

SORPTION OF 2,4-DICHLOROPHENOL TO SURFACE SOILS: NONEQUILIBRIUM-PHASE DISTRIBUTION

¹Monica Palomo and ¹Alok Bhandari

¹*Department of Civil Engineering, Fiedler Hall, Kansas State University, Manhattan, KS 66506;
Phone: (785)532-5862; Fax: (785)532-7717.*

Abstract

The nonequilibrium-phase distribution of the pesticide derivative 2,4-dichlorophenol (DCP) was studied in the context of two surface soils. DCP sorption was evaluated for five different initial aqueous concentrations of the solute -5, 10, 50, 100, and 500 μM . Solute-soil contact times were 0.02, 1, 7, 14, 28, 56, and 84 days. Uniformly ring-¹⁴C-labelled DCP was used to improve detection limits and track the contaminant among various soil components. The sorbed DCP was subjected to a single water extraction, followed by sequential methanol and alkali extractions. ¹⁴C activities associated with the different extracts, as well as the humic acid, fulvic acid, and soil/humin fractions, were quantified. Direct determination of solid-phase radioactivity was performed utilizing a biological oxidizer. The nonequilibrium-sorption behavior was expressed in terms of phase-distribution relationships (PDRs), sorption isotherms, hysteresis indices (HIs), and time-dependent distributions of the contaminant among various soil components.

Key words: dichlorophenol, adsorption, desorption, binding, hysteresis