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DATA EVALUATION RECORD

2-Hydroxy-Propazine §163-1

FORMULATION--00--ACTIVE INGREDIENT DEGRADATE

STUDY ID 442873-13
Perdue, D. 1995. Soil Adsorption/Desorption of 2-Hydroxy-[^{14}C]Propazine by the Batch Equilibrium Method. Project No. 913. Report No. 1817. Unpublished study performed by PTRL East, Inc., Richmond, KY, and submitted by Griffin Corporation, Valdosta, GA.

REVIEWED BY:

Rodolfo A. Pisigan, Jr., Ph.D.
Chemist
OPPTS/OPP/EFED
ERB-IV

Signature: RPisigan Jr.

Date: 4/15/98

APPROVED BY:

Larry Liu, Ph.D.
Environmental Scientist
OPPTS/OPP/EFED
ERB-IV

Signature: Larry Liu

Date: 4/16/98

CONCLUSIONS:

Mobility -- Adsorption/Desorption

1. This study was submitted to fulfill EPA Data Requirements for Registering Pesticides by providing information on the mobility (batch equilibrium) of 2-hydroxy-propazine (a degradate of an active ingredient propazine) in sandy loam, sand, loam, and silty clay soil samples. The study is considered acceptable.

2. Batch equilibration tests using four different soil samples and radiolabeled hydroxypropazine were conducted. The estimated adsorption Freundlich K_d values of 2-hydroxy-propazine are 1.447 for sandy loam, 0.283 for sand, 1.334 for loam, and 4.569 for silty clay. The desorption K_d values are 6.610 for sandy loam, 4.617 for sand, 3.123 for loam, and 12.362 for silty clay. The adsorption K_{oc} values are 144.7 for sandy loam, 329 for sand, 78 for loam, and 342 for silty clay . Both K_d and K_{oc} values suggest that 2-hydroxy-propazine is not strongly adsorbed by the soil samples and would be mobile. The extent of mobility would depend on existing environmental conditions and physicochemical properties of the system.

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METHODOLOGY

Sandy loam was collected in Fayette County, while sand, loam, and silty clay soil samples were collected in Madison County, Kentucky. The sandy loam was the same soil used in the previous soil metabolism study entitled "Aerobic Soil Metabolism of [^{14}C]Propazine in Sandy Loam (PTRL Project No. 865). The physicochemical characterization results for the 4 soil samples used in the current are summarized in Table 1. The solubility of 2-hydroxy-propazine in HPLC-grade water was determined at pH 7.0 at 25.0 ± 1.0°C to be 57 ppm. Preliminary studies were conducted to determine the appropriate soil:solution ratios and equilibration time. From the results, the author selected a soil:solution ratio of 1:3 (10 g : 30 ml of 0.01M $CaCl_2$ solution) for sandy loam and silty clay and 2:3 (20 g : 30 ml of 0.01M $CaCl_2$ solution) for sand and loam to achieve an acceptable range of 20 - 80% adsorption. A 24-hour equilibration period was selected and used in the definitive study.

The soil samples were air-dried and sieved through a 2-mm screen. Duplicate subsamples of each soil type were weighed into Teflon tubes. Aqueous solutions of 0.01M $CaCl_2$ with 0.25, 0.5, 0.75 and 1.0 ppm of ring- labeled 2-hydroxy-[^{14}C]Propazine [2-hydroxy-N,N'-bis(1-methylethyl)-1,3,5-triazine-2,4-diamine] (Chemical Structure in Figure 1) were added to the tubes. Solutions with 6 concentrations are preferred with the lowest concentration at least an order of magnitude lower than the highest concentration. The radiochemical purity and specific activity of the test chemical were >99.0% and 17.6mCi/mmol, respectively. After equilibrating the tubes for approximately 24 hours in the dark at 24.9 ± 0.8°C in shaking water bath, the tubes were centirifuged at approximately 1,576 G for about 10 minutes as in the preliminary study. The total radioactivity of the separated supernatant liquids was analyzed by LSC. For the desorption study, the supernatant liquids were replaced with an equal volume of fresh 0.01M $CaCl_2$ solution and slurries were also equilibrated as before for approximately 24 hours. The supernatant liquids were collected after centrifugation (~1,576G and about 10 minutes) and then radioassayed by LSC. The total radiocarbon in each homogenized air-dried soil sample was determined using a biological oxidizer.

