Data Evaluation Report on the Anaerobic Biotransformation of Orthosulfamuron in a Water/Sediment System

PMRA Submission Number {.....} EPA MRID Number 46578967

Data Requirement: PMRA Data Code:
EPA DP Barcode: D320283
OECD Data Point:
EPA Guideline: 162-3

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: Lisa Koterwas
Cambridge Environmental

Signature:
Date: 12/1/05

Secondary Reviewer: Kathleen Ferguson
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Company Code:
Active Code:
Use Site Category:
EPA PC Code: 108209

CITATION: Scacchi, A., R. Soddu, and G. Pizzingrilli. 2003. Anaerobic Aquatic Metabolism of ^{14}C-IR5878 in Two American Soils. Unpublished study performed by Isagro Ricerca Srl, Environmental Chemistry, Metabolism & Environmental Fate, Novara, Italy; and sponsored and submitted by Isagro SpA, Milano, Italy. Study No.: MEF.02.16. Experiment initiated on August 26, 2002 and completed on November 10, 2003; final report issued on December 12, 2003. 280 pp.

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EXECUTIVE SUMMARY

The anaerobic biotransformations of [^{14}C-5-pyrimidinyl]-labeled and [^{14}C-U-phenyl]-labeled orthosulfamuron {IR5878; 1-(4,6-dimethoxypyrimidin-2-yl)-3-[2-(dimethylcarbamoyl) phenylsulfamoyl]-urea} were studied in darkness at 20 ±2°C in a pond water-loam sediment system (water pH 7.8, dissolved organic carbon not reported; sediment pH 6.9, organic carbon 0.87%) from Arkansas, US for 180 days and in a pond water-clay sediment system (water pH 7.7, dissolved organic carbon not reported; sediment pH 6.0, organic carbon 1.8%) from California, US for 150 days. [^{14}C]IR5878 was applied at the rate of 0.75 mg a.i./L (equivalent to 75 g a.i./ha). The water/sediment ratio used was 2.2:1 for the Arkansas water-loam sediment system and 2.5:1 for the California water-clay sediment system. The experiment was conducted in accordance with the USEPA Pesticide Assessment Guidelines, Subdivision N §162-3 and OECD Guideline 307 "Aerobic and Anaerobic Transformation in Soil", and in compliance with the Italian OECD-GLP standards. The test system consisted of glass cylinders (4.5 cm i.d., 15.9 cm^2 area) filled with soil to a depth of 2.5 cm and with a 6-cm water layer. The incubation units were maintained in a nitrogen atmosphere and attached to traps for the collection of CO_2 (volatile organic compounds were not collected separately). Duplicate samples were analyzed at 0, 8, 15, 42, 71, 100 and 180 days of incubation for the Arkansas water-loam sediment system and at 0, 8, 15, 35, 59, 100 and 150 days of incubation for the California water-clay sediment system. The water samples were basified with saturated $NaHCO_3$ solution, and the sediment samples were extracted once with acetonitrile:33mM $NaHCO_3$ (7:3, v:v) and twice with acetonitrile:33mM $NaHCO_3$ (1:1, v:v). Post-extraction soils that contained greater than 20% of the applied radioactivity were further separated into fulvic acids, humic acids and humin. Identification of the parent and transformation products was done via TLC co-chromatography and LC-MS analysis.

The test conditions outlined in the study protocol were reportedly maintained throughout the study. The initial and final microbial activities were not determined; there was no indication that the system was biologically active. During the 180-day study of the Arkansas water-loam sediment system, conditions were strongly reducing (-400 to –200 mV) in the water layers and the sediments with measured redox potential ranges of *ca.* -320 to *ca.* –290 mV and *ca.* –320 to *ca.* –270 mV, respectively. In the water layers throughout the study, dissolved oxygen levels and pH were *ca.* 0.0 to *ca.* 0.1 and *ca.* 8.2 to *ca.* 8.7, respectively; the pH of the sediments ranged from *ca.* 8.2 to *ca.* 8.75. During the 150-day study of the California water-clay sediment system, conditions were reducing (-200 to –50 mV) in the water layers and the sediments with measured redox potential ranges of *ca.* -175 to *ca.* –120 mV and *ca.* –150 to *ca.* –110 mV, respectively. In the water layers throughout the study, dissolved oxygen levels and pH were *ca.* 0.0 to *ca.* 0.1 and *ca.* 7.2 to *ca.* 7.75, respectively; the pH of the sediments ranged from *ca.* 7.0 to *ca.* 7.7.

The major transformation products detected in the soils treated with [^{14}C-5-pyrimidinyl]orthosulfamuron were S9 {O-desmethyl IR5878, 1-(4-hydroxy-6-methoxy pyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenylsulfamoyl]-urea} and S12 {DOP urea, N-(4,6-dimethoxypyrimidin-2-yl)urea}. S11 was observed at >10% of the applied; however, it was determined to be composed of 5 compounds. The detected minor transformation products were

S13 {DOP amine, 4,6-dimethoxypyrimidin-2-yl amine}; S15 {not identified}; and S16 {not identified}. The major transformation products detected in the soils treated with [^{14}C-U-phenyl]orthosulfamuron were S1 {DBS acid, (2-dimethylcarbamoylphenyl) sulfamic acid} and S9 {O-desmethyl IR5878}. S5 was observed at >10% of the applied; however, it was determined to be composed of 8 compounds. The detected minor transformation products in the soils were S2 {DBS amide, 2-[(aminosulfony)amino]-N,N-dimethylbenzamide}; S4 {DB amine, 2-amino-N,N-dimethylbenzamide}; S7 {not identified}; S8 {not identified}; and S16 {not identified}.

Arkansas water-loam sediment system

The total material balance in the water/sediment system was 94.98-107.92% (99.78 ± 3.66%) of the applied (combined radiolabels). There was no steady decline over time for either label system. Through the course of both radiolabel experiments, [^{14}C]residues dissipated quickly from the water layer into the sediment. Distribution ratios (water:sediment) were 99:1 at time 0, 4:1 at day 8, 2:1 at day 15 and 1:1 at days 42-180 for [^{14}C-5-pyrimidinyl]orthosulfamuron and 149:1 at time 0, 3:1 at day 8 and 1-2:1 at days 15-180 for [^{14}C-U-phenyl]orthosulfamuron. The extractable [^{14}C]residues in sediment increased from <dl-0.73% at day 0 to 40.18-44.72% at day 42, then decreased to 27.56-27.65% of the applied amount at the end of incubation period (day 180; combined radiolabels). Non-extractable [^{14}C]residues in sediment increased from <dl at day 0 to 22.07-32.03% of the applied at the end of incubation period (remained <10% for at least 71 days posttreatment). The day 180 soil residue was further extracted and fractioned into fulvic acids, humic acids and humin. The acidic extraction, fulvic acids, humic acids and humin were determined as 0.81-7.21%, 10.20-11.84%, 2.04-2.05% and 3.04-19.10%, respectively (combined radiolabels). At the end of the study, 0.24-0.44% of the recovered radioactivity was present as CO_2 (combined radiolabels); volatile organic compounds were not collected separately.

The concentration of orthosulfamuron in the total system decreased from 95.32-96.40% at time 0 to 54.56-55.11% at day 71 to 19.41-21.92% of the applied amount at study termination (day 180; combined radiolabels). In the water layer, [^{14}C]orthosulfamuron decreased from 95.32-96.40% at time 0 to 63.51-65.86% at day 15 to 43.98-45.66% at day 42 to 35.02-35.52% at day 100 to 10.44-12.39% of the applied amount at study termination. The concentration of [^{14}C]orthosulfamuron in the sediment increased from 14.78-19.95% at day 8 to 20.71-22.48% at days 15-42, then decreased to 8.97-9.53% of the applied amount at the end of the study period (not analyzed at time 0).

In the Arkansas water-loam sediment system treated with [^{14}C-5-pyrimidinyl]orthosulfamuron, O-desmethyl IR5878 (S9) was detected at a maximum and final of 12.63% and 17.47% of the applied amount in the water and total system, respectively, at study termination (day 180). In the sediment, O-desmethyl IR5878 was observed at a maximum of 7.28% at day 42 and a final of 4.84% at day 180. DOP urea (S12) was detected at a maximum of 2.31% (71 DAT), 11.39% (42 DAT) and 12.47% (42 DAT) in the water, sediment and total system, respectively, and final of 0.36%, 2.84% and 3.19% in the water, sediment and total system, respectively, at day 180. S11 was detected at a maximum and final of 14.59%, 8.59% and 23.18% in the water, sediment and

total system, respectively, at day 180. DOP amine (S13) was detected at a maximum of 0.42%, 0.75% and 1.14% in the water, sediment and total system, respectively. Unidentified transformation products S15 and S16 were detected at maximums of 0.86-1.10%, 0.41-1.85% and 0.86-2.95% in the water, sediment and total system, respectively.

In the Arkansas water-loam sediment system treated with [^{14}C-U-phenyl]orthosulfamuron, DBS acid (S1) was detected at a maximum of 6.23% and 12.01% of the applied amount in the sediment and total system, respectively, at day 100 and final of 2.32% and 9.09% in the sediment and total system, respectively, at study termination (day 180). In the water, DBS acid was observed at a maximum and final of 6.78% at day 180. O-desmethyl IR5878 (S9) was detected at a maximum of 7.94% (71 DAT) and 18.59% (100 DAT) in the sediment and total system, respectively, and final of 4.48% and 16.18% in the sediment and total system, respectively, at day 180. In the water, O-demethyl IR5878 was observed at a maximum and final of 11.70% at day 180. S5 was detected at a maximum and final of 15.10%, 6.77% and 21.86% in the water, sediment and total system, respectively, at day 180. DBS amide (S2) was detected at a maximum of 3.02%, 1.21% and 4.23% in the water, sediment and total system, respectively. DB amine (S4) was detected at a maximum of 4.92%, 2.56% and 6.41% in the water, sediment and total system, respectively. Unidentified transformation products S7 (detected only in sediment), S8 and S16 were detected at maximums of 1.01-1.15%, 0.58-1.17% and 1.01-2.32% of the applied amount in the water, sediment and total system, respectively.

Accounting for non-extractable residues as parent compound in the Arkansas water-loam sediment system, linear/natural log half-life values of [^{14}C]orthosulfamuron (both labels) were 63-68, >365, and 142->365 days in the water, sediment, and total system, respectively.

California water-clay sediment system

The total material balance in the water/sediment system was 90.37-103.21% (98.48 ± 2.82%) of the applied (combined radiolabels). There was no steady decline over time for either label system. Through the course of both radiolabel experiments, [^{14}C]residues dissipated quickly from the water layer into the sediment. Distribution ratios (water:sediment) were 149:1 at time 0, 2:1 at day 8, 1:1 at day 15, 1:2 at days 35-59, 1:3 at day 100 and 1:4 at day150 for [^{14}C-5-pyrimidinyl]orthosulfamuron and 201:1 at time 0, 2:1 at day 8, 1:1 at days 15-35 and 1:1-2 at days 59-150 for [^{14}C-U-phenyl]orthosulfamuron. The extractable [^{14}C]residues in sediment increased from 0.51-0.66% at day 0 to 47.42-56.29% at day 59, then decreased to 36.64-37.64% of the applied amount at the end of incubation period (day 150; combined radiolabels). Non-extractable [^{14}C]residues in sediment increased from <dl at day 0 to 10.10-13.23% at day 15 to 23.91-43.23% of the applied at the end of incubation period. The day 150 soil residue was further extracted and fractioned into fulvic acids, humic acids and humin. The acidic extraction, fulvic acids, humic acids and humin were determined as <dl-0.34%, 11.08-12.14%, 2.08-2.21% and 9.91-26.76%, respectively (combined radiolabels). At the end of the study, 0.33-0.67% of the recovered radioactivity was present as CO_2 (combined radiolabels); volatile organic compounds were not collected separately.

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The concentration of orthosulfamuron in the total system decreased from 95.14-96.01% at time 0 to 45.62-51.99% at day 35 to 15.34-16.81% at day 100 to 7.41-7.52% of the applied amount at study termination (day 150; combined radiolabels). In the water layer, [^{14}C]orthosulfamuron decreased from 95.14-96.01% at time 0 to 56.80-59.81% at day 8 to 21.04-22.66% at day 35 to 3.85-4.27% at day 100 to 0.81-1.20% of the applied amount at study termination. The concentration of [^{14}C]orthosulfamuron in the sediment increased from 19.67-21.51% at day 8 to 21.37-34.28% at days 35-59, then decreased to 6.32-6.60% of the applied amount at the end of the study period (not analyzed at time 0).

In the California water-clay sediment system treated with [^{14}C-5-pyrimidinyl]orthosulfamuron, O-desmethyl IR5878 (S9) was detected at a maximum of 9.51% (59 DAT), 3.29% (35 DAT) and 12.21% (59 DAT) in the water, sediment and total system, respectively, and final of 2.70%, 1.75% and 4.44% in the water, sediment and total system, respectively, at study termination (day 150). DOP urea (S12) was detected at a maximum of 1.27% (0 DAT), 18.27% (59 DAT) and 18.97% (59 DAT) in the water, sediment and total system, respectively, and final of 0.35%, 15.91% and 16.26% in the water, sediment and total system, respectively, at day 150. S11 was detected at a maximum and final of 13.21%, 7.73% and 20.94% of the applied amount in the water, sediment and total system, respectively, at study termination. DOP amine (S13) was detected at a maximum of 0.42%, 0.85% and 0.98% of the applied amount in the water, sediment and total system, respectively. Unidentified transformation products S15 and S16 were detected at maximums of 0.48-0.90%, 0.36-4.45% and 0.90-4.93% of the applied amount in the water, sediment and total system, respectively.

In the California water-clay sediment system treated with [^{14}C-U-phenyl]orthosulfamuron, DBS acid (S1) was detected at a maximum and final of 21.59%, 17.06% and 38.65% in the water, sediment and total system, respectively, at study termination (day 150). O-desmethyl IR5878 (S9) was detected at a maximum of 8.96% (35 DAT), 5.27% (59 DAT) and 13.11% (59 DAT) in the water, sediment and total system, respectively, and final of 2.22%, 2.04% and 4.26% in the water, sediment and total system, respectively, at day 180. S5 was detected at a maximum of 12.39% and 16.10% in the water and total system, respectively, at day 100 and final of 9.26% and 14.79% in the water and total system, respectively, at day 150. In the sediment, S5 was a maximum of 5.53% of the applied at 150 days posttreatment. DBS amide (S2) was detected at a maximum of 2.13%, 2.06% and 3.83% in the water, sediment and total system, respectively. DB amine (S4) was detected at a maximum of 4.57%, 3.03% and 5.74% in the water, sediment and total system, respectively. Unidentified transformation products S7, S8 and S16 were detected at maximums of 0.17-1.33%, 0.63-1.32% and 0.63-2.24% of the applied amount in the water, sediment and total system, respectively.

Accounting for non-extractable residues as parent compound in the California water-clay sediment system, linear/natural log half-life values of [^{14}C]orthosulfamuron (both labels) were 23-25, >365, and 88-161 days in water, sediment, and total system, respectively.

The biotransformation pathway of orthosulfamuron in anaerobic water- sediment systems was illustrated by the study authors. The main degradation pathway of IR5878 was the hydrolytic

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cleavage of the sulfamoylurea linkage to give S12 {DOP urea} and S1 {DBS acid}. Another degradation pathway was the demethylation of IR5878 to S9 {O-desmethyl IR5878}, which also degraded to DBS acid. Minor transformation pathways lead to the formation of S13 {DOP amine}, S2 {DBS amide} and S4 {DB amine}. IR5878 degraded to DOP amine, DBS amide and DB amine. DOP urea also degraded to DOP amine. DBS amide and DBS acid also degraded to DB amine.

Results Synopsis:

Test system used: Water-loam sediment from Arkansas.
[Pyrimidinyl-5-^{14}C]-label:

Linear half-life in water:	68 days (r^2 = 0.9592).
Linear half-life (42-180 day data) in sediment:	124 days (r^2 = 0.9143).
Accounting non-extracted residues as parent:	Stable.
Linear half-life in the entire system:	89 days (r^2 = 0.9809).
Accounting non-extracted residues as parent:	217 days (r^2 = 0.8943).

Major transformation products:

- O-desmethyl IR5878 (S9) {1-(4-hydroxy-6-methoxy pyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenylsulfamoyl]-urea; maximum of 12.63%, 7.28% and 17.47% in the water, sediment and total system, respectively}.
- DOP urea (S12) { N-(4,6-dimethoxypyrimidin-2-yl)urea; maximum of 2.31%, 11.39% and 12.47% in the water, sediment and total system, respectively}.
- S11 {composed of 5 compounds; maximum of 14.59%, 8.59% and 23.18% in the water, sediment and total system, respectively}.

Minor transformation products:

- DOP amine (S13) {4,6-dimethoxypyrimidin-2-yl amine; maximum of 0.42%, 0.75% and 1.14% in the water, sediment and total system, respectively}.
- CO2.

[Phenyl-U-^{14}C]-label:

Linear half-life in water:	63 days (r^2 = 0.9589).
Linear half-life (15-180 day data) in sediment:	117 days (r^2 = 0.9124).
Accounting non-extracted residues as parent:	Stable.
Linear half-life in the entire system:	80 days (r^2 = 0.9868).
Accounting non-extracted residues as parent:	142 days (r^2 = 0.9634).

Major transformation products:

- DBS acid (S1) {(2-dimethylcarbamoylphenyl) sulfamic acid; maximum of 6.78%, 6.23% and 12.01% of the applied amount in the water, sediment and total system, respectively}.
- O-desmethyl IR5878 (S9) {maximum of 11.70%, 7.94% and 18.59% in the water, sediment and total system, respectively}.

- S5 {composed of 8 compounds; maximum of 15.10%, 6.77% and 21.86% in the water, sediment and total system, respectively}.

Minor transformation products:

- DBS amide (S2) {2-[(aminosulfony)amino]-N,N-dimethylbenzamide; maximum of 3.02%, 1.21% and 4.23% in the water, sediment and total system, respectively}.
- DB amine (S4) {2-amino-N,N-dimethylbenzamide; maximum of 4.92%, 2.56% and 6.41% in the water, sediment and total system, respectively}.
- CO2.

Test system used: Water-clay sediment from California.

[Pyrimidinyl-5-^{14}C]-label:

Linear half-life in water:	25 days (r^2 = 0.9889).
Linear half-life (35-150 day data) in sediment:	57 days (r^2 = 0.9803).
Accounting non-extracted residues as parent:	Stable.
Linear half-life in the entire system:	41 days (r^2 = 0.9958).
Accounting non-extracted residues as parent:	161 days (r^2 = 0.7124).

Major transformation products:

- O-desmethyl IR5878 (S9) {maximum of 9.51%, 3.29% and 12.21% in the water, sediment and total system, respectively}.
- DOP urea (S12) {maximum of 1.27%, 18.27% and 18.97% in the water, sediment and total system, respectively}.
- S11 {maximum of 13.21%, 7.73% and 20.94% of the applied amount in the water, sediment and total system, respectively}.

Minor transformation products:

- DOP amine (S13) {maximum of 0.42%, 0.85% and 0.98% of the applied amount in the water, sediment and total system, respectively}.
- CO2.

[Phenyl-U-^{14}C]-label:

Linear half-life in water:	23 days (r^2 = 0.9754).
Linear half-life (59-150 day data) in sediment:	39 days (r^2 = 0.9377).
Accounting non-extracted residues as parent:	>365 days (r^2 = 0.0820).
Linear half-life in the entire system:	41 days (r^2 = 0.9894).
Accounting non-extracted residues as parent:	88 days (r^2 = 0.9272).

Major transformation products:

- DBS acid (S1) {maximum and final of 21.59%, 17.06% and 38.65% in the water, sediment and total system, respectively}.
- O-desmethyl IR5878 (S9) {maximum of 8.96%, 5.27% and 13.11% in the water, sediment and total system, respectively}.
- S5 {maximum of 12.39%, 3.71% and 16.10% in the water, sediment and total system, respectively}.

Minor transformation products:

- DBS amide (S2) {maximum of 2.13%, 2.06% and 3.83% in the water, sediment and total system, respectively}.
- DB amine (S4) {maximum of 4.57%, 3.03% and 5.74% in the water, sediment and total system, respectively}.
- CO2.

