A CRITICAL REVIEW OF THE ELECTROKINETICS OF CLAY MINERAL PARTICLES

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Chemical properties of soils and aquatic sediments are largely determined by the surface physicochemical interactions at the mineral surface and aqueous interface (Stumm, 1992; Sposito, 1984). Electric charge and ionic interaction of complex surface processes is conveniently studied by electrokinetic measurements (Hunter, 1986; Williams and Williams, 1978; Sondi et. al., 1996; Leroy and Revil, 2004). Its outmost importance is in studies of clay minerals the main components of suspended matter and sediments in natural aquatic systems (Sondi and Pravdić, 2001; Sondi and Pravdić, 2002).

This lecture discusses the electrokinetic properties of clay mineral particles, based on knowledge of diversity of their structural properties, chemical composition, and surface physicochemical interactions. Such studies have been spawning much interest in environmental science and material chemistry studies.

Numerous investigations have shown that organic matter adsorbed at the particle surfaces, modifies the original physicochemical properties of underlying surfaces, and dominates surface interactions of mineral particles with the aquatic medium (O'Melia, 1989; Beckett and Le, 1990; Sondi and Pravdić, 2001). In natural aquatic systems, the omnipresent humic substances are the most important component of the organic film covering the surface of mineral particles, particularly of high adsorptive capacity clay minerals (Sposito, 1984). Therefore, this lecture also describes the influence of adsorption of humic macromolecules on electrokinetic properties. As a real life example, the electrokinetic behaviour of suspended clay mineral particles from the River Raša (Istrian Peninsula, Croatia) will be discussed in view of their colloid stability, coagulation and sedimentation (Sondi et. al., 1995).

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