalline copolysiloxanes containing [S]-1-(2-naphthyl) alkyl 6-[4-(10-undecen-1-yloxy) biphenyl- -carbonyloxy]-2-naphthoate mesogenic and 4-biphenyl-allyloxybenzoate mesogenic side groups within the backbone and side chains liquid crystalline copolymers were ready and evaluated as attainable stationary phases. All copolymers show enantiotropic cholesteric phases. These mesomorphic polysiloxanes specimens with the widest temperature vary were they used as the stationary phase in a gas chromatography capillary column, and they showed smart thermal and physical stability, chemical immobility, and distinctive separation properties for polycyclic aromatic compounds. These cholesteric LC copolysiloxane stationary phases show far better separation results for the polycyclic hydrocarbon than those of the nematic and smectic LC copolysiloxanes.

Increasing necessary analyses of isomeric compounds and therefore the issues encountered in their separation necessitate a study of additional efficient systems that exhibit a high sensitivity. In Gas Chromatography (GC) new selective stationary phases are examined. Attention is targeted on the utilization of drugs with oriented molecules that allow selective separations; these properties are exhibited by, for example, the inclusion of some compounds and liquid crystals [1,2]. Though the interaction mechanisms are totally different from liquid crystals, the stereoselective properties are therefore necessary that it's desirable to deal with their potential use in gas chromatography. The interaction mechanism with the inclusion of some compounds is based on a selected interaction throughout the molecule is inserted, the total molecule or a part of it, into a cavity in another molecule (the host) so as to realize a state with minimum energy.

Liquid crystals describe a mesomorphic material between solid crystalline substances and isotropic liquids. Mesophases are formed that have ordered structures that may be nematic, smectic, or cholesteric. On more heating, the orientation is disturbed and therefore the phases regenerate into an isotropic liquid. The long structure of liquids causes isomers with additional drawn-out shapes to be readily dissolved within the ordered liquid crystal substrate (mesophase) so yielding stronger sorbate-sorbent interactions. Liquid crystals are used as stationary parts in gas chromatography to separate a range of compounds including isomeric mixtures that can't be separated on standard stationary phases. Conventional stationary part separation of analytes is based on variations in vapor pressures of the solutes and/or variations in solubility arising from specific energetic interactions [3]. A liquid stationary part separates analytes based upon variations in solute molecular form, with the anisotropic packing behavior of liquid crystalline materials allowing the separation of isomers based on their individual molecular geometries.

Polysiloxane has been used as the backbone for the side-chain liquid crystalline polymers due to its properties of low glass transition temperature and high thermostability. Stationary phases supported low molecular mass, liquid crystals gain substantial potency after they are connected to flexible polymer backbones. A flexible spacer between the backbone and mesogenic unit permits the resulting polymers to retain liquid crystalline properties [4]. Polymeric stationary phases containing liquid crystalline substituents are fascinating for their high thermal stability.

Cholesteric polymers will be obtained by copolymerization of a nematogenic chemical compound (4-biphenyl 4-allyloxybenzoate) with a chiral commoner ([S]-1-(2-naphthyl) alkyl 6-[4-(10-undecen-1-yl-oxy) biphenyl-4-carbonyloxy]-2-naphthoate). A cholesteric mesophase will be realized by changing the composition of mesogens connected to a polysiloxane backbone. Among these polymers, we tend to choose P3, which shows the widest temperature range of cholesteric part, to fabricate the capillary column stationary part.

Side-chain liquid crystalline polysiloxanes with wide temperature ranges of cholesteric part are verified to be helpful in separating PAH compounds. The obtained polymers showed terribly high thermal stability and had wide temperature ranges related to the cholesteric liquid part. These results could also be due to the twisted packing structure of the cholesteric mesophase exhibited by the new stationary phases [5]. As a result of the separation is based on molecular form, isomers that have similar intrinsic properties can be separated by these varieties of mesomorphic polymer stationary phases. The prepared column described here

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displayed high column potency and holds promise for the separation of a wide range of PAH compounds.

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