

C-II1

Mobility of some Benzene Derivatives on Progressively Dried Fe (III)-Impregnated Silica Gel

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It is known that the surface of rocks, sediments and soils have active functional groups, in particular OH, derived from hydrous oxides or organic materials. The hydroxy groups of metal hydroxy/oxides are active factors for processes of interaction with organic ligands i.e. formation of inner sphere surface complexes (1).

In the transformation of iron in soils and sediments, and also in biochemical systems, great importance has been attributed to the dissolution of iron hydrous oxides (2). In natural systems this process is affected by biogenic ligands such as organic acids - dicarboxylic or hydroxy carboxylic. Iron hydrous oxides may differ widely with regard to chemical composition and structure and consequently may have different chemical reactivity (3,4,5,6).

In our work we examined the dependence of the level of hydration of iron hydrous oxides on the behaviour (binding) of some benzene derivatives, as a model system for natural conditions. As the technique thin-layer chromatography on silica gel impregnated with Fe(III)-ions was applied. The plates were prepared by spraying with iron nitrate solution and dried at 140°C for different time intervals. Developers were distilled and tap waters. Organic model compounds were pyrogallol and salicylic acid.

It was found that prolonged drying of the support increased mobility of the compounds. This phenomenon can be explained by formation of different species of silica gel Fe(III) complexes containing decreasing amounts at hydroxy groups and water. The results are given in Table 1. representing the dependence of $R_f \times 100$ of the compounds on drying time.

Table 1.

Compound	Time of drying at 140°C		
	5 min	3 h	22 h
Pyrogallol	$R_f = 20$	$R_f = 24$	$R_f = 54$
Salicylic acid	$R_f = 30$	$R_f = 37$	$R_f = 49$

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