The adsorption solutions, following approximately 24-hour equilibration at the highest concentration tested (nominal 1 ppm), were analyzed by HPLC. The modular liquid chromatograph has a ODS reverse phase column equipped with a variable UV/Vis detector monitoring at 240 nm and radioactivity flow detector. The results indicated that 2-hydroxy-[^{14}C]Propazine was stable during the adsorption phase. No stability data were provided because the samples were not stored prior to analysis.

DATA SUMMARY:

The overall material balance of the applied radioactivity was 98.4 ± 0.7% (mean ± % standard deviation). The material balance for the individual doses in the definitive study ranged from 92.7 to 104.3% (Tables III - VI). As the concentration of 2-hydroxy-propazine in the aqueous solutions increased, the percentage of applied radioactivity adsorbed on each soil sample decreased during the adsorption phase: 41.69 to 34.57% for sandy loam, 44.83 to 36.60% for sand, 58.59 to 51.42% for loam, and 75.92 to 67.26 for silty clay (Table VII). However, the trend of decreasing adsorbed radioactivity with increasing solution concentration was not observed during the desorption phase. Instead, the desorbed radioactivity generally increased with increasing solution concentration in 3 soils: 18.70 to 22.19% for sand, 16.26 to 22.19% for loam, and 12.00 to 14.52% for silty clay. No specific trend could be deciphered for sandy loam.

The adsorption and desorption data were analyzed using the logarithmic form of Freundlich isotherm:

$$\ln(x/m) = \ln K_d + (1/n)\ln Ce$$

where x = mass of 2-hydroxy-propazine adsorbed (ug), m = mass of adsorbent or soil (g), K_d = adsorption coefficient (ml/g), n = a constant for a given adsorbate-adsorbent system, and Ce = equilibrium concentration of 2-hydroxy-propazine in solution (ug/ml).The values of (1/n) and K_d were determined from the slope and intercept, respectively, of the plot of ln (x/m) vs ln Ce. The plots are shown in Figures 10 - 13. The results of the regression calculations of Freundlich isotherms for adsorption and desorption are presented in Tables VIII - XI and the adsorption/desorption coefficients are summarized in Table XII. The adsorption K_d values of 2-hydroxy-propazine were calculated to be 1.447 for sandy loam, 0.823 for sand, 1.334 for loam and 4.659 for silty clay. The desorption coefficients were 6.610 for sandy loam, 4.167 for sand, 3.123 for loam, and 12.362 for silty clay. The adsorption and desorption coefficients were then normalized to organic carbon content by multiplying K_d by (100 / % organic C) to yield K_{oc} . The adsorption K_{oc} values were 144.7 for sandy loam, 329.2 for sand, 78.0 for loam and 342.6 for silty clay.

REVIEWERS COMMENTS:

1. Using the adsorption coefficients, the author ranked the relative mobility of 2-hydroxy-propazine in the four soil samples. Based on K_d values, mobility was predicted to be greatest in sand, followed by loam, sandy loam and silty clay. Based on K_{oc} values, the highest mobility was predicted for loam, followed by sandy loam, sand, and clay. Predicting the relative mobility of 2-hydroxy-propazine in the 4 soils does not appear to be scientifically sound because not all the test systems used in the definitive study are the same. The soil:solution ratio for sandy loam and silty clay was 1:3 while the soil:solution ratio for sand and loam was 2:3. If the soil:solution ratio changes, the extent of adsorption would be expected to change also. Thus, it would not appear reasonable to make a direct comparison of adsorption behavior of 2-hydroxy-propazine based on K_d values in soil samples in contact with different volumes of equilibrating solution. With respect to K_{oc}, an important factor that might potentially influence the relative mobility comparison is the form of 2-hydroxy-propazine present in the aqueous phase under a given pH. The conjugate acid of the parent compound, propazine, has an acidity constant or pKa of 1.85 at 22°C (Montgomery, 1993). It is possible that the degradate 2-hydroxy-propazine might form ions under certain ranges of pH. Therefore, the acidity or basicity constant of the chemical needs to be known to be able to predict whether the chemical would be predominantly in the ionized or unionized form in the solution. If the test system pH would favor the ionized form, then the mechanism of adsorption would not be strictly related to organic carbon content.Thus, assessing the mobility solely on the basis of K_{oc} could lead to potential errors. K_{oc}, which is a function of organic carbon present in the soil or adsorbent, is generally regarded to be important for adsorption of neutral or nonionizable or undissociated compounds (Green and Karickhoff, 1990; Howard, 1991).

2. The plots of Freundlich isotherms in Figures 10 - 13 were developed possibly with an implied tacit assumption that n is equal to one. The graphical axes of x/m and Ce are linear in scale, or the plots were not expressed in logarithmic function. Consequently, different values of slope and intercepts might be generated from these plots compared to those derived from regression analysis of ln (x/m) vs ln Ce that yielded values of n not equal to one.

