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DATA EVALUATION RECORD 5

CHEM 108401 Thiobencarb §163-1

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 43150601
Christensen, K.P. 1994. 4-Chlorobenzoic Acid-Determination of the Adsorption and Desorption Properties. Laboratory Project ID: VP-10804. Unpublished study performed by Springborn Laboratories, Inc, Wareham, MA, and submitted by Valent USA Corporation, Walnut Creek, CA.

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CONCLUSIONS:

Aged Mobility / Leaching and Adsorption/Desorption

1. The batch equilibrium study in this review using the thiobencarb degradate, 4-chlorobenzoic acid, is acceptable and satisfies the aged portion of the 163-1 data requirement.

2. Based on batch equilibrium experiments, [^{14}C]4-chlorobenzoic acid, a degradate of thiobencarb, was determined to be very mobile in sandy loam (pH 5.8, 0.88 % OC), loamy sand (pH 5.6, 0.76 % OC), silt loam (pH 6.0, 0.88 % OC), and clay soil(pH 6.0, 2.0 % OC):calcium chloride solution slurries (1:5, w:v) containing 4-chlorobenzoic acid at approximately 0.03, 0.08, 0.2, and 0.5 mg/L. The slurries were equilibrated in darkness for 5-18 hours at 17-22 °C. Freundlich K_{ads} values were 0.74 for the sandy loam soil, 0.98 for the loamy sand soil, 1.22 for the silt loam soil, and 3.26 for clay soil. The corresponding K_{ocads} values were 84, 128, 138, and 163, respectively. The N values were 1.58, 1.58, 1.56, 1.28, respectively. K_{des} values were 2.19 for the sandy loam soil, 1.94 for the loamy sand soil, 2.44 for the silt loam soil, and 8.31 for the clay soil. The corresponding K_{ocdes} values were 249, 253, 277, and 416, respectively. The N values were 1.58, 1.54, 1.56, 1.18, respectively. Mobility

decreased with increasing clay content, increasing organic matter content, and increasing cation exchange capacity.

METHODOLOGY:

Non-labeled 4-chlorobenzoic acid was made into an 100 ml solution containing 0.5 mg/ml. Labeled 4-chlorobenzoic acid (99 % radiochemical purity, SA =56 mCi/mmol, 794,000 dpm/ug, p.13) was quantitatively transferred to a 50-ml volumetric flask and diluted to volume with acetone to make a 0.0524 mg/ml solution. A calcium chloride solution (0.01 M) was made from reagent grade products and then sterilized by autoclaving. The final solutions made using both labeled and unlabeled 4-chlorobenzoic acid contained 0.5, 0.2, 0.08, and 0.03 mg/L.

Preliminary Study for Adsorption to Glass and Soil.

To determine adsorption to glass, the registrant prepared four centrifuge tubes containing 40 ml of the final solution. After 24 hours of shaking, an aliquot was removed and counted using LSC. A control without radiolabeled 4-chlorobenzoic acid was also prepared. Four tubes/soil (8 g soil in 40 ml solution, Table in Comment 2) were prepared, shaken, and sampled at 5, 18, 24, and 48 hours. After centrifugation, an aliquot (5 ml) of the supernatant from each tube was sampled and counted using LSC. The registrant also conducted a stability test for 4-chlorobenzoic acid following the preliminary study.

Definitive Study

Triplicate samples of 8 g of each soil (oven-dry basis) and 40 ml of test solution at each 4-chlorobenzoic acid concentration of 0.5, 0.2, 0.08, and 0.03 mg/L were put into centrifuge tubes. In addition, three tubes containing only solution at each concentration and one $CaCl_2$ blank were also put into tubes. Following shaking at 125 rpm for the appropriate time intervals (18 hours for the Arkansas, Stockton, and Georgia soils and 5 hours for the Texas soil), and centrifuging and decanting, the supernatants were sampled for radioassay (LSC) as described above. For desorption, fresh 0.01 M $CaCl_2$ with no added pesticide was added to each tube and the tubes were again shaken for the same time intervals as adsorption. After centrifuging and decanting, the supernatants were analyzed using LSC. The soil pellets were then extracted using 50:50 methanol:0.1 M K_2HPO_4 and 1 ml aliquots were combusted to determine extractable residues. The soils were then combusted to determine the amount of bound residues. Further details about the analytical methodology for both the preliminary and definitive studies may be seen in the attached Materials and Methods from the study.

DATA SUMMARY:

Based on batch equilibrium experiments, [^{14}C]4-chlorobenzoic acid, a degradate of thiobencarb, was determined to be very mobile in sandy loam (pH 5.8, 0.88 % OC), loamy sand (pH 5.6, 0.76 % OC), silt loam (pH 6.0, 0.88 % OC), and clay soil(pH 6.0, 2.0 % OC):calcium chloride solution slurries (1:5, w:v) containing 4-chlorobenzoic acid at approximately 0.03, 0.08, 0.2, and 0.5 mg/L. The slurries were equilibrated in darkness for 5-18 hours at 17-22 °C. Freundlich K_{ads} values were 0.74 for the sandy loam soil, 0.98 for the loamy sand soil, 1.22 for the silt loam soil, and 3.26 for clay soil. The corresponding K_{ocads} values were 84, 128, 138, and 163, respectively. The N values were 1.58, 1.58, 1.56, 1.28, respectively. K_{des} values were 2.19 for the sandy loam soil, 1.94 for the loamy sand soil, 2.44 for the silt loam soil, and 8.31 for the clay soil. The corresponding K_{ocdes} values were 249, 253, 277, and 416, respectively. The N values were 1.58, 1.54, 1.56, 1.18, respectively. Mobility decreased with increasing clay content, increasing organic matter content, and increasing cation exchange capacity.

At the termination of the experiment, radioactive material balances for the soil:solution slurries ranged from 83.8 to 107% of the applied. 4-Chlorobenzoic acid was stable in the study in all soils, with 89.9-100 % as parent (Table XII).

COMMENTS:

1. The report did not contain any description of a preliminary study for desorption. However, this was unimportant since 4-chlorobenzoic acid did not degrade significantly in the study. Also, there was no adsorption to glass.

2. The chemical and physical characteristics of the soils and sediment used in this study follow in the Table.

Property	Soil			
Particle Size Distribution	Arkansas silt loam	Stockton Clay Adobe	Georgia loamy sand	Texas sandy loam
Sand (%)	27	18	86	72
Silt (%)	56	27	10	21
Clay (%)	17	55	4	7
Organic Carbon	0.88	2.0	0.76	0.88
pH	6.0	6.0	5.6	5.8
Cation Exchange (CEC, meq/100g)	9.0	40.3	4.9	6.2
Base saturation (% Ca + Mg + Na + K)	60	82	42	57
Bulk Density	1.00	1.21	1.44	1.36
Moisture Content at 1/3 bar	22.3	41.2	3.9	17.6

Thiobencarb

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