**Data Evaluation Report on the Adsorption-desorption of Orthosulfamuron (IR5878) in Soil**

PMRA Submission Number {.....} EPA MRID Number 46578971

Data Requirement: PMRA Data Code:
EPA DP Barcode: D320283
OECD Data Point:
EPA Guideline: 163-1

**Test material:**

Common name: Orthosulfamuron

Chemical name:

IUPAC name: 1-(4,6-Dimethoxypyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenyl-sulfamoyl]urea.

CAS name: 2-[[[[[(4,6-Dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]-amino]-N,N-dimethylbenzamide.

CAS No.: 213464-77-8.

Synonyms IR5878.

Smiles string: CN(C(=O)c1ccccc1NS(=O)(=O)NC(=O)Nc1nc(cc(n1)OC)OC)C (ISIS v2.3/Universal SMILES).
No EPI Suite, v3.12 SMILES String found as of 11/21/05.

**Primary Reviewer:** Kindra Bozicevich
**Cambridge Environmental**
**Signature:**
**Date:** 12/1/05

**Secondary Reviewer:** Joan Harlin
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**Company Code:**
**Active Code:**
**Use Site Category:**
**EPA PC Code:** 108209

**CITATION:** Scacchi, A. and M. Trucco. 2005. Adsorption-desorption of $^{14}$C-IR5878 in American Soils. Unpublished study performed by ISAGRO RICERCA S.r.l., Novara, Italy; sponsored and submitted by ISAGRO S.p.A., Milano, Italy. Study Number MEF.04.02. Experiment start date March 9, 2004, and completion date June 28, 2004. Final report issued January 10, 2005. 210 pp.

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**Cambridge Environmental**
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**Company Code:**
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## EXECUTIVE SUMMARY

The adsorption/desorption characteristics of [$^{14}$C-5-pyrimidinyl]-labeled 1-(4,6-dimethoxypyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenyl-sulfamoyl]urea (orthosulfamuron; IR5878) were studied in two sandy loam soils [pH 6.5, organic carbon 1.04%; pH 5.7, organic carbon 0.35%] from Arkansas, a sand soil [pH 4.7, organic carbon 1.03%] from Minnesota, a clay loam soil [pH 5.4, organic carbon 3.01%] and a loam soil [pH 7.4, organic carbon 1.8%] from North Dakota, and a silt loam soil [pH 7.5, organic carbon 0.92%] from Italy, in a batch equilibrium experiment. The experiment was conducted in accordance with the USEPA Guidelines for Pesticides Registration, Subdivision N §163-1, and in compliance with the OECD principles of Good Laboratory Practice, Council Directives 88/320/EEC and 90/18/EEC, and EC Directive 2004/9/EC. The adsorption phase of the study was carried out by equilibrating air-dried soil with [$^{14}$C-5-pyrimidinyl]orthosulfamuron at 0.25, 0.75, 2.5, 7.5, and 25.0 mg a.i./kg soil at 20 ± 2°C for 2 hours (lighting conditions were not reported). The equilibrating solution used was 0.01M $CaCl_2$, with soil/solution ratios of 1:5 (w:v) for all test soils. The desorption phase of the study was carried out by replacing the adsorption solution with an equivalent volume of pesticide-free 0.01M $CaCl_2$ solution and equilibrating at 20 ± 2°C for 2 hours (lighting conditions were not reported). The desorption step was conducted twice for all test soils. The supernatant solution after adsorption and desorption was separated by centrifugation and aliquots were analyzed for total radioactivity using LSC. Samples were not analyzed for the parent compound or transformation products.

The incubation temperature employed during the study was maintained at 20 ± 2°C; no supporting data were provided. The pH values of the test solution during the study ranged from 5.19-7.41 for all test soils. Mass balances were not determined, except for a supplementary experiment.

After 2 hours of equilibration, 32.37-37.35%, 56.41-65.48%, 32.28-45.57%, 77.38-82.38%, 25.36-37.51%, and 54.72-61.99% of the applied [$^{14}$C-5-pyrimidinyl]orthosulfamuron was adsorbed to the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively. Freundlich adsorption K values were 2.37, 8.17, 3.61, 19.7, 2.00, and 6.86 for the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively; corresponding 1/n values were 0.974, 1.062, 1.152, 0.980, 1.019, and 0.990. Respective Freundlich adsorption $K_{oc}$ values were 228, 2330, 350, 653, 217, and 381. At the end of two desorption steps, 54.86-65.35%, 35.31-41.84%, 44.90-56.79%, 22.53-29.40%, 54.01-68.69%, and 45.93-55.42% of the adsorbed [$^{14}$C]orthosulfamuron was desorbed from the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively. Freundlich desorption K values were 4.01, 8.38, 5.11, 13.8, 3.17, and 4.72 for the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively; corresponding 1/n values were 1.048, 1.019, 0.935, 0.958, 1.023, and 0.991. Respective Freundlich desorption $K_{oc}$ values were 385, 2390, 496, 460, 345, and 262.

In a supplementary experiment to determine the stability of the test material, duplicate aliquots of pre-equilibrated test soils were treated with [$^{14}$C-5-pyrimidinyl]orthosulfamuron at a nominal

test concentration of 7.5 mg a.i./kg soil (1.5 µg/mL). The samples were incubated under agitation for 2 hours at 20 ± 2°C, then centrifuged and analyzed in duplicate for total radioactivity using LSC. The samples were sonicated, then extracted twice with 33 mM $CH_3CN$:$NaHCO_3$ (Extracts A and B). Following each extraction, the samples were centrifuged and the resulting extracts were pooled, brought to volume with acetonitrile, and analyzed in duplicate using LSC. The radioactivity remaining in the soil was determined using LSC analysis following combustion. The stability of the test material was determined by analyzing aliquots of the adsorption supernatants and pooled extracts using reverse-phase TLC.

Based on TLC analysis, supplementary experiment mass balances averaged 100.10 ± 0.0% (range 100.10-100.10%), 100.26 ± 1.047% (range 99.52-101.00%), 100.63 ± 0.792% (range 100.07-101.19%), 100.37 ± 0.495% (range 100.02-100.72%), 100.78 ± 0.926% (range 100.12-101.43%), and 100.49 ± 0.580% (range 100.08-100.90%) of the applied for the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam test soils, respectively.

**Results Synopsis:**

**Adsorption:**

| Soil | Amount adsorbed (% of the applied) | $K_f$ | 1/n | $R^2$ | $K_{foc}$ |
|---|---|---|---|---|---|
| Ark-1 Sandy loam | 32.37-37.35% | 2.37 | 0.974 | 0.988 | 228 |
| Ark-2 Sandy loam | 56.41-65.48% | 8.17 | 1.062 | 0.992 | 2330 |
| Benson Sand | 32.28-45.57% | 3.61 | 1.152 | 0.984 | 350 |
| M-CL Clay loam | 77.38-82.38% | 19.7 | 0.980 | 0.998 | 653 |
| PC-1 Silt loam | 25.36-37.51% | 2.00 | 1.019 | 0.993 | 217 |
| Pratt Loam | 54.72-61.99% | 6.86 | 0.990 | 0.997 | 381 |

**Desorption:**

| Soil | Amount desorbed (% of the adsorbed) | $K_f$ | 1/n | $R^2$ | $K_{foc}$ |
|---|---|---|---|---|---|
| Ark-1 Sandy loam | 54.86-65.35% | 4.01 | 1.048 | 0.993 | 385 |
| Ark-2 Sandy loam | 35.31-41.84% | 8.38 | 1.019 | 0.997 | 2394 |
| Benson Sand | 44.90-56.79% | 5.11 | 0.935 | 0.988 | 496 |
| M-CL Clay loam | 22.53-29.40% | 13.8 | 0.958 | 0.996 | 460 |
| PC-1 Silt loam | 54.01-68.69% | 3.17 | 1.023 | 0.985 | 345 |
| Pratt Loam | 45.93-55.42% | 4.72 | 0.991 | 0.991 | 262 |

**Study Acceptability:** This study is classified as **supplemental**, as material balances were determined only for test soils treated at one test concentration, rather than for all test concentrations/test soil groups.

