
Hydrolysis of Azinphosmethyl Induced by the Surface of Smectites

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Abstract: The effect of layer charge and of the interlayer cations of smectites on the hydrolysis of azinphosmethyl (0,0-dimethyl S-((4-oxo-1,2,3-benzotriazine-3(4H)-yl)methyl)phosphorodithioate) in an aqueous medium was investigated. Ultraviolet spectroscopy was used for monitoring the hydrolysis process. Hydrolysis of the pesticide is catalyzed by Ca-hectorite (layer charge 0.216) but is not catalyzed by Ca-nontronite nor by Ca-montmorillonites with a layer charge above 0.216. The Mg- and Cu-hectorites and Cu-montmorillonite with a layer charge of 0.264 also show catalytic activity. The catalytic activities of the Ca^{2+} and Cu^{2+} cations as exchange cations of the smectite and as salts are compared. In agreement with previously reported work, the results show that the hydrolysis of azinphosmethyl may involve the adsorption of the pesticide into the interlayer space of the smectites, forming a hidentate complex with the interlayer cations. This interaction must enhance the electrophilic nature of the phosphorus atom, thereby facilitating its nucleophilic attack by the OH ion and producing rupture of the P–S bond.

Key Words: Hydrolysis • Adsorption • Azinphosmethyl • Smectite • Organophosphorus pesticides

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