

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

VNDATED

DER 4B

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: 41835102

Laster, W. 1991a. Hexamethyleneimine adsorption-desorption in four soils and one aquatic sediment. ABC Laboratories' Final Report No. 39230. ICI Americas, Inc. Report No. RR 91-018B (PMS 358). Unpublished study performed by Analytical Bio-Chemistry Laboratories, Inc., Columbia, MO, and submitted by ICI Americas, Inc., Richmond, CA.

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CONCLUSIONS:

1. This study can be used towards the fulfillment of data requirements.
2. Hexamethyleneimine, a degradate of molinate, was mobile in sandy loam, silt loam, loam, and clay soils, and in a clay sediment, with Freundlich K_{ads} values of 1.64-7.23.
3. This study is acceptable and partially fulfills EPA Data Requirements for Registering Pesticides by providing information on the mobility (batch equilibrium) of hexamethyleneimine, a degradate of molinate, in four soils and an aquatic sediment.
4. No additional information on the mobility of hexamethyleneimine is needed at this time. Acceptable data on the mobility of parent molinate and molinate sulfoxide, another molinate degradate, in four soils and a clay sediment were presented in MRID 40749701 and in MRID 41835103,

respectively.

METHODOLOGY:

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

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 (2 g) into Teflon centrifuge tubes and mixed with 10 mL of sterile 0.01 M calcium chloride solutions containing ring-labeled [¹⁴C]hexamethyleneimine (radiochemical purities 92.8-98.4%, specific activity 23.0 mCi/mMol, ICI Americas) at nominal concentrations of 0.013, 0.13, 1.3, or 13 ug/mL (actual concentrations, 0.014, 0.133, 1.34, and 13.2 ug/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 ug/mL stock solution and of the post-equilibrium supernatant from the soil:solution slurry that had been treated at 17.2 ug/mL were analyzed for specific compounds using one-dimensional TLC on silica gel plates developed in 100% acetone. The samples were cochromatographed with unlabeled hexamethyleneimine. 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, hexamethyleneimine was determined to be mobile in sandy loam, silt loam, loam, and clay soils, and an aquatic clay sediment. The soil/sediment:calcium chloride solution slurries (1:5), containing ring-labeled [¹⁴C]hexamethyleneimine (radiochemical purities ≥92.8%) at 0.014, 0.133, 1.34, or 13.2 ug/mL, were equilibrated by shaking for 4 hours at 25 C. Freundlich K_{ads} values were 1.64 for the sandy loam soil, 5.62 for the silt loam soil, 4.51 for the loam soil, 7.23 for the clay soil, and 5.69 for the clay sediment (Table XIX). Freundlich K_{des} values ranged from 1.13 to 9.22. K_{oc} values ranged from 226-603 for adsorption and 230-768 for desorption; n values were 1.04-1.56. Material balances following desorption were 80.2-103% of applied for the sandy loam soil, 65.8- 106% for the silt loam soil, 54.0-100% for the loam soil, 66.5-102% for the clay soil, and 72.5-91.2% for the clay sediment (Tables XX-XXIV). Hexamethyleneimine was 99.3-99.5% 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).