Study Acceptability: This study is classified as **supplemental** and does not satisfy the Subdivision N §162-3 guideline requirement. Microbial biomass was not measured at any time in sediment or water. Multiple solvent systems were not employed in a reasonable extraction attempt; non-extractable [^{14}C]residues in sediment were measured at >10% by day 15 in the California water-clay sediment system and by day 100-180 in the Arkansas water-loam sediment system.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: This study was conducted in accordance with USEPA Pesticide Assessment Guidelines, Subdivision N §162-3 (1982) and OECD Guideline 307 "Aerobic and Anaerobic Transformation in Soil" (August 2000; p. 1). Significant deviations from Subdivison N guidelines were as follows:

Microbial biomass was not determined in the study at any time in sediment or water.

Multiple solvent systems were not employed in a reasonable extraction attempt. Subdivision N guidelines require that a reasonable attempt be made to identify the parent and all major degradates, including rates of their formation and decline.

COMPLIANCE: This study was conducted in compliance with the Italian OECD Good Laboratory Practices (1992; p. 3). Signed and dated Data Confidentiality, GLP, declaration and signatures and Quality Assurance statements were provided (pp. 2-6).

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A. MATERIALS:

1. Test Materials

[^{14}C-5-pyrimidinyl]IR5878 (Pyr-IR5878) and [^{14}C-U-phenyl]IR5878 (Phe-IR5878; p. 17).

Chemical Structure:

See DER Attachment 1.

Description:

Technical grade; solid (p. 14).

Purities:

[^{14}C-5-pyrimidinyl]IR5878

Radiochemical purity: >98% (by TLC; p. 17).
Lot/Batch No.: 208.
Analytical purity: Not reported.
Specific activity: 4.452 MBq/mg (120.323 µCi/mg, 267117 dpm/µg).
Locations of the label: The C5 carbon of the pyrimidinyl ring.

[^{14}C-U-phenyl]IR5878

Radiochemical purity: >98% (by TLC; p. 17).
Lot/Batch No.: 209.
Analytical purity: Not reported.
Specific activity: 7.357 MBq/mg (198.85 µCi/mg, 441447 dpm/µg).
Locations of the label: Uniformly in the phenyl ring.

Storage conditions of test chemicals:

The test materials were stored frozen at –20°C (lighting conditions were not reported; p. 18).

Physico-chemical properties of orthosulfamuron:

Parameter	Value	Comment
Molecular weight	424.44 g/mol	
Molecular formula	$C_{16}H_{20}N_6O_6S$	
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 obtained from p. 14 of the study report.

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2. Water-sediment collection, storage and properties

Table 1: Description of water collection and storage.

Description		Arkansas	California
Geographic location		Shoffner Farm, Arkansas	Maria Renner, Offenbach Farm, California
Pesticide use history at the collection site		Roundup Ultra Max, Karate Z and Pix Plus	None
Collection procedures for:	Water:	Not reported.	
	Sediment	Not reported.	
Sampling depth for:	Water:	Not reported.	
	Sediment:	Upper 20 cm layer	
Storage conditions		Water and sediment were stored at 4°C.	
Storage length[1]		*ca.* 5 months	*ca.* 4 months
Preparation of water and sediment samples (eg: water -filtered/not filtered; sediment -sieved/not sieved)		Water- filtered, paper filter (extra rapid). Sediment- sieved, 2 mm.	

Data obtained from p. 18 and Appendix 4, p. 175 of the study report.
1. Storage length was estimated using the experimental start date (August 26, 2002; p. 15) and the collection dates for the Arkansas (March 29, 2002; Appendix 4, p. 176) and California (April 23, 2002; Appendix 4, p. 178) systems.

Table 2: Properties of the water.

Description	Arkansas		California	
	Initial	Final	Initial	Final
Temperature (°C)	Not reported			
pH	7.8	7.44	7.7	6.82
Redox potential (mV)[1]	*ca.* -320	*ca.* -300	*ca.* –120 to -140	*ca.* –140 to -150
Oxygen concentration (mg/L)[1]	≤0.1	≤0.1	≤0.1	≤0.1
Dissolved organic carbon (%)	Not reported.			
Hardness (ppm $CaCO_3$)	224		39	
Electrical conductivity (mmhos/cm)	0.52		Not reported.	
Biomass (mg microbial C/100 g or CFU or other)	Not reported.			

Data obtained from Tables 1-2, pp. 55-56 and Appendix 5, pp. 187-189 of the study report.
1. The values for redox potential and oxygen concentration were estimated from graphical representations of the data that were provided by the study authors; no values were provided by the study authors.

Table 3: Properties of the sediment.

Property		Arkansas		California	
		Initial	Final	Initial	Final
Soil texture (USDA)		loam		clay	
%Sand (50-2000 µm)		51		18	
%Silt (2-50 µm)		38		22	
%Clay (<2 µm)		11		60	
pH	In water	6.9	7.45	6.0	6.72
	In 0.01 M $CaCl_2$	6.2	6.49	5.6	5.99
Organic carbon (%)		0.87	1.33	1.8	1.97
CEC(meq/100g)		7.5		47.5	
Redox potential (mV) [1]		*ca.* -300	*ca.* -270 to -310	*ca.* -120 to -130	*ca.* -135 to -140
Moisture at 1/3 bar (%)		21.1		44.7	
Bulk density (g/cm^3)		1.24		1.1	
Biomass (mg microbial C/100 g or CFU or other)		Not reported.	Not reported.	Not reported.	Not reported.

Data obtained from Tables 1-2, pp. 55-56 and Appendix 5, pp. 187-189 of the study report.
1. The values for redox potential were estimated from graphical representations of the data that were provided by the study authors; no values were provided by the study authors.

B. EXPERIMENTAL DESIGN:

1. Preliminary experiments: No preliminary experiments were conducted.

2. Experimental conditions:

Table 4: Study design.

Parameter	Arkansas	California
Duration of the test	180 day	150 days
Water: Filtered/unfiltered water: Type and size of filter used, if any:	Filtered. Paper filter, size not reported.	
Amount of sediment and water/ treatment	49.29 g soil (dry weight)	43.73 g soil (dry weight)
Water/sediment ratio	2.2:1 [49.29 g soil (dry weight) and *ca.* 110 mL water]	2.5:1 [43.73 g soil (dry weight) and *ca.* 110 mL water]
Application rates (mg a.i./L) Nominal: Actual:	0.75 mg a.i./L (equivalent to 75 g a.i./ha) Not reported.	
Control conditions, if used	Not reported.	
No. of replications Control, if used: Treatments:	Not reported. Two samples were collected at each sampling interval.	

Parameter		Arkansas	California
Test apparatus Type/material/volume: Details of traps for CO_2 and organic volatile, if any:		Glass cylinders (4.5 cm i.d., 15.9 cm^2 area) were filled with soil to a depth of 2.5 cm and with a 6-cm water layer. The incubation units were maintained in a nitrogen atmosphere for 33 days in experimental conditions (dark, 20 ±2°C) prior to test material application. Each glass cylinder was connected to a glass drechsel containing 100 mL of 2N KOH. The incubation units were illustrated in Appendix 10, Figure I, p. 275 of the study report.	
If no traps were used, is the system closed?		Traps were used.	
Identity and concentration of co-solvent		Acetonitrile, <0.01%.	
Pesticide application method	Volume of the test solution used/treatment:	0.81 mL of the Pyr-IR5878 dosing solution and 0.80 mL of the Phe-IR5878 dosing solution	
	Application method (eg: mixed/not mixed):	Added dropwise, not mixed.	
Any indication of the test material adsorbing to the walls of the test apparatus?		Not reported.	
Microbial biomass/microbial population of the test samples		Initial	Final
	Water:	Not reported.	Not reported.
	Sediment:	Not reported.	Not reported.
Microbial biomass/microbial population of the control		Initial	Final
	Water:	Not applicable.	Not applicable.
	Sediment:	Not applicable.	Not applicable.
Experimental conditions:	Temperature (°C):	20 ±2	
	Continuous darkness (Yes/No):	Yes	
Other details, if any		Four additional samples of each soil and radiolabel were prepared at 60x the dose rate for confirmation of identification of the parent and transformation products; only the California soil samples were processed and analyzed. Two additional samples were prepared to monitor pH, redox potential and oxygen concentration.	

Data obtained from pp. 11, 18, 21-23 and 29 of the study report.

3. Anaerobic conditions: Anaerobic conditions were maintained by incubating the soil-water systems under a nitrogen atmosphere (p. 21). Water that was added to the test samples throughout the experiment to maintain water level was fluxed with nitrogen prior to use. In the 33-day pre-incubation period, redox potentials and dissolved oxygen levels in the water layers were *ca.* –300 to –220 mV and *ca.* 0.0-0.5 mg/L in the Arkansas water-loam soil system and *ca.* –275 to –120 mV and *ca.* 0.0-0.2 mg/L in the California water-clay soil system (Appendix 5, pp. 187-189; redox potentials and dissolved oxygen levels were estimated by the primary reviewer

from graphical representations of the data which were provided by the study authors). Corresponding redox potentials in the sediment layers were *ca.* –280 to –220 mV and *ca.* –175 to –105 mV in the Arkansas water-loam soil system and the California water-clay soil system, respectively. Microbial biomass determinations were not performed.

4. Supplementary experiments: No supplementary experiments were conducted.

5. Sampling:

Table 5: Sampling details.

Criteria	Details
Sampling intervals	Arkansas- 0, 8, 15, 42, 71, 100 and 180 days. California- 0, 8, 15, 35, 59, 100 and 150 days.
Sampling method	Two incubation units were collected at each sampling interval.
Method of collection of CO_2 and organic volatile compounds	The corresponding KOH drechsels were collected at each sampling interval, except time 0.
Sampling intervals/times for: Sterility check: pH measurement:	 None reported. At each sampling interval.
Sample storage before analysis	Water layers and soil extracts were analyzed by LSC immediately, but stored at 1-7°C prior to TLC (storage time <2 weeks) and LC-MS analysis (storage time unreported).
Other observation, if any (eg: precipitation, color change etc.)	None.

Data obtained from pp. 11, 21, 23-25 and 27 of the study report.

C. ANALYTICAL METHODS:

Separation of the sediment and water: Water layer was removed from the sediment via pipette (p. 23).

Extraction/clean up/concentration methods for water and sediment samples: The water layer was mixed with saturated $NaHCO_3$ solution until a basic mixture was achieved, then brought to volume with acetonitrile (p. 23).

The sediment layers were extracted sequentially with 250 mL of the following solvent mixtures: acetonitrile:33mM $NaHCO_3$ (7:3, v:v; extraction A); acetonitrile:33mM $NaHCO_3$ (1:1, v:v; extraction B); and acetonitrile:33mM $NaHCO_3$ (1:1, v:v; extraction C; p. 24). The day 0 samples and day 8 Arkansas Phe-IR5878 samples were only extracted with extraction A and extractions A and B, respectively. After the addition of the extraction solution, the mixture was shaken for 1 hour at 300 strokes/min and separated by centrifugation (20 minutes at 15,200 RCF). The supernatant was decanted and made to volume with acetonitrile. After the shaking of extraction solution C, the mixture was sonicated for 50 minutes at 40°C prior to centrifugation. Extracts A, B and C were not combined.

The extraction and analysis scheme was illustrated by the study authors in Scheme 1, p. 49 of the study report.

Total ^{14}C measurement: Duplicate aliquots of the water layers (2 x 0.5 mL), extracts A, B and C (2 x 1 mL) of the sediment layers, KOH solutions (2 x 1 mL), acidic extractions of the soil residues (2 x 1 mL), fulvic acid fractions (2 x 1 mL) and humic acid fractions (2 x 0.25 mL) were analyzed by LSC (pp. 23-25).

The total radioactivity measurement was determined as the sum of the radioactivity in the water layers, in the extracts A, B and C of the sediment layers, in the bound residues and in the KOH solution (p. 25).

Determination of non-extractable residues: Aliquots (3 x 0.25-1.22 g) of extracted soil residues were combusted prior to radioanalysis by LSC (p. 24).

Post-extraction soils that contained greater than 20% of the applied radioactivity were further separated into fulvic acids, humic acids and humin (pp. 24-25). Prior to partitioning, the post-extraction soil was extracted once with 0.1N HCl (100 mL) via continuous shaking (300 strokes/min) for 48 hours. The extraction mixture was centrifuged (20 minutes at 15,200 RCF), and the supernatant decanted (acidic extraction). Then the post-acidic extraction soil was partitioned into fulvic acids, humic acids and humin. The soil pellet was extracted with 0.5N NaOH (100 mL) via continuous shaking (300 strokes/min) for 48 hours. The extraction mixture was centrifuged (20 minutes at 15,200 RCF), and the supernatant decanted. The residue, the humin, was dried and combusted prior to radioanalysis by LSC (0.40-1.35 g aliquots). The pH of the supernatant was adjusted to 1 with 6N HCl. The precipitate was isolated via centrifugation (20 minutes at 15,200 RCF) and decanting, then re-dissolved in 100 mL of 0.5N NaOH and acidified to pH 1 with 6N HCl. The second precipitate, the humic acid, was separated from supernatant via centrifugation (20 minutes at 15,200 RCF) and decanting, and then re-dissolved in 25 mL of 0.5N NaOH for analysis. The two acidic supernatants were combined to produce the fulvic acid fraction. The fractionation of the soil was illustrated by the study authors in Scheme 2, p. 50 of the study report.

Derivatization method, if used: No derivatization method was employed.

Identification and quantification of parent compound: The parent was identified in [^{14}C]residues in the water and sediment layers using normal-phase and reversed-phase TLC (pp. 26-28). The reversed-phase TLC was performed using RP-18 F_{254S} plates (0.25 mm thickness) that were developed using acetonitrile:water (92:8, v:v; solvent system 1). The normal-phase TLC was performed using silica gel 60 F_{254} plates (0.25 mm thickness) that were developed using chloroform:methanol:ammonium hydroxide 30% (75:22:3, v:v:v; solvent system 2). The amount of parent was quantified using a Bio-Imaging Analyzer (BAS 1500). Identification was confirmed via co-chromatography of selected water and sediment samples with the unlabeled

orthosulfamuron reference standard (IR5878; Lot/Batch No.: 20698/27; Analytical purity: 98.19%; pp. 14, 17, 38; Figure 46, p. 122; Figure 55, p. 131).

Confirmation of the identification of the parent was performed via LC-MS analysis of the additional 60x dose California samples (pp. 28-29; for processing of the additional samples, see Reviewer's Comment #4). The LC-MS analysis conditions were the following: Supelcosil™ LC-18 column (250 x 4.6 mm, 5 µm); mobile phase of 1mM CH_3COONH_4 (pH 4.5; solvent A) and acetonitrile (solvent B) with gradient elution conditions (percent A:B; time 0 80:20 and 20 min 10:90); flow rate 0.8 mL/min; and ESI positive ion source. Identification was confirmed via the ion fragmentation spectra of orthosulfamuron: $[2M]^+$ 848, $[M+H]^+$ 425 and fragmentation ions (227, 199, 182, 163, 156, 148, and 120; p. 38; Figures 69-70, pp. 145-146).

Identification and quantification of transformation products: The transformation products were identified and quantified using the same TLC methods as described for the parent, except that 2-D TLC with solvent system 2 (3 runs) and solvent system 3 (acetonitrile:water:ammonium hydroxide 30%, 65:28:7, v:v:v; 1 run) was subsequently used for unresolved fractions (p. 27).

The following radiolabeled reference standards were included for transformation product identification (p. 45; Figure 47, p. 123; Appendix 9, pp. 269-273):

Code No.	Conventional Name	Lot No.	Radiochemical Purity	IUPAC Name
S1[1]	DBS acid	187	>98%	(2-dimethylcarbamoylphenyl) sulfamic acid
S2[1]	DBS amide	186	>99%	2-[(aminosulfony)amino]-N,N-dimethylbenzamide
S4[1]	DB amine	181	>96%	2-amino-N,N-dimethylbenzamide
S9[2]	O-desmethyl IR5878	isolated in Study MEF.01.13		1-(4-hydroxy-6-methoxy pyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenylsulfamoyl]-urea
S12[3]	DOP urea	205	>99%	N-(4,6-dimethoxypyrimidin-2-yl)urea
S13[3]	DOP amine	178	>99%	4,6-dimethoxypyrimidin-2-yl amine

1. Radiolabeled uniformly in the phenyl ring.
2. Unknown position of radiolabel.
3. Radiolabeled on the C5 carbon of the pyrimidine ring.

Confirmation of the identification of the transformation products was performed via LC-MS analysis of the additional 60x dose California samples (pp. 28-29). The LC-MS analysis conditions for S2 and S12 were the same as those for the parent. The LC-MS analysis conditions for S9 were the following: Supelcosil™ LC-18 column (250 x 4.6 mm, 5 µm); mobile phase of 1mM CH_3COONH_4 (pH 4.5; solvent A) and acetonitrile (solvent B) with isocratic elution conditions (percent A:B; 88:12); flow rate 0.8 mL/min; and ESI positive ion source. The LC-MS analysis conditions for S1 were the following: Synergi 4µ Polar-RP 80A column (250 x 4.6 mm, 4 µm); mobile phase of 5mM CH_3COONH_4 (pH 4.5; solvent A) and acetonitrile (solvent B) with isocratic elution conditions (percent A:B; 93:7); flow rate 0.6 mL/min; and ESI positive ion source. Identification was confirmed via the ion fragmentation spectra.

Detection limits (LOD, LOQ) for the parent compound: The LOD for the LSC analysis was twice the background counting rate (p. 26). The LOD for the TLC analysis was the minimum radioactivity amount detectable with a signal to noise ratio greater than 5 (p. 28). The LOQs were not reported.

Detection limits (LOD, LOQ) for the transformation products: The LOD and LOQ for the transformation products were the same as those for the parent.

II. RESULTS AND DISCUSSION:

A. TEST CONDITIONS: Anaerobic conditions, temperature (20 ±2°C) and other experimental conditions (*e.g.*, darkness) were maintained throughout the study. The initial and final microbial activities were not determined; there was no indication that the system was biologically active. During the 180-day study of the Arkansas water-loam sediment system, conditions were strongly reducing (-400 to –200 mV) in the water layers and the sediments with measured redox potential ranges of *ca.* -320 to *ca.* –290 mV and *ca.* –320 to *ca.* –270 mV, respectively (Appendix 5, pp. 185-189; redox potentials, pH and dissolved oxygen levels were estimated from graphical representations of the data provided by the study authors). In the water layers throughout the study, dissolved oxygen levels and pH were *ca.* 0.0 to *ca.* 0.1 and *ca.* 8.2 to *ca.* 8.7, respectively; the pH of the sediments ranged from *ca.* 8.2 to *ca.* 8.75. During the 150-day study of the California water-clay sediment system, conditions were reducing (-200 to –50 mV) in the water layers and the sediments with measured redox potential ranges of *ca.* -175 to *ca.* –120 mV and *ca.* –150 to *ca.* –110 mV, respectively. In the water layers throughout the study, dissolved oxygen levels and pH were *ca.* 0.0 to *ca.* 0.1 and *ca.* 7.2 to *ca.* 7.75, respectively; the pH of the sediments ranged from *ca.* 7.0 to *ca.* 7.7.

B. MATERIAL BALANCE: In the Arkansas water-loam sediment system, the mean total recoveries of radiolabeled material were 98.61 ± 4.03% (range 94.98-107.92%), 100.96 ± 2.94% (range 96.05-106.13%) and 99.78 ± 3.66% (range 94.98-107.92%) of the applied for the [^{14}C-5-pyrimidinyl]orthosulfamuron, [^{14}C-U-phenyl]orthosulfamuron and [^{14}C]orthosulfamuron (combined radiolabels) in water and sediment (Appendix 7, Tables III-IV, pp. 200-203, Tables VII-VIII, pp. 208-211, Table XII, pp. 217-218, Table XIV, pp. 221-222, Table XVI, p. 225, Table XVIII, p. 227; DER Attachment 2). Through the course of both radiolabel experiments, [^{14}C]residues dissipated quickly from the water layer into the sediment (DER Attachment 2). Distribution ratios (water:sediment) were 99:1 at time 0, 4:1 at day 8, 2:1 at day 15 and 1:1 at days 42-180 for [^{14}C-5-pyrimidinyl]orthosulfamuron and 149:1 at time 0, 3:1 at day 8 and 1-2:1 at days 15-180 for [^{14}C-U-phenyl]orthosulfamuron.