3. As mentioned in the protocol deviation, the centrifugation during phase separation was done at 1,576

G instead of 2,000 G. Calculations in future studies showing the minimum G required for settling of smaller or finer soil particles would be useful. This would aid in evaluating whether the chemical analysis would lead to overprediction of equilibrium solution concentration or underprediction of adsorbed phase concentration. Either case can influence the magnitude of the adsorption/desorption coefficients.

4. There seems to be a slight discrepancy in the way the bulk density of the soil samples was reported. On page 14, the bulk density (**disturbed**) of sand, silt and clay were provided by A & L Great Lakes Laboratories, Inc. and the bulk density (undisturbed) for sandy loam was provided by University of Kentucky (Lexington, KY). However, in Table 1 on page 29, footnote c indicated that the bulk density of **undisturbed** sand, loam and silty clays was determined by PTRL East, Inc. Appropriate or correct values of soil bulk density are useful in estimating retardation factors that are sometimes utilized in soil-to-groundwater pathway analysis and pesticide leaching assessment.

5. Four concentrations (0.25, 0.5, 0.75, and 1 ppm) were used in the study. The use of six concentrations with the lowest one at least an order of magnitude lower than the highest concentration is much preferred.

6.The values of the adsorption/desorption coefficients of the current study are generally lower than those reported for some soils in a previous adsorption/desorption study (MRID 001529-97) that was found acceptable in the 1987 EAB document. The adsorption K_d values in that study were 1.13 for loamy sand, 2.94 for sandy loam, 31.8 for loam, land 106 for clay loam. The desorption coefficients were 3.42 for loamy sand, 5.53 for sandy loam, 56.8 for loam, and 143 for clay loam. The adsorption K_{oc} values were 276 for loamy sand, 359 for sandy loam, 1871 for loam, and 2163 for clay loam.

References:

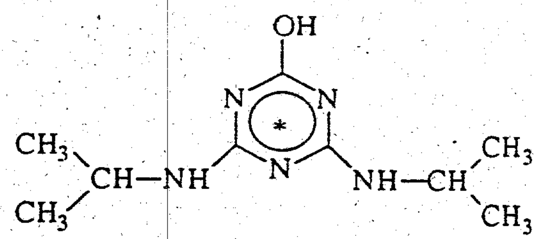
Green, R. E. and Karichkoff, S.W. 1990. Sorption Estimates for Modeling. In Pesiticides in the Soil Environment: Processes, Impacts, and Modeling. (H. H. Cheng, ed.) Soil Science Society of America, Inc., Wisconsin.

Howard, P.H. 1991. Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Vol. III. Pesticides. Lewis Publishers, Inc., Michigan.

Montgomery, J.H. 1993. Agrochemicals Desk Reference: Environmental Data. Lewis Publishers, Boca Raton

STUDY AUTHOR'S RESULTS AND CONCLUSIONS

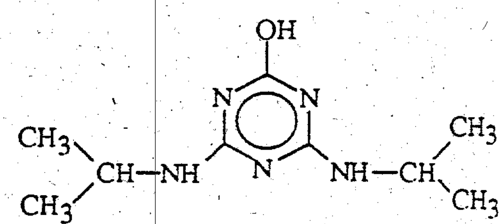
INCLUDING PERTINENT TABLES AND FIGURES



*Denotes site of radiolabel

2-Hydroxy-[^{14}C]Propazine

PTRL No.: 913-1
Lot No.: 010995
Specific Activity: 17.6 mCi/mmol
Radiochemical Purity: >99.0%
Date Received: 1-17-95



2-Hydroxy-Propazine

PTRL No.: 821-1
Lot No.: CH10128
Chemical Purity: 99.9%
Date Received: 12-15-93

Figure 1. Chemical Structures and Receipt Data for 2-Hydroxy-[^{14}C]Propazine.

Table I. Physicochemical Characteristics of Soils.(a)

PTRL East Inc. Log No.	Soil Type	Organic Carbon (%)	Texture Class Sand (%)	Silt (%)	Clay (%)	CEC(b) meq/100 g	Bulk Density (g/cm3)(c)	pH	Field Capacity(d)
Q-2	Sandy Loam(e)	1.00	67.0	23.0	10.0	5.5	1.24	6.8	15.1
U-3	Sand(f)	0.25	91.2	6.0	2.8	2.0	1.2	7.6	2.8
R-2	Loam(g)	1.71	48.4	32.4	19.2	17.2	1.51	7.6	23.5
V-1	Silty Clay(h)	1.36	8.8	44.0	47.2	16.6	1.46	5.9	32.2

(a) All soils collected from horizon A. Sandy loam collected in Fayette County, while the sand, loam and silty clay soils were collected in Madison County, Kentucky. Physicochemical characteristics of sandy loam determined by PTRL East, Inc., Richmond, Kentucky and sand, loam and silty clay by A & L Great Lakes Laboratories, Inc., Fort Wayne, Indiana.