## I. MATERIALS AND METHODS

**GUIDELINE FOLLOWED:** This study was conducted in accordance with USEPA Guidelines for Pesticides Registration, Subdivision N §163-1 and Series OPPTS 835.1220 (p. 14). One significant deviation from the objectives of Subdivision N guidelines was identified:

Material balances were incomplete.

**COMPLIANCE:** This study was conducted in compliance with OECD principles of Good Laboratory Practice, Council Directives 88/320/EEC and 90/18/EEC, and EC Directive 2004/9/EC (pp. 3-4; Appendix 9, pp. 207-210). Signed and dated GLP, Quality Assurance, No Data Confidentiality, and Declaration and Signatures statements were provided (pp. 2-6; Appendix 9, pp. 207-210). A Certificate of Authenticity was not provided.

### A. MATERIALS:

**1. Test Material:** [$^{14}$C-5-Pyrimidinyl]orthosulfamuron (IR5878; p. 16).

**Chemical Structure:** See DER Attachment 1.

**Description:** Technical grade, solid (p. 13).

**Purity:**
Radiolabeled: Radiochemical purity: >97% (by TLC; p. 16).
Lot/Batch No. 208.
Specific activity: 4.452 MBq/mg; 120.323 µCi/mg; 267117 dpm/µg.

Locations of the label: 5 Carbon of the pyrimidinyl ring.

Non-radiolabeled: Analytical purity: >95% (by HPLC; p. 16; Appendix 2, p. 103; Appendix 3, p. 123).
Lot/Batch No. G032/02.

**Storage conditions of test chemicals:** Stored at -20°C (p. 17).

**Physico-chemical properties of orthosulfamuron (IR5878).**

| Parameter | Value | Comment |
|---|---|---|
| Molecular formula | $C_{16}H_{20}N_6O_6S$ | |
| Molecular weight | 424.44 g/mole | |
| Water Solubility | Not reported. | |
| Vapor Pressure/Volatility | Not reported. | |
| UV Absorption | Not reported. | |
| Pka | Not reported. | |
| $K_{ow}$/log $K_{ow}$ | Not reported. | |
| Stability of compound at room temperature, if provided | Not reported. | |

Data were obtained from p. 13 of the study report.

## 2. Soil Characteristics

**Table 1: Description of soil collection and storage.**

| Description | Ark-1 | Ark-2 | Benson | M-CL | PC-1 | Pratt |
|---|---|---|---|---|---|---|
| Geographic location | Shoffner Farm Research, Arkansas | Shoffner Farm Research, Arkansas | Minnesota | Mutchler Farm, North Dakota | Italy | North Dakota |
| Pesticide use history at the collection site | Not reported. | Not reported. | Not reported. | Not reported. | Not reported. | Not reported. |
| Collection procedures | Not reported. | Not reported. | Not reported. | Not reported. | Not reported. | Not reported. |
| Sampling depth (cm) | 0-20 | 0-20 | 0-20 | 0-20 | 0-20 | 0-20 |
| Storage conditions | Not reported. | Not reported. | Not reported. | Not reported. | Not reported. | Not reported. |
| Storage length [1] | *ca.* 16 months. | *ca.* 16 months. | *ca.* 21 months. | *ca.* 30 months. | *ca.* 22 months. | *ca.* 21 months. |
| Soil preparation | Air-dried; sieved (2 mm). | Air-dried; sieved (2 mm). | Air-dried; sieved (2 mm). | Air-dried; sieved (2 mm). | Air-dried; sieved (2 mm). | Air-dried; sieved (2 mm). |

Data were obtained from p. 17 and Appendix 4, p. 125 of the study report.

1. The storage length was determined as the interval from the date of sampling (September 2001 for M-CL; May 2002 for PC-1; June 2002 for Pratt and Benson; November 2002 for Ark-1 and Ark-2) to experiment initiation (March 2004).

**Table 2: Properties of the soils.**

| Property | Ark-1 | Ark-2 | Benson | M-CL | PC-1 | Pratt |
|---|---|---|---|---|---|---|
| Soil texture | Sandy loam | Sandy loam | Sand | Clay loam | Silt loam | Loam |
| %Sand | 58.25 | 60.00 | 87.25 | 24.75 | 13.50 | 42.00 |
| %Silt | 36.25 | 32.00 | 11.00 | 44.50 | 72.50 | 38.00 |
| %Clay | 5.50 | 8.00 | 1.75 | 30.75 | 14.00 | 20.00 |
| pH (0.01 $CaCl_2$) | 6.50 | 5.66 | 4.70 | 5.37 | 7.50 | 7.40 |
| Organic carbon (%) | 1.04 | 0.35 | 1.03 | 3.01 | 0.92 | 1.80 |
| Organic matter (%) [1] | 1.77 | 0.60 | 1.75 | 5.12 | 1.56 | 3.06 |
| CEC (meq/100g) | 7.19 | 5.89 | 1.46 | 27.18 | 17.01 | 22.40 |
| Moisture at 1/3 atm (%) | Not reported. | | | | | |
| Bulk density (g/$cm^3$) | Not reported. | | | | | |
| Biomass (mg microbial C/100 g or CFU or other) | Not reported. | | | | | |
| Soil taxonomic classification | Not reported. | | | | | |
| Sol mapping unit (for EPA) | Not reported. | | | | | |

Data were obtained from p. 17 and Table 2, p. 44 of the study report.
1. Calculated as % organic carbon × 1.7.

## C. STUDY DESIGN:

**1. Preliminary study:** Preliminary experiments were conducted to determine the appropriate equilibrium time to be used in the definitive study, and to determine the adsorption of the test material to the test vessels (p. 18).

**Kinetic test:** Prior to use, 1-g (dry weight equivalent) aliquots of each test soil were pre-equilibrated in polypropylene centrifuge tubes at 20 ± 2°C for ≥24 hours with 2.5 mL of 0.01M $CaCl_2$ solution (p. 19). Following pre-equilibration, the test soils were treated with an additional aliquot of 0.01M $CaCl_2$ solution and an aliquot of [$^{14}$C-5-pyrimidinyl]orthosulfamuron, at a nominal test concentration of 25.0 mg a.i./kg soil (5.0 µg/mL), to establish soil:solution ratios of 1:5 (w:v; p. 21). The samples were incubated under agitation at 20 ± 2°C (lighting conditions not reported). Following 30 minutes, 45 minutes, 1 hour, and 2 hours of incubation, the samples were centrifuged and duplicate 0.2-mL aliquots were analyzed for total radioactivity using LSC (Scheme 1, p. 39). The supernatant samples were stored at 1-7°C prior to analysis.

After 2 hours of equilibrium, an average 36.98%, 61.22%, 47.78%, 81.35%, 35.88%, and 58.91% of the applied [$^{14}$C-5-pyrimidinyl]orthosulfamuron was adsorbed to the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively (p. 31; Table 3, p. 45; Figure 1, p. 59). Based on these results, it was determined that the definitive study would be conducted using an equilibration time of 2 hours.