In the California water-clay sediment system, the mean total recoveries of radiolabeled material were 97.57 ± 2.85% (range 90.37-101.42%), 99.39 ± 2.57% (range 94.72-103.21%) and 98.48 ± 2.82% (range 90.37-103.21%) of the applied for the [^{14}C-5-pyrimidinyl]orthosulfamuron, [^{14}C-U-phenyl]orthosulfamuron and [^{14}C]orthosulfamuron (combined radiolabels) in water and sediment (Appendix 7, Tables V-VI, pp. 204-207, Tables IX-X, pp. 212-215, Table XIII, pp.

219-220, Table XV, pp. 223-224, Table XVII, p. 226, Table XIX, p. 228; DER Attachment 2). Through the course of both radiolabel experiments, [^{14}C]residues dissipated quickly from the water layer into the sediment (DER Attachment 2). Distribution ratios (water:sediment) were 149:1 at time 0, 2:1 at day 8, 1:1 at day 15, 1:2 at days 35-59, 1:3 at day 100 and 1:4 at day 150 for [^{14}C-5-pyrimidinyl]orthosulfamuron and 201:1 at time 0, 2:1 at day 8, 1:1 at days 15-35 and 1:1-2 at days 59-150 for [^{14}C-U-phenyl]orthosulfamuron.

There was no steady decline over time for any soil/label system.

Table 6a: Biotransformation of [^{14}C-5-pyrimidinyl]orthosulfamuron, expressed as percentage of applied radioactivity (mean ± s.d.[1]), in Arkansas water- loam sediment system under anaerobic conditions.

Compound		Sampling times (days)						
		0	8	15	42	71	100	180
IR5878 (S3; parent)	water	95.32 ±0.83	71.17 ±0.43	65.86 ±0.16	43.98 ±0.62	38.94 ±1.97	35.02 ±4.90	12.39 ±0.06
	sediment	NA	14.78 ±2.11	20.71 ±1.47	21.78 ±2.56	15.63 ±1.49	14.66 ±1.06	9.53 ±0.57
	system	95.32 ±0.83	85.94 ±2.55	86.57 ±1.63	65.76 ±3.12	54.56 ±0.48	49.68 ±3.84	21.92 ±0.51
S9 (O-des methyl IR5878)	water	0.53 ±0.04	0.61 ±0.07	0.87 ±0.09	3.90 ±0.28	6.84 ±0.14	8.83 ±0.90	12.63 ±0.21
	sediment	NA	0.43 ±0.08	0.75 ±0.01	7.28 ±0.35	6.88 ±0.47	6.10 ±0.47	4.84 ±0.18
	system	0.53 ±0.04	1.04 ±0.01	1.62 ±0.07	11.18 ±0.63	13.72 ±0.62	14.93 ±0.43	17.47 ±0.02
S11[3]	water	0.49 ±0.05	0.50 ±0.12	0.20	1.50 ±0.06	3.44 ±0.02	4.52 ±1.61	14.59 ±0.98
	sediment	NA	<dl	0.42 ±0.00	2.41 ±0.17	2.11 ±0.30	1.59 ±0.69	8.59 ±0.71
	system	0.49 ±0.05	0.50 ±0.12	0.52 ±0.14	3.91 ±0.11	5.54 ±0.33	6.10 ±2.31	23.18 ±1.69
S12 (DOP urea)	water	0.92 ±0.11	1.59 ±0.00	0.65 ±0.18	1.09 ±0.09	2.31 ±0.28	0.76 ±0.06	0.36 ±0.04
	sediment	NA	1.17 ±0.31	1.72 ±0.16	11.39 ±0.19	10.05 ±0.92	7.32 ±0.62	2.84 ±0.18
	system	0.92 ±0.11	2.76 ±0.31	2.37 ±0.34	12.47 ±0.10	12.36 ±1.20	8.07 ±0.68	3.19 ±0.14
S13 (DOP amine)	water	0.31 ±0.04	0.42 ±0.09	0.31[2]	<dl	0.39 ±0.14	0.38 ±0.06	<dl
	sediment	NA	0.26[2]	0.37[2]	0.40 ±0.03	0.75 ±0.29	0.32 ±0.05	0.35[2]
	system	0.31 ±0.04	0.55 ±0.27	0.68[2]	0.40 ±0.03	1.14 ±0.43	0.70 ±0.11	0.35[2]
S15	water	0.43 ±0.05	0.38 ±0.04	0.27 ±0.03	0.31 ±0.04	0.76 ±0.04	0.64 ±0.03	1.10 ±0.10
	sediment	NA	<dl	<dl	1.13 ±0.12	0.92 ±0.38	0.36 ±0.11	1.85 ±0.11
	system	0.43 ±0.05	0.38 ±0.04	0.27 ±0.03	1.44 ±0.16	1.68 ±0.42	1.00 ±0.09	2.95 ±0.01
S16	water	0.86 ±0.11	0.57 ±0.05	0.41 ±0.01	0.26[2]	0.31 ±0.00	<dl	0.26[2]
	sediment	NA	<dl	0.31 ±0.00	0.34 ±0.10	0.41 ±0.06	0.26[2]	<dl
	system	0.86 ±0.11	0.57 ±0.05	0.72 ±0.01	0.47 ±0.09	0.72 ±0.06	0.26[2]	0.22 ±0.06
CO_2		NA	<dl	<dl	<dl	0.11 ±0.16	0.31 ±0.02	0.44 ±0.27
Volatile organics		Not measured						
Extractable sediment residues		<dl	17.09 ±2.48	24.26 ±1.67	44.72 ±2.87	36.73 ±0.03	30.58 ±0.71	27.56 ±0.72

Compound		Sampling times (days)						
		0	8	15	42	71	100	180
Non-extractable sediment residues		<dl	1.93 ±0.21	3.67 ±0.25	9.87 ±0.56	8.80 ±0.36	14.22 ±1.68	32.03 ±1.59
Total recovery	water	98.85 ±1.13	75.21 ±0.06	68.34 ±0.39	51.02 ±0.98	52.98 ±2.31	50.13 ±2.53	41.43 ±1.35
	sediment[4]	NA	19.02 ±2.28	27.93 ±1.42	54.59 ±2.31	45.53 ±0.39	44.80 ±2.39	59.59 ±2.31
	system[4]	98.85 ±1.13	94.23 ±2.34	96.27 ±1.82	105.61 ±3.28	98.62 ±2.08	95.24 ±0.15	101.46 ±0.69

Data obtained from Table 3/A, p. 57; Table 7/A, p. 61; Table 8/A, p. 62; Table 9/A, p. 63; Appendix 7, Tables III-IV, pp. 200-203, Table XII, pp. 217-218, Table XVI, p. 225; Appendix 8, Tables XXVII-XXXIII, pp. 237-243; and DER Attachment 2.

1. Mean and standard deviation were calculated by the study authors unless otherwise noted.
2. Single value reported instead of mean and standard deviation because one replicate had a value of "<dl".
3. Composed of 5 compounds.
4. Standard deviation was not provided by the study authors.

<dl = Below the detection limit.
NA = Not analyzed.

Table 6b: Biotransformation of [^{14}C-U-phenyl]orthosulfamuron, expressed as percentage of applied radioactivity (mean ± s.d.[1]), in Arkansas water- loam sediment system under anaerobic conditions.

Compound		Sampling times (days)						
		0	8	15	42	71	100	180
IR5878 (S3; parent)	water	96.40 ±0.53	75.37 ±0.80	63.51 ±2.02	45.66 ±2.04	40.42 ±0.28	35.52 ±0.04	10.44 ±0.89
	sediment	NA	19.95 ±1.00	22.48 ±1.16	21.11 ±0.13	14.70 ±1.37	11.59 ±0.64	8.97 ±0.54
	system	96.40 ±0.53	95.32 ±1.80	85.99 ±3.18	66.77 ±1.91	55.11 ±1.64	47.10 ±0.68	19.41 ±0.35
S1 (DBS acid)	water	0.49 ±0.06	1.53 ±0.22	1.05 ±0.02	1.52 ±0.19	2.41 ±0.21	5.79 ±0.15	6.78 ±0.01
	sediment	NA	0.42 ±0.00	0.58 ±0.10	3.71 ±0.18	4.78 ±0.29	6.23 ±1.69	2.32 ±0.06
	system	0.49 ±0.06	1.95 ±0.22	1.63 ±0.12	5.23 ±0.01	7.19 ±0.08	12.01 ±1.84	9.09 ±0.06
S2 (DBS amide)	water	0.36 ±0.03	0.52 ±0.06	0.64 ±0.08	1.32 ±0.13	2.84 ±0.01	2.13 ±0.01	3.02 ±0.03
	sediment	NA	0.35 ±0.03	0.33 ±0.18	0.99 ±0.01	0.92 ±0.06	0.39 ±0.01	1.21 ±0.04
	system	0.36 ±0.03	0.87 ±0.09	0.97 ±0.26	2.31 ±0.12	3.76 ±0.06	2.52 ±0.00	4.23 ±0.01
S4 (DB amine)	water	0.46 ±0.07	0.51 ±0.02	0.42 ±0.05	1.88 ±0.54	4.92 ±0.05	0.50 ±0.10	2.31 ±0.09
	sediment	NA	0.61 ±0.10	0.45 ±0.07	4.00 ±0.02	1.50 ±0.74	1.63 ±0.10	2.56 ±0.18
	system	0.46 ±0.07	1.11 ±0.11	0.87 ±0.12	5.87 ±0.57	6.41 ±0.69	2.13 ±0.00	4.86 ±0.09
S5[3]	water	0.86 ±0.03	0.74 ±0.08	0.74 ±0.45	1.47 ±0.16	3.04 ±0.01	4.46 ±0.84	15.10 ±0.54
	sediment	NA	0.44 ±0.01	0.53 ±0.06	1.57 ±0.11	1.40 ±0.20	0.82 ±0.06	6.77 ±0.50
	system	0.86 ±0.03	1.18 ±0.06	1.26 ±0.38	3.03 ±0.06	4.44 ±0.21	5.28 ±0.90	21.86 ±1.05
S7	sediment	NA	<dl	0.59 ±0.07	<dl	0.29[2]	<dl	<dl
S8	water	0.20 ±0.06	0.17[2]	<dl	0.30 ±0.02	0.62 ±0.02	0.51 ±0.04	1.15 ±0.03
	sediment	NA	<dl	0.22[2]	0.44 ±0.02	0.41 ±0.01	0.27 ±0.01	1.17 ±0.10
	system	0.20 ±0.06	0.17[2]	0.22[2]	0.73 ±0.00	1.02 ±0.03	0.77 ±0.04	2.32 ±0.13
S9 (O-des methyl IR5878)	water	0.85 ±0.01	0.85 ±0.03	1.23 ±0.05	3.70 ±0.19	7.83 ±0.11	11.51 ±0.19	11.70 ±0.16
	sediment	NA	0.55 ±0.01	0.89 ±0.16	7.80 ±0.45	7.94 ±0.86	7.09 ±0.91	4.48 ±0.30
	system	0.85 ±0.01	1.40 ±0.04	2.11 ±0.11	11.49 ±0.26	15.77 ±0.76	18.59 ±0.72	16.18 ±0.14
S16	water	1.01 ±0.01	0.74 ±0.08	0.63 ±0.08	0.30 ±0.04	0.23 ±0.04	0.22 ±0.01	0.41 ±0.07
	sediment	NA	0.25 ±0.07	0.32 ±0.13	0.58 ±0.13	0.32[2]	0.17 ±0.01	0.20 ±0.01

Compound		Sampling times (days)						
		0	8	15	42	71	100	180
	system	1.01 ±0.01	0.99 ±0.01	0.95 ±0.05	0.87 ±0.17	0.39 ±0.19	0.39 ±0.00	0.61 ±0.06
CO_2		NA	<dl	<dl	<dl	0.22 ±0.00	0.34 ±0.01	0.24 ±0.01
Volatile organics		Not measured						
Extractable sediment residues		0.73 ±0.27	22.68 ±0.95	26.27 ±0.48	40.18 ±0.62	31.92 ±1.62	28.17 ±0.27	27.65 ±0.72
Non-extractable sediment residues		<dl	2.38 ±0.04	3.61 ±0.07	3.52 ±0.14	8.98 ±2.37	8.64 ±0.26	22.07 ±0.67
Total recovery	water	100.63 ±0.64	80.32 ±0.18	68.24 ±2.37	56.11 ±2.84	62.27 ±0.05	60.63 ±1.11	50.90 ±1.74
	sediment[4]	0.73 ±0.28	25.06 ±0.90	29.88 ±0.55	43.70 ±0.49	40.90 ±0.74	36.81 ±0.53	49.72 ±0.05
	system[4]	101.36 ±0.91	105.38 ±1.07	98.12 ±2.93	99.81 ±2.35	103.39 ±0.69	97.78 ±1.63	100.86 ±1.70

Data obtained from Table 5/A, p. 59; Table 13/A, p. 67; Table 14/A, p. 68; Table 15/A, p. 69; Appendix 7, Tables VII-VIII, pp. 208-211, Table XIV, pp. 221-222, Table XVIII, p. 227; Appendix 8, Tables XLIII-XLIX, pp. 253-259; and DER Attachment 2.

1. Mean and standard deviation were calculated by the study authors unless otherwise noted.
2. Single value reported instead of mean and standard deviation because one replicate had a value of "<dl".
3. Composed of 8 compounds.
4. Standard deviation was not provided by the study authors.

<dl = Below the detection limit.
NA = Not analyzed.

Table 6c: Biotransformation of [^{14}C-5-pyrimidinyl]orthosulfamuron, expressed as percentage of applied radioactivity (mean ± s.d.[1]), in California water- clay sediment system under anaerobic conditions.

Compound		Sampling times (days)						
		0	8	15	35	59	100	150
IR5878 (S3; parent)	water	95.14 ±0.91	59.81 ±2.28	48.00 ±0.42	21.04 ±1.90	13.98 ±0.16	4.27 ±0.33	1.20 ±0.13
	sediment	NA	21.51 ±0.65	22.76 ±1.80	24.59 ±0.87	21.37 ±2.40	12.54 ±0.29	6.32 ±0.30
	system	95.14 ±0.91	81.32 ±2.93	70.76 ±1.37	45.62 ±2.77	35.35 ±2.24	16.81 ±0.62	7.52 ±0.18
S9 (O-des methyl IR5878)	water	0.48 ±0.01	1.69 ±0.10	2.23 ±0.42	8.16 ±0.09	9.51 ±0.42	5.43 ±0.40	2.70 ±0.02
	sediment	NA	0.85 ±0.06	1.90 ±0.28	3.29 ±0.33	2.70 ±0.10	1.74 ±0.11	1.75 ±0.56
	system	0.48 ±0.01	2.54 ±0.04	4.12 ±0.69	11.45 ±0.41	12.21 ±0.52	7.17 ±0.28	4.44 ±0.58
S11[3]	water	0.47 ±0.02	0.56 ±0.24	<dl	2.51 ±0.02	6.34 ±0.40	11.73 ±0.71	13.21 ±0.23
	sediment	NA	0.46 ±0.03	0.72 ±0.07	1.86 ±0.37	3.16 ±0.24	6.25 ±0.59	7.73 ±1.41
	system	0.47 ±0.02	1.02 ±0.27	0.72 ±0.07	4.37 ±0.35	9.50 ±0.16	17.97 ±1.30	20.94 ±1.65
S12 (DOP urea)	water	1.27 ±0.05	1.11 ±0.09	0.82 ±0.15	0.94 ±0.02	0.71 ±0.08	0.31 ±0.04	0.35 ±0.06
	sediment	NA	3.87 ±0.01	7.77 ±1.49	16.23 ±1.39	18.27 ±0.33	18.03 ±0.33	15.91 ±0.02
	system	1.27 ±0.05	4.98 ±0.08	8.59 ±1.34	17.16 ±1.41	18.97 ±0.41	18.34 ±0.36	16.26 ±0.08
S13 (DOP amine)	water	0.42[2]	0.26[2]	0.29[2]	<dl	0.24[2]	<dl	<dl
	sediment	NA	0.29[2]	0.42[2]	0.44 ±0.21	0.74[2]	0.85 ±0.19	0.52 ±0.22
	system	0.42[2]	0.55[2]	0.36 ±0.09	0.44 ±0.21	0.98[2]	0.85 ±0.19	0.52 ±0.22
S15	water	0.42 ±0.04	0.24 ±0.04	<dl	0.31 ±0.05	0.31 ±0.03	0.38 ±0.00	0.48 ±0.07
	sediment	NA	<dl	0.37[2]	0.96 ±0.11	1.43 ±0.15	1.87 ±0.18	4.45 ±0.32
	system	0.42 ±0.04	0.24 ±0.04	0.37[2]	1.27 ±0.16	1.74 ±0.12	2.25 ±0.18	4.93 ±0.39
S16	water	0.90 ±0.05	0.37 ±0.04	0.24 ±0.01	<dl	<dl	<dl	<dl
	sediment	NA	0.36 ±0.00	0.29 ±0.01	<dl	<dl	<dl	<dl
	system	0.90 ±0.05	0.73 ±0.04	0.53 ±0.01	<dl	<dl	<dl	<dl
CO_2		NA	<dl	<dl	<dl	0.16 ±0.23	0.11 ±0.16	0.67 ±0.21
Volatile organics		Not measured						
Extractable sediment residues		0.66[2]	27.47 ±0.57	34.06 ±3.60	47.35 ±2.14	47.42 ±1.23	41.38 ±0.23	36.64 ±2.14

Compound		Sampling times (days)						
		0	8	15	35	59	100	150
Non-extractable sediment residues		<dl	6.47 ±0.43	13.23 ±0.72	14.03 ±1.65	17.68 ±0.46	34.00 ±2.70	43.23 ±2.25
Total recovery	water	98.88 ±0.69	63.99 ±1.86	51.48 ±0.00	33.15 ±2.11	31.09 ±0.45	22.25 ±0.15	17.92 ±0.00
	sediment[4]	0.33 ±0.47	33.94 ±0.13	47.29 ±2.88	61.38 ±3.79	65.10 ±1.68	75.38 ±2.93	79.87 ±4.38
	system[4]	99.21 ±0.22	97.93 ±2.00	98.77 ±2.88	94.53 ±5.90	96.35 ±1.00	97.74 ±2.92	98.46 ±4.17

Data obtained from Table 4/A, p. 58; Table 10/A, p. 64; Table 11/A, p. 65; Table 12/A, p. 66; Appendix 7, Tables V-VI, pp. 204-207, Table XIII, pp. 219-220, Table XVII, p. 226; Appendix 8, Tables XXXV-XLI, pp. 245-251; and DER Attachment 2.

1. Mean and standard deviation were calculated by the study authors unless otherwise noted.
2. Single value reported instead of mean and standard deviation because one replicate had a value of "<dl".
3. Composed of 5 compounds.
4. Standard deviation was not provided by the study authors.

<dl = Below the detection limit.
NA = Not analyzed.

Table 6d: Biotransformation of [^{14}C-U-phenyl]orthosulfamuron, expressed as percentage of applied radioactivity (mean ± s.d.[1]), in California water- clay sediment system under anaerobic conditions.