(b) Cation exchange capacity.

(c) Determined on undisturbed sandy loam soil by College of Agriculture, University of Kentucky, Lexington, Kentucky and on undisturbed sand, loam and silty clay soils by PTRL East, Inc., Richmond, Kentucky.

(d) Based on ml water/100g dry soil at 0.33 bar.

(e) USDA soil series classification: Sandy loam from Huntington silt loam series.

(f) USDA soil series classification: Sand from Kickapoo sandy loam series.

(g) USDA soil series classification: Loam from Huntington silt loam series.

(h) USDA soil series classification: Silty clay from Eden silty clay loam series.

Table VI. Definitive Phase: Accountability of [14C]Residues from Soil Treated with 1.00 ppm 2-Hydroxy-[14C]Propazine.(a)

Soil Type	Replicate	Applied dpm(b)	µg/ml	Adsorption dpm(c)	µg/ml	Actual Desorption dpm(d)	µg/ml	Actual Combusted Solids(e)	µg/g	Total dpm	Percent Recovery
Sandy Loam	A	5,627,100	1.014	3,563,520	0.642	433,196	0.078	1,219,242	0.659	5,215,958	92.7
	B	5,627,100	1.014	3,800,640	0.685	543,984	0.098	1,148,701	0.621	5,493,325	97.6
Sand	A	5,627,100	1.014	3,522,720	0.635	352,024	0.063	1,473,072	0.398	5,347,816	95.0
	B	5,627,100	1.014	3,612,360	0.651	336,656	0.061	1,350,821	0.365	5,299,837	94.2
Loam	A	5,627,100	1.014	2,767,260	0.499	548,723	0.099	2,197,459	0.594	5,513,442	98.0
	B	5,627,100	1.014	2,699,520	0.487	694,484	0.125	2,151,043	0.582	5,545,047	98.5
Silty Clay	A	5,627,100	1.014	1,875,840	0.338	515,900	0.093	2,929,581	1.584	5,321,321	94.6
	B	5,627,100	1.014	1,809,240	0.326	538,220	0.097	3,289,788	1.779	5,637,248	100.2
										Mean	96.4

(a) Specific activity of 184,926 dpm/µg.
(b) Based on radioassay of treatment solution.
(c) Amount remaining in adsorption solution following equilibration.
(d) Dpm in desorption solution minus dpm in adsorption solution remaining in soil after equilibration.
(e) Dpm remaining on soil minus dpm in solution remaining in soil after desorption.

Table V. Definitive Phase: Accountability of [14C]Residues from Soil Treated with 0.75 ppm 2-Hydroxy-[14C]Propazine.(a)

Soil Type	Replicate	Applied dpm(b)	µg/ml	Adsorption dpm(c)	µg/ml	Actual Desorption dpm(d)	µg/ml	Actual Combusted Solids(e)	µg/g	Total dpm	Percent Recovery
Sandy Loam	A	4,144,680	0.747	2,759,640	0.497	461,068	0.083	987,572	0.534	4,208,280	101.5
	B	4,144,680	0.747	2,545,200	0.459	448,860	0.081	1,036,834	0.561	4,030,894	97.3
Sand	A	4,144,680	0.747	2,439,360	0.440	329,052	0.059	1,234,773	0.334	4,003,185	96.6
	B	4,144,680	0.747	2,504,100	0.451	342,420	0.062	1,347,656	0.364	4,194,176	101.2
Loam	A	4,144,680	0.747	2,008,080	0.362	452,772	0.082	1,692,090	0.458	4,152,942	100.2
	B	4,144,680	0.747	2,025,120	0.365	438,988	0.079	1,820,392	0.492	4,284,500	103.4
Silty Clay	A	4,144,680	0.747	1,284,300	0.231	391,485	0.071	2,351,619	1.272	4,027,404	97.2
	B	4,144,680	0.747	1,280,700	0.231	400,530	0.072	2,486,469	1.345	4,167,699	100.6
										Mean	99.8

(a) Specific activity of 184,926 dpm/µg.
(b) Based on radioassay of treatment solution.
(c) Amount remaining in adsorption solution following equilibration.
(d) Dpm in desorption solution minus dpm in adsorption solution remaining in soil after equilibration.
(e) Dpm remaining on soil minus dpm in solution remaining in soil after desorption.