**Screening test:** Prior to use, 1-g (dry weight equivalent) aliquots of each test soil were pre-equilibrated in polypropylene centrifuge tubes at 20 ± 2°C for ≥24 hours with 2.5 mL of 0.01M $CaCl_2$ solution (p. 19). Following pre-equilibration, the test soils were treated with an additional aliquot of 0.01M $CaCl_2$ solution and an aliquot of [$^{14}$C-5-pyrimidinyl]orthosulfamuron, at a nominal test concentration of 25.0 mg a.i./kg soil (5.0 µg/mL), to establish soil:solution ratios of 1:5 (w:v; p. 22). Blank samples for each test soil were prepared without addition of the test material. Control samples were prepared without addition of the test soils. The samples were incubated under agitation for 2 hours at 20 ± 2°C (lighting conditions not reported). Following equilibration, the samples were centrifuged and duplicate 0.2-mL aliquots were analyzed for total radioactivity using LSC (Scheme 1, p. 39). Following the adsorption phase, the supernatant solution was removed and an equivalent volume of 0.01M $CaCl_2$ solution was added to the test vessels. The samples were incubated under agitation for 2 hours at 20 ± 2°C (lighting conditions not reported). Following centrifugation, the supernatants were removed and the process was repeated. Following each desorption step, aliquots were analyzed using LSC. The control samples were analyzed after 6 hours of incubation to determine adsorption of the test material to the test vessels. All supernatant samples were stored at 1-7°C prior to analysis.

## 2. Definitive study experimental conditions:

**Table 3: Study design for the adsorption phase.**

| Parameters | | Ark-1 Sandy loam | Ark-2 Sandy loam | Benson Sand | M-CL Clay loam | PC-1 Silt loam | Pratt Loam |
|---|---|---|---|---|---|---|---|
| Condition of soil (air dried/fresh) [1] | | Air-dried | | | | | |
| Have these soils been used for other laboratory studies? (specify which) | | MRID 46578968. | | | | | |
| Soil (g/replicate) | | 1 | | | | | |
| Equilibrium solution used (eg: 0.01N $CaCl_2$) | | 0.01M $CaCl_2$ | | | | | |
| Control used (with salt solution only) (Yes/No) | | No | | | | | |
| Test material concentrations [2] | Nominal application rates (mg a.i./kg soil) | 0.25, 0.75, 2.5, 7.5, 25.0 | | | | | |
| | Analytically measured concentrations ( mg a.i./kg soil) | Not reported. | | | | | |
| Identity and concentration of co-solvent, if any | | Methyl cyanide, 0.2%. | | | | | |
| Soil:solution ratio | | 1:5 | | | | | |
| Initial pH of the equilibration solution, if provided | | 6.30 | | | | | |
| No. of replications | Controls | 0 | | | | | |
| | Treatments | 2 | | | | | |
| Equilibration | Time (hours) | 2 | | | | | |
| | Temperature (°C) | 20 ± 2 | | | | | |
| | Darkness (Yes/No) | Not reported. | | | | | |
| | Shaking method | Agitation, not further described. | | | | | |
| | Shaking time (hours) | 2 | | | | | |
| Method of separation of supernatant (eg., centrifugation) | | Centrifugation | | | | | |
| Centrifugation | Speed (RCF) | 20200 | | | | | |
| | Duration (min) | 10 | | | | | |
| | Method of separation of soil and solution | Not reported. | | | | | |

Data were obtained from pp. 17, 19-20, 23-24 and Appendix 5, p. 127 of the study report.

1. Prior to use, 1 g (dry weight equivalent) aliquots of each test soil were pre-equilibrated for ≥24 hours with 2.5 mL of 0.01M $CaCl_2$ solution (p. 23).

2. Test material concentrations were calculated by converting ppm (µg/mL) to mg a.i./kg using the following equation: [test concentration (ppm) × total volume of test material (mL)] ÷ amount of soil (g); *e.g.* [5 ppm × 5.0 mL] ÷ 1.0 g = 25 mg a.i./kg soil.

**Table 4: Study design for the desorption phase.**

| Parameters | | Ark-1 Sandy loam | Ark-2 Sandy loam | Benson Sand | M-CL Clay loam | PC-1 Silt loam | Pratt Loam |
|---|---|---|---|---|---|---|---|
| Were the soil residues from the adsorption phase used? If not, describe the method for adsorption using a separate adsorption Table | | Soil residues from the adsorption phase were used. | | | | | |
| Amount of test material present in the adsorbed state/adsorbed amount (mg a.i./kg soil) | 0.25 | 0.089 | 0.143 | 0.082 | 0.202 | 0.066 | 0.145 |
| | 0.75 | 0.297 | 0.461 | 0.261 | 0.649 | 0.264 | 0.492 |
| | 2.5 | 0.809 | 1.612 | 1.002 | 1.999 | 0.624 | 1.410 |
| | 7.5 | 2.642 | 4.884 | 3.434 | 6.583 | 2.802 | 4.954 |
| | 25.0 | 7.919 | 15.076 | 11.150 | 18.933 | 6.222 | 13.387 |
| No. of desorption cycles | | 2 | | | | | |
| Equilibration solution and quantity used per treatment for desorption (eg., 0.01M $CaCl_2$) | | 0.01M $CaCl_2$ | | | | | |
| Soil:solution ratio | | 1:5 | | | | | |
| Replications | Controls | 0 | | | | | |
| | Treatments | 2 | | | | | |
| Desorption equilibration | Time (hours) | 2 | | | | | |
| | Temperature (°C) | 20 ± 2 | | | | | |
| | Darkness | Not reported. | | | | | |
| | Shaking method | Stirred, not further described. | | | | | |
| | Shaking time (hours) | 2 | | | | | |
| Centrifugation | Speed (RCF) | 20200 | | | | | |
| | Duration (min) | 10 | | | | | |
| | Method of separation of soil and solution | Not reported. | | | | | |
| Second desorption (Indicate if the method is same as the first desorption cycle. Briefly describe the method, if different.) | | Same. | | | | | |

Data were obtained from p. 24 and Tables 8-13, pp. 50-55 of the study report.

**Supplementary Experiment:** To determine the stability of the test material, duplicate 1-g aliquots of pre-equilibrated test soils were treated with [$^{14}$C-5-pyrimidinyl]orthosulfamuron at a nominal test concentration of 7.5 mg a.i./kg soil (1.5 µg/mL; p. 25; Scheme 1, p. 39). The samples were incubated under agitation for 2 hours at 20 ± 2°C. Following equilibration, the samples were centrifuged and duplicate 0.05-1.0 mL aliquots were analyzed for total radioactivity using LSC (p. 28). The samples were then sonicated for 1 hour and extracted by agitation for 1 hour with 33 mM $CH_3CN$:$NaHCO_3$ (7:3, v:v; 10 mL; Extract A). The sonication

and extraction process was repeated a second time using 33 mM $CH_3CN$:$NaHCO_3$ (1:1, v:v; 10 mL; Extract B). Following each extraction, the samples were centrifuged and the resulting extracts were pooled. The pooled extracts were brought to 25 mL with acetonitrile and duplicate 0.5-mL aliquots were analyzed for total radioactivity using LSC (pp. 25, 28). The radioactivity remaining in the soil was determined using LSC analysis following combustion; combustion efficiency was >94% (pp. 25-26, 28).

The stability of the test material was determined by analyzing aliquots of the adsorption supernatants (5-15 µL) and pooled extracts (10 µL) using reverse-phase TLC on RP-18 $F_{254S}$ plates (0.2 mm thickness) developed in acetonitrile:water (92:8, v:v; SS 2; pp. 25, 29). $R_f$ values for orthosulfamuron were reported to be 0.45 (Appendix 8, p. 201). Following development, areas of radioactivity were quantified using a Bio-Imaging Analyzer. The imaging plates were coated with photostimulable phosphor $BaFBr:Eu^{2+}$, from which the luminescence was detected using a photomultiplier tube and analyzed using Tina 2.10 software. Limits of Detection (LOD) ranged from 0.57% to 1.40% (Appendix 8; Table LX, p. 202). Limits of Quantification (LOQ) were not reported.