Compound		Sampling times (days)						
		0	8	15	35	59	100	150
IR5878 (S3; parent)	water	96.01 ±2.86	56.80 ±3.26	44.92 ±1.22	22.66 ±1.49	6.83 ±0.30	3.85 ±0.21	0.81 ±0.10
	sediment	NA	19.67 ±0.40	27.99 ±1.55	29.33 ±1.27	34.28 ±3.54	11.49 ±0.34	6.60 ±0.26
	system	96.01 ±2.86	76.46 ±3.66	72.90 ±2.77	51.99 ±2.77	41.11 ±3.23	15.34 ±0.55	7.41 ±0.35
S1 (DBS acid)	water	0.63 ±0.04	2.79 ±0.48	4.03 ±0.05	11.68 ±0.47	14.04 ±2.33	18.41 ±0.05	21.59 ±0.77
	sediment	NA	0.91 ±0.58	2.40 ±0.22	6.15 ±0.53	10.39 ±1.10	10.72 ±0.42	17.06 ±1.29
	system	0.63 ±0.04	3.70 ±1.06	6.42 ±0.27	17.83 ±1.00	24.43 ±1.22	29.12 ±0.37	38.65 ±0.32
S2 (DBS amide)	water	0.33 ±0.00	0.47 ±0.05	0.57 ±0.03	1.17 ±0.07	1.17 ±0.14	2.13 ±0.21	1.77 ±0.06
	sediment	NA	0.31 ±0.08	0.34 ±0.08	0.85 ±0.02	1.15 ±0.29	1.27 ±0.13	2.06 ±0.27
	system	0.33 ±0.00	0.77 ±0.03	0.91 ±0.05	2.02 ±0.09	2.32 ±0.15	3.40 ±0.08	3.83 ±0.33
S4 (DB amine)	water	0.57 ±0.11	0.31 ±0.01	0.24 ±0.08	0.35 ±0.01	0.38 ±0.15	4.57 ±0.08	1.36 ±0.86
	sediment	NA	1.02 ±0.59	0.49 ±0.08	1.56 ±0.18	1.06 ±0.69	1.18 ±0.09	3.03 ±0.26
	system	0.57 ±0.11	1.33 ±0.61	0.72 ±0.16	1.91 ±0.16	1.44 ±0.54	5.74 ±0.17	4.39 ±0.60
S5[3]	water	0.85 ±0.13	0.71 ±0.02	0.49[2]	2.68 ±0.16	2.45 ±0.55	12.39 ±1.10	9.26 ±0.62
	sediment	NA	0.51 ±0.07	0.76 ±0.03	1.18 ±0.27	2.31 ±0.76	3.71 ±0.37	5.53 ±0.52
	system	0.85 ±0.13	1.22 ±0.05	1.01 ±0.32	3.86 ±0.43	4.76 ±1.32	16.10 ±1.47	14.79 ±0.09
S7	water	<dl	<dl	<dl	<dl	<dl	0.34[2]	<dl
	sediment	NA	<dl	0.63 ±0.11	<dl	0.36[2]	0.15[2]	<dl
	system	<dl	<dl	0.63 ±0.11	<dl	0.36[2]	0.25 ± 0.1	<dl
S8	water	0.20 ±0.01	0.16 ±0.04	<dl	0.26 ±0.01	0.23[2]	1.33 ±0.11	0.90 ±0.05
	sediment	NA	0.22 ±0.05	0.21[2]	0.46 ±0.04	0.63 ±0.43	0.91 ±0.08	1.32 ±0.13
	system	0.20 ±0.01	0.37 ±0.01	0.21[2]	0.72 ±0.05	0.74 ±0.59	2.24 ±0.04	2.22 ±0.08
S9 (O-des methyl IR5878)	water	0.91 ±0.01	2.44 ±0.09	3.20 ±1.27	8.96 ±0.23	6.18 ±0.94	6.15 ±0.54	2.22 ±0.06
	sediment	NA	1.27 ±0.12	2.28 ±0.00	4.15 ±0.16	5.27 ±0.87	2.08 ±0.09	2.04 ±0.28
	system	0.91 ±0.01	3.70 ±0.03	5.48 ±1.27	13.11 ±0.39	11.84 ±1.81	8.23 ±0.45	4.26 ±0.35

Compound		Sampling times (days)						
		0	8	15	35	59	100	150
S16	water	1.09 ±0.11	0.46 ±0.01	0.36 ±0.01	0.18 ±0.00	0.19[2]	0.34[2]	<dl
	sediment	NA	0.40 ±0.00	0.33 ±0.01	0.38 ±0.01	0.64 ±0.08	0.21 ±0.09	<dl
	system	1.09 ±0.11	0.86 ±0.01	0.69 ±0.01	0.56 ±0.01	0.73 ±0.21	0.38 ±0.33	<dl
CO_2		NA	<dl	<dl	0.08 ±0.11	<dl	0.16 ±0.13	0.33 ±0.04
Volatile organics		Not measured						
Extractable sediment residues		0.51 ±0.08	24.29 ±0.07	35.30 ±1.02	44.04 ±0.47	56.29 ±0.44	31.63 ±1.31	37.64 ±0.62
Non-extractable sediment residues		<dl	9.75 ±0.87	10.10 ±0.84	6.97 ±0.59	11.67 ±1.17	18.64 ±0.32	23.91 ±1.05
Total recovery	water	100.57 ±2.94	64.12 ±3.94	53.54 ±2.90	47.92 ±0.65	31.34 ±0.52	49.14 ±2.04	37.89 ±0.71
	sediment[4]	0.51 ±0.08	34.04 ±0.94	45.40 ±1.87	51.01 ±1.05	67.96 ±0.73	50.27 ±1.63	61.55 ±0.43
	system[4]	101.08 ±3.02	98.16 ±4.88	98.94 ±4.77	99.01 ±1.82	99.20 ±1.25	99.57 ±3.72	99.77 ±1.17

Data obtained from Table 6/A, p. 60; Table 16/A, p. 70; Table 17/A, p. 71; Table 18/A, p. 72; Appendix 7, Tables IX-X, pp. 212-215, Table XV, pp. 223-224, Table XIX, p. 228; Appendix 8, Tables LI-LVII, pp. 261-267; and DER Attachment 2.

1. Mean and standard deviation were calculated by the study authors unless otherwise noted.
2. Single value reported instead of mean and standard deviation because one replicate had a value of "<dl".
3. Composed of 8 compounds.
4. Standard deviation was not provided by the study authors.

<dl = Below the detection limit.
NA = Not analyzed.

C. TRANSFORMATION OF PARENT COMPOUND: In the Arkansas water-loam sediment system treated with [^{14}C]orthosulfamuron, the concentration of orthosulfamuron in the total system decreased from 95.32-96.40% of the applied at time 0 to 54.56-55.11% at day 71 to 19.41-21.92% of the applied amount at study termination (day 180; combined radiolabels; Table 9/A, p. 63; Table 15/A, p. 69). In the water layer, [^{14}C]orthosulfamuron decreased from 95.32-96.40% at time 0 to 63.51-65.86% at day 15 to 43.98-45.66% at day 42 to 35.02-35.52% at day 100 to 10.44-12.39% of the applied amount at study termination (Table 7/A, p. 61; Table 13/A, p. 67). The concentration of [^{14}C]orthosulfamuron in the sediment increased from 14.78-19.95% at day 8 to 20.71-22.48% at days 15-42, then decreased to 8.97-9.53% of the applied amount at the end of the study period (not analyzed at time 0; Table 8/A, p. 62; Table 14/A, p. 68).

In the California water-clay sediment system treated with [^{14}C]orthosulfamuron, the concentration of orthosulfamuron in the total system decreased from 95.14-96.01% at time 0 to 45.62-51.99% at day 35 to 15.34-16.81% at day 100 to 7.41-7.52% of the applied amount at study termination (day 150; combined radiolabels; Table 12/A, p. 66; Table 18/A, p. 72). In the water layer, [^{14}C]orthosulfamuron decreased from 95.14-96.01% at time 0 to 56.80-59.81% at day 8 to 21.04-22.66% at day 35 to 3.85-4.27% at day 100 to 0.81-1.20% of the applied amount at study termination (Table 10/A, p. 64; Table 16/A, p. 70). The concentration of [^{14}C]orthosulfamuron in the sediment increased from 19.67-21.51% at day 8 to 21.37-34.28% at days 35-59, then decreased to 6.32-6.60% of the applied amount at the end of the study period (not analyzed at time 0; Table 11/A, p. 65; Table 17/A, p. 71).

Half-lives: Half-life values for the dissipation of [^{14}C]orthosulfamuron from the water, sediment, and total system of the treated systems were determined using Excel 2000 for first-order linear regression analysis and Sigma Plot v 8.0 for first-order nonlinear least squares regression analysis; all data points were used unless otherwise noted. Since only one extraction method was employed and non-extractable residues were >10% of the applied by study termination in each system, half-life values were calculated both with and without accounting of non-extracted residues as parent compound (DER Tables 7 and 8, respectively).

Table 7: Half-live ($t_{1/2}$) values, accounting non-extracted residues as parent compound.[1]

Label		Half-life	First order linear regression equation	r^2
Arkansas water-loam sediment system				
[^{14}C-5-pyrimidinyl]orthosulfamuron				
Water[2]	Linear/natural log	68.1 d	y = - 0.0102x + 4.3941	0.9592
Sediment[3]	Linear/natural log	Stable	--	--
System[2]	Linear/natural log	217 d	y = -0.0032x + 4.4972	0.8943
[^{14}C-5-phenyl]orthosulfamuron				
Water[2]	Linear/natural log	62.5 d	y = - 0.0111x + 4.4409	0.9589
Sediment[3]	Linear/natural log	Stable	--	--
System[2]	Linear/natural log	142 d	y = -0.0049x + 4.5469	0.9634
California water-clay sediment system				

Label		Half-life	First order linear regression equation	r^2
[^{14}C-5-pyrimidinyl]orthosulfamuron				
Water[2]	Linear/natural log	24.6 d	y = - 0.0282x + 4.3109	0.9889
Sediment[3]	Linear/natural log	Stable	--	--
System[2]	Linear/natural log	161 d	y = - 0.0043x + 4.4220	0.7124
[^{14}C-5-phenyl]orthosulfamuron				
Water[2]	Linear/natural log	22.6 d	y = - 0.0307x + 4.2618	0.9754
Sediment[3]	Linear/natural log	737 d	y = - 0.0009x + 3.6007	0.0820
System[2]	Linear/natural log	87.9 d	y = - 0.0079x + 4.4773	0.9272

1. Determined using Excel 2000 (linear) and Sigmaplot v 8.0 (nonlinear), and individual sample data obtained from Appendix 8, Table XXVII, p. 237, Table XXX, p. 240, Table XXXII, p. 242, Table XXXV, p. 245, Table XXXVIII, p. 248, Table XL, p. 250, Table XLIII, p. 253, Table XLVI, p. 256, Table XLVIII, p. 258, Table LI, p. 261, Table LIV, p. 264, Table LVI, p. 266 of the study report (DER Attachment 2).
2. All data points were used for the regression.
3. 8-180 day data were used for the regression.

Table 8: Half-live ($t_{1/2}$), DT_{50} and DT_{90}values, not accounting non-extracted residues as parent compound.[1]

Label		Half-life[1]	First order linear regression equation	r^2	DT_{50}	DT_{90}
Arkansas water-loam sediment system						
[^{14}C-5-pyrimidinyl]orthosulfamuron						
Water[2]	Linear/natural log	67.96 d	y = - 0.0102x + 4.3941	0.9592	15-42 d	ND
	Nonlinear/normal	61.51 d	---	0.9266	---	---
Sediment[3]	Linear/natural log	123.78 d	y = - 0.0056x + 3.2379	0.9143	100-180 d	ND
	Nonlinear/normal	113.63 d	---	0.8810	---	---
System[2]	Linear/natural log	88.87 d	y = - 0.0078x + 4.5581	0.9809	100 d	ND
	Nonlinear/normal	93.00 d	---	0.9815	---	---
[^{14}C-5-phenyl]orthosulfamuron						
Water[2]	Linear/natural log	62.45 d	y = - 0.0111x + 4.4409	0.9589	15-42 d	ND
	Nonlinear/normal	60.79 d	---	0.9316	---	---
Sediment[4]	Linear/natural log	117.48 d	y = - 0.0059x + 3.1816	0.9124	100 d	ND
	Nonlinear/normal	123.16 d	---	0.8697	---	---
System[2]	Linear/natural log	79.67 d	y = - 0.0087x + 4.6067	0.9868	100 d	ND
	Nonlinear/normal	84.31 d	---	0.9881	---	---
[^{14}C]orthosulfamuron						
Water[2]	Linear/natural log	65.39 d	y = - 0.0106x + 4.4175	0.9573	---	---
	Nonlinear/normal	61.15 d	---	0.9288	---	---
Sediment[3]	Linear/natural log	121.60 d	y = - 0.0057x + 3.1999	0.8700	---	---

Label		Half-life[1]	First order linear regression equation	r^2	DT_{50}	DT_{90}
	Nonlinear/normal	105.12 d	---	0.8626	---	---
System[2]	Linear/natural log	83.51 d	y = - 0.0083x + 4.5824	0.9812	---	---
	Nonlinear/normal	88.43 d	---	0.9826	---	---
California water-clay sediment system						
[^{14}C-5-pyrimidinyl]orthosulfamuron						
Water[2]	Linear/natural log	24.58 d	y = - 0.0282x + 4.3109	0.9889	15 d	59-100 d
	Nonlinear/normal	16.45 d	---	0.9861	---	---
Sediment[5]	Linear/natural log	57.28 d	y = - 0.0121x + 3.7024	0.9803	100 d	ND
	Nonlinear/normal	102.85 d	---	0.7803	---	---
System[2]	Linear/natural log	41.26 d	y = - 0.0168x + 4.5118	0.9958	35 d	100-150 d
	Nonlinear/normal	38.68 d	---	0.9932	---	---
[^{14}C-5-phenyl]orthosulfamuron						
Water[2]	Linear/natural log	22.58 d	y = - 0.0307x + 4.2618	0.9754	15 d	35-59 d
	Nonlinear/normal	14.69 d	---	0.9860	---	---
Sediment[6]	Linear/natural log	38.94 d	y = - 0.0178x + 4.4561	0.9377	59-100 d	129
	Nonlinear/normal	30.12 d	---	0.9655	---	---
System[2]	Linear/natural log	40.53 d	y = - 0.0171x + 4.5504	0.9894	35-59 d	100-150 d
	Nonlinear/normal	42.97 d	---	0.9846	---	---
[^{14}C]orthosulfamuron						
Water[2]	Linear/natural log	23.58 d	y = - 0.0294x + 4.2864	0.9764	---	---
	Nonlinear/normal	15.54 d	---	0.9852	---	---
Sediment[5]	Linear/natural log	51.34 d	y = - 0.0135x + 3.8918	0.9116	---	---
	Nonlinear/normal	59.27 d	---	0.7625	---	---
System[2]	Linear/natural log	41.01 d	y = - 0.0169x + 4.5311	0.9923	---	---
	Nonlinear/normal	40.85 d	---	0.9877	---	---

1. Determined using Excel 2000 (linear) and Sigmaplot v 8.0 (nonlinear), and individual sample data obtained from Appendix 8, Table XXVII, p. 237, Table XXX, p. 240, Table XXXII, p. 242, Table XXXV, p. 245, Table XXXVIII, p. 248, Table XL, p. 250, Table XLIII, p. 253, Table XLVI, p. 256, Table XLVIII, p. 258, Table LI, p. 261, Table LIV, p. 264, Table LVI, p. 266 of the study report (DER Attachment 2).
2. All data points were used for the linear and nonlinear determinations.
3. 42-180 day data were used for the linear and nonlinear determinations.
4. 15-180 day data were used for the linear and nonlinear determinations.
5. 35-150 day data were used for the linear and nonlinear determinations.
6. 59-180 day data were used for the linear and nonlinear determinations.

ND = Not determined.

TRANSFORMATION PRODUCTS: The major transformation products detected in the soils treated with [^{14}C-5-pyrimidinyl]orthosulfamuron were S9 {O-desmethyl IR5878, 1-(4-hydroxy-6-methoxy pyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenylsulfamoyl]-urea} and S12 {DOP

urea, N-(4,6-dimethoxypyrimidin-2-yl)urea; pp. 12-13, 33-40, 45}. S11 was observed at >10% of the applied; however, it was determined to be composed of 5 compounds. The detected minor transformation products were S13 {DOP amine, 4,6-dimethoxypyrimidin-2-yl amine}; S15 {not identified}; and S16 {not identified}.

The major transformation products detected in the soils treated with [^{14}C-U-phenyl]ortho-sulfamuron were S1 {DBS acid, (2-dimethylcarbamoylphenyl) sulfamic acid} and S9 {O-desmethyl IR5878}. S5 was observed at >10% of the applied; however, it was determined to be composed of 8 compounds. The detected minor transformation products were S2 {DBS amide, 2-[(aminosulfony)amino]-N,N-dimethylbenzamide}; S4 {DB amine, 2-amino-N,N-dimethylbenzamide}; S7 {not identified}; S8 {not identified}; and S16{not identified}. DBS acid (S1), DBS amide (S2), DB amine (S4), O-desmethyl IR5878 (S9), DOP urea (S12) and DOP amine (S13) were identified via TLC co-chromatography and LC-MS analysis (pp. 12-13, 39-40).

In the Arkansas water-loam sediment system treated with [^{14}C-5-pyrimidinyl]orthosulfamuron, O-desmethyl IR5878 (S9) was detected at a maximum and final of 12.63% and 17.47% of the applied amount in the water and total system, respectively, at study termination (day 180; Tables 7/A-9/A, pp. 61-63). In the sediment, O-desmethyl IR5878 was observed at a maximum of 7.28% at day 42 and a final of 4.84% at day 180. DOP urea (S12) was detected at a maximum of 2.31% (71 DAT), 11.39% (42 DAT) and 12.47% (42 DAT) in the water, sediment and total system, respectively, and final of 0.36%, 2.84% and 3.19% in the water, sediment and total system, respectively, at day 180. S11 was detected at a maximum and final of 14.59%, 8.59% and 23.18% in the water, sediment and total system, respectively, at day 180. DOP amine (S13) was detected at a maximum of 0.42%, 0.75% and 1.14% in the water, sediment and total system, respectively. Unidentified transformation products S15 and S16 were detected at maximums of 0.86-1.10%, 0.41-1.85% and 0.86-2.95% in the water, sediment and total system, respectively.

In the Arkansas water-loam sediment system treated with [^{14}C-U-phenyl]orthosulfamuron, DBS acid (S1) was detected at a maximum of 6.23% and 12.01% of the applied amount in the sediment and total system, respectively, at day 100 and final of 2.32% and 9.09% in the sediment and total system, respectively, at study termination (day 180; Tables 13/A-15/A, pp. 67-69). In the water, DBS acid was observed at a maximum and final of 6.78% at day 180. O-desmethyl IR5878 (S9) was detected at a maximum of 7.94% (71 DAT) and 18.59% (100 DAT) in the sediment and total system, respectively, and final of 4.48% and 16.18% in the sediment and total system, respectively, at day 180. In the water, O-demethyl IR5878 was observed at a maximum and final of 11.70% at day 180. S5 was detected at a maximum and final of 15.10%, 6.77% and 21.86% in the water, sediment and total system, respectively, at day 180. DBS amide (S2) was detected at a maximum of 3.02%, 1.21% and 4.23% in the water, sediment and total system, respectively. DB amine (S4) was detected at a maximum of 4.92%, 2.56% and 6.41% in the water, sediment and total system, respectively. Unidentified transformation products S7 (detected only in sediment), S8 and S16 were detected at maximums of 1.01-1.15%, 0.58-1.17% and 1.01-2.32% of the applied amount in the water, sediment and total system, respectively.

In the California water-clay sediment system treated with [^{14}C-5-pyrimidinyl]orthosulfamuron, O-desmethyl IR5878 (S9) was detected at a maximum of 9.51% (59 DAT), 3.29% (35 DAT) and 12.21% (59 DAT) in the water, sediment and total system, respectively, and final of 2.70%, 1.75% and 4.44% in the water, sediment and total system, respectively, at study termination (day 150; Tables 10/A-12/A, pp. 64-66). DOP urea (S12) was detected at a maximum of 1.27% (0 DAT), 18.27% (59 DAT) and 18.97% (59 DAT) in the water, sediment and total system, respectively, and final of 0.35%, 15.91% and 16.26% in the water, sediment and total system, respectively, at day 150. S11 was detected at a maximum and final of 13.21%, 7.73% and 20.94% of the applied amount in the water, sediment and total system, respectively, at study termination. DOP amine (S13) was detected at a maximum of 0.42%, 0.85% and 0.98% of the applied amount in the water, sediment and total system, respectively. Unidentified transformation products S15 and S16 were detected at maximums of 0.48-0.90%, 0.36-4.45% and 0.90-4.93% of the applied amount in the water, sediment and total system, respectively.