Table IV. Definitive Phase: Accountability of [14C]Residues from Soil Treated with 0.50 ppm 2-Hydroxy-[14C]Propazine.(a)

Soil Type	Replicate	Applied dpm(b)	µg/ml	Adsorption dpm(c)	µg/ml	Actual Desorption dpm(d)	µg/ml	Actual Combusted Solids(e)	µg/g	Total dpm	Percent Recovery
Sandy Loam	A	2,752,080	0.496	1,743,300	0.314	321,060	0.058	724,207	0.392	2,788,567	101.3
	B	2,752,080	0.496	1,729,440	0.312	283,380	0.051	723,654	0.391	2,736,474	99.4
Sand	A	2,752,080	0.496	1,549,620	0.279	230,769	0.042	904,105	0.244	2,684,494	97.5
	B	2,752,080	0.496	1,645,620	0.297	177,142	0.032	838,500	0.227	2,661,262	96.7
Loam	A	2,752,080	0.496	1,229,820	0.222	294,534	0.053	1,132,686	0.306	2,657,040	96.5
	B	2,752,080	0.496	1,229,940	0.222	292,416	0.053	1,188,676	0.321	2,711,032	98.5
Silty Clay	A	2,752,080	0.496	761,220	0.137	245,523	0.044	1,680,746	0.909	2,687,489	97.7
	B	2,752,080	0.496	757,980	0.137	245,604	0.044	1,705,103	0.922	2,708,687	98.4
										Mean	98.3

(a) Specific activity of 184,926 dpm/µg.
(b) Based on radioassay of treatment solution.
(c) Amount remaining in adsorption solution following equilibration.
(d) Dpm in desorption solution minus dpm in adsorption solution remaining in soil after equilibration.
(e) Dpm remaining on soil minus dpm in solution remaining in soil after desorption.

Table III. Definitive Phase: Accountability of [14C]Residues from Soil Treated with 0.25 ppm 2-Hydroxy-[14C]Propazine.(a)

Soil Type	Replicate	Applied dpm(b)	μg/ml	Adsorption dpm(c)	μg/ml	Actual Desorption dpm(d)	μg/ml	Actual Combusted Solids(e)	μg/g	Total dpm	Percent Recovery
Sandy Loam	A	1,383,900	0.249	809,280	0.146	173,136	0.031	414,257	0.224	1,396,673	100.9
	B	1,383,900	0.249	804,540	0.145	171,188	0.031	406,388	0.220	1,382,116	99.9
Sand	A	1,383,900	0.249	746,940	0.135	106,994	0.019	542,411	0.147	1,396,345	100.9
	B	1,383,900	0.249	780,000	0.141	117,320	0.021	443,583	0.120	1,340,903	96.9
Loam	A	1,383,900	0.249	565,620	0.102	139,014	0.025	738,148	0.200	1,442,782	104.3
	B	1,383,900	0.249	570,660	0.103	124,122	0.022	620,535	0.168	1,315,317	95.0
Silty Clay	A	1,383,900	0.249	336,960	0.061	124,284	0.022	889,004	0.481	1,350,248	97.6
	B	1,383,900	0.249	329,400	0.059	118,770	0.021	893,657	0.483	1,341,827	97.0
										Mean	99.1

(a) Specific activity of 184,926 dpm/μg.
(b) Based on radioassay of treatment solution.
(c) Amount remaining in adsorption solution following equilibration.
(d) Dpm in desorption solution minus dpm in adsorption solution remaining in soil after equilibration.
(e) Dpm remaining on soil minus dpm in solution remaining in soil after desorption.

Table VII. Definitive Phase: Summary of Percent Adsorption/Desorption of 2-Hydroxy-[14C]Propazine with Four Soil Types.

Soil Type	Initial Aqueous Concentration (ppm)	Percent Adsorbed(a)	Percent Desorbed(b)
Sandy Loam	0.25	41.69	29.56
	0.50	36.91	29.43
	0.75	36.00	31.02
	1.00	34.57	29.18
Mean ± S.D.		37.29 ± 3.09	29.80 ± 0.83
Sand	0.25	44.83	18.70
	0.50	41.95	18.89
	0.75	40.36	20.65
	1.00	36.60	19.62
Mean ± S.D.		40.94 ± 3.43	19.47 ± 0.88
Loam	0.25	58.95	16.26
	0.50	55.31	20.19
	0.75	51.34	20.27
	1.00	51.42	22.19
Mean ± S.D.		54.26 ± 3.64	19.73 ± 2.49
Silty Clay	0.25	75.92	12.00
	0.50	72.40	12.67
	0.75	69.06	14.07
	1.00	67.26	14.52
Mean ± S.D.		71.16 ± 3.82	13.32 ± 1.18

(a) Mean of two replicates.