**3. Description of analytical procedures:**

**Extraction/clean up/concentration methods:** Extraction/clean up/concentration methods were not employed in this study.

**Total $^{14}C$ measurement:** Following adsorption and desorption, duplicate 0.05-1.0 mL aliquots of the supernatants were analyzed for total radioactivity using LSC (pp. 24, 28).

**Non-extractable residues, if any:** Not applicable.

**Derivatization method, if used:** A derivatization method was not employed in this study.

**Identification and quantification of parent compound:** Samples were not analyzed for orthosulfamuron.

**Identification and quantification of transformation products, if appropriate:** Samples were not analyzed for transformation products of orthosulfamuron.

**Detection limits (LOD, LOQ) for the parent compound:** The Limit of Detection (LOD) for LSC analysis was twice the background radioactivity (p. 28). The Limit of Quantification (LOQ) was not reported.

**Detection limits (LOD, LOQ) for the transformation products, if appropriate:** Samples were not analyzed for transformation products of orthosulfamuron.

## II. RESULTS AND DISCUSSION

**A. TEST CONDITIONS:** The incubation temperature during the study was maintained at 20 ± 2°C; no supporting data were provided (p. 24). The pH values of the test solution during the study ranged from 5.19-7.41 for all test soils (Appendix 5, p. 127). Lighting conditions were not reported. Based on TLC analysis of the supplementary study adsorption supernatant and soil extracts treated at a nominal test concentration of 7.5 mg a.i./kg soil (1.5 µg/mL), [$^{14}$C-5-pyrimidinyl]orthosulfamuron was stable in aqueous solution, accounting for >90% of the applied radioactivity (p. 33; Figures 15-26, pp. 73-84; Appendix 8, Table LXIV, p. 205).

**B. MASS BALANCE:** Mass balances were determined only for the test soils treated at 7.5 mg a.i./kg soil (1.5 µg/mL) in the supplementary experiment (p. 26).

**Table 5: Recovery of [$^{14}$C-5-pyrimidinyl]orthosulfamuron (% of applied radioactivity) in soil of supplementary experiment after adsorption/desorption (mean ± s.d.).**

| Matrices | Ark-1 Sandy loam | Ark-2 Sandy loam | Benson Sand | M-CL Clay loam | PC-1 Silt loam | Pratt Loam |
|---|---|---|---|---|---|---|
| **At the end of the adsorption phase** | | | | | | |
| Supernatant solution | 50.74 ± 0.849 | 32.49 ± 1.556 | 47.68 ± 0.877 | 14.26 ± 0.007 | 53.70 ± 3.578 | 30.36 ± 0.481 |
| Solid phase (extracted) [1] | 44.77 ± 0.566 | 56.47 ± 0.382 | 45.24 ± 2.341 | 84.30 ± 0.014 | 40.78 ± 2.418 | 66.77 ± 0.389 |
| Non-extractable residues in soil, if measured | 4.59 ± 0.283 | 11.30 ± 0.891 | 7.72 ± 0.672 | 1.82 ± 0.516 | 6.30 ± 0.233 | 3.37 ± 0.488 |
| Total recovery | 100.10 ± 0.000 | 100.26 ±1.047 | 100.63 ± 0.792 | 100.37 ± 0.495 | 100.78 ± 0.926 | 100.49 ± 0.580 |
| **At the end of the desorption phase** | | | | | | |
| Supernatant solution | Not determined. | | | | | |
| Solid phase (total $^{14}$C) | Not determined. | | | | | |
| Non-extractable residues in soil, if measured | Not determined. | | | | | |
| Total recovery | Not determined. | | | | | |

Data were obtained from Table 7, p. 49 of the study report.

1. All soils were extracted prior to combustion.

**Table 6: Concentration of [$^{14}$C-5-pyrimidinyl]orthosulfamuron in the solid and liquid phases at the end of the adsorption equilibration period (mean ± s.d.).**

| Concentration (mg a.i./kg soil) | Ark-1 Sandy loam | | | Ark-2 Sandy loam | | | Benson Sand | | |
|---|---|---|---|---|---|---|---|---|---|
| | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % adsorbed | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % adsorbed | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % adsorbed |
| 0.25 | 0.089 ± 0.001 | 0.033 ± 0.000 | 35.24 ± 0.481 | 0.143 ± 0.004 | 0.023 ± 0.001 | 56.41 ± 1.294 | 0.082 ± 0.008 | 0.034 ± 0.001 | 32.28 ± 3.429 |
| 0.75 | 0.297 ± 0.006 | 0.099 ± 0.001 | 37.35 ± 0.820 | 0.461 ± 0.009 | 0.067 ± 0.002 | 58.11 ± 1.174 | 0.261 ± 0.048 | 0.106 ± 0.010 | 32.89 ± 6.095 |
| 2.5 | 0.809 ± 0.030 | 0.330 ± 0.006 | 32.85 ± 1.237 | 1.612 ± 0.004 | 0.170 ± 0.001 | 65.48 ± 0.148 | 1.002 ± 0.239 | 0.291 ± 0.048 | 40.71 ± 9.730 |
| 7.5 | 2.642 ± 0.718 | 1.068 ± 0.144 | 33.07 ± 8.987 | 4.884 ± 0.100 | 0.621 ± 0.020 | 61.13 ± 1.266 | 3.434 ± 0.066 | 0.910 ± 0.013 | 42.97 ± 0.820 |
| 25.0 | 7.919 ± 0.003 | 3.304 ± 0.001 | 32.37 ± 0.007 | 15.076 ± 0.044 | 1.879 ± 0.009 | 61.61 ± 0.184 | 11.150 ± 0.256 | 2.659 ± 0.052 | 45.57 ± 1.047 |

| Concentration (mg a.i./kg soil) | M-CL Clay loam | | | PC-1 Silt loam | | | Pratt Loam | | |
|---|---|---|---|---|---|---|---|---|---|
| | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % adsorbed | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % adsorbed | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % adsorbed |
| 0.25 | 0.202 ± 0.001 | 0.010 ± 0.000 | 79.91 ± 0.424 | 0.066 ± 0.013 | 0.037 ± 0.003 | 26.18 ± 5.042 | 0.145 ± 0.011 | 0.022 ± 0.002 | 57.12 ± 4.356 |
| 0.75 | 0.649 ± 0.001 | 0.029 ± 0.001 | 81.84 ± 0.240 | 0.264 ± 0.003 | 0.106 ± 0.001 | 37.51 ± 0.396 | 0.492 ± 0.002 | 0.060 ± 0.000 | 61.95 ± 0.269 |
| 2.5 | 1.999 ± 0.000 | 0.092 ± 0.001 | 81.23 ± 0.007 | 0.624 ± 0.004 | 0.366 ± 0.001 | 25.36 ± 0.191 | 1.410 ± 0.007 | 0.209 ± 0.001 | 57.30 ± 0.290 |
| 7.5 | 6.583 ± 0.045 | 0.279 ± 0.008 | 82.38 ± 0.559 | 2.802 ± 0.107 | 1.031 ± 0.021 | 35.07 ± 1.336 | 4.954 ± 0.059 | 0.603 ± 0.012 | 61.99 ± 0.735 |
| 25.0 | 18.933 ± 0.359 | 1.097 ± 0.071 | 77.38 ± 1.464 | 6.222 ± 0.293 | 3.628 ± 0.059 | 25.43 ± 1.195 | 13.387 ± 0.047 | 2.199 ± 0.009 | 54.72 ± 0.191 |

Data were obtained from Tables 8-13, pp. 50-55 of the study report.

