Adsorption of Organic Diacids and Sodium Polyacrylate onto Montmorillonite

B. Siffert and P. Espinasse

Centre de Recherches sur la Physico-Chimie des Surfaces Solides, 24, Avenue du Président Kennedy, 68200 Mulhouse, France

Abstract: Organic diacid (oxalic and succinic) adsorption onto montmorillonite is feasible, but weak (～1 mg/g). The comparison of chemical and radiochemical determinations reveals that 80% of the acid in contact with the smectite is used to attack the clay lattice. The pH is the main parameter involved in adsorption, and fixation passes through a minimum for pH 6 to 7. Polyacrylate adsorption is also weak (～1.5 mg/g). It changes with the nature of the exchangeable cation of smectite. Its pH-dependence displays a pronounced maximum for a value corresponding to the pK_a of the acidic functions (pH ～6.8), and a minimum at about pH 8. On the assumption that a polyacrylate macromolecule is 100% hydrolyzed, it follows that the-COOH groups carried by 20% hydrolyzed polyacrylamide molecules (such as those used in the tertiary recovery of petroleum) contribute at the very most to 10% of the total adsorption onto clay. Fixation, therefore, involves predominantly protonation of the amide functions at the edge surfaces of the clay. The acidic functions play a minor role in the adsorption phenomenon in that they affect the length of the macromolecule. The extent of this contribution, however, is virtually impossible to estimate.

Key Words: Adsorption • Montmorillonite • Organic diacids • Polyacrylate • Polyacrylamide

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