Interaction of the Herbicide Acifluorfen with Montmorillonite: Formation of Insoluble Fe^{3+}, Al^{3+}, Cu^{2+}, and Ca^{2+} Complexes

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Abstract: Analytical, spectroscopic, and X-ray powder diffraction techniques were used to investigate the adsorption of the herbicide sodium acifluorfen (acifluorfen = 5-[2-chloro-4-(trifluoromethyl)phenoxy]-2-nitrobenzoic acid) from aqueous solution onto Cu^{2+}-, Al^{3+}-, Fe^{3+}-, and Ca^{2+}-saturated montmorillonite. As indicated by infrared and electron spin resonance spectra, which are coincident with those of the corresponding solid metal complexes, and by the basal spacings, which are the same for all the samples, acifluorfen extracted the exchangeable ions from the clay interlayer and precipitated them on external surfaces. The process involved the replacement of sodium as the saturating ion and was due to the formation of insoluble complexes between the herbicide and polyvalent metal ions.

Key Words: Adsorption • Acifluorfen • Infrared spectroscopy • Interlayer cations • Montmorillonite • Pesticides

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