7-30-96

DATA EVALUATION RECORD

I. Study Type: Batch Equilibrium

II. Citation:

Muller, K. and M.K. Jeavans. 1995. ICIA5504: Adsorption and Desorption Properties of Two USA Soils. Performed by Zeneca Agrochemicals (Zeneca Limited), Berkshire, U.K. Submitted by Zeneca Agricultural Products (Zeneca Inc.), Wilmington, Delaware. MRID 43678181.

III. Reviewer:

Name: James A. Hetrick, Ph.D. James A. Hetrick
Title: Soil Chemist
Organization: EFGWB/EFED/OPP 30 JUL 1996

IV. Approved by:

Name: Paul J. Mastradone, Ph.D. Paul J. Mastradone
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V. Conclusions:

The study provides acceptable data on methyl(E)-2-{2-[6-(6-2-cyanophenoxy)pyrimidin-4-yloxy]pheny}-3-methoxy-acrylate (ICIA5504) partitioning in mineral soils. These data in conjunction with batch equilibrium data (MRID 43678178) fulfill the unaged portion of the 163-1 data requirement. No additional data are needed at this time.

Radiolabeled ICIA5504 had Freundlich adsorption coefficients of 2.9 ml/g (K_{oc}=1490; 1/n=0.85) in the ERTC soil and 23 ml/g (K_{oc}=1690; 1/n=0.90) in the NRTC soil.

The reported data indicate ICIA5504 should be relatively immobile to mobile in terrestrial and aquatic environments.

VI. Materials and Methods:

Test soils were taken from the Zeneca Eastern Regional Technical Center in Whitaker, NC and the Zeneca Ag Products Laboratory in Champaign, IL. Physicochemical properties of the test soils are shown in Table 2. The soils were air-dried, passed through a 2 mm sieve, and then shipped to the United Kingdom. The soils were sterilized using gamma irradiation (25 to 35 KGys/250g of test soil) prior to experimentation.

Definitive Study

Subsamples (10g) of each soil type were placed into each of 22 Teflon centrifuge tubes, suspended in 19 ml of sterile, 0.01 $CaCl_2$, and then mechanically shaken for 16 hours. After pre-equilibration, four samples of each soil type were amended with radiolabeled ICIA5504 (cyanophenyl labeled; SA=2.323 Gbq mmol-1; radiopurity > 97%) to yield nominal concentrations of 0.05, 0.1, 0.2, 0.4, and 0.8 µg/ml. The water solubility of ICIA5504 is 6 µg/ml. The remaining sample of each soil type was not amended with ICIA5504 to serve as a treatment control. The samples were mechanically shaken for 24 hours at 20°C. After equilibration, the samples were centrifuged to separate soil and water phases. Duplicate samples of each soil type were retained for chemical analysis. The remaining samples were used in the desorption study. These samples were treated exactly as described in the adsorption study except the soil pellet of each sample was retained for the desorption study. The soil pellet was suspended in pesticide-free 0.01M $CaCl_2$ and then mechanically shaken for 16 hours at 20°C. Supernatant and soil were taken for chemical analysis.

Analytical

All treatments in a single replicate for the ERTC soil and the 0.4 µg/ml treatment for the NRTC soil were analyzed for ICIA5504. Subsamples of supernatant were analyzed for the total ^{14}C content. Radiolabeled residues in non-filtered subsamples of supernatant were extracted using a solid phase extraction with acetone elution. Soil samples were sequentially extracted acetone. Acetone soil extracts for each sample were combined and then concentrated for chemical analysis.

Soluble radiolabeled residues in supernatant and soil extracts were separated using 1-D TLC with a n-hexane:ethyl acetate solvent system. Separated residues were identified by co-chromatography with known standards. The ^{14}C content in supernatant samples was determined by LSC. The ^{14}C content in extracted soil samples was determined by combustion-LSC.

VII. Study Author's Conclusions

A. The material balance of radioactivity ranged from 87 to 102% of applied in all treatments of ERTC soil and the 0.4 µg/ml treatment for the NRTC soil (Table 9 and 10).

B. Parent ICIA5504 was stable during the 48 hour batch equilibrium study (Tables 13 and 14).

C. Radiolabeled ICIA5504 had Freundlich adsorption coefficients of 2.9 ml/g (K_{oc}=1490; 1/n=0.85) in the ERTC soil and 23 ml/g (K_{oc}=1690; 1/n=0.90) in the NRTC soil (Table 6).

D. Radiolabeled ICIA5504 had Freundlich desorption coefficients of 3.6 ml/g (K_{oc}=1270 ml/g) in the ERTC soil and 29 ml/g (K_{oc}=1360 ml/g) in the NRTC soil (Table 8).

E. The registrant classified the mobility of ICIA5504 as low according to McCall's mobility classification scale. The registrant stated the low mobility of ICIA5504 can be attributed to the hydrophobic characteristics of neutral ICIA5504 and hence preferential binding to soil organic matter.

E. The registrant stated that ICIA5504 partitioning in soil was not reversible because the adsorption-desorption partitioning coefficients are not equal. The non-reversible nature of binding is expected to lower the mobility of ICIA5504.

VIII. Reviewer's Comments

A. The USDA soil taxonomy classification of test soils was taken from MRID 4378182. EFGWB appreciates the registrant's effort to cross-reference the United Kingdom soils into USDA soil taxonomy.

B. The registrant provided chromatograms with a single peak as evidence of stability of ICIA5504 during equilibration. EFGWB notes the registrant did not provide a reference chromatogram for ICIA5504. In future studies, the registrant should provide a standard chromatogram as reference for retention time.

C. The registrant did not provide a preliminary study to determine the time for a pseudo-equilibrium or steady-state condition for ICIA5504. EFGWB notes a preliminary study in the batch equilibrium study (MRID 43678178) indicates ICIA5504 reached a steady-state or pseudo-equilibrium condition after 16 hours of mechanical shaking.

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