

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Mushtaq, M. and L.R. Syintsakos. 1993. Sorption and Desorption of [³H]4"-Deoxy-4"-epimethylamino Avermectin B_{1A} (MAB_{1A}) Benzoate with Soils. Study performed and submitted by Merck Research Laboratories, Three Bridges, New Jersey. MRID No. 428515-26.

TYPE OF STUDY: Leaching and Adsorption/Desorption (163-1)

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CONCLUSIONS:

1. This batch equilibrium study is acceptable and satisfies the unaged portion of the leaching and adsorption/desorption data requirements.
2. It can be concluded that MAB_{1A} can be considered immobile in the four soils tested. The reported Freundlich adsorption (K_{ad}) values for MAB_{1A} were 2037 in the Texas sandy loam soil, 219 in the Florida sand, 665 in the Texas clay loam, and 295 in the New Jersey silt loam soil. The respective K_{oc} values were 279000, 730000, 25382, and 28365. The reported desorption constants ranged from 127 to 4088.

MATERIALS AND METHODS:

Chemical: Tritium labeled MAB_{1A}, specific activity 11.5 mCi/mg, radiochemical purity 97%, and unlabeled MK-0244 contained 91.1% MAB_{1A} and 5.1% MAB_{1B} components.

Four soils (a Texas sandy loam, a Florida sand, a Texas clay loam, and a New Jersey silt loam, see Appendix III for soil characteristics) were air dried and sieved through a 2 mm mesh screen prior to use. In this study the unlabeled and labeled parent material was diluted with methanol to prepare stock solutions. These solutions were then diluted using deionized distilled water containing 0.01 M CaCl to prepare working solutions containing 2.23 ng/ml (W), 10.27 ng/ml (X), 31.54 ng/ml (Y), and 129.12 ng/ml (Z) for isotherm determination.

Approximately 1.0 g soil for each soil type was weighed into the number of required conical (40 ml) test tubes. Blank tubes for each soil were made by adding 5.0 ml of the 0.01 M CaCl to one tube containing 1 g of soil. Five ml of each [^3H]MAB_{1A} benzoate working solution was added to an empty tube for each control. Test samples were made by adding 5.0 ml of each working solution to duplicate (preliminary) or triplicate (definitive study) soil tubes for each soil type. All tubes were covered with aluminum foil, capped and shaken for sorption equilibration. In the preliminary study solution equilibrium was achieved within two hours in the Texas sandy loam soil. In the definitive test 5 hours was used for the sorption phase and desorption with CaCl solution was allowed to proceed for 13.5 hr in each of the four soil types. Following equilibration and subsequent centrifugation (5-10 min at 2,000 rpm), triplicate one ml aliquots were withdrawn from each blank, control and test sample tube for determination of radioactivity. The remaining solutions from each sample tube was saved and the total volume of supernatant withdrawn was recorded. This was replaced with 5.0 ml of freshly prepared 0.01 M CaCl for desorption equilibration. All tubes were covered with aluminum foil, capped, shaken, and after equilibration the tubes were centrifuged and the supernatant decanted and radioactivity determined by LSC. After sorption and desorption, soil samples were extracted by ammonia saturated ethyl acetate followed by methanol containing 100 mM ammonium acetate. The extracted radioactivity was determined by LSC. After extraction the soil samples were combusted to quantitate any unextracted radioactivity.

REPORTED RESULTS:

1. The reported Freundlich adsorption (K_{ad}) values for MAB_{1A} were 2037 in the Texas sandy loam soil, 219 in the Florida sand soil, 665 in the Texas clay loam soil, and 295 in the New Jersey silt loam soil. The respective K_{oc} values were 279,000, 730,000, 25,382, and 28,365 for the same four soils. The reported desorption constants ranged from 127 to 4088 (Table XII).

2. The recovery of [^3H]MAB_{1A} benzoate from the soils ranged from 97.61 \pm 5.39% to 107.24 \pm 1.68% (Table VIII). The analyses of soil organic extracts indicated no metabolism or degradation of the test compound.

DISCUSSION:

1. More than 99% of the [^3H]MAB_{1A} was reported to be sorbed to the soils tested (Table VI) and very little subsequently desorbed into fresh CaCl solution (\leq 1.28 \pm 0.20%, Table VII). The results indicated that MAB_{1A} benzoate was immobile in the four soils tested and was strongly adsorbed onto the soil. The migration of MAB_{1A} benzoate into ground water or through run-off appears to be unlikely.

AVERMECTIN

MRID 42851526

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