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**Table 7: Concentration of [$^{14}$C-5-pyrimidinyl]orthosulfamuron in the solid and liquid phases at the end of desorption (total of all desorption phases).**

| Concentration (mg a.i./kg soil) | Ark-1 Sandy loam | | | Ark-2 Sandy loam | | | Benson Sand | | |
|---|---|---|---|---|---|---|---|---|---|
| | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed |
| 0.25 | 0.031 ± 0.003 | 0.012 ± 0.001 | 65.35 ± 3.253 | 0.083 ± 0.001 | 0.012 ± 0.001 | 41.84 ± 2.744 | 0.037 ± 0.001 | 0.005 ± 0.001 | 55.69 ± 3.620 |
| 0.75 | 0.133 ± 0.004 | 0.033 ± 0.002 | 55.14 ± 2.270 | 0.289 ± 0.006 | 0.035 ± 0.001 | 37.36 ± 0.000 | 0.132 ± 0.028 | 0.026 ± 0.004 | 56.79 ± 8.627 |
| 2.5 | 0.346 ± 0.008 | 0.093 ± 0.005 | 57.26 ± 0.672 | 1.045 ± 0.023 | 0.114 ± 0.005 | 35.31 ± 1.584 | 0.439 ± 0.222 | 0.056 ± 0.001 | 48.04 ± 1.442 |
| 7.5 | 1.197 ± 0.358 | 0.289 ± 0.071 | 54.86 ± 1.287 | 2.995 ± 0.088 | 0.382 ± 0.008 | 39.22 ± 0.028 | 1.593 ± 0.001 | 0.368 ± 0.013 | 53.59 ± 0.919 |
| 25.0 | 3.273 ± 0.440 | 0.928 ± 0.087 | 58.67 ± 5.544 | 9.290 ± 0.052 | 1.158 ± 0.019 | 38.51 ± 0.516 | 6.139 ± 0.315 | 1.001 ± 0.114 | 44.90 ± 4.087 |

| Concentration (mg a.i./kg soil) | M-CL Clay loam | | | PC-1 Silt loam | | | Pratt Loam | | |
|---|---|---|---|---|---|---|---|---|---|
| | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed | on soil (mg a.i./kg) | in solution (µg a.i./mL) | % desorbed as % of the adsorbed |
| 0.25 | 0.154 ± 0.006 | 0.010 ± 0.001 | 23.78 ± 3.217 | 0.024 ± 0.004 | 0.009 ± 0.004 | 63.59 ± 12.792 | 0.068 ± 0.008 | 0.016 ± 0.001 | 53.20 ± 1.945 |
| 0.75 | 0.489 ± 0.001 | 0.032 ± 0.001 | 24.63 ± 0.438 | 0.101 ± 0.007 | 0.033 ± 0.002 | 61.75 ± 2.885 | 0.260 ± 0.004 | 0.046 ± 0.000 | 47.15 ± 0.424 |
| 2.5 | 1.508 ± 0.003 | 0.098 ± 0.001 | 24.55 ± 0.156 | 0.196 ± 0.001 | 0.086 ± 0.001 | 68.69 ± 0.148 | 0.653 ± 0.023 | 0.151 ± 0.004 | 53.74 ± 1.414 |
| 7.5 | 5.100 ± 0.060 | 0.294 ± 0.004 | 22.53 ± 0.396 | 1.291 ± 0.153 | 0.301 ± 0.009 | 54.01 ± 3.705 | 2.678 ± 0.004 | 0.453 ± 0.011 | 45.93 ± 0.566 |
| 25.0 | 13.370 ± 0.585 | 1.102 ± 0.045 | 29.40 ± 1.754 | 2.191 ± 0.033 | 0.802 ± 0.052 | 64.78 ± 1.124 | 5.969 ± 0.179 | 1.472 ± 0.026 | 55.42 ± 1.181 |

Data were obtained from Tables 8-13, pp. 50-55 of the study report.

**C. ADSORPTION:** After 2 hours of equilibration, 32.37-37.35%, 56.41-65.48%, 32.28-45.57%, 77.38-82.38%, 25.36-37.51%, and 54.72-61.99% of the applied [$^{14}$C]orthosulfamuron was adsorbed to the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively (p. 32; Tables 8-13, pp. 50-55). Freundlich adsorption K values ($K_{ads}$) were 2.37, 8.17, 3.61, 19.7, 2.00, and 6.86 for the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively; corresponding 1/N values were 0.974, 1.062, 1.152, 0.980, 1.019, and 0.990. Respective Freundlich adsorption $K_{oc}$ values were 228, 2330, 350, 653, 217, and 381 (Table 14, p. 56).

The coefficient of variation (CV) for the $K_{ads}$ values was 93%, whereas the CV for the $K_{foc}$ values was 118%. Therefore, $K_{oc}$ is not appropriate for describing this compound's mobility in soil, as soil organic carbon variation is not sufficient to account for variation in $K_{ads}$ values ($R^2 = 0.6769$). Using a non-standard classification scheme based on the $K_{ads}$ values, orthosulfamuron can be said to be mobile to slightly mobile in soil.

**Table 8: Adsorption and desorption constants of [$^{14}$C-5-pyrimidinyl]orthosulfamuron in test soils.**[1]

| Soil | Adsorption | | | | Desorption | | | |
|---|---|---|---|---|---|---|---|---|
| | $K_f$ | 1/n | $R^2$ | $K_{foc}$ | $K_f$ | 1/n | $R^2$ | $K_{foc}$ |
| Ark-1 Sandy loam | 2.37 | 0.974 | 0.988 | 228 | 4.01 | 1.048 | 0.993 | 385 |
| Ark-2 Sandy loam | 8.17 | 1.062 | 0.992 | 2330 | 8.38 | 1.019 | 0.997 | 2390 |
| Benson Sand | 3.61 | 1.152 | 0.984 | 350 | 5.11 | 0.935 | 0.988 | 496 |
| M-CL Clay loam | 19.7 | 0.980 | 0.998 | 653 | 13.8 | 0.958 | 0.996 | 460 |
| PC-1 Silt loam | 2.00 | 1.019 | 0.993 | 217 | 3.17 | 1.023 | 0.985 | 345 |
| Pratt Loam | 6.86 | 0.990 | 0.997 | 381 | 4.72 | 0.991 | 0.991 | 262 |

Data were obtained from p. 32, Table 14, p. 56, and Figures 2- 13, pp. 60-71 of the study report.

1. $K_f$ - Freundlich adsorption and desorption coefficients; 1/n - Slope of Freundlich adsorption/desorption isotherms; $R^2$ - Regression coefficient of Freundlich equation; $K_{foc}$ - Organic carbon-normalized Freundlich partition coefficient ($K_{foc} = K_f \times 100\% \div$ % organic carbon).

Freundlich adsorption $K_f$ values were calculated using the following equation (p. 27):

$\log x/m = \log K_{ads} + 1/n \log C_e$, where

$x/m$ = concentration in soil after adsorption (µg/g);

$K_{ads}$ = Freundlich adsorption coefficient;

$1/n$ = Freundlich adsorption isotherm slope; and

$C_e$ = concentration in supernatant after adsorption (µg/mL).

