

THE INFLUENCE OF ORGANIC SUBSTANCES ON THE ZETA POTENTIAL OF CALCITE

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Suspended matter in river waters is the important transport mean for some contaminants, because of the mutual interaction of adsorbing mineral particles and dissolved organic or inorganic species. The attraction forces which govern adsorption processes depend on the properties of adsorbates and adsorbents, and on some physico-chemical parameters (pH, salinity, temperature). For that reason the fate of contaminants is decided in estuarine regions where those parameters change rapidly and cause :

1- adsorption which leads to flocculation and sedimentation and removal of contaminants from the water column (SONDI *et al.*, 1994);

2- remobilization of already adsorbed material which can be carried further into the sea or become biologically available (ELBAZ-POULICHET *et al.*, 1982).

The aim of our work was to study the behavior of suspended particles in relation to changes of pH, salinity and organic matter concentration encountered in estuarine regions. For that purpose we used calcite (pure chemical precipitate) as one of representatives of mineral compounds in natural estuarine and sea waters of Adriatic region and studied its behavior in the transition from riverine to seawater. As an indicator of changes we used zeta potential (ζ , mV), a parameter calculated from the results for electrophoretic mobility (epm). Epm measurements were made with an automated apparatus for microelectrophoresis, PenKem 3000.

The results have shown that in initial solution (10^{-3} mol dm^{-3} NaCl representing river water) model minerals show different values of zeta potential - not only in range, but also in sign. Namely, opposite to all other minerals, calcite shows positive value for zeta potential in pure NaCl solution. Titration of the initial suspension with artificial seawater (ASW) slightly reduced zeta potential of all samples, but charge reversal of calcite was observed only after titration with natural seawater (Table 1).

Table 1: Zeta potential of model minerals in different solutions

Model mineral	10^{-3} mol dm^{-3} NaCl	ASW	NSW
calcite	+ 20 mV	+ 5 mV	- 10 mV
quartz	- 50 mV	- 7 mV	- 12 mV
montmorillonite	- 30 mV	- 12 mV	- 15 mV

Where is the origin of the negative zeta potential in NSW? BISCAN and DRAGCEVIC (1993) found that the reasons could be either amorphous Fe and Mn oxides in calcite sample, or adsorbed organic material. Since the seawater contains a wide variety of organic substances our aim was to find which type of organic matter can reverse the positive charge of calcite into a negative. For that purpose we exposed calcite to the influence of some organic substances (fulvic, citric, oxalic and some saturated fatty acids - propionic, capric and myristic) in 10^{-3} mol dm^{-3} NaCl and artificial seawater (ASW). Fulvic acid caused the charge reversal at a concentration of about 0.4 mg dm^{-3} , and citric acid caused the reversal of charge at about 5×10^{-5} mol dm^{-3} . No effect on the zeta potential was observed either for oxalic acid or for the saturated fatty acids in the concentration range between 5×10^{-7} and 10^{-4} mol dm^{-3} . The results obtained revealed some organics which can reverse the positive charge of calcite, but they also showed that this is not just the question of the type of organic matter but also the question of concentration. Studies of the assessment of the adsorption of these organics at the calcite surface are in progress.

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