Adsorption/Desorption (Batch Equilibrium) of Pymetrozine (Degradate CGA-300407)

Report: Gohdes, M. (1997) The Adsorption and Desorption of (carbon 14)-CGA-300407 on Representative Agricultural Soils: Lab Project Number: COVANCE 6117-345: 6117-345: 226-96. Unpublished study prepared by Covance Labs., Inc. 83 p.

Document No.: MRID 44411328

Guideline: OPPTS 835.1230

Classification: A study classification was not provided on the attached Data Evaluation Record, therefore, this study is now classified as Supplemental. This study is scientifically valid, but information on the soil mobility (batch equilibrium) of pymetrozine degradate CGA-300407 in five U.S. soils was not determined due to the instability of the degradate. Biodegradation can be shown by repeating the experiment with a sterilized sample of the soil. If no plateau is achieved even in this case, the experimenter should search for other phenomena that could be involved. This could be done with appropriate modifications of the experimental conditions (temperature, shaking times, soil/solution ratios).

PC Code: 101103

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DATA EVALUATION RECORD

STUDY 6d

CHEM 101103 Pymetrozine §163-1
CAS No. 123312-89-0
FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 44411328
Gohdes, M. 1997. The adsorption and desorption of ^{14}C-CGA-300407 on representative agricultural soils. Laboratory Project ID: Covance 6117-345. Unpublished study performed by Covance Laboratories, Inc., Madison, WI; and submitted by Novartis Crop Protection, Inc., Greensboro, NC.

DIRECT REVIEW TIME = 21 hours

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CONCLUSIONS

Mobility - Leaching & Adsorption/Desorption

1. This study is scientifically valid, but does not provide useful information on the soil mobility (batch equilibrium) of the pymetrozine degradate CGA-300407. Because the test compound was unstable under test conditions, a definitive adsorption/desorption study could not be performed and a valid mobility assessment was not possible using viable soils.

2. This study does not meet Subdivision N Guidelines for the partial fulfillment of EPA data requirements on soil mobility for the following reasons:

   (i) K_{ads} and K_{des} values were not reported.

3. The mobility of triazine ring-labeled [6-^{14}C]CGA-300407, at a nominal concentration of 5.38 µg/mL, could not be determined due to instability of the compound in each of the four soil:solution slurries studied; data indicated instability of the test compound during a 2-hour equilibration period. Due to the instability of the parent compound in the soil:0.01 M $CaCl_2$ test systems, a definitive adsorption/desorption study could not be performed and the adsorption and desorption coefficients could not be calculated.

METHODOLOGY

Based on the results of a preliminary study for the adsorption of the pymetrozine degradate pyridinyl ring-labeled [6-^{14}C]CGA-300407 (3-pyridinecarboxyaldehyde; radiochemical purity 98.7%, specific activity 50.8 µCi/mg; p. 12) to test soils, it was determined that the test compound was unstable during a 2-hour equilibration period (p. 25; Table IV, p. 29). Adsorption of the applied radioactivity to the test tubes was not observed (p. 23; Table II, p. 27).

For the adsorption phase of the preliminary study, aliquots (10 mL) of 0.01 M $CaCl_2$ treated with triazine ring-labeled [6-^{14}C]CGA-300407 (dissolved in methanol) at a nominal concentration of 5.38 µg/mL (p. 18), were added to test tubes containing subsamples (5 g) of air-dried, sieved (2 mm) Hanford sandy loam, Plainfield sand, Gadsden silty clay loam, and Bosket loam soils (Table I, p. 26); duplicate samples were prepared for each soil type. The test tubes containing the soil:solution slurries (1:2, w:v) were equilibrated in a shaking water bath for up to 24 hours at 25° C. Samples were removed for analysis at 2, 4, 8, and 24 hours posttreatment. Following each equilibration period, soil:solution slurries were centrifuged and the supernatant decanted. Triplicate aliquots of each supernatant were analyzed for total radioactivity by LSC; the limit of detection was 34 dpm (p. 21).

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Following the 24-hour equilibration period, one replicate of each soil type was extracted twice by sonicating with acetonitrile:water (8:2, v:v) followed by centrifugation (p. 18). Triplicate aliquots of the combined supernatant were analyzed by LSC. Soil samples were further extracted twice by sonicating with acetonitrile:aqueous 0.5 M ammonium hydroxide (NH_4OH; 8:2, v:v) followed by centrifugation. Triplicate aliquots of the combined supernatant were analyzed by LSC. Soil extracts were concentrated by evaporation, filtered (0.45 µm), and rinsed with methanol:water (1:3; v:v). Aliquots of the concentrated extract were analyzed by LSC and HPLC (Zorbax RX-C8 column) with a mobile phase gradient of 0.05% trifluoroacetic acid in water:methanol (0:100 to 7:93 to 12:88 to 80:20; v:v) with radioactive flow detection (p. 19); the limit of detection was 0.1% of the applied radioactivity (p. 22). Samples were co-chromatographed with reference standards for the parent compound which were visualized by UV (254 nm). Aliquots of supernatants from the 2-hour and 24-hour equilibration periods were analyzed by HPLC as previously described for the soil extracts.

Prior to and following extraction, triplicate subsamples from one replicate of each soil type was air dried and analyzed for total radioactivity by LSC following combustion (pp. 18, 19).

To determine viability of the soil, microbial activity was measured prior to application of the test solutions (p. 14); separate bacterial and fungal counts were performed (p. 15).

DATA SUMMARY

The mobility of triazine ring-labeled [6-^{14}C]CGA-300407 (radiochemical purity 98.7%), at a nominal concentration of 5.38 µg/mL, could not be determined due to instability of the compound in each of the four soil:solution slurries studied; data indicated instability of the test compound during a 2-hour equilibration period. The parent compound was present at 16.1% of the applied radioactivity in the sand supernatant, 53.9% in the sandy loam supernatant, 0.1% in the loam supernatant, and 46.1% in the silty clay loam supernatant following the 2-hour equilibration period (Table IV, p. 29). Following the 24-hour equilibration period, the parent compound was present in the supernatants plus extracts at combined totals of <1% for all four soils (Table V, p. 30). Due to the instability of [^{14}C]CGA-300407 in the soil:0.01 M $CaCl_2$ test systems, a definitive adsorption/desorption study could not be performed, and the adsorption and desorption coefficients could not be calculated.

COMMENTS

1. Due to the instability of [^{14}C]CGA-300407 in the soil:0.01 M $CaCl_2$ test systems, a definitive adsorption/desorption study was not conducted and the K_{ads} and K_{des} were not calculated. Therefore, the mobility of the test compound could not be determined in the viable soils used in this study.

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2. The Hanford sandy loam soil was the same type of soil used in two aerobic soil metabolism studies of (MRIDs 44024965 and 44024966) of parent pymetrozine.