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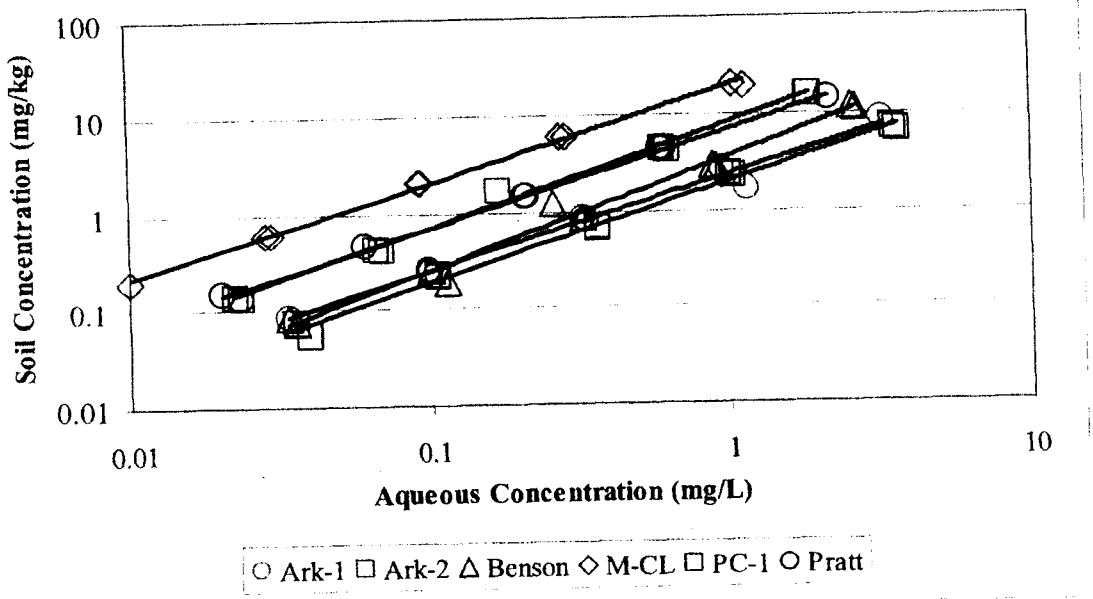
**Figure 1. Freundlich Adsorption Isotherms for Orthosulfamuron in Six Soils with Two Replications.**




**D. DESORPTION:** At the end of two desorption steps, 54.86-65.35%, 35.31-41.84%, 44.90-56.79%, 22.53-29.40%, 54.01-68.69%, and 45.93-55.42% of the adsorbed [$^{14}$C]orthosulfamuron was desorbed from the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively (pp. 32-33; Tables 8-13, pp. 50-55). Freundlich desorption K values were 4.01, 8.38, 5.11, 13.8, 3.17, and 4.72 for the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam soils, respectively; corresponding 1/n values were 1.048, 1.019, 0.935, 0.958, 1.023, and 0.991. Respective Freundlich desorption $K_{oc}$ values were 385, 2390, 496, 460, 345, and 262.

**Screening Test:** After 2 hours of equilibrium, an average 30.20-80.00% of the applied [$^{14}$C-5-pyrimidinyl]-orthosulfamuron was adsorbed to all test soils (p. 31; Table 5, p. 47). Adsorption $K_d$ values ranged from an average 2.18 to 20.19 for all test soils; corresponding adsorption $K_{oc}$ values ranged from an average 237 to 2179. At the end of the desorption phase, an average 28.32-62.43% of the adsorbed [$^{14}$C-5-pyrimidinyl]orthosulfamuron was desorbed from all test soils. Desorption $K_d$ values ranged from an average 3.02 to 12.86 for all test soils; corresponding desorption $K_{oc}$ values were not reported.

After 6 hours of equilibrium, [$^{14}$C-5-pyrimidinyl]orthosulfamuron accounted for an average of 98.68-99.94% of the applied radioactivity, indicating no adsorption of the test material to the walls of the test vessels (pp. 31, 33; Table 4, p. 46; Figure 14, p. 72).

**Supplementary Experiment:** Mass balances for the soils treated at 7.5 mg a.i./kg soil (1.5 µg/mL) averaged 100.10 ± 0.0% (range 100.10-100.10%), 100.26 ± 1.047% (range 99.52-101.00%), 100.63 ± 0.792% (range 100.07-101.19%), 100.37 ± 0.495% (range 100.02-100.72%), 100.78 ± 0.926% (range 100.12-101.43%), and 100.49 ± 0.580% (range 100.08-100.90%) of the applied for the Ark-1 sandy loam, Ark-2 sandy loam, Benson sand, M-CL clay loam, PC-1 silt loam, and Pratt loam test soils, respectively (pp. 26, 33; Table 7, p. 49).

## III. STUDY DEFICIENCIES:

1. Material balances were incomplete. Mass balances were determined only for test soils treated at 7.5 mg a.i./kg soil (1.5 µg/mL), rather than for all test concentrations/test soil groups.

2. It could not be determined if the Italian silt loam soil was comparable to soils found at domestic intended use sites.

3. The lighting conditions during the study were not reported. However, the test substance did not degrade during the study.

## IV. REVIEWER'S COMMENTS:

1. $K_{ads}$ values were compared to soil characteristics through linear regression. The $R^2$ value for the relationship of $K_{ads}$ vs. % organic carbon is 0.6769, for $K_{ads}$ vs. pH is 0.1187, and for $K_{ads}$ vs. % clay is 0.6866 (DER Attachment 2).

2. Complete descriptions of soil collection and storage were incomplete; the pesticide use history at the collection site, collection procedures, and storage conditions were not reported. In addition, the test soils were incompletely described; the soil moisture at 1/3 atm, bulk density, and soil biomass were not reported.

3. The physio-chemical properties of orthosulfamuron were incomplete; water solubility, vapor pressure, UV adsorption, pKa, $K_{ow}$/log $K_{ow}$, and the stability of orthosulfamuron at room temperature were not reported.

4. Control samples were not employed in the definitive study.

5. Preliminary quantitative data should have been provided to support the use of a soil:solution ratio of 1:5 (w:v) in the definitive study.

6. Based on TLC analysis, the radiochemical purities of the [$^{14}$C-5-pyrimidinyl]ortho-sulfamuron test solutions during the preliminary and definitive studies were >97% (p. 30; Appendices 2-3, pp. 104-121).

7. An experimental protocol was included in Appendix 1, pp. 87-101 of the study report. Raw data for the preliminary and definitive studies are provided in Appendix 7, pp. 141-200 and Appendix 8, pp. 204-205 of the study report.

## V. REFERENCES:

1. U.S. Environmental Protection Agency. 1982. Pesticide Assessment Guidelines, Subdivision N, Chemistry: Environmental Fate, Section 163-1. Mobility studies. Office of Pesticide and Toxic Substances, Washington, DC. EPA 540/9-82-021.

2. U.S. Environmental Protection Agency. 1989. FIFRA Accelerated Reregistration, Phase 3 Technical Guidance. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 540/09-90-078.

3. U.S. Environmental Protection Agency. 1993. Pesticide Registration Rejection Rate Analysis - Environmental Fate. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 738.

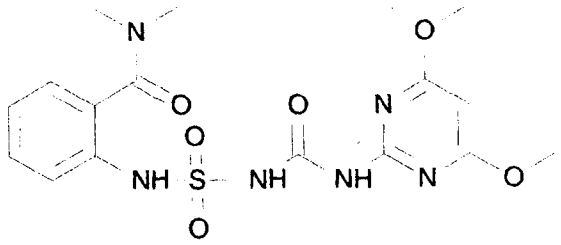
4. U.S. Environmental Protection Agency. 2003. Guidance for Calculating Sorption Coefficients in Batch Equilibrium Studies.

## Attachment 1: Structures of Parent Compound and Transformation Products

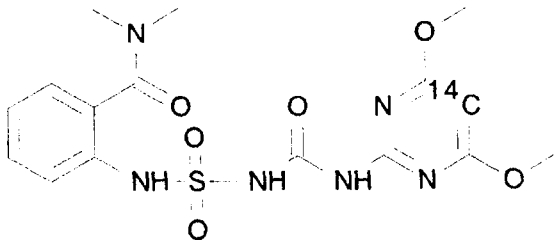
**Orthosulfamuron [IR5878; S3]**

| | |
|---|---|
| **IUPAC Name:** | 1-(4,6-Dimethoxypyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenylsulfamoyl]urea. |
| **CAS Name:** | 2-[[[[[(4,6-Dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]amino]-N,N-dimethylbenzamide. |
| **CAS Number:** | 213464-77-8. |
| **SMILES String:** | CN(C(=O)c1ccccc1NS(=O)(=O)NC(=O)Nc1nc(cc(n1)OC)OC)C (ISIS v2.3/Universal SMILES). No EPI Suite, v3.12 SMILES String found as of 11/21/05. |

**Unlabeled**



**[Pyrimidinyl-5-$^{14}$C]IR5878**

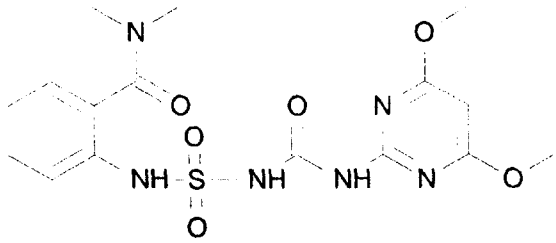


$^{14}$C = Location of the radiolabel.