In the California water-clay sediment system treated with [^{14}C-U-phenyl]orthosulfamuron, DBS acid (S1) was detected at a maximum and final of 21.59%, 17.06% and 38.65% in the water, sediment and total system, respectively, at study termination (day 150; Tables 16/A-18/A, pp. 70-72). O-desmethyl IR5878 (S9) was detected at a maximum of 8.96% (35 DAT), 5.27% (59 DAT) and 13.11% (59 DAT) in the water, sediment and total system, respectively, and final of 2.22%, 2.04% and 4.26% in the water, sediment and total system, respectively, at day 180. S5 was detected at a maximum of 12.39% and 16.10% in the water and total system, respectively, at day 100 and final of 9.26% and 14.79% in the water and total system, respectively, at day 150. In the sediment, S5 was a maximum of 5.53% of the applied at 150 days posttreatment. DBS amide (S2) was detected at a maximum of 2.13%, 2.06% and 3.83% in the water, sediment and total system, respectively. DB amine (S4) was detected at a maximum of 4.57%, 3.03% and 5.74% in the water, sediment and total system, respectively. Unidentified transformation products S7, S8 and S16 were detected at maximums of 0.17-1.33%, 0.63-1.32% and 0.63-2.24% of the applied amount in the water, sediment and total system, respectively.

NON-EXTRACTABLE AND EXTRACTABLE RESIDUES: In the Arkansas water-loam sediment system treated with [^{14}C]orthosulfamuron, the extractable [^{14}C]residues in sediment increased from <dl-0.73% at day 0 to 40.18-44.72% at day 42, then decreased to 27.56-27.65% of the applied amount at the end of incubation period (day 180; combined radiolabels; Table 3/A, p. 57; Table 5/A, p. 59). Non-extractable [^{14}C]residues in sediment increased from <dl at day 0 to 22.07-32.03% of the applied at the end of incubation period (remained <10% for at least 71 days posttreatment). The day 180 soil residue was further extracted and fractioned into fulvic acids, humic acids and humin. The acidic extraction, fulvic acids, humic acids and humin were determined as 0.81-7.21%, 10.20-11.84%, 2.04-2.05% and 3.04-19.10%, respectively (combined radiolabels; Table 3/B, p. 57 and Table 5/B, p. 59).

In the California water-clay sediment system treated with [^{14}C]orthosulfamuron, the extractable [^{14}C]residues in sediment increased from 0.51-0.66% at day 0 to 47.42-56.29% at day 59, then decreased to 36.64-37.64% of the applied amount at the end of incubation period (day 150; combined radiolabels;Table 4/A, p. 58 and Table 6/A, p. 60). Non-extractable [^{14}C]residues in

sediment increased from <dl at day 0 to 10.10-13.23% at day 15 to 23.91-43.23% of the applied at the end of incubation period. The day 150 soil residue was further extracted and fractioned into fulvic acids, humic acids and humin (day 100 soil residue also fractioned, but only for one radiolabel). The acidic extraction, fulvic acids, humic acids and humin were determined as <dl-0.34%, 11.08-12.14%, 2.08-2.21% and 9.91-26.76%, respectively (combined radiolabels; Table 4/B, p. 58 and Table 6/B, p. 60).

VOLATILIZATION: At the end of the study, 0.24-0.44% (day 180) and 0.33-0.67% (day 150) of the recovered radioactivity was present as CO_2 in the Arkansas water-loam sediment systems (combined radiolabels) and the California water-clay sediment systems (combined radiolabels;Table 3/A, p. 57, Table 4/A, p. 58, Table 5/A, p. 59 and Table 6/A, p. 60). Volatile organic compounds were not collected separately.

TRANSFORMATION PATHWAY: The biotransformation pathway of orthosulfamuron in anaerobic water- sediment systems was illustrated by the study authors (p. 44). The main degradation pathway of IR5878 was the hydrolytic cleavage of the sulfamoylurea linkage to give S12 {DOP urea, N-(4,6-dimethoxypyrimidin-2-yl)urea} and S1 {DBS acid, (2-dimethylcarbamoylphenyl) sulfamic acid; p. 41}. Another degradation pathway was the demethylation of IR5878 to S9 {O-desmethyl IR5878, 1-(4-hydroxy-6-methoxy pyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenylsulfamoyl]-urea}, which also degraded to DBS acid. Minor transformation pathways lead to the formation of S13 {DOP amine, 4,6-dimethoxypyrimidin-2-yl amine}, S2 {DBS amide, 2-[(aminosulfony)amino]-N,N-dimethylbenzamide} and S4 {DB amine, 2-amino-N,N-dimethylbenzamide}. IR5878 degraded to DOP amine, DBS amide and DB amine. DOP urea also degraded to DOP amine. DBS amide and DBS acid also degraded to DB amine.

Table 9: Chemical names and CAS numbers for the transformation products of orthosulfamuron.

Applicants Code Name	CAS Number	Chemical Name	Chemical Formula	Molecular Weight (g/mol)	Smiles String
DBS acid	Not reported	(2-dimethylcarbamoylphenyl) sulfamic acid	$C_9H_{12}N_2SO_4$	244.28	Not reported
DBS amide	Not reported	2-[(aminosulfony)amino]-N,N-dimethylbenzamide	$C_9H_{13}N_3SO_3$	243.28	Not reported
DB amine	Not reported	2-amino-N,N-dimethylbenzamide	$C_9H_{12}N_2O$	164.21	Not reported
O-desmethyl IR5878	Not reported	1-(4-hydroxy-6-methoxy pyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)phenylsulfamoyl]-urea	Not reported	Not reported	Not reported
DOP urea	Not reported	N-(4,6-dimethoxypyrimidin-2-yl)urea	$C_7H_{10}N_4O_3$	198.21	Not reported
DOP amine	Not reported	4,6-dimethoxypyrimidin-2-yl amine	$C_6H_9N_3O_2$	155.16	Not reported

Data obtained from p. 45 and Appendix 9, pp. 269-273 of the study report. CAS numbers were provided for some of the degradates in MRID 46588508.

D. SUPPLEMENTARY STUDY- RESULTS: No supplementary study was described.

III. STUDY DEFICIENCIES

1. Initial and final biomass measurements in water and sediment from either source were not reported. Biomass viability should be confirmed to support the purpose of the study.

2. Multiple solvent systems were not employed in a reasonable extraction attempt; non-extractable [^{14}C]residues in sediment exceeded 10% of the applied by day 15 in the California water-clay sediment system and by day 100-180 in the Arkansas water-loam sediment system. Extraction was only performed using acetonitrile:33mM $NaHCO_3$ (7:3, v:v) and acetonitrile:33mM $NaHCO_3$ (1:1, v:v). Furthermore, no method validation was performed by the study author to demonstrate that this was the best extraction method. However, upon partitioning of the non-extractable [^{14}C]residues into fulvic acids, humic acids and humin, most of the [^{14}C]residues remained in the humin (9.91% and 26.76%). Subdivision N §162-3 guidelines require that a reasonable attempt be made to extract residues from the sediment.

3. The water and sediments were incompletely characterized. For the water, the collection procedures, sampling depth, temperature, dissolved oxygen content and microbial biomass were not reported. For the sediment, the collection procedures and microbial biomass were not reported. Furthermore, the specific sources of the samples (pond or river) were not reported. Subdivision N §162-3 guidelines require that the water and sediment are completely characterized.

4. The Limit of Quantification (LOQ) for the TLC and LSC analyses were not reported. Subdivision N §162-3 guidelines require that the LOQs are reported.

IV. REVIEWER'S COMMENTS

1. In the California water-clay sediment system, the day 100 soil residue of [^{14}C-5-pyrimidinyl]IR5878 was further extracted and fractioned into fulvic acids, humic acids and humin. The acidic extraction, fulvic acids, humic acids and humin were determined as 0.10%, 8.72%, 1.49% and 21.20%, respectively (Table 4/B, p. 58).

2. The sample processing for the additional 60x dose rate samples (only the California soils were processed for analysis) was the same as the definitive samples, except that the surface waters were pooled, concentrated and extracted with ethyl acetate prior to LC-MS and TLC analyses (pp. 29-30). The extraction and analysis scheme was illustrated by the study authors in Schemes 3-4, pp. 51-52 of the study report.

3. The redox potentials, pH and dissolved oxygen levels were estimated from graphical representations of the data (Appendix 5, pp. 185-189). Due to the scales of the graphical representations, there is a certain amount of error in the interpretation of the reported values of redox potentials, pH and dissolved oxygen levels.

4. The test application rate, 75 g a.i./ha, was the maximum recommended field application rate (p. 11).

5. According to N. Wolfe, *et al.* (1990), redox potentials in the range of +400 to +800 mV are considered strongly oxidizing, +200 to +400 mV moderately oxidizing, -50 to +200 mV moderately reducing, -200 to -50 mV reducing, and -400 to -200 mV strongly reducing.

6. Representative TLC chromatographs were provided in Figures 13-64, pp. 89-140 of the study report. Representative LC-MS chromatographs were provided in Figures 65-74, pp. 141-150 of the study report. The experimental protocol and amendments were provided in Appendix 1, pp. 153-167 of the study report. Sample calculations were provided in Appendix 6, pp. 191-197 of the study report.

V. REFERENCES

1. U.S. Environmental Protection Agency. 1982. Pesticide Assessment Guidelines, Subdivision N, Chemistry: Environmental Fate, Section 162-3, Anaerobic Aquatic Metabolism 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-R-93-010.

4. Wolfe, N., *et al.* 1990. Abiotic transformations in water, sediments and soil. *In* Pesticides in the Soil Environment, Soil Science Society of America, pp. 103-110.

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.

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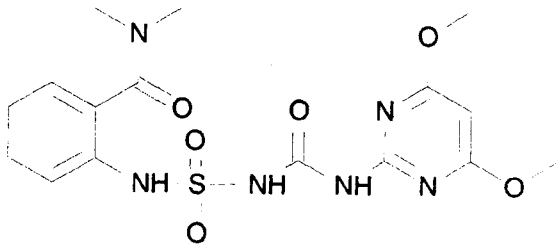
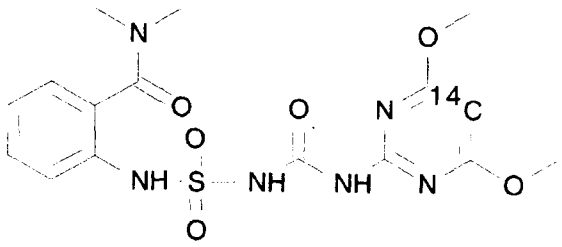


[Pyrimidinyl-5-^{14}C]IR5878



^{14}C = Location of the radiolabel.

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 11/21/05.

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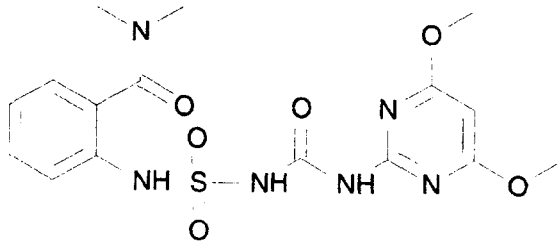
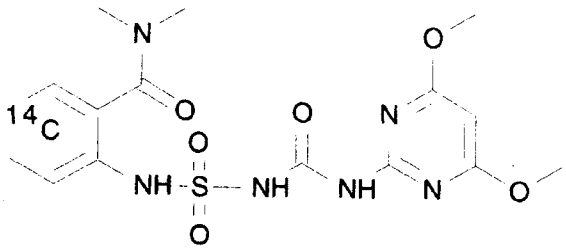


[Phenyl-U-^{14}C]IR5878

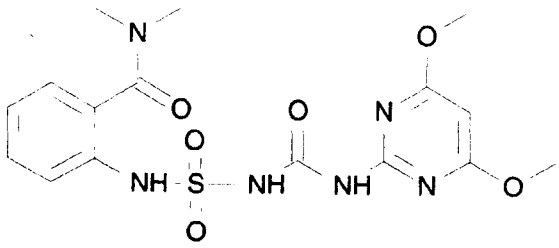


^{14}C = Location of the radiolabel.

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 11/21/05.



S9 [IR8181; O-desmethyl IR5878]

IUPAC Name: 1-(4-Hydroxy-6-methoxypyrimidin-2-yl)-3-[2-(2-dimethylcarbamoyl)phenylsulfamoyl]urea.

CAS Name: 1-[2(Dimethylcarbamoyl)phenylsulfamyl]-3-(4-hydroxy-6-methoxypyrimidin-2-yl)urea.

CAS Number: Not reported.

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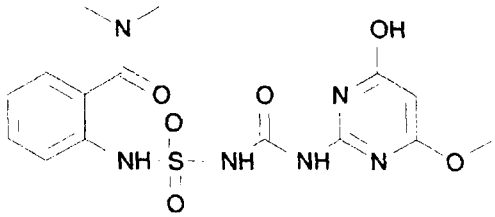
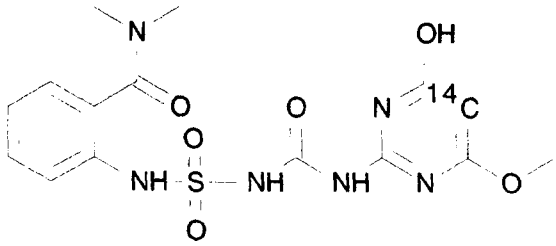


[^{14}C]O-desmethyl IR5878



^{14}C = Location of the radiolabel.

S12 [IR7825; DOP urea]

IUPAC Name: N-(4,6-Dimethoxypyrimidin-2-yl)-urea.
CAS Name: 4,6-Dimethoxy-2-pyrimidinyl urea.
CAS Number: Not reported.

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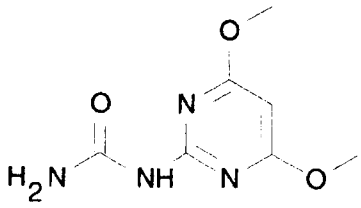
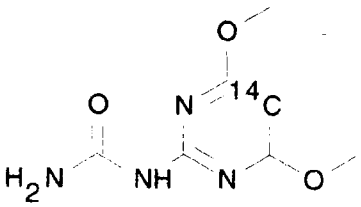


[Pyrimidinyl-5-^{14}C]DOP urea



^{14}C = Location of the radiolabel.

S13 [DOP amine]

IUPAC Name: 4,6-Dimethoxypyrimidin-2-yl amine.
2-Amino-4,6-dimethoxypyrimidine.
CAS Name: Not reported.
CAS Number: Not reported.

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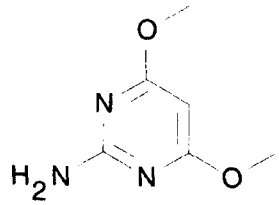
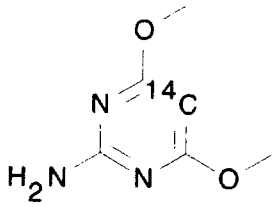


[Pyrimidinyl-5-^{14}C]DOP amine

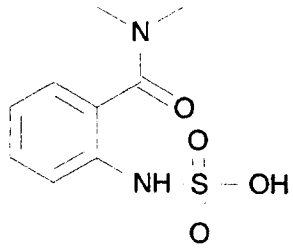


^{14}C = Location of the radiolabel.

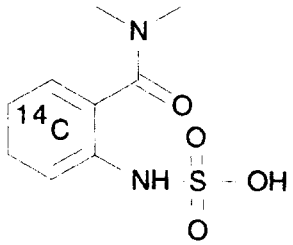
S1 [IR7863; DBS acid]

IUPAC Name: (2-Dimethylcarbamoylphenyl)sulfamic acid.
CAS Name: Sodium (2-dimethylcarbamoylphenyl)sulfamate.
CAS Number: Not reported.

Unlabeled



[Phenyl-U-^{14}C]DBS acid



^{14}C = Location of the radiolabel.

S2 [DBS amide]

IUPAC Name: 2-[(Aminosulfonyl)amino]-N,N-dimethylbenzamide.
CAS Name: Not reported.
CAS Number: Not reported.

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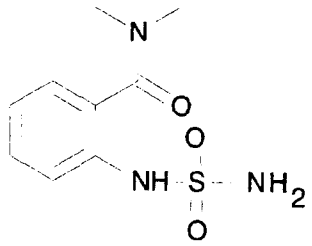
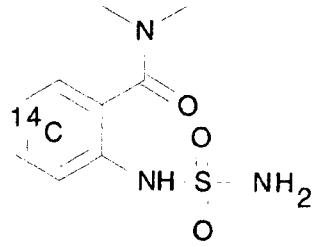


[Phenyl-U-^{14}C]DBS amide



^{14}C = Location of the radiolabel.

S4 [DB amine]

IUPAC Name: 2-Amino-N,N-dimethylbenzamide.
CAS Name: Not reported.
CAS Number: Not reported.

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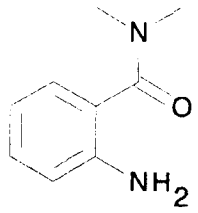
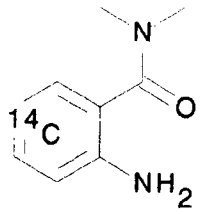


[Phenyl-U-^{14}C]DB amine



^{14}C = Location of the radiolabel.

S11

IUPAC Name: Not reported.
CAS Name: Not reported.
CAS Number: Not reported.

No structure was provided.

S5

IUPAC Name: Not reported.
CAS Name: Not reported.
CAS Number: Not reported.

No structure was provided.

Carbon Dioxide

IUPAC Name: Not reported.
CAS Name: Not reported.
CAS Number: Not reported.

Attachment 2: Excel Spreadsheets

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Soil/Water Ratios
Pyr-Orthosulfamuron Ark system
Data obtained from Appendix 7, Tables III-IV, pp. 200-203, Table XII, pp. 217-218 and Table XVI, p. 225 of the study report.

Days	Surface water	Mean	SD	Soil extracts (A+B+C)	Mean	SD	Bound residues	Mean	SD	Total soil radioactivity	Mean	SD
0	99.65									0.00		
0	98.05	98.85	1.13							0.00	0.00	0.00
8	75.17			15.34			2.08			17.42		
8	75.26	75.22	0.06	18.85	17.10	2.48	1.79	1.94	0.21	20.64	19.03	2.28
15	68.06			23.08			3.84			26.92		
15	68.62	68.34	0.40	25.44	24.26	1.67	3.49	3.67	0.25	28.93	27.93	1.42
42	50.33			42.69			10.26			52.95		
42	51.71	51.02	0.98	46.74	44.72	2.86	9.47	9.87	0.56	56.21	54.58	2.31
71	51.34			36.75			9.06			45.81		
71	54.61	52.98	2.31	36.71	36.73	0.03	8.55	8.81	0.36	45.26	45.54	0.39
100	48.35			31.08			15.41			46.49		
100	51.92	50.14	2.52	30.08	30.58	0.71	13.03	14.22	1.68	43.11	44.80	2.39
180	40.48			28.07			33.15			61.22		
180	42.39	41.44	1.35	27.05	27.56	0.72	30.91	32.03	1.58	57.96	59.59	2.31

Days	CO_2	Mean	SD	Total Radioactivity	Mean	SD
0	0.00			99.65		
0	0.00	0.00	0.00	98.05	98.85	1.13
8	0.00			92.59		
8	0.00	0.00	0.00	95.90	94.25	2.34
15	0.00			94.98		
15	0.00	0.00	0.00	97.55	96.27	1.82
42	0.00			103.28		
42	0.00	0.00	0.00	107.92	105.60	3.28
71	0.00			97.15		
71	0.22	0.11	0.16	100.09	98.62	2.08
100	0.30			95.14		
100	0.32	0.31	0.01	95.35	95.25	0.15
180	0.25			101.95		
180	0.63	0.44	0.27	100.98	101.47	0.69

Combined Radiolabels	
Overall Radioactivity	
Mean	99.78
SD	3.66

Overall Radioactivity	
Mean	98.61
SD	4.03

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Soil/Water Ratios
Phe-Orthosulfamuron Ark system
Data obtained from Appendix 7, Tables VII-VIII, pp. 208-211, Table XIV, pp. 221-222 and Table XVIII, p. 227 of the study report.

