US EPA ARCHIVE DOCUMENT

11-24-92

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Tong, T.R. 1991. Soil Adsorption and Desorption of SAN-582 H, Unaged, by the Batch Equilibrium Method. Environmental Chemistry Section of Sandoz Crop Protection Corporation, Des Plaines, Illinois. MRID No. 420348-06.

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

REVIEWED BY:

George Tompkins, Entomologist
Review Section 1, EFGWB, EFED

Signature: George Tompkins
Date: NOV 24 [illegible]

APPROVED BY:

Paul J. Mastradone, Section Chief
Review Section 1, EFGWB, EFED

Signature: Paul J Mastradone
Date: NOV 24 1992

CONCLUSIONS:

1. This study is satisfactory and partially fulfills the 163-1 data requirement by fulfilling the unaged portion of the leaching/adsorption/desorption study.

2. This study combined with the satisfactory information submitted in MRID No.420348-07 (Sandoz Crop Protection responses to EFGWB # 91-0101 and 90-0893 review of aged leaching and adsorption/desorption study MRID No. 415965-34), discussed in the Discussion Section 10.1 of this report, satisfy the leaching and adsorption/ desorption data requirements for SAN 582 H.

3. The Freundlich adsorption (K_{ads}) values for SAN 582 H were 3.3 in the Kenyon loam soil, 3.5 in the clay loam soil, 0.7 in the silt loam soil, and 2.0 in the sandy clay loam soil. The respective desorption (K_{des}) values for the same four soils were 3.7, 3.9, 0.7, and 2.1 (Tables III and IV). The respective adsorption K_{oc} values were 150, 120.7, 233.3, and 117.7 for these same four soils. These values indicate that SAN 582 H has the potential to be a moderately mobile material in the Kenyon loam and clay loam soil and the potential to be highly mobile in the silt loam and sandy clay loam soils.

4. The mean value of the mass balance was 101.0% of the applied in the Kenyon loam soil, 98.7% in the clay loam soil, 101.0% in the silt loam soil, and 101.1% in the sandy clay loam soil.

MATERIALS AND METHODS:

Chemical: ^{14}C-SAN-582 H, specific activity 50.51 mCi/mmole, radiopurity 98%. Unlabeled SAN-582 H standard was 99.6% pure

Soil: Four soils (Kenyon loam, clay loam, silt loam, and a sandy clay loam, see Table I for characteristics) were sieved through a 2 mm sieve and then oven dried at 105°C for 24 hrs. All test water was deionized and sterilized.

Preliminary study: A preliminary study was performed to select an appropriate soil to water ratio and equilibration time for the test compound and four soil types. The adsorption experiment was first conducted at a ratio of 5:1(water:soil, ml:wt). Duplicate 5 g samples of each soil were suspended with 25 ml of 0.01 M $CaCl_2$ solution containing 1.0 ug/ml of SAN-582 H in 50 ml polallomer centrifuge tubes. The tubes were wrapped with aluminum foil and placed on a mechanical shaker at 25±1°C in the dark for 24 hr. Sequential samplings of supernatant (duplicate samples of each soil) were taken at 2, 4, 6, and 24 hr. At each sampling time, the tubes were centrifuged at 9000xG for 15 min. Aliquots (duplicate 100 ul) of the supernatant were withdrawn for LSC analysis. The soil pellets were resuspended and the tubes returned to the shaker.

To determine the desorption equilibrium time, following centrifugation, the supernatant solution was removed from the tubes and replaced with an equal volume of 0.01 M $CaCl_2$ solution. The soil pellets were resuspended and the rubes returned to the shaker. At 2, 4, 5, and 24 hr intervals, tubes were centrifuged as above and duplicate 100 ul aliquots of the supernatant were radioassayed by LSC. In all trials, two blank tubes (without soil) with SAN-582 H and 0.01 M $CaCl_2$ solution were included to determine adsorption onto the cell wall. To counteract the wall adsorption ('14%), polyallomer tubes coated with Surfasil siliconizing fluid were tested and found not to significantly (<4%) adsorb the test chemical. Surfasil fluid coated tubes were used in the definitive study.