**Identified Compounds**

**Orthosulfamuron [IR5878; S3]**

| | |
|---|---|
| **IUPAC Name:** | 1-(4,6-Dimethoxypyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenylsulfamoyl]urea. |
| **CAS Name:** | 2-[[[[[(4,6-Dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]amino]-N,N-dimethylbenzamide. |
| **CAS Number:** | 213464-77-8. |
| **SMILES String:** | CN(C(=O)c1ccccc1NS(=O)(=O)NC(=O)Nc1nc(cc(n1)OC)OC)C (ISIS v2.3/Universal SMILES). No EPI Suite, v3.12 SMILES String found as of 11/21/05. |



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**Attachment 2: Excel Spreadsheets**

Chemical: Orthosulfamuron
PC Code: 108209
MRID: 46578971
Guideline No: 163-1

Ark-1- Adsorption

| Initial soln concen ($C_o$) (ug/mL) | Volume of soln ($V_o$) (mL) | Concen in soln after equil ($C_{eq}$) (ug/mL) | Volume of soln ($V_o$) (mL) | Dry mass of sorbent (m) (g) | $[(C_oV_o)-(C_{eq}V_o)]$/soil mass | Kd | KOC |
|---|---|---|---|---|---|---|---|
| 5 | 5 | 3.303 | 5 | 1 | 8.4850 | 2.57 | 247 |
| 5 | 5 | 3.304 | 5 | 1 | 8.4800 | 2.57 | 247 |
| 1.5 | 5 | 0.966 | 5 | 1 | 2.6700 | 2.76 | 266 |
| 1.5 | 5 | 1.169 | 5 | 1 | 1.6550 | 1.42 | 136 |
| 0.5 | 5 | 0.326 | 5 | 1 | 0.8700 | 2.67 | 257 |
| 0.5 | 5 | 0.334 | 5 | 1 | 0.8300 | 2.49 | 239 |
| 0.15 | 5 | 0.1 | 5 | 1 | 0.2500 | 2.50 | 240 |
| 0.15 | 5 | 0.098 | 5 | 1 | 0.2600 | 2.65 | 255 |
| 0.05 | 5 | 0.033 | 5 | 1 | 0.0850 | 2.58 | 248 |
| 0.05 | 5 | 0.033 | 5 | 1 | 0.0850 | 2.58 | 248 |

Ark-2- Adsorption

| Initial soln concen ($C_o$) (ug/mL) | Volume of soln ($V_o$) (mL) | Concen in soln after equil ($C_{eq}$) (ug/mL) | Volume of soln ($V_o$) (mL) | Dry mass of sorbent (m) (g) | $[(C_oV_o)-(C_{eq}V_o)]$/soil mass | Kd | KOC |
|---|---|---|---|---|---|---|---|
| 5 | 5 | 1.885 | 5 | 1 | 15.5750 | 8.26 | 2361 |
| 5 | 5 | 1.872 | 5 | 1 | 15.6400 | 8.35 | 2387 |
| 1.5 | 5 | 0.635 | 5 | 1 | 4.3250 | 6.81 | 1946 |
| 1.5 | 5 | 0.607 | 5 | 1 | 4.4650 | 7.36 | 2102 |
| 0.5 | 5 | 0.17 | 5 | 1 | 1.6500 | 9.71 | 2773 |
| 0.5 | 5 | 0.169 | 5 | 1 | 1.6550 | 9.79 | 2798 |
| 0.15 | 5 | 0.065 | 5 | 1 | 0.4250 | 6.54 | 1868 |
| 0.15 | 5 | 0.068 | 5 | 1 | 0.4100 | 6.03 | 1723 |
| 0.05 | 5 | 0.022 | 5 | 1 | 0.1400 | 6.36 | 1818 |
| 0.05 | 5 | 0.023 | 5 | 1 | 0.1350 | 5.87 | 1677 |

Benson- Adsorption

| Initial soln concen ($C_o$) (ug/mL) | Volume of soln ($V_o$) (mL) | Concen in soln after equil ($C_{eq}$) (ug/mL) | Volume of soln ($V_o$) (mL) | Dry mass of sorbent (m) (g) | $[(C_oV_o)-(C_{eq}V_o)]$/soil mass | Kd | KOC |
|---|---|---|---|---|---|---|---|
| 5 | 5 | 2.695 | 5 | 1 | 11.5250 | 4.28 | 415 |
| 5 | 5 | 2.622 | 5 | 1 | 11.8900 | 4.53 | 440 |
| 1.5 | 5 | 0.919 | 5 | 1 | 2.9050 | 3.16 | 307 |
| 1.5 | 5 | 0.9 | 5 | 1 | 3.0000 | 3.33 | 324 |
| 0.5 | 5 | 0.257 | 5 | 1 | 1.2150 | 4.73 | 459 |
| 0.5 | 5 | 0.325 | 5 | 1 | 0.8750 | 2.69 | 261 |
| 0.15 | 5 | 0.113 | 5 | 1 | 0.1850 | 1.64 | 159 |
| 0.15 | 5 | 0.099 | 5 | 1 | 0.2550 | 2.58 | 250 |
| 0.05 | 5 | 0.035 | 5 | 1 | 0.0750 | 2.14 | 208 |
| 0.05 | 5 | 0.033 | 5 | 1 | 0.0850 | 2.58 | 250 |

Data were obtained from Tables 8-13, pp. 50-55 of the study report.

Chemical: Orthosulfamuron
PC Code: 108209
MRID: 46578971
Guideline No: 163-1

M-CL- Adsorption

| Initial soln concen ($C_o$) (ug/mL) | Volume of soln ($V_o$) (mL) | Concen in soln after equil ($C_{eq}$) (ug/mL) | Volume of soln ($V_o$) (mL) | Dry mass of sorbent (m) (g) | $[(C_oV_o)-(C_{eq}V_o)]$/soil mass | Kd | KOC |
|---|---|---|---|---|---|---|---|
| 5 | 5 | 1.147 | 5 | 1 | 19.2650 | 16.80 | 558 |
| 5 | 5 | 1.046 | 5 | 1 | 19.7700 | 18.90 | 628 |
| 1.5 | 5 | 0.285 | 5 | 1 | 6.0750 | 21.32 | 708 |
| 1.5 | 5 | 0.273 | 5 | 1 | 6.1350 | 22.47 | 747 |
| 0.5 | 5 | 0.091 | 5 | 1 | 2.0450 | 22.47 | 747 |
| 0.5 | 5 | 0.092 | 5 | 1 | 2.0400 | 22.17 | 737 |
| 0.15 | 5 | 0.028 | 5 | 1 | 0.6100 | 21.79 | 724 |
| 0.15 | 5 | 0.029 | 5 | 1 | 0.6050 | 20.86 | 693 |
| 0.05 | 5 | 0.01 | 5 | 1 | 0.2000 | 20.00 | 664 |
| 0.05 | 5 | 0.01 | 5 | 1 | 0.2000 | 20.00 | 664 |