Days	Surface water	Mean	SD	Soil extracts (A+B+C)	Mean	SD	Bound residues	Mean	SD	Total soil radioactivity	Mean	SD
0	101.08			0.92						0.92		
0	100.18	100.63	0.64	0.53	0.73	0.28				0.53	0.73	0.28
8	80.19			22.01			2.41			24.42		
8	80.44	80.32	0.18	23.34	22.68	0.94	2.35	2.38	0.04	25.69	25.06	0.90
15	69.92			26.61			3.66			30.27		
15	66.56	68.24	2.38	25.93	26.27	0.48	3.56	3.61	0.07	29.49	29.88	0.55
42	54.10			40.62			3.43			44.05		
42	58.12	56.11	2.84	39.74	40.18	0.62	3.62	3.53	0.13	43.36	43.71	0.49
71	62.31			33.07			7.31			40.38		
71	62.24	62.28	0.05	30.77	31.92	1.63	10.66	8.99	2.37	41.43	40.91	0.74
100	61.41			28.36			8.82			37.18		
100	59.84	60.63	1.11	27.97	28.17	0.28	8.46	8.64	0.25	36.43	36.81	0.53
180	49.66			28.16			21.60			49.76		
180	52.13	50.90	1.75	27.14	27.65	0.72	22.55	22.08	0.67	49.69	49.73	0.05

Days	CO_2	Mean	SD	Total Radioactivity	Mean	SD
0	0.00			102.00		
0	0.00	0.00	0.00	100.71	101.36	0.91
8	0.00			104.61		
8	0.00	0.00	0.00	106.13	105.37	1.07
15	0.00			100.19		
15	0.00	0.00	0.00	96.05	98.12	2.93
42	0.00			98.15		
42	0.00	0.00	0.00	101.48	99.82	2.35
71	0.22			102.91		
71	0.22	0.22	0.00	103.89	103.40	0.69
100	0.33			98.92		
100	0.35	0.34	0.01	96.62	97.77	1.63
180	0.23			99.65		
180	0.24	0.24	0.01	102.06	100.86	1.70

Combined Radiolabels	
Overall Radioactivity	
Mean	99.78
SD	3.66

Overall Radioactivity	
Mean	100.96
SD	2.94

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Soil/Water Ratios
Pyr-Orthosulfamuron Ark system

Days	Aqueous %AR	Sed %AR	Ratio W:S	Mean	SD	Ratio S:W	Mean	SD
0	99.65	0.00	#DIV/0!			0		
0	98.05	0.00	#DIV/0!	#DIV/0!	#DIV/0!	0	0	0
8	75.17	17.42	4			0		
8	75.26	20.64	4	4	0	0	0	0
15	68.06	26.92	3			0		
15	68.62	28.93	2	2	0	0	0	0
42	50.33	52.95	1			1		
42	51.71	56.21	1	1	0	1	1	0
71	51.34	45.81	1			1		
71	54.61	45.26	1	1	0	1	1	0
100	48.35	46.49	1			1		
100	51.92	43.11	1	1	0	1	1	0
180	40.48	61.22	1			2		
180	42.39	57.96	1	1	0	1	1	0

Data obtained from Appendix 7, Table III-, pp. 200-202 of the study report and **Mat Bal Ark** worksheet.

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Soil/Water Ratios
Phe-Orthosulfamuron Ark system

Days	Aqueous %AR	Sed %AR	Ratio W:S	Mean	SD	Ratio S:W	Mean	SD
0	101.08	0.92	110			0		
0	100.18	0.53	189	149	56	0	0	0
8	80.19	24.42	3			0		
8	80.44	25.69	3	3	0	0	0	0
15	69.92	30.27	2			0		
15	66.56	29.49	2	2	0	0	0	0
42	54.10	44.05	1			1		
42	58.12	43.36	1	1	0	1	1	0
71	62.31	40.38	2			1		
71	62.24	41.43	2	2	0	1	1	0
100	61.41	37.18	2			1		
100	59.84	36.43	2	2	0	1	1	0
180	49.66	49.76	1			1		
180	52.13	49.69	1	1	0	1	1	0

Data obtained from Appendix 7, Tables VII, pp. 208-210 of the study report and **Mat Bal Ark** worksheet.

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Soil/Water Ratios
Pyr-Orthosulfamuron Cal system
Data obtained from Appendix 7, Tables V-VI, pp. 204-207, Table XIII, pp. 219-220 and Table XVII, p. 226 of the study report.

Days	Surface water	Mean	SD	Soil extracts (A+B+C)	Mean	SD	Bound residues	Mean	SD	Total soil radioactivity	Mean	SD
0	99.37									0.00		
0	98.40	98.89	0.69	0.66						0.66	0.33	0.47
8	65.31			27.87			6.17			34.04		
8	62.67	63.99	1.87	27.07	27.47	0.57	6.78	6.48	0.43	33.85	33.95	0.13
15	51.48			36.61			12.72			49.33		
15	51.48	51.48	0.00	31.52	34.07	3.60	13.74	13.23	0.72	45.26	47.30	2.88
35	34.64			48.87			15.20			64.07		
35	31.66	33.15	2.11	45.84	47.36	2.14	12.87	14.04	1.65	58.71	61.39	3.79
59	31.41			46.55			17.36			63.91		
59	30.77	31.09	0.45	48.28	47.42	1.22	18.01	17.69	0.46	66.29	65.10	1.68
100	22.14			41.21			32.09			73.30		
100	22.35	22.25	0.15	41.54	41.38	0.23	35.91	34.00	2.70	77.45	75.38	2.93
150	17.92			35.13			41.65			76.78		
150	17.92	17.92	0.00	38.16	36.65	2.14	44.82	43.24	2.24	82.98	79.88	4.38

Days	CO_2	Mean	SD	Total Radioactivity	Mean	SD
0	0.00			99.37		
0	0.00	0.00	0.00	99.06	99.22	0.22
8	0.00			99.35		
8	0.00	0.00	0.00	96.52	97.94	2.00
15	0.00			100.81		
15	0.00	0.00	0.00	96.74	98.78	2.88
35	0.00			98.71		
35	0.00	0.00	0.00	90.37	94.54	5.90
59	0.32			95.64		
59	0.00	0.16	0.23	97.06	96.35	1.00
100	0.23			95.67		
100	0.00	0.12	0.16	99.80	97.74	2.92
150	0.82			95.52		
150	0.52	0.67	0.21	101.42	98.47	4.17

Combined Radiolabels	
Overall Radioactivity	
Mean	98.48
SD	2.82

Overall Radioactivity	
Mean	97.57
SD	2.85

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Soil/Water Ratios
Phe-Orthosulfamuron Cal system
Data obtained from Appendix 7, Tables IX-X, pp. 212-215, Table XV, pp. 223-224 and Table XIX, p. 228 of the study report

Days	Surface water	Mean	SD	Soil extracts (A+B+C)	Mean	SD	Bound residues	Mean	SD	Total soil radioactivity	Mean	SD
0	98.49			0.45						0.45		
0	102.65	100.57	2.94	0.56	0.51	0.08				0.56	0.51	0.08
8	61.34			24.24			9.14			33.38		
8	66.91	64.13	3.94	24.34	24.29	0.07	10.37	9.76	0.87	34.71	34.05	0.94
15	55.59			36.03			10.69			46.72		
15	51.49	53.54	2.90	34.58	35.31	1.03	9.50	10.10	0.84	44.08	45.40	1.87
35	47.45			43.71			6.55			50.26		
35	48.38	47.92	0.66	44.37	44.04	0.47	7.38	6.97	0.59	51.75	51.01	1.05
59	31.61			55.98			12.49			68.47		
59	30.87	31.24	0.52	56.60	56.29	0.44	10.84	11.67	1.17	67.44	67.96	0.73
100	47.70			30.71			18.41			49.12		
100	50.58	49.14	2.04	32.56	31.64	1.31	18.87	18.64	0.33	51.43	50.28	1.63
150	37.39			38.08			23.17			61.25		
150	38.38	37.89	0.70	37.20	37.64	0.62	24.66	23.92	1.05	61.86	61.56	0.43

Days	CO_2	Mean	SD	Total Radioactivity	Mean	SD
0	0.00			98.94		
0	0.00	0.00	0.00	103.21	101.08	3.02
8	0.00			94.72		
8	0.00	0.00	0.00	101.62	98.17	4.88
15	0.00			102.31		
15	0.00	0.00	0.00	95.57	98.94	4.77
35	0.00			97.71		
35	0.16	0.08	0.11	100.29	99.00	1.82
59	0.00			100.08		
59	0.00	0.00	0.00	98.31	99.20	1.25
100	0.12			96.94		
100	0.19	0.16	0.05	102.20	99.57	3.72
150	0.30			98.94		
150	0.36	0.33	0.04	100.60	99.77	1.17

Combined Radiolabels	
Overall Radioactivity	
Mean	98.48
SD	2.82

Overall Radioactivity	
Mean	99.39
SD	2.57

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Soil/Water Ratios
Pyr-Orthosulfamuron Cal system

Days	Aqueous %AR	Sed %AR	Ratio W:S	Mean	SD	Ratio S:W	Mean	SD
0	99.37	0.00				0		
0	98.40	0.66	149	149		0	0	0
8	65.31	34.04	2			1		
8	62.67	33.85	2	2	0	1	1	0
15	51.48	49.33	1			1		
15	51.48	45.26	1	1	0	1	1	0
35	34.64	64.07	1			2		
35	31.66	58.71	1	1	0	2	2	0
59	31.41	63.91	0			2		
59	30.77	66.29	0	0	0	2	2	0
100	22.14	73.30	0			3		
100	22.35	77.45	0	0	0	3	3	0
150	17.92	76.78	0			4		
150	17.92	82.98	0	0	0	5	4	0

Data obtained from Appendix 7, Table V, pp. 204-206 of the study report and **Mat Bal Cal** worksheet.

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Soil/Water Ratios
Phe-Orthosulfamuron Cal system

Days	Aqueous %AR	Sed %AR	Ratio W:S	Mean	SD	Ratio S:W	Mean	SD
0	98.49	0.45	219			0		
0	102.65	0.56	183	201	25	0	0	0
8	61.34	33.38	2			1		
8	66.91	34.71	2	2	0	1	1	0
15	55.59	46.72	1			1		
15	51.49	44.08	1	1	0	1	1	0
35	47.45	50.26	1			1		
35	48.38	51.75	1	1	0	1	1	0
59	31.61	68.47	0			2		
59	30.87	67.44	0	0	0	2	2	0
100	47.70	49.12	1			1		
100	50.58	51.43	1	1	0	1	1	0
150	37.39	61.25	1			2		
150	38.38	61.86	1	1	0	2	2	0

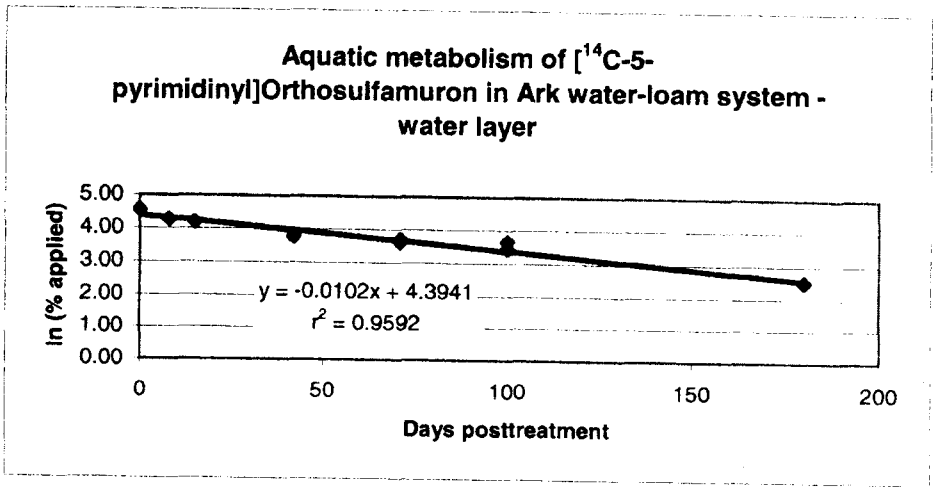
Data obtained from Appendix 7, Table IX, pp. 212-214 of the study report and **Mat Bal Cal** worksheet.

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Water layer
Pyr-label Ark system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0	95.91	4.5634
0	94.73	4.5510
8	70.86	4.2607
8	71.47	4.2693
15	65.75	4.1859
15	65.97	4.1892
42	43.54	3.7737
42	44.41	3.7935
71	37.54	3.6254
71	40.33	3.6971
100	31.55	3.4516
100	38.48	3.6501
180	12.35	2.5137
180	12.43	2.5201

Half-life (days): 68.1



Data obtained from Appendix 8, Table XXVII, p. 237 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.979398
R Square	0.95922
Adjusted R	0.955821
Standard E	0.134919
Observatio	14

ANOVA

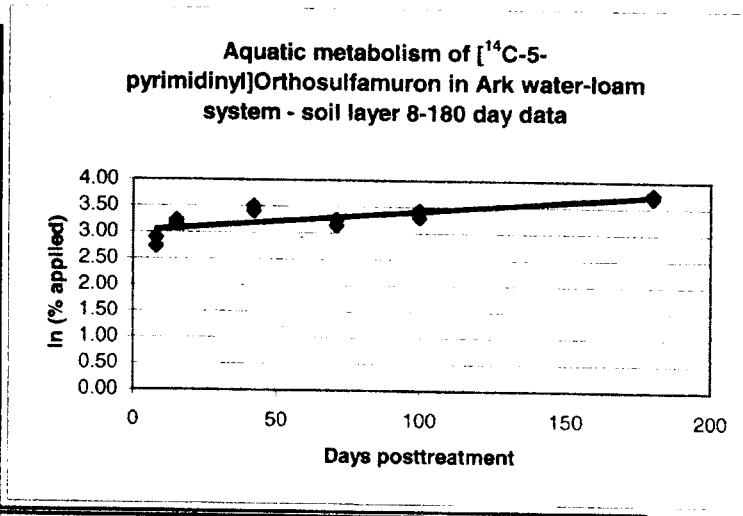
	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	5.137976	5.137976	282.2595	1.06E-09
Residual	12	0.218436	0.018203		
Total	13	5.356412			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	4.3941	0.050969	86.21126	3.96E-18	4.283048	4.505152	4.283048	4.505152
X Variable	-0.010184	0.000606	-16.80058	1.06E-09	-0.011504	-0.008863	-0.011504	-0.008863

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Soil layer
Pyr-label Ark system

Orthosulfamuron				
Days	Ext.	Bound	Total	LN (Total)
0			0.00	#NUM!
0			0.00	#NUM!
8	13.28	2.08	15.36	2.7318
8	16.27	1.79	18.06	2.8937
15	19.67	3.84	23.51	3.1574
15	21.75	3.49	25.24	3.2284
42	19.97	10.26	30.23	3.4088
42	23.59	9.47	33.06	3.4983
71	16.68	9.06	25.74	3.2480
71	14.57	8.55	23.12	3.1407
100	15.41	15.41	30.82	3.4282
100	13.91	13.03	26.94	3.2936
180	9.93	33.15	43.08	3.7631
180	9.13	30.91	40.04	3.6899



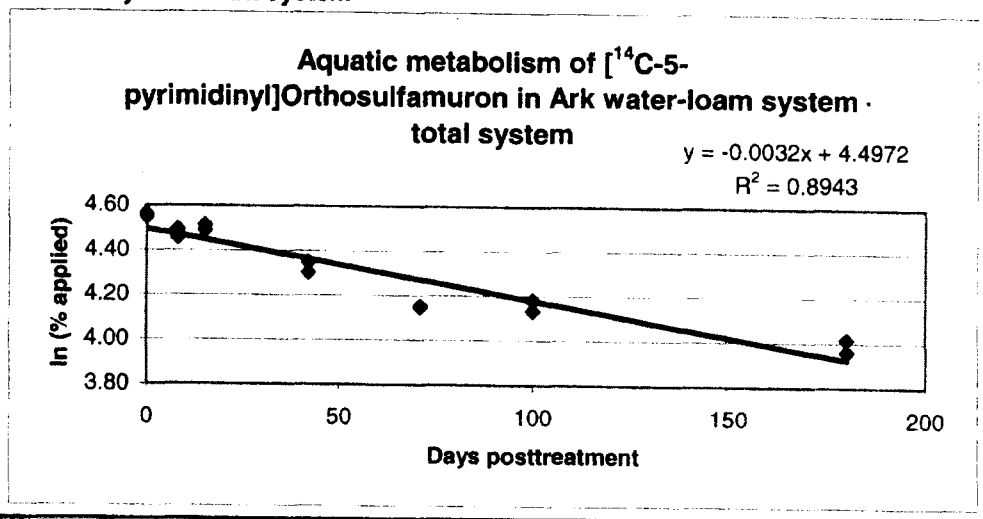
Half-life (days):	Stable

Data obtained from Appendix 8, Table XXX, p. 240 of the study report.

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Total System
Pyr-label Ark system

Days	Orthosulfamuron %AR	LN (%AR)
0	95.91	4.5634
0	94.73	4.5510
8	86.22	4.4569
8	89.53	4.4946
15	89.26	4.4916
15	91.21	4.5132
42	73.77	4.3010
42	77.47	4.3499
71	63.28	4.1476
71	63.45	4.1503
100	62.37	4.1331
100	65.42	4.1808
180	55.43	4.0151
180	52.47	3.9602
Half-life (days):		217.4



Data obtained from Appendix 8, Table XXXII, p. 242 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.94566
R Square	0.894273
Adjusted R	0.885463
Standard E	0.070428
Observatio	14

ANOVA

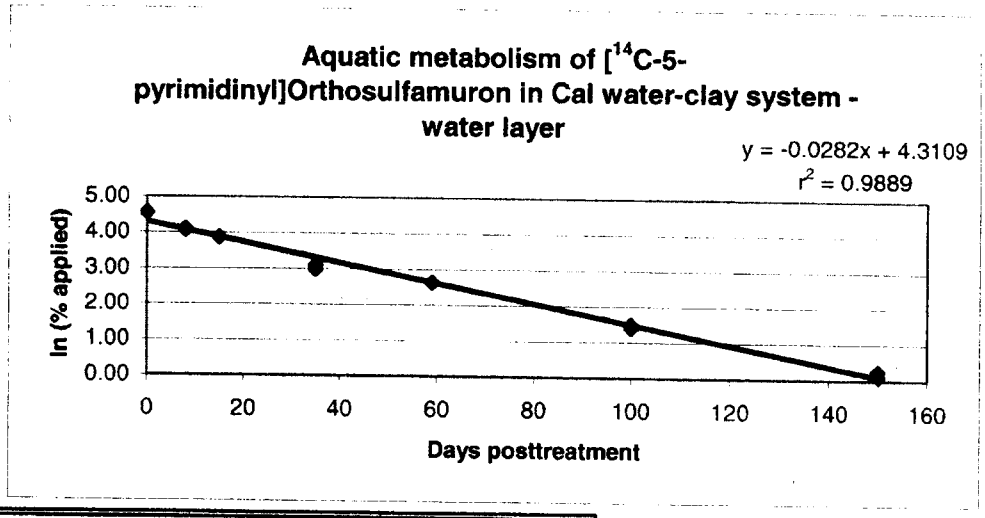
	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	0.503451	0.503451	101.5003	3.3E-07
Residual	12	0.059521	0.00496		
Total	13	0.562973			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	4.497199	0.026606	169.0296	1.24E-21	4.43923	4.555169	4.43923	4.555169
X Variable	-0.003188	0.000316	-10.07473	3.3E-07	-0.003877	-0.002498	-0.003877	-0.002498

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Water layer
Pyr-label Cal system

Days	Orthosulfamuron %AR	LN (%AR)
0	95.78	4.5621
0	94.50	4.5486
8	61.42	4.1177
8	58.20	4.0639
15	47.70	3.8649
15	48.30	3.8774
35	22.38	3.1082
35	19.69	2.9801
59	14.09	2.6455
59	13.86	2.6290
100	4.50	1.5041
100	4.04	1.3962
150	1.29	0.2546
150	1.11	0.1044



Half-life (days): 24.6

Data obtained from Appendix 8, Table XXXV, p. 245 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.99442
R Square	0.988871
Adjusted R	0.987944
Standard E	0.164989
Observatio	14

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	29.02544	29.02544	1066.27	4.31E-13
Residual	12	0.326658	0.027221		
Total	13	29.3521			

