
Dimepiperate Adsorption and Hydrolysis on Al³⁺-, Fe³⁺-, Ca²⁺-, and Na⁺-Montmorillonite

A. Pusino¹, W. Liu² and C. Gessa³

¹ Istituto di Chimica Agraria e Forestale, Università di Reggio Calabria, Piazza San Francesco di Sales 4, 89061 Gallina (RC), Italy

² Department of Chemistry, Zhejiang University, Hangzhou 310027, People's Republic of China

³ Istituto di Chimica Agraria, Università di Bologna, Via Berti Pichat 11, 40127 Bologna, Italy

Abstract: The adsorption of the herbicide dimepiperate S-(α,α -dimethylbenzyl)-1-piperidinecarbothioate on homoionic Fe³⁺-, Al³⁺-, Ca²⁺-, and Na⁺-montmorillonite was studied in aqueous medium. The adsorption is described well by the Freundlich equation. The adsorption capacity decreases in the order Fe³⁺ > Al³⁺ > Ca²⁺ > Na⁺ clay. The dimepiperate adsorption from chloroform solution was also investigated by analytical, spectroscopic, and X-ray powder diffraction techniques. IR results suggest that the adsorption involves the interaction of the thioester carbonyl group of dimepiperate possibly with the surrounding water of metal ions. On Al³⁺ and Fe³⁺ clays, this interaction leads to hydrolysis of the thioester bond and formation of the thiol and carbamic acid derivatives that yield α -methylstyrene and piperidine, respectively.

Key Words: Adsorption • Dimepiperate • Hydrolysis • Infrared spectroscopy • Interlayer cations • Montmorillonite • Pesticides

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