(b) Mean of two replicates; percent of amount adsorbed.

Table VIII. Regression Calculations of Freundlich Equation for Sandy Loam.(a)

Phase	Nominal Rate (ppm)	Ce(b)	x ln (Ce)	x/m(c)	y ln(x/m)
Adsorption	0.25	0.145	-1.928	0.312	-1.165
	0.50	0.313	-1.162	0.549	-0.599
	0.75	0.478	-0.738	0.807	-0.214
	1.00	0.664	-0.410	1.052	0.050

r = 0.999
r^2 = 0.998
slope = 0.804
intercept = 0.370
Kd = 1.447
n = 1.244

Phase	Nominal Rate (ppm)	Ce(b)	x ln (Ce)	x/m(c)	y ln(x/m)
Desorption	0.25	0.031	-3.473	0.222	-1.506
	0.50	0.054	-2.910	0.391	-0.938
	0.75	0.082	-2.501	0.547	-0.603
	1.00	0.088	-2.430	0.640	-0.446

r = 0.997
r^2 = 0.994
slope = 0.976
intercept = 1.889
Kd = 6.610
n = 1.024

(a) Values taken from data in Appendix 3: mean of replicates reported.
(b) Actual concentration in sorption solution (ppm).
(c) x = mass of test material in soil in µg.
m = mass of soil in grams.

Table IX. Regression Calculations of Freundlich Equation for Sand.(a)

Phase	Nominal Rate (ppm)	Ce(b)	x ln (Ce)	x/m(c)	y ln(x/m)
Adsorption	0.25	0.138	-1.983	0.168	-1.785
	0.50	0.288	-1.245	0.312	-1.164
	0.75	0.446	-0.808	0.452	-0.793
	1.00	0.643	-0.442	0.557	-0.585

r = 0.998
r^2 = 0.995
slope = 0.793
intercept = -0.195
Kd = 0.823
n = 1.262

Phase	Nominal Rate (ppm)	Ce(b)	x ln (Ce)	x/m(c)	y ln(x/m)
Desorption	0.25	0.020	-3.901	0.133	-2.015
	0.50	0.037	-3.303	0.236	-1.446
	0.75	0.061	-2.805	0.349	-1.052
	1.00	0.062	-2.780	0.382	-0.963

r = 0.998
r^2 = 0.996
slope = 0.907
intercept = 1.530
Kd = 4.617
n = 0.907

(a) Values taken from data in Appendix 3; mean of replicates reported.
(b) Actual concentration in sorption solution (ppm).
(c) x = mass of test material in soil in µg.
m = mass of soil in grams.

Table X. Regression Calculations of Freundlich Equation for Loam.(a)

Phase	Nominal Rate (ppm)	Ce(b)	x ln (Ce)	x/m(c)	y ln(x/m)
Adsorption	0.25	0.102	-2.279	0.221	-1.512
	0.50	0.222	-1.506	0.412	-0.888
	0.75	0.363	-1.012	0.575	-0.553
	1.00	0.493	-0.708	0.782	-0.245

r = 0.999
r^2 = 0.997
slope = 0.790
intercept = 0.288
Kd = 1.334
n = 1.265

Phase	Nominal Rate (ppm)	Ce(b)	x ln (Ce)	x/m(c)	y ln(x/m)
Desorption	0.25	0.024	-3.742	0.184	-1.695
	0.50	0.053	-2.939	0.314	-1.159
	0.75	0.080	-2.521	0.475	-0.745
	1.00	0.112	-2.189	0.588	-0.531

r = 0.997
r^2 = 0.994
slope = 0.762
intercept = 1.139
Kd = 3.123
n = 1.312

(a) Values taken from data in Appendix 3: mean of replicates reported.
(b) Actual concentration in sorption solution (ppm).
(c) x = mass of test material in soil in µg.
m = mass of soil in grams.

