Modeling the sorption kinetic of metsulfuron-methyl on Andisols and Ultisols volcanic ash-derived soils: Kinetics parameters and solute transport mechanisms

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Metsulfuron-methyl sorption kinetic was studied in Andisol and Ultisol soils in view of their distinctive physical and chemical properties: acidic pH and variable surface charge. Different kinetic models were applied to the experimental results. The pseudo-second-order model fitted sorption kinetics data better than the pseudo-first-order model. The rate constant and the initial rate constant values obtained through this model demonstrated the different behavior of metsulfuron-methyl in both kinds of soils, both parameters being the highest for Andisol. The application of Elovich equation, intraparticle diffusion model and a two-site nonequilibrium model (TSNE) allowed to conclude that: (i) the high organic matter content is the governing factor for Andisols where mass transfer across the boundary layer, and in a lesser degree, intraparticle diffusion were the two processes controlling sorption kinetic and (ii) the mineral composition was more relevant in Ultisols where rate was contro