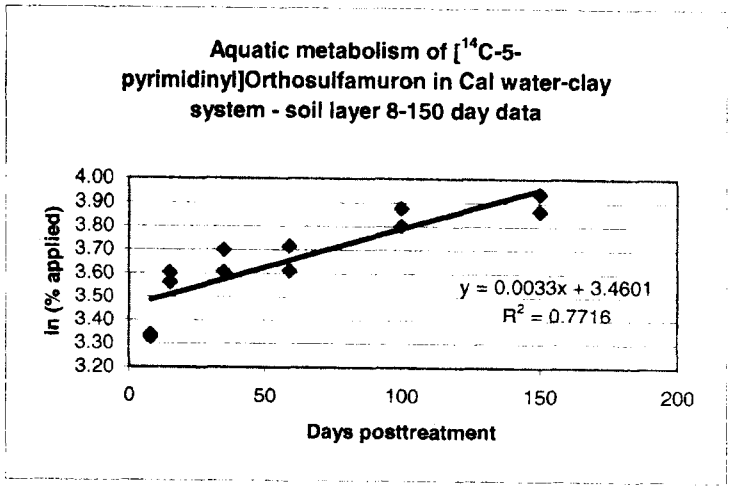
	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	4.310937	0.063198	68.21326	6.54E-17	4.17324	4.448633	4.17324	4.448633
X Variable	-0.028197	0.000864	-32.65379	4.31E-13	-0.030078	-0.026315	-0.030078	-0.026315

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Soil layer
Pyr-label Cal system

Orthosulfamuron				
Days	**%AR**	**Bound**	**Total**	**LN (Total)**
0			0.00	#NUM!
0			0.00	#NUM!
8	21.97	6.17	28.14	3.3372
8	21.05	6.78	27.83	3.3261
15	24.03	12.72	36.75	3.6041
15	21.49	13.74	35.23	3.5619
35	25.20	15.20	40.40	3.6988
35	23.97	12.87	36.84	3.6066
59	19.67	17.36	37.03	3.6117
59	23.07	18.01	41.08	3.7155
100	12.74	32.09	44.83	3.8029
100	12.33	35.91	48.24	3.8762
150	6.10	41.65	47.75	3.8660
150	6.53	44.82	51.35	3.94

Half-life (days): Stable



Data obtained from Appendix 8, Table XXXVIII, p. 248 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.878399
R Square	0.771585
Adjusted R	0.748744
Standard E	0.098571
Observatio	12

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	0.328217	0.328217	33.77998	0.00017
Residual	10	0.097163	0.009716		
Total	11	0.425381			

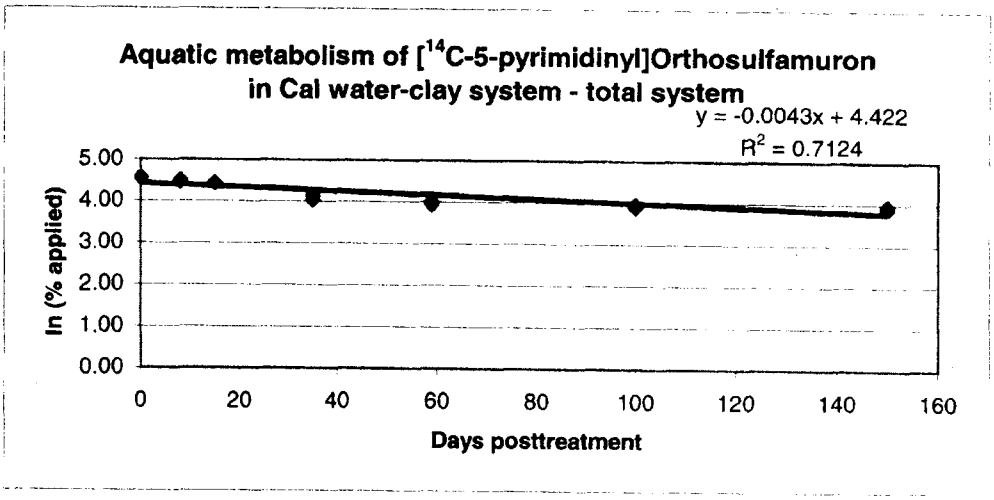
	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	3.46014	0.044918	77.03163	3.32E-15	3.360055	3.560224	3.360055	3.560224
X Variable	0.003303	0.000568	5.812055	0.00017	0.002036	0.004569	0.002036	0.004569

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Total System
Pyr-label Cal system

Days	Orthosulfamuron %AR	LN (%AR)
0	95.78	4.5621
0	94.50	4.5486
8	89.56	4.4949
8	86.03	4.4547
15	84.45	4.4362
15	83.53	4.4252
35	62.78	4.1396
35	56.53	4.0348
59	51.12	3.9342
59	54.94	4.0062
100	49.33	3.8985
100	52.28	3.9566
150	49.04	3.8926
150	52.46	3.9601

Half-life (days): 160.81



Data obtained from Appendix 8, Table XL, p. 250 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.844043
R Square	0.712408
Adjusted R	0.688442
Standard E	0.151051
Observatio	14

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	0.678234	0.678234	29.72574	0.000147
Residual	12	0.273796	0.022816		
Total	13	0.95203			

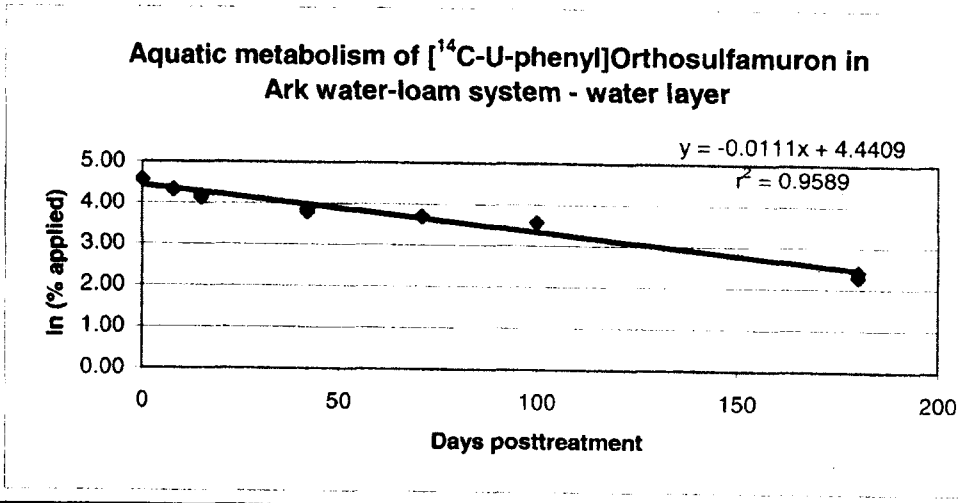
	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Jpper 95.0%*
Intercept	4.421999	0.057859	76.42726	1.68E-17	4.295935	4.548062	4.295935	4.548062
X Variable	-0.00431	0.000791	-5.452132	0.000147	-0.006033	-0.002588	-0.006033	-0.002588

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Water layer
Phe-label Ark system

Days	Orthosulfamuron %AR	LN (%AR)
0	96.77	4.5723
0	96.02	4.5646
8	74.80	4.3148
8	75.93	4.3298
15	64.94	4.1735
15	62.08	4.1284
42	44.22	3.7892
42	47.10	3.8523
71	40.61	3.7040
71	40.22	3.6944
100	35.49	3.5693
100	35.54	3.5707
180	9.81	2.2834
180	11.07	2.4042

Half-life (days): 62.5



Data obtained from Appendix 8, Table XLIII, p. 253 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.97923
R Square	0.958892
Adjusted R	0.955466
Standard E	0.147454
Observatio	14

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	6.086061	6.086061	279.9139	1.11E-09
Residual	12	0.260911	0.021743		
Total	13	6.346973			

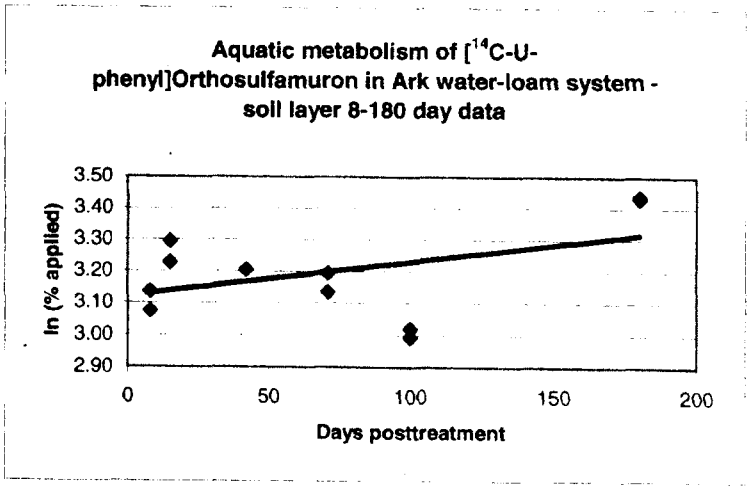
	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Jpper 95.0%*
Intercept	4.440873	0.055704	79.72201	1.01E-17	4.319504	4.562243	4.319504	4.562243
X Variable	-0.011083	0.000662	-16.73063	1.11E-09	-0.012527	-0.00964	-0.012527	-0.00964

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Soil layer
Phe-label Ark system

Orthosulfamuron				
Days	%AR	Bound	Total	LN (Total)
0			0.00	#NUM!
0			0.00	#NUM!
8	19.24	2.41	21.65	3.0750
8	20.66	2.35	23.01	3.1359
15	23.30	3.66	26.96	3.2944
15	21.66	3.56	25.22	3.2276
42	21.20	3.43	24.63	3.2040
42	21.02	3.62	24.64	3.2044
71	15.66	7.31	22.97	3.1342
71	13.73	10.66	24.39	3.1942
100	11.13	8.82	19.95	2.9932
100	12.04	8.46	20.50	3.0204
180	9.35	21.60	30.95	3.4324
180	8.58	22.55	31.13	3.4382

Half-life (days): Stable

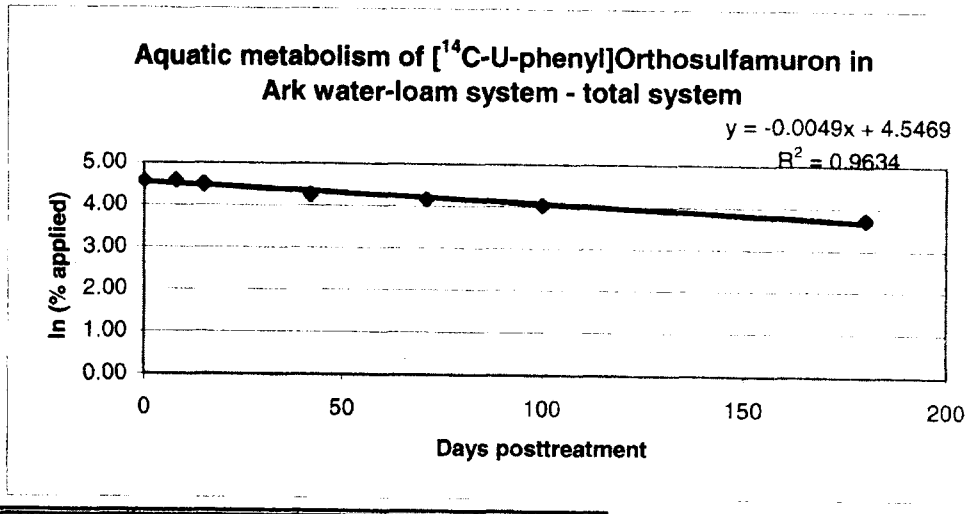


Data obtained from Appendix 8, Table XLVI, p. 256 of the study report.

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Total System
Phe-label Ark system

Days	Orthosulfamuron %AR	LN (%AR)
0	96.77	4.5723
0	96.02	4.5646
8	96.45	4.5690
8	98.94	4.5945
15	91.90	4.5207
15	87.30	4.4694
42	68.85	4.2319
42	71.74	4.2730
71	63.58	4.1523
71	64.61	4.1684
100	55.44	4.0153
100	56.04	4.0261
180	40.76	3.7077
180	42.20	3.7424
Half-life (days):		142.43



Data obtained from Appendix 8, Table XLVIII, p. 258 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.981523
R Square	0.963388
Adjusted R	0.960337
Standard E	0.060957
Observatio	14

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	1.173312	1.173312	315.7621	5.52E-10
Residual	12	0.04459	0.003716		
Total	13	1.217902			

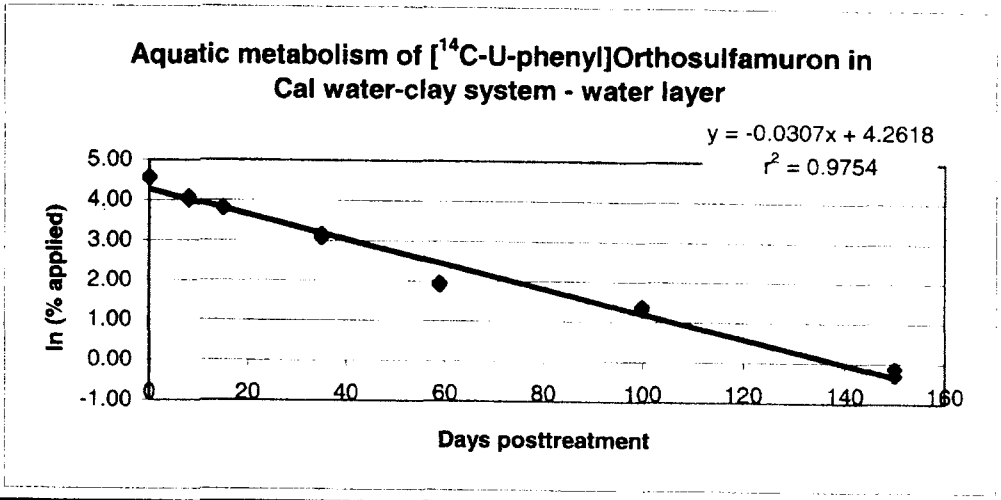
	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	4.546894	0.023028	197.4485	1.92E-22	4.49672	4.597068	4.49672	4.597068
X Variable	-0.004866	0.000274	-17.7697	5.52E-10	-0.005463	-0.00427	-0.005463	-0.00427

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Water layer
Phe-label Cal system

Days	Orthosulfamuron %AR	LN (%AR)
0	93.99	4.5432
0	98.03	4.5853
8	54.49	3.9980
8	59.10	4.0792
15	45.78	3.8238
15	44.05	3.7853
35	21.60	3.0727
35	23.71	3.1659
59	6.61	1.8886
59	7.04	1.9516
100	3.70	1.3083
100	4.00	1.3863
150	0.74	-0.3011
150	0.88	-0.1278

Half-life (days): 22.61



Data obtained from Appendix 8, Table LI, p. 261 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.987611
R Square	0.975375
Adjusted R	0.973323
.Standard E	0.268727
Observatio	14

ANOVA

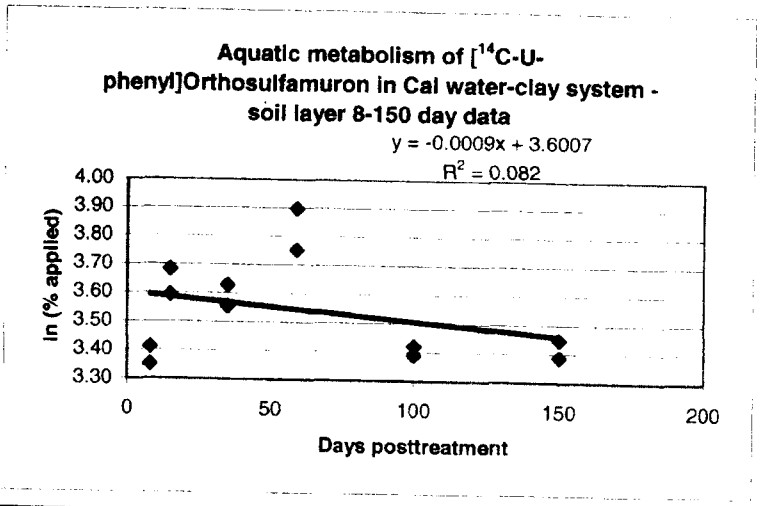
	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	34.32408	34.32408	475.3077	5.08E-11
Residual	12	0.866573	0.072214		
Total	13	35.19065			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	4.261835	0.102934	41.40355	2.55E-14	4.037561	4.486109	4.037561	4.486109
X Variable	-0.030663	0.001406	-21.80155	5.08E-11	-0.033727	-0.027598	-0.033727	-0.027598

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Soil layer
Phe-label Cal system

Orthosulfamuron				
Days	**%AR**	**Bound**	**Total**	**LN (%AR)**
0			0.00	#NUM!
0			0.00	#NUM!
8	19.38	9.14	28.52	3.3506
8	19.95	10.37	30.32	3.4118
15	29.08	10.69	39.77	3.6831
15	26.89	9.50	36.39	3.5943
35	28.43	6.55	34.98	3.5548
35	30.23	7.38	37.61	3.6273
59	36.78	12.49	49.27	3.8973
59	31.78	10.84	42.62	3.7523
100	11.25	18.41	29.66	3.3898
100	11.73	18.87	30.60	3.4210
150	6.42	23.17	29.59	3.3874
150	6.78	24.66	31.44	3.4481



Half-life (days): 736.94

Data obtained from Appendix 8, Table LIV, p. 264 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.286366
R Square	0.082005
Adjusted R	-0.009794
Standard E	0.172634
Observatio	12

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	0.026623	0.026623	0.893309	0.366859
Residual	10	0.298026	0.029803		
Total	11	0.324649			

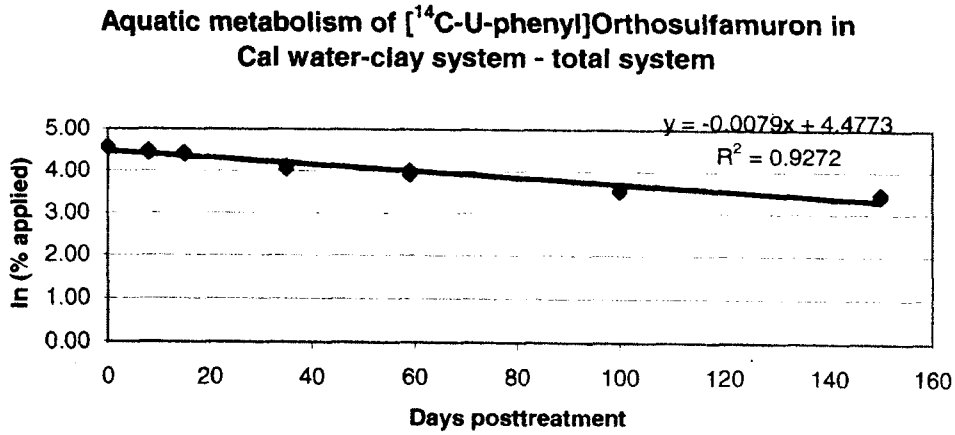
	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Jpper 95.0%*
Intercept	3.600683	0.078669	45.77033	5.97E-13	3.425399	3.775968	3.425399	3.775968
X Variable	-0.000941	0.000995	-0.94515	0.366859	-0.003158	0.001277	-0.003158	0.001277

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations Accounting Bound Residues as Parent
Total System
Phe-label Cal system

Days	Orthosulfamuron %AR	LN (%AR)
0	93.99	4.5432
0	98.03	4.5853
8	83.01	4.4190
8	89.42	4.4933
15	85.55	4.4491
15	80.44	4.3875
35	56.58	4.0357
35	61.32	4.1161
59	55.88	4.0232
59	49.66	3.9052
100	33.36	3.5074
100	34.60	3.5439
150	30.33	3.4121
150	32.32	3.4757

Half-life (days): 87.93



Data obtained from Appendix 8, Table LVI, p. 266 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.962928
R Square	0.927229
Adjusted R	0.921165
Standard E	0.121803
Observatio	14

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	2.268453	2.268453	152.9019	3.46E-08
Residual	12	0.178032	0.014836		
Total	13	2.446485			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Jpper 95.0%*
Intercept	4.47732	0.046656	95.96493	1.1E-18	4.375665	4.578974	4.375665	4.578974
X Variable	-0.007883	0.000637	-12.36535	3.46E-08	-0.009272	-0.006494	-0.009272	-0.006494

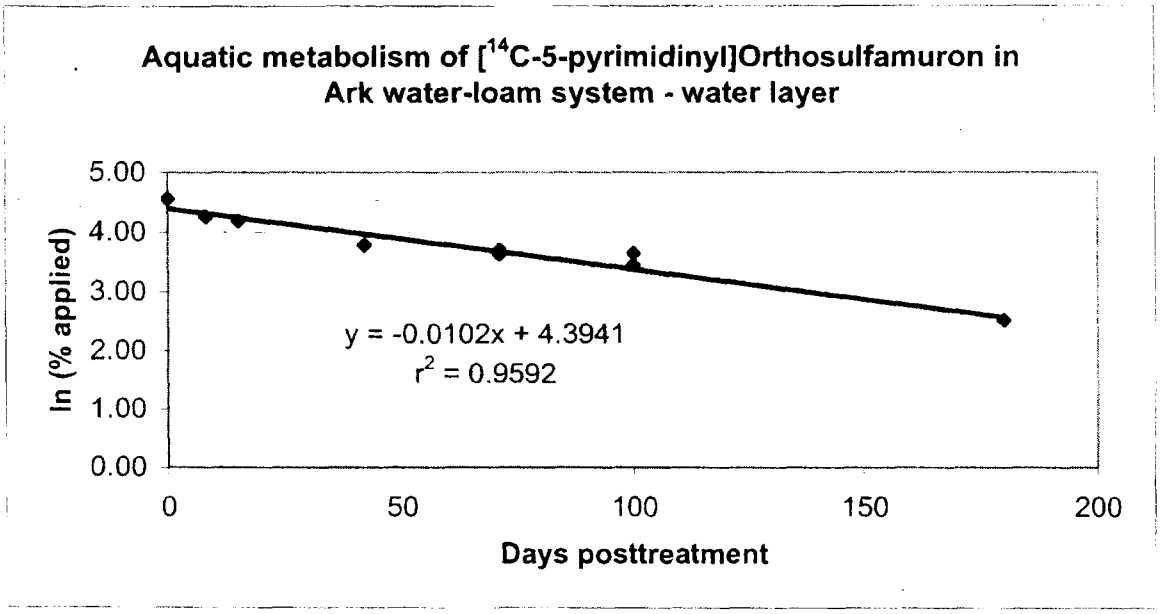
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Water layer
Pyr-label Ark system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0	95.91	4.5634
0	94.73	4.5510
8	70.86	4.2607
8	71.47	4.2693
15	65.75	4.1859
15	65.97	4.1892
42	43.54	3.7737
42	44.41	3.7935
71	37.54	3.6254
71	40.33	3.6971
100	31.55	3.4516
100	38.48	3.6501
180	12.35	2.5137
180	12.43	2.5201

Half-life (days):	67.96

Data obtained from Appendix 8, Table XXVII, p. 237 of the study report.