Table XI. Regression Calculations of Freundlich Equation for Silty Clay.(a)

Phase	Nominal Rate (ppm)	Ce(b)	x ln (Ce)	x/m(c)	y ln(x/m)
Adsorption	0.25	0.060	-2.812	0.568	-0.565
	0.50	0.137	-1.988	1.077	0.075
	0.75	0.231	-1.465	1.548	0.437
	1.00	0.332	-1.102	2.047	0.716

r	=	1.000
r^2	=	0.999
slope	=	0.745
intercept	=	1.539
Kd	=	4.659
n	=	1.341

Phase	Nominal Rate (ppm)	Ce(b)	x ln (Ce)	x/m(c)	y ln(x/m)
Desorption	0.25	0.022	-3.821	0.482	-0.730
	0.50	0.044	-3.118	0.915	-0.088
	0.75	0.071	-2.640	1.308	-0.269
	1.00	0.095	-2.354	1.682	0.520

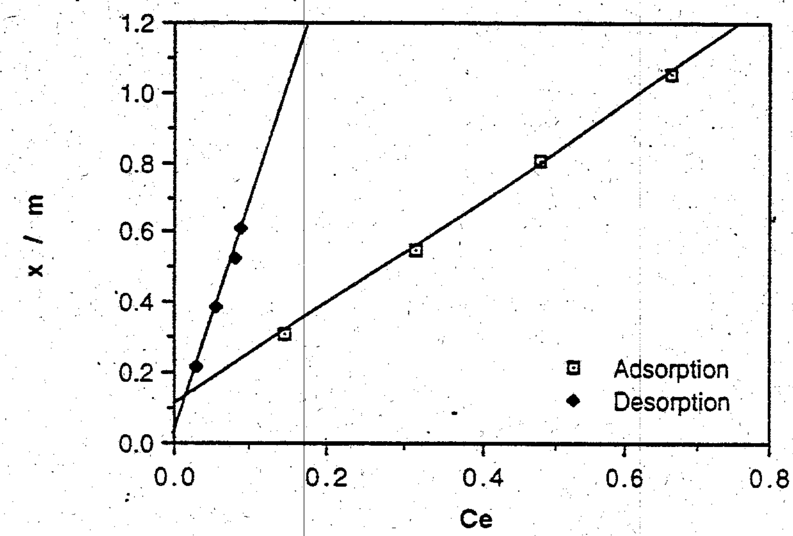
r	=	0.999
r^2	=	0.998
slope	=	0.845
intercept	=	2.515
Kd	=	12.362
n	=	1.183

(a) Values taken from data in Appendix 3; mean of replicates reported.
(b) Actual concentration in sorption solution (ppm).
(c) x = mass of test material in soil in µg.
m = mass of soil in grams.

Table XII. Adsorption/Desorption Constants for 2-Hydroxy-[14C]Propazine in Four Soil Types.

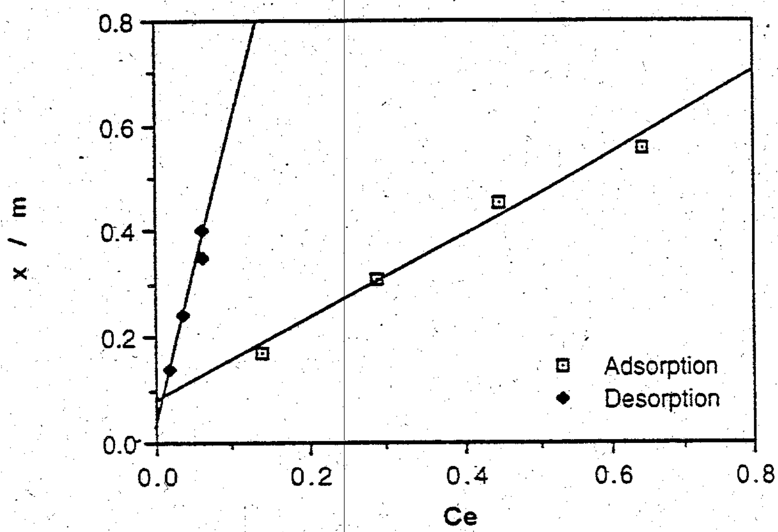
Soil Type	Study Phase	Percent Organic Carbon	Kd	Koc(a)	n(b)
Sandy Loam	Adsorption	1.00	1.447	144.7	1.244
	Desorption	1.00	6.610	661.0	1.024
Sand	Adsorption	0.25	0.823	329.2	1.262
	Desorption	0.25	4.617	1,846.8	0.907
Loam	Adsorption	1.71	1.334	78.0	1.265
	Desorption	1.71	3.123	182.6	1.312
Silty Clay	Adsorption	1.36	4.659	342.6	1.341
	Desorption	1.36	12.362	909.0	1.183

(a) Koc = (Kd x 100)/(% organic carbon).
(b) n = 1/slope of linear regression of Freundlich equation x/m = (1/n)(lnCe) + ln Kd.



