

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

I. Study Type: Batch Equilibrium

II. Citation:

M. Lane. 1995. ICIA5504: Adsorption and Desorption Properties in Soil of R401553, a Soil Degradate. Performed by Zeneca Agrochemicals (Zeneca Limited), Berkshire, U.K. Submitted by Zeneca Agricultural Products (Zeneca Inc.), Wilmington, Delaware. MRID 43678177.

III. Reviewer:

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

James A. Hetrick

30 JUL 1996

IV. Approved by:

Name: Paul J. Mastradone, Ph.D.
Title: Section Chief
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Paul J. Mastradone

30 JUL 1996

V. Conclusions:

The study provides marginally acceptable data on 4-(2-cyanophenoxy)-6-hydroxypyrimidine (R401553) partitioning in mineral soils. The data are deemed marginally acceptable because the registrant did not provide a complete description of the study design. (Please see Section VIII for more details.) EFGWB believes the absence of a complete description of the study design does not alter acceptance of the data because R401553 is expected to be mobile to very mobile in soil environments. These data in conjunction with batch equilibrium data (MRIDs 43678179 and 43678180) fulfill the aged portion of the 163-1 data requirement. No additional data are needed at this time.

The Freundlich adsorption coefficients of radiolabeled R401553 was 2.4 ml/g ($K_{oc}=81$; $1/n=0.84$) in the Kenny Hill sandy loam soil, 1.6 ml/g ($K_{oc}=66$; $1/n=0.85$) in the Wisborough Green silty clay loam soil, 0.76 ml/g ($K_{oc}=93$; $1/n=0.81$) in the ERTC loamy sand soil, 11 ml/g ($K_{oc}=500$; $1/n=0.89$) in the NRTC silty clay loam soil, 1.90 ml/g ($K_{oc}=110$; $1/n=0.96$) in the Hyde Farm sandy clay loam soil, and 2.9 ml/g ($K_{oc}=110$; $1/n=0.96$) in the Pickett Piece clay loam soil.

The reported data indicate R401553 is expected to be mobile to very mobile in terrestrial and aquatic environments.

VI. Materials and Methods:

The test soils from the United Kingdom were described as a Hyde Farm, Pickett Piece, Kenny Hill, and Wisborough Green. The test soil from the United States were described as ERTC and NRTC. Physicochemical properties of the test soils are shown in Table 2. The test soils were passed through a 2 mm sieve and then sterilized with gamma radiation.

Preliminary Study

Subsamples of Hyde Farm test soil were suspended in 0.01M CaCl₂ solution with a radiolabeled R401553 (cyanophenyl labeled; SA=2.30 GBq mmol⁻¹; radiopurity = > 98%) at a concentration of 0.2 µg/ml. The soil:water ratio was 1:2. Samples were mechanically shaken for 16 hours. (Reviewer Note: The registrant did not provide a complete description of the preliminary study.)

Definitive Study

Subsamples of each soil type were suspended in 0.01 CaCl₂ solutions containing radiolabeled R401553 concentrations (cyanophenyl labeled; SA=2.30 GBq mmol⁻¹; radiopurity = > 98%) at concentrations of 0.04, 0.10, 0.20, 1.00, and 2.0 µg/ml. (Reviewer Note: The water solubility of R401553 was not reported.) The soil samples were mechanically shaken for 20 hours.

Analytical

The registrant did not provide a description of the analytical methods.

VII. Study Author's Conclusions

A. The registrant states that radiolabeled R401553 reached a pseudo-equilibrium or steady-state after 16 hours of mechanical shaking.

B. A material balance was not provided.

C. Radiolabeled R401553 had a Freundlich adsorption coefficient of 2.4 ml/g ($K_{oc}=81$; $1/n=0.84$) in the Kenny Hill sandy loam soil, 1.6 ml/g ($K_{oc}=66$; $1/n=0.85$) in the Wisborough Green silty clay loam soil, 0.76 ml/g ($K_{oc}=93$; $1/n=0.81$) in the ERTC loamy sand soil, 11 ml/g ($K_{oc}=500$; $1/n=0.89$) in the NRTC silty clay loam soil, 1.90 ml/g ($K_{oc}=110$; $1/n=0.96$) in the Hyde Farm sandy clay loam soil, and 2.9 ml/g ($K_{oc}=110$; $1/n=0.96$) in the Pickett Piece clay loam soil (Table 3).

E. The registrant classified the mobility of R401553 from low to high according to McCall's mobility classification scale. The Freundlich adsorption coefficients of R401553 were not correlated with soil physicochemical properties. The registrant believes the lack of correlation with soil properties can be explained by the complex equilibria (or multiple species) of R401553 (Figure 2).

F. Radiolabeled R401553 had a desorption (K_{oc}) coefficients of 99 ml/ μ g ($K_d=4.6$) in the Kenny Hill sandy loam soil, 120 ml/ μ g ($K_d=4.6$) in the Wisborough Green silty clay loam soil, 410 ml/ μ g ($K_d=1.9$) in the ERTC loamy sand soil, 750 ml/ μ g ($K_d=23$) in the NRTC silty clay loam soil, 150 ml/ μ g ($K_d=4.2$) in the Hyde Farm sandy clay loam soil, and 140 ml/ μ g ($K_d=4.7$) in the Pickett Piece clay loam soil (Table 5).

VIII. Reviewer's Comments

A. The registrant did not provide a complete description of the analytical methods and study design. EFGWB notes the registrant reference the OECD guidelines as a description of the study design. EFGWB believes a complete description of the study should not influence acceptance of the data because R401553 is expected to be mobile to very mobile ($K_d < 5$) in terrestrial and aquatic environments. In future studies, the registrant should provide a complete description of study.

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

C. The registrant did not provide the water solubility of R401553. EFGWB notes the water solubility of R401553 is needed to evaluate the theoretical upper bound concentration for adsorption. EFGWB believes the absence of water solubility data should not influence acceptance of the study because R401553 is expected to be mobile to very mobile ($K_d < 5$) in terrestrial and aquatic environments.

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