

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

UNDATED

DER 4C

SHAUGHNESSY No. 041402
COMMON NAME: Molinate
CHEMICAL NAME: S-Ethyl hexahydro-1H-azepine-1-carbothioate
FORMULATION: Not formulated, pure active ingredient, ¹⁴C-labeled.
DATA REQUIREMENT: Mobility - Leaching and Adsorption/Desorption
(163-1)

MRID No: 41835103

Laster, W. 1991. "Soil/Sediment Adsorption-Desorption of ¹⁴C-Molinate Sulfoxide". Performed by ABC Laboratories, Inc. Final Report No. 39231. Submitted by ICI Americas, Inc. Report No. RR 91-017B (PMS 357).

REVIEWED BY: Ibrahim Abdel-Saheb/Agronomist Signature:
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Date:

CONCLUSIONS:

1. This study is acceptable and partially fulfills the Leaching and Adsorption/Desorption data requirement by providing information on the mobility (batch equilibrium) of molinate sulfoxide, a degradate of molinate, in four soils and an aquatic sediment.
2. Molinate sulfoxide was very mobile in sandy loam, silt loam, loam, and clay soils, and in a clay sediment, with Freundlich K_{ads} values of 0.78-2.81.

METHODOLOGY:

Based on data from preliminary experiments, soil:solution ratios of 3:10 for Visalia sandy loam soil and 1:5 for Atterbery silt loam, Sorrento loam, and Stockton adobe clay (Biggs clay) soils, and a clay sediment (Table I) were selected, and an equilibration time of 4 hours at 25°C was chosen for the definitive study. Also, it was determined that molinate sulfoxide did not adsorb to the walls of the

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sample tubes and did not degrade during equilibration. A test of centrifuge stability was also done; results demonstrated stability of the test material during centrifugation.

Air-dried, sieved (2-mm mesh) Visalia sandy loam, Atterbery silt loam, Sorrento loam, Stockton adobe clay (Biggs clay) soils, and an aquatic clay sediment from the Colusa Canal in California (Table I) were weighed (3 g for the sandy loam soil, 2 g for others) into Teflon centrifuge tubes and mixed with 10 mL of sterile 0.01 M calcium chloride solutions containing ring-labeled [¹⁴C]molinate sulfoxide (radiochemical purity 96.9%, specific activity 26.2 mCi/mMol, ICI Americas) at nominal concentrations of 0.015, 0.15, 1.5, or 15 µg/mL (actual concentrations, 0.018, 0.177, 1.74, or 17.2 µg/mL). The soil:solution slurries were shaken in darkness for 4 hours at 25 ± 1°C, then centrifuged. The supernatants were decanted, and aliquots were analyzed using LSC.

To measure desorption, a pesticide-free calcium chloride solution was added to each tube to replace the decanted supernatant. The tubes were shaken in the dark for 24 hours, then centrifuged. Aliquots of each supernatant were analyzed by LSC. The desorbed soil was analyzed for remaining radioactivity using LSC following combustion.

Aliquots of the 17.2 µg/mL stock solution and of the post-equilibrium supernatant from the soil:solution slurry that had been treated at 17.2 µg/mL were analyzed for specific compounds using one-dimensional TLC on silica gel plates developed in 100% acetone. The samples were cochromatographed with unlabeled molinate sulfoxide. Following development, [¹⁴C]residues were located using autoradiography and the standard was located with UV light. The radioactive zones were scraped from the plates, and the [¹⁴C]residues were desorbed with methanol and quantified using LSC.

DATA SUMMARY:

Based on batch equilibrium studies, molinate sulfoxide was determined to be very mobile in sandy loam, silt loam, loam, and clay soils, and an aquatic clay sediment. The soil/sediment:calcium chloride solution slurries (3:10 for sandy loam soil, 1:5 for others), containing ring-labeled [¹⁴C]molinate sulfoxide (radiochemical purity 96.9%) at 0.018, 0.177, 1.74, or 17.2 µg/mL, were equilibrated by shaking for 4 hours at 25°C. Freundlich K_{ads} values were 0.78 for the sandy loam soil, 2.26 for the silt loam soil, 1.86 for the loam soil, 2.81 for the clay soil, and 1.88 for the clay sediment. Freundlich K_{des} values ranged from 0.93 to 3.53. K_{OC} values ranged from 93-234 for adsorption and 126-294 for desorption; n values ranged from 1.01 to 1.11. Material balances following desorption were 96.1-100% of the applied for the sandy loam soil, 96.6-102.6% for the silt loam soil, 93.0-101.8% for the loam soil, 92.6-100.1% for the clay soil, and 97.5-99.8% for the clay sediment. Molinate sulfoxide was 87.8% of the recovered in the stock solution and 86.1-89.5% of the recovered in the adsorption supernatants.

COMMENT:

The clay soil was described both as a Stockton adobe clay and a Biggs clay (Biggs being the location at which the soil was obtained).