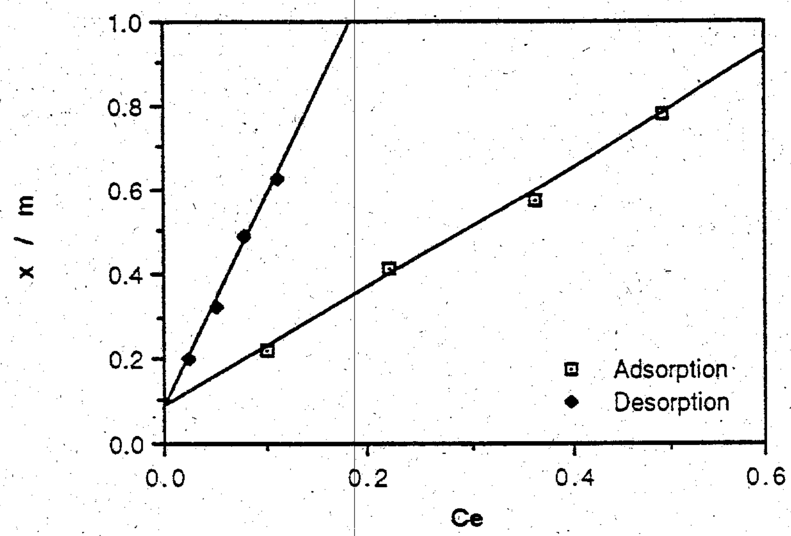
Ce = Actual concentration in sorption solution (µg/ml).
x/m = Test material in soil (µg/l).

Figure 10. Adsorption/Desorption Isotherms of 2-Hydroxy-[^{14}C]Propazine in Sandy Loam.



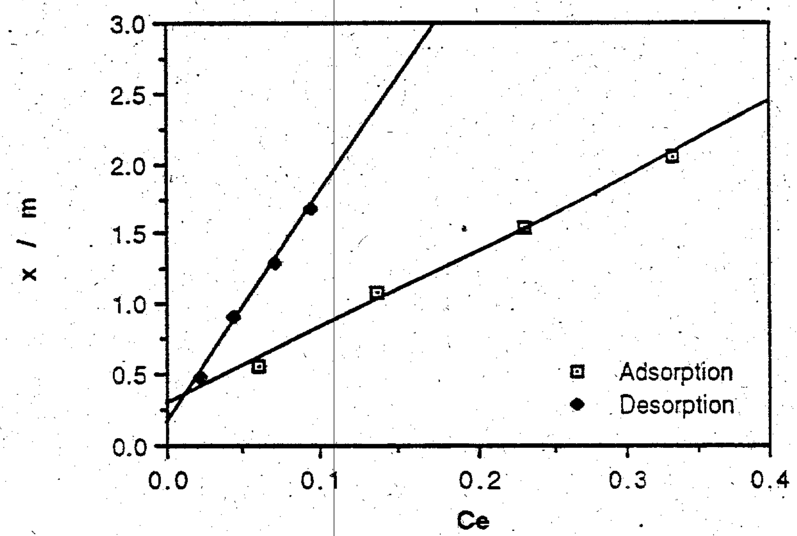
Ce = Actual concentration in sorption solution (µg/ml).
x/m = Test material in soil (µg/l).

Figure 11. Adsorption/Desorption Isotherms of 2-Hydroxy-[^{14}C]Propazine in Sand.



Ce = Actual concentration in sorption solution (µg/ml).
x/m = Test material in soil (µg/l).

Figure 12. Adsorption/Desorption Isotherms of 2-Hydroxy-[^{14}C]Propazine in Loam.



Ce = Actual concentration in sorption solution (µg/ml).
x/m = Test material in soil (µg/l).

Figure 13. Adsorption/Desorption Isotherms of 2-Hydroxy-[^{14}C]Propazine in Silty Clay.

CONCLUSIONS

Adsorption/desorption isotherms for 2-hydroxy-[^{14}C]propazine were determined using four soil types. The adsorption/desorption constants (K_{oc} values) are 144.7/661.0 for sandy loam, 329.2/1,846.8 for sand, 78.0/182.6 for loam and 342.6/909.0 for silty clay. If K_{oc} values are used as a measure of relative mobility, mobility is predicted to be greatest in loam followed by sandy loam, sand and silty clay. If K_d values are used, mobility is predicted to be greatest in sand (0.823/4.617) followed by loam (1.334/3.123), sandy loam (1.447/6.610) and silty clay (4.659/12.362).