090501

Data Evaluation Record
Mobility - Adsorption/Desorption
Study 1

3/4/1998

CHEM 090501 Alachlor §163-1
Formulation - N/A - Metabolite

Study MRID# 444053-01
Blamhorst, M.R.. 1997. "Soil Adsorption/Desorption of [^{14}C] Alachlor Sulfonic Acid Metabolite (ESA) by the Batch Equilibrium Method." Unpublished study performed by EPL Bio-Analytical Services, Inc., Harristown, IL, and submitted by Monsanto Company, St. Louis, MO

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Conclusions:

1. This study is not acceptable and cannot be used to fulfill the Mobility - Adsorption/ Desorption data requirement. The study is not acceptable because Freundlich adsorption values could not be calculated in three of the soils. However, tne study provides supplemental information about the mobility of alachlor-ESA, a major metabolite of alachlor.. No additional data on the mobility of alachlor-ESA is required at this time.

2. Based on batch equilibrium studies, uniformly phenyl ring-labeled [^{14}C]-alachlor ESA (alachlor sulfonic acid, sodium salt), at approximately 6.0, 1.0, 0.2, and 0.04 μg/mL, was determined to be very mobile in Sable silty clay loam:calcium chloride solution slurries (1:5) that were equilibrated in the dark for 24 hours at approximately 25°C. Freundlich K_{ads} value was 0.45 and K_{OC} value was 15. Following one desorption step, Freundlich K_{des} value was 1.43. Material balance ranged from 95.8 to 110.9% of the applied for the definitive study.

3. Based on batch equilibrium studies, uniformly phenyl ring-labeled [^{14}C]-alachlor ESA, at approximately 6.0, 1.0, 0.2, and 0.04 μg/mL, was determined to be very mobile in Sarpy sandy loam, Spinks sandy loam, and Katy loam:calcium chloride solution slurries (1:5) that were equilibrated in the dark for 24 hours, at approximately 25°C. Accurate Freundlich K_{ads} values could not be calculated because levels of adsorbed [^{14}C]-alachlor ESA metabolite were very low. Adsorption values in these three soils were approximately 0%.

Methods:

1. Sable silty clay loam (3% sand, 57% silt, 40% clay, 5.2% O.M., pH 5.5, CEC 34.7 meq/100 g), Sarpy sandy loam (68% sand, 20% silt, 12% clay, 0.8% O.M., pH 7.9, CEC 15.5 meq/100 g), Spinks sandy loam (70% sand, 18% silt, 12% clay, 2.4% O.M., pH 5.4, CEC 13.7 meq/100 g), and Katy loam (46% sand, 37% silt, 17% clay, 1.4% O.M., pH 4.9, and CEC 11.9 meq/100 g) were sieved (2 mm) prior to use. Based on data from preliminary experiments, a soil:solution ratio of 1:5 and an equilibration time of 24 hours were chosen for the definitive study. Based on such preliminary studies it was also determined that the test containers did not adsorb alachlor ESA.

2. To measure adsorption, subsamples of each soil were weighed into glas centrifuge tubes and mixed with 0.01 M $CaCl_2$ solution. The soil:solution slurries (1:5) were individually treated at nominal concentrations of 6.0, 1.0, 0.2, and 0.04 μg/mL with uniformly phenyl ring-labeled [^{14}C]-alachlor ESA (radiochemical purity >98%, specific activity 10.44 mCi/mmole, Monsanto), dissolved in 0.01 M Ca Cl_2. Samples were pre-equilibrated with 20 mL of 0.01M $CaCl_2$ solution for at least 24 hours. The tubes were shaken for 24 hours, maintained in the dark at a temperature of 25±1°C. After shaking, the samples were centrifuged at 2000 rpm for 15 minutes, and aliquots of the supernatant were analyzed by LSC. Additional aliquots of the supernatant were analyzed by HPLC with Spherisorb ODS 5 μm column kept at 40°C and a gradient mobile phase containing 0.1% trifluoroacetic acid in water and acetonitrile with UV (230 nm) and radioactivity detection.

3. To measure desorption, metabolite-free calcium chloride solution was added to each tube to replace the decanted and suctioned supernatant. The tubes were shaken for 24 hours, then centrifuged. Only one desorption step was performed. Aliquots from the supernatant were analyzed by HPLC and LSC. Three subsamples of the soil were oxidized for 3 minutes and ^{14}C-activity was determined by LSC. Material balance was calculated based on the cumulative radioactivity recovered from the adsorption and desorption solutions and the soil.

Comments:

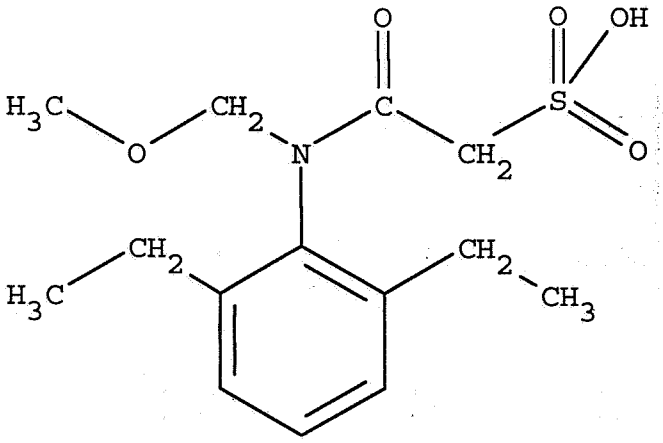
1. The soil characterization submitted by EPL-BAS Laboratories yielded a clay fraction higher than expected (compared to previous analyses of the same soils). Samples were re-tested by A&L Laboratories. Both results are presented in Table 1. The textural classifications were the same; however, the clay values were lower in the analyses by A&L Laboratories. The results by EPL-BAS Laboratories are reported here.

2. According to the registrant, the test containers did not adsorb alachlor-ESA.

3. The levels of [^{14}C]-alachlor ESA adsorbed were very low. For three of the soils, the levels adsorbed were approximately 0%. It was not possible to calculate desorption values for such soils.

4. The registrant concludes that equilibrium was reached for all soils after 24 hours of shaking. For the Sable silty clay loam it appears that the percent adsorbed increased from 24 to 48 hours shaking.

5. Comparison of results obtained for adsorption and desorption solution concentrations, analyzed by LSC and HPLC were very similar. HPLC results appear to indicate that alachlor-ESA was stable in the slurries.



2',6'-Diethyl-N-methoxymethyl-2-sulfoacetanilide
(Alachlor sulfonic acid)

RIN 2858-00

Alachlor EFED Review

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