PC-1- Adsorption

| Initial soln concen ($C_o$) (ug/mL) | Volume of soln ($V_o$) (mL) | Concen in soln after equil ($C_{eq}$) (ug/mL) | Volume of soln ($V_o$) (mL) | Dry mass of sorbent (m) (g) | $[(C_oV_o)-(C_{eq}V_o)]$/soil mass | Kd | KOC |
|---|---|---|---|---|---|---|---|
| 5 | 5 | 3.669 | 5 | 1 | 6.6550 | 1.81 | 197 |
| 5 | 5 | 3.586 | 5 | 1 | 7.0700 | 1.97 | 214 |
| 1.5 | 5 | 1.016 | 5 | 1 | 2.4200 | 2.38 | 259 |
| 1.5 | 5 | 1.046 | 5 | 1 | 2.2700 | 2.17 | 236 |
| 0.5 | 5 | 0.366 | 5 | 1 | 0.6700 | 1.83 | 199 |
| 0.5 | 5 | 0.365 | 5 | 1 | 0.6750 | 1.85 | 201 |
| 0.15 | 5 | 0.106 | 5 | 1 | 0.2200 | 2.08 | 226 |
| 0.15 | 5 | 0.105 | 5 | 1 | 0.2250 | 2.14 | 233 |
| 0.05 | 5 | 0.035 | 5 | 1 | 0.0750 | 2.14 | 233 |
| 0.05 | 5 | 0.039 | 5 | 1 | 0.0550 | 1.41 | 153 |

Pratt- Adsorption

| Initial soln concen ($C_o$) (ug/mL) | Volume of soln ($V_o$) (mL) | Concen in soln after equil ($C_{eq}$) (ug/mL) | Volume of soln ($V_o$) (mL) | Dry mass of sorbent (m) (g) | $[(C_oV_o)-(C_{eq}V_o)]$/soil mass | Kd | KOC |
|---|---|---|---|---|---|---|---|
| 5 | 5 | 2.192 | 5 | 1 | 14.0400 | 6.41 | 356 |
| 5 | 5 | 2.205 | 5 | 1 | 13.9750 | 6.34 | 352 |
| 1.5 | 5 | 0.594 | 5 | 1 | 4.5300 | 7.63 | 424 |
| 1.5 | 5 | 0.611 | 5 | 1 | 4.4450 | 7.27 | 404 |
| 0.5 | 5 | 0.208 | 5 | 1 | 1.4600 | 7.02 | 390 |
| 0.5 | 5 | 0.21 | 5 | 1 | 1.4500 | 6.90 | 384 |
| 0.15 | 5 | 0.06 | 5 | 1 | 0.4500 | 7.50 | 417 |
| 0.15 | 5 | 0.06 | 5 | 1 | 0.4500 | 7.50 | 417 |
| 0.05 | 5 | 0.023 | 5 | 1 | 0.1350 | 5.87 | 326 |
| 0.05 | 5 | 0.02 | 5 | 1 | 0.1500 | 7.50 | 417 |

Data were obtained from Tables 8-13, pp. 50-55 of the study report.

**Chemical:** Orthosulfamuron (IR5878)
**PC Code:** 108209
**MRID:** 46578971
**Guideline No:** 163-1

**Table 8:** **Adsorption Kf**

| | Kads | 1/n | r^2 | Kfoc |
|---|---|---|---|---|
| Ark-1 | 2.37 | 0.974 | 0.9876 | 228 |
| Ark-2 | 8.17 | 1.062 | 0.9919 | 2333 |
| Benson | 3.61 | 1.152 | 0.9840 | 350 |
| MC-L | 19.66 | 0.980 | 0.9975 | 653 |
| PC-1 | 2.00 | 1.019 | 0.9934 | 217 |
| Pratt | 6.86 | 0.990 | 0.9974 | 381 |
| s.d. | 6.63 | | | 818 s.d. |
| Mean | 7.11 | | | 694 Mean |
| CV | 93% | | | 118% CV |

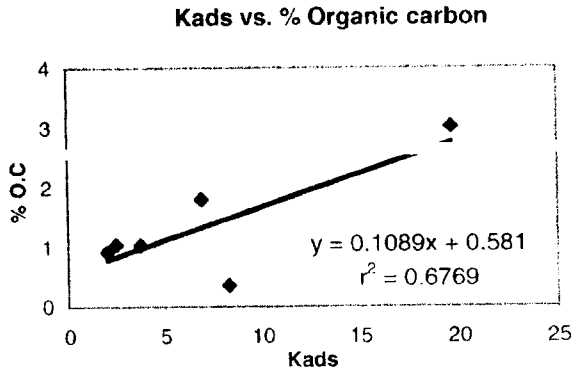
**Kd**

| Kd | Koc |
|---|---|
| 2.48 | 238 |
| 7.51 | 2145 |
| 3.17 | 307 |
| 20.68 | 687 |
| 1.98 | 215 |
| 6.99 | 389 |
| 7.04 | 746 |
| 7.13 | 664 |
| 99% | 112% |

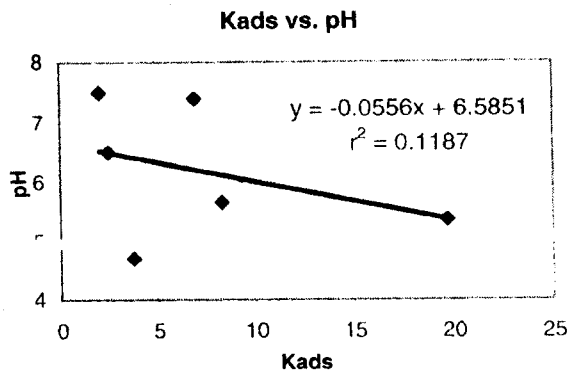
Data were calculated from the tables above and Figure 1.

**Chemical:** Orthosulfamuron
**PC Code:** 108209
**MRID:** 46578971
**Guideline No:** 163-1

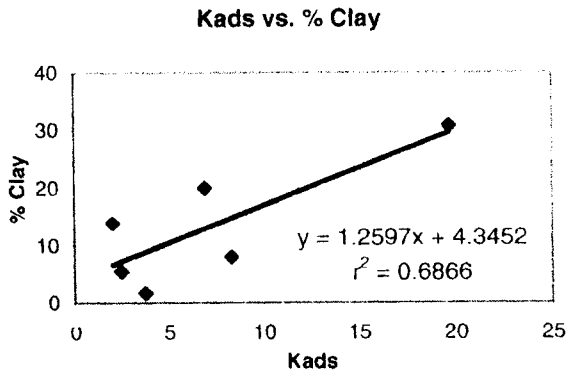
| Soil | Kads | % organic carbon |
|---|---|---|
| Ark-1 | 2.48 | 1.04 |
| Ark-2 | 8.31 | 0.35 |
| Benson | 3.75 | 1.03 |
| M-CL | 19.72 | 3.01 |
| [illegible] | [illegible] | [illegible] |
| Pratt | 6.93 | 1.8 |




| Soil | Kads | pH |
|---|---|---|
| Ark-1 | 2.48 | 6.5 |
| Ark-2 | 8.31 | 5.66 |
| Benson | 3.75 | 4.7 |
| M-CL | 19.72 | 5.37 |
| PC-1 | 2.03 | 7.5 |
| Pratt | 6.93 | 7.4 |




| Soil | Kads | % clay |
|---|---|---|
| Ark-1 | 2.48 | 5.5 |
| Ark-2 | 8.31 | 8 |
| Benson | 3.75 | 1.75 |
| M-CL | 19.72 | 30.75 |
| PC-1 | 2.03 | 14 |
| Pratt | 6.93 | 20 |




Data were obtained from Table 2, p. 44. Kads values were calculated using data obtained from Tables 8-13, pp. 50-55 of the study report.