Definitive Study: The definitive study was conducted with four concentrations (1, 5, 10, and 25 ug/ml of SAN 582 H) in 0.01 M $CaCl_2$ solution. Duplicate aliquots of each test solution were radioassayed to determine the actual concentration. Five grams of each soil type were weighed into the surfasil coated centrifuge tubes and suspended in 10 ml of each test concentration solution (1:2 ratio of soil to water). The soil suspensions were shaken in the dark on a mechanical shaker for 24 hours at 25±1°C.

Following equilibrium, the soil suspension was centrifuged at 9000xG and the supernatant was removed and filtered, and the volume measured. Desorption from the soil was then conducted by resuspending the soil pellet in 0.01 M $CaCl_2$ solution and shaking the tubes on the mechanical shaker for another 24 hr in the dark. The suspensions were then centrifuged, filtered, volumes measured and samples taken for LSC analysis. The material balance was determined by combining the radioactivity of test chemical in the

solutions and in the soil. The radioactivity in the soil pellet was determined by combustion of aliquots.

In order to check whether the radiocarbon measured by the LSC method represented the ^{14}C-SAN-582 H, 10 ml of supernatant (after the 24 hr adsorption or desorption period) was partitioned with hexane twice. The hexane fractions were combined, measured, radioassayed and concentrated for TLC or HPLC analysis. One Kenyon loam soil sample (5 g) after both adsorption and desorption phases was extracted twice with methanol:water (1:1) after mechanical shaking for 3 hr at 25±1°C. The methanol water extracts were pooled, total volume measured, aliquots radioassayed, and the extracts then partitioned with hexane twice. The hexane fractions were then concentrated for TLC analysis.

Aliquots of the concentrated hexane and methanol fractions were chromatographed along with SAN-582 H and the metabolic reference standards oxalamide, M11, sulfoxide thioglycolic acid, sulfoxide thiolactic acid, and sulfonate on silica gel plates with UV 254 indicator. Plates were developed separately in either solvent system I (ethyl acetate:toluene:formic acid:water, 87:3:5:5, v/v/v/v) or solvent system II (toluene:ethyl acetate, 60:40, v/v).

REPORTED RESULTS:

1. The reported Freundlich adsorption (K_{ads}) for SAN 582 H were 3.3 in the Kenyon loam soil, 3.5 in the clay loam, 0.7 in the silt loam, and 2.0 in the sandy clay loam with respective desorption (K_{des}) values for the same four soils of 3.7, 3.9, 0.7, and 2.1 (Table III and IV). The adsorption K_{oc} values were 150, 120.7, 233.3, and 117.7 for the same four soils, respectively.

2. The mean value of the mass balance of each soil was 101.0, 98.7, 101.0, and 101.1% of the applied radiocarbon for Kenyon loam, clay loam, silt loam, and sandy clay loam soil, respectively (Table IX). The total ^{14}C-SAN-582 H in the supernatant was about 96% for both the adsorption and desorption phases. The rest of the radiocarbon was minute amounts of M11 and some polar metabolites (these metabolites include sulfonate, sulfoxide of the thioglycolic acid, and oxalamide, Table XI). Approximately 98% of the radiocarbon extracted from the post-desorption soil was SAN-582 H.

3. Analysis of control samples indicated that the walls of the polyallomer centrifuge tubes adsorbs ~14% of the test chemical after 24 hr. To counteract this, the polyallomer tubes were coated with SurfaSil siliconizing fluid and then found not to adsorb the test chemical significantly (<4%) and used in the definitive study.

DISCUSSION:

1. In the materials section of the study (p 11) and in the

summary (p 9) it states that five types of soil were selected for determining the adsorption and desorption characteristics of SAN-582 H. However, since the percent of adsorption onto the sandy loam soil was less than 20%, all the information presented in the tables was for the other four soils. Information regarding the sandy loam soil characteristics and initial raw data were included in the Appendix section.

FRONTIER RIN 1650-93

Page_____ is not included in this copy.

Pages 5 through 15 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

____ A draft product label.

____ The product confidential statement of formula.

____ Information about a pending registration action.

✓ FIFRA registration data.

____ The document is a duplicate of page(s) _____.

____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.