

### Model Investigation of Interaction of some Benzene Derivatives with Metals Related to Soils and Sediments

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It is considered (1) that processes of alteration and dissolution of minerals of soils and sediments are a consequence of surface reactions occurring, beside the others (such as H<sup>+</sup> action), between OH-groups on the surface of hydrous oxides and dissolved organic ligands through coordination and surface complexes formation. Investigation with natural occurring materials (2-4) revealed that in dissolution of metals through complexation the most important role have the compounds with carboxy and hydroxy functional groups. These compounds, being mostly benzene derivatives, are either degradation products of humic material or are found as free molecule in soils and sediments (5-7). These facts initiated us to investigate the chromatographic behaviour of some benzene derivatives on various supports, such as: silica gel (8), alumina and silica gel impregnated with Fe(III) (9), Ca and Mg ions to simulate natural conditions. Organic model compounds were benzene derivatives with carboxy, hydroxy and methoxy groups. Thin layer chromatography was performed using tap and distilled waters as developers.

The following results were found:

- benzene carboxylic and phenolic acids exhibit small mobility on plain plates of silica gel and alumina and also on plates impregnated with Ca and Mg ions. This can be attributed to low solubility of the compounds in water. On the same supports the mobility of the compounds having two hydroxy or an aldehyde group is greater.
- on Fe(III) impregnated plates the mobility of the compounds examined is greater or lesser than on plain plates depending on the properties of the complexes formed with iron oxy/hydroxide. In addition, it is dependent on the way of how the plates are prepared; by prolongation of drying the plates, the mobility of the compounds is increased. This can be explained by decreasing the amount of hydroxy groups and water on the support and thus by different complexes formed.

The chromatographic data obtained can give us some information about the behaviour of the complexes formed as well as about the possible activity of the compounds tested against metal oxides in soils.

#### References:

1. W. Stumm, B. Wehrli and E. Wieland, *Croat. Chem. Acta* **60** (1987) 429.
2. M. Schnitzer and S.I.M. Skinner, *Soil Sci.* **94** (1965) 278.
3. M. Schnitzer and P.A. Poabst, *Nature (London)* **213** (1967) 598.
4. T. Takamatsu, R. Kusakabe and T. Yoshida, *Soil Sci.* **136** (1983) 371.
5. J.I. Hedges and P.L. Parker, *Geochim Cosmochim. Acta* **40** (1976) 1019.
6. I. Kogel and R. Bochter, *Soil. Biol. Biochem.* **17** (1985) 637.
7. G. Eglinton and M.T.J. Murphy, *Organic Geochemistry*, Springer Verlag, Berlin, 1969, p. 566.
8. O. Hadžija, S. Iskrić and M. Tonković, *J. Chromatogr.* **402** (1987) 358.
9. O. Hadžija, S. Iskrić and M. Tonković, *J. Chromatogr.* **464** (1988) 220.

### Relationship between Specific Surface Area and Bulk Properties of Particulates - Investigation in the Northern Adriatic

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Geochemical and sedimentological investigations of particulates (suspended matter and sediments) in the northern Adriatic Sea revealed direct relationship between surface properties of particulates (specific surface area, SSA) and granulometric and mineralogic composition. Suspended matter samples, collected by sediment traps, have a mean size between 3 and 10  $\mu\text{m}$ , large quantities of aluminosilicates, and SSA between 7 and 23  $\text{m}^2/\text{g}$ . Investigated sediment samples (surface samples and core samples up to 2 m deep) vary in size between 5 and 180  $\mu\text{m}$ , have carbonate share between 2 and 50 %, and SSA between 1 and 15  $\text{m}^2/\text{g}$ .

Mineralogic composition and grain size distribution are interrelated indicating that samples having more clay minerals (either sediments or suspended matter) are always fine-grained. On the other hand coarse sediments have more quartz and carbonates.

It was found that the SSA is apparently most dependent to grain size. However, laboratory investigations show that mineralogic composition is the most important factor that governs the SSA of the inorganic core of particulates.

Organic matter found in large concentrations in investigated samples (up to 16.5 %) considerably changes the SSA of investigated samples. In the investigated samples organic matter present in sediment samples usually increases the SSA, whereas the surface of suspended matter is usually blocked by the organics.

#### References

1. Rabitti, S., Boldrin, A. & Menegazzo Vitturi, L. (1983): Relationship between surface area and grain size in bottom sediments. *J. Sediment. Petro.*, **53**, 665-667.
2. Jednačak-Biščan, J. & Juračić, M. (1987): Organic matter and surface properties of solid particles in the estuarine mixing zone. *Mar. Chem.*, **22**, 257-261.