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Basic Chromatographic Properties of Polyethylene Glycol-type, Polymer-based Monolithic Columns

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We have prepared polyethylene glycol (PEG)-type, polymer-based monolithic columns (PEG-type columns) to study the basic properties of PEG-type monolithic polymers. Chromatographic characteristics of the PEG-type columns were obtained using a semi-micro HPLC system while polycyclic aromatic hydrocarbons and benzene derivatives having various functional groups were utilized as solutes. Results were compared with those of commercially available polymer-based packed columns. PEG-type columns showed greater recognition ability for planar solutes based on separation factors, α (*k* triphenylene/*k* *o*-terphenyl) and α (*k* pyrene/*k* naphthalene). Benzene derivatives having a carboxyl group or a phenolic hydroxyl group, *i.e.*, benzoic acid and phenol, tended to be retained more preferentially on the PEG-type column than other solutes without a carboxyl group or a phenolic hydroxyl group. These recognition abilities towards carboxyl group and/or phenolic hydroxyl group were found to be greater on the PEG-type columns having the longer ethylene oxide chains. However, unexpectedly HILIC mode did not work, even in 95% AN mobile phase, for nucleic-acid bases, benzoic acid, or phenol that careful studies suggested hydrophobic interaction was the dominant retention mechanism, while relatively weak hydrogen bonding between proton on carboxyl group or phenolic hydroxyl group of the retained solutes and oxygen in ethylene oxide chain on the PEG-based polymer prolonged the hydrophobic-based retentions.

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