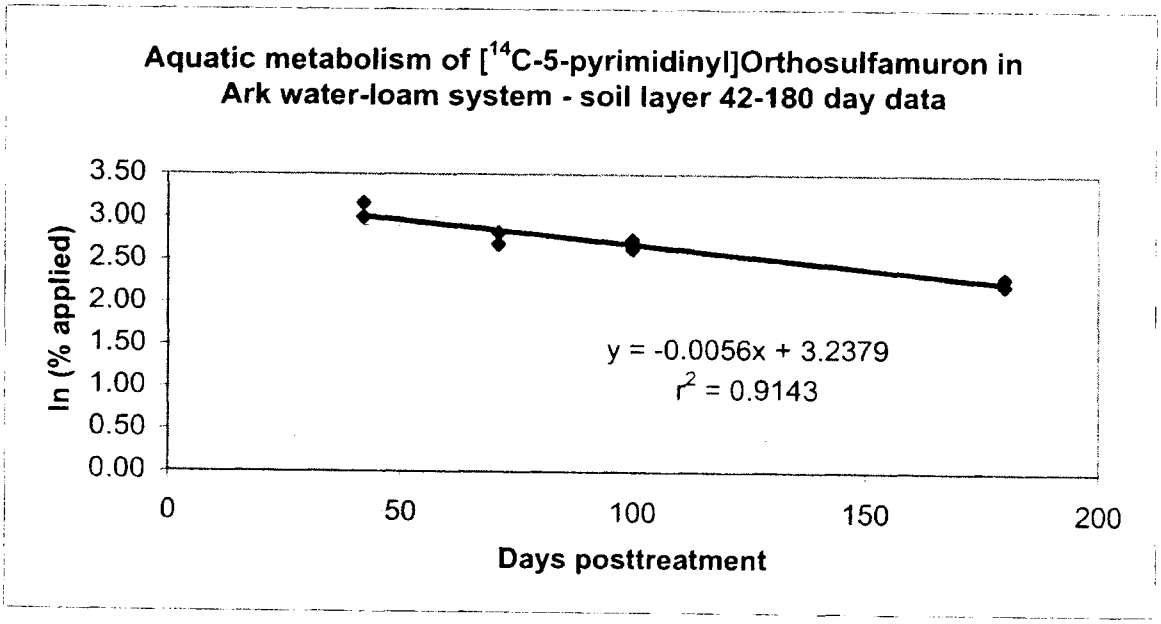
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Soil layer
Pyr-label Ark system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0		#NUM!
0		#NUM!
8	13.28	2.5863
8	16.27	2.7893
15	19.67	2.9791
15	21.75	3.0796
42	19.97	2.9942
42	23.59	3.1608
71	16.68	2.8142
71	14.57	2.6790
100	15.41	2.7350
100	13.91	2.6326
180	9.93	2.2956
180	9.13	2.2116

Half-life (days):	123.78

Data obtained from Appendix 8, Table XXX, p. 240 of the study report.



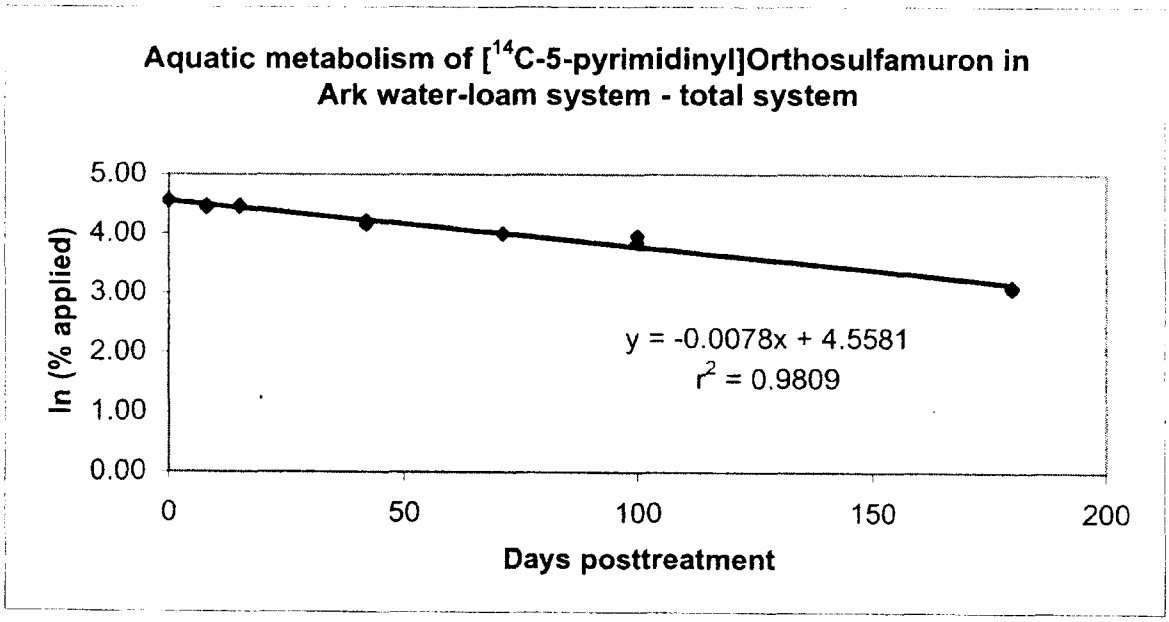
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Total System
Pyr-label Ark system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0	95.91	4.5634
0	94.73	4.5510
8	84.14	4.4325
8	87.74	4.4744
15	85.42	4.4476
15	87.72	4.4741
42	63.51	4.1512
42	68.00	4.2195
71	54.22	3.9930
71	54.90	4.0055
100	46.96	3.8493
100	52.39	3.9587
180	22.28	3.1037
180	21.56	3.0708

Half-life (days):	88.87

Data obtained from Appendix 8, Table XXXII, p. 242 of the study report.



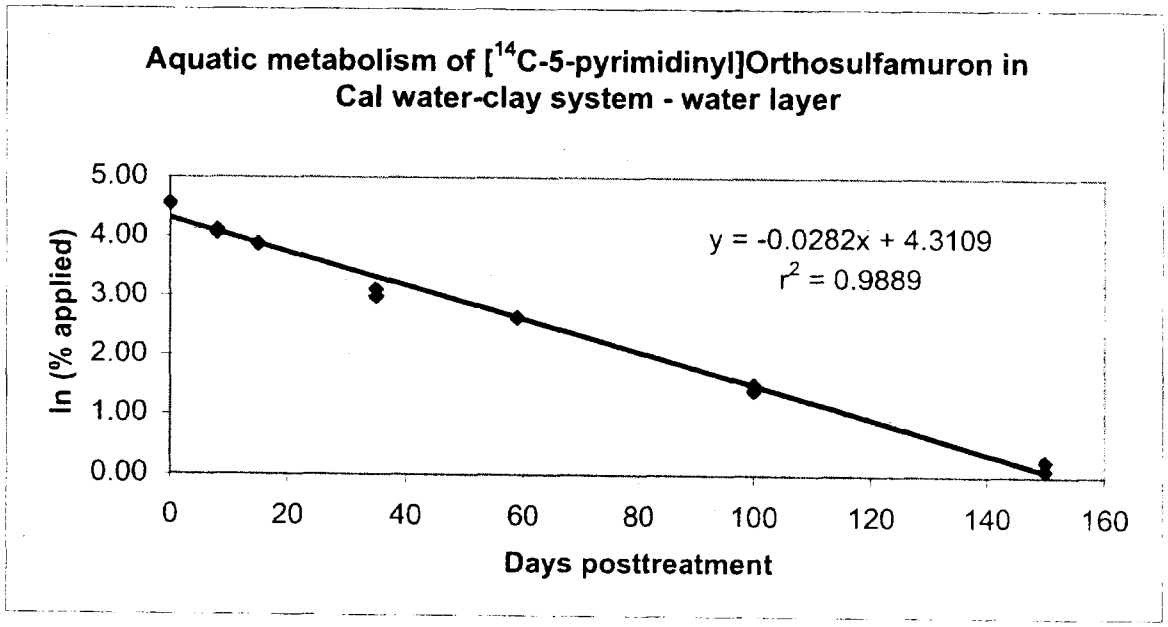
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Water layer
Pyr-label Cal system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0	95.78	4.5621
0	94.50	4.5486
8	61.42	4.1177
8	58.20	4.0639
15	47.70	3.8649
15	48.30	3.8774
35	22.38	3.1082
35	19.69	2.9801
59	14.09	2.6455
59	13.86	2.6290
100	4.50	1.5041
100	4.04	1.3962
150	1.29	0.2546
150	1.11	0.1044

Half-life (days): 24.58

Data obtained from Appendix 8, Table XXXV, p. 245 of the study report.

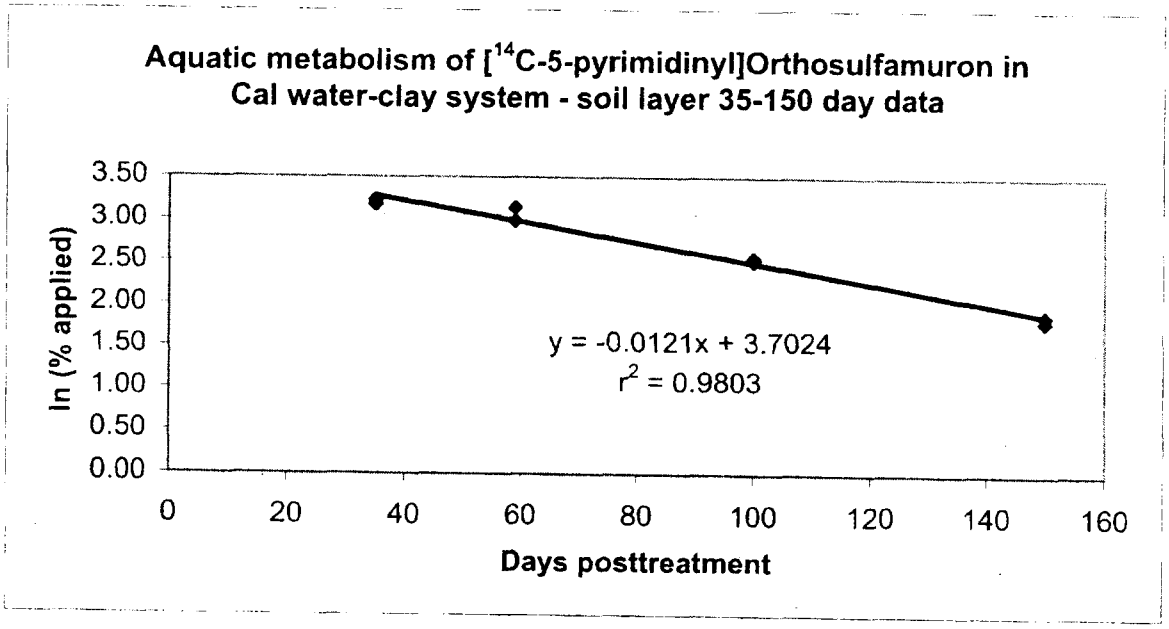


Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Soil layer
Pyr-label Cal system

Days	Orthosulfamuron %AR	LN (%AR)	
0		#NUM!	
0		#NUM!	
8	21.97	3.0897	
8	21.05	3.0469	
15	24.03	3.1793	
15	21.49	3.0676	
35	25.20	3.2268	
35	23.97	3.1768	
59	19.67	2.9791	
59	23.07	3.1385	
100	12.74	2.5447	
100	12.33	2.5120	
150	6.10	1.8083	
150	6.53	1.8764	**Half-life (days):** 57.28

Data obtained from Appendix 8, Table XXXVIII, p. 248 of the study report.

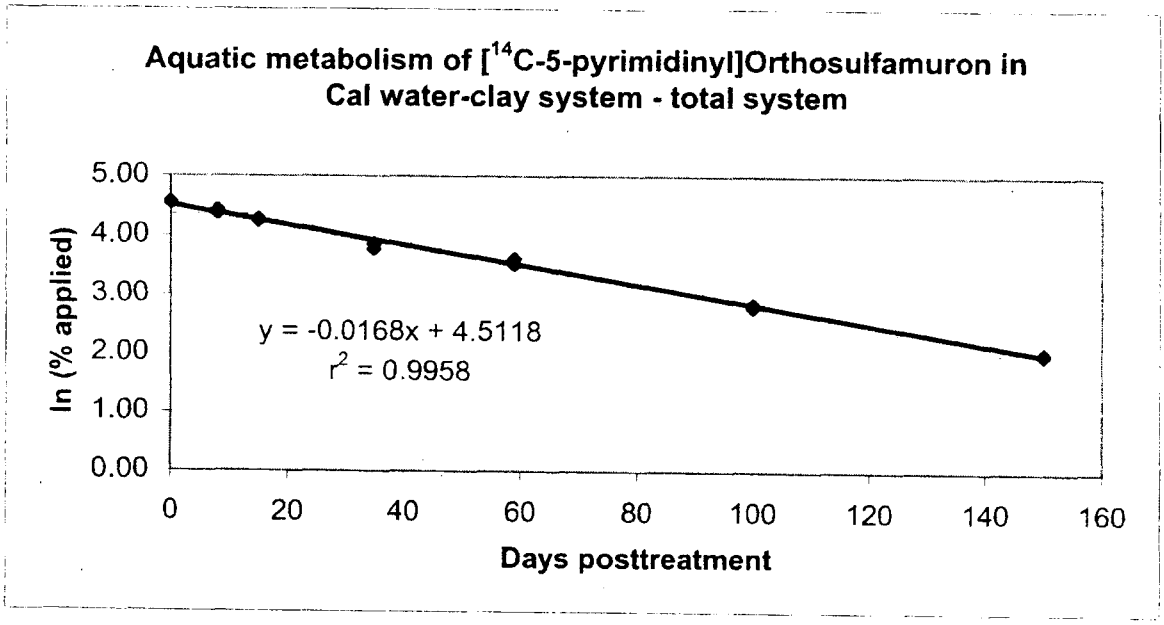


Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Total System
Pyr-label Cal system

Days	Orthosulfamuron %AR	LN (%AR)	
0	95.78	4.5621	
0	94.50	4.5486	
8	83.39	4.4235	
8	79.25	4.3726	
15	71.73	4.2729	
15	69.79	4.2455	
35	47.58	3.8624	
35	43.66	3.7764	
59	33.76	3.5193	
59	36.93	3.6090	
100	17.24	2.8472	
100	16.37	2.7955	
150	7.39	2.0001	
150	7.64	2.0334	**Half-life (days):** 41.26

Data obtained from Appendix 8, Table XL, p. 250 of the study report.

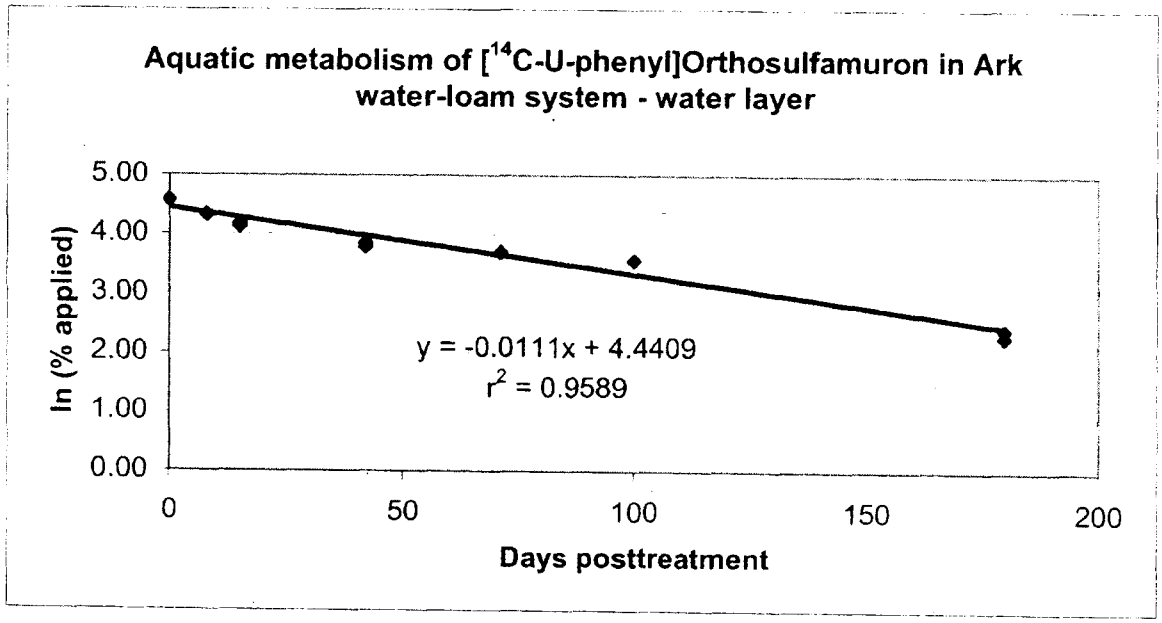


Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Water layer
Phe-label Ark system

Days	Orthosulfamuron %AR	LN (%AR)	
0	96.77	4.5723	
0	96.02	4.5646	
8	74.80	4.3148	
8	75.93	4.3298	
15	64.94	4.1735	
15	62.08	4.1284	
42	44.22	3.7892	
42	47.10	3.8523	
71	40.61	3.7040	
71	40.22	3.6944	
100	35.49	3.5693	
100	35.54	3.5707	
180	9.81	2.2834	
180	11.07	2.4042	**Half-life (days):** 62.45

Data obtained from Appendix 8, Table XLIII, p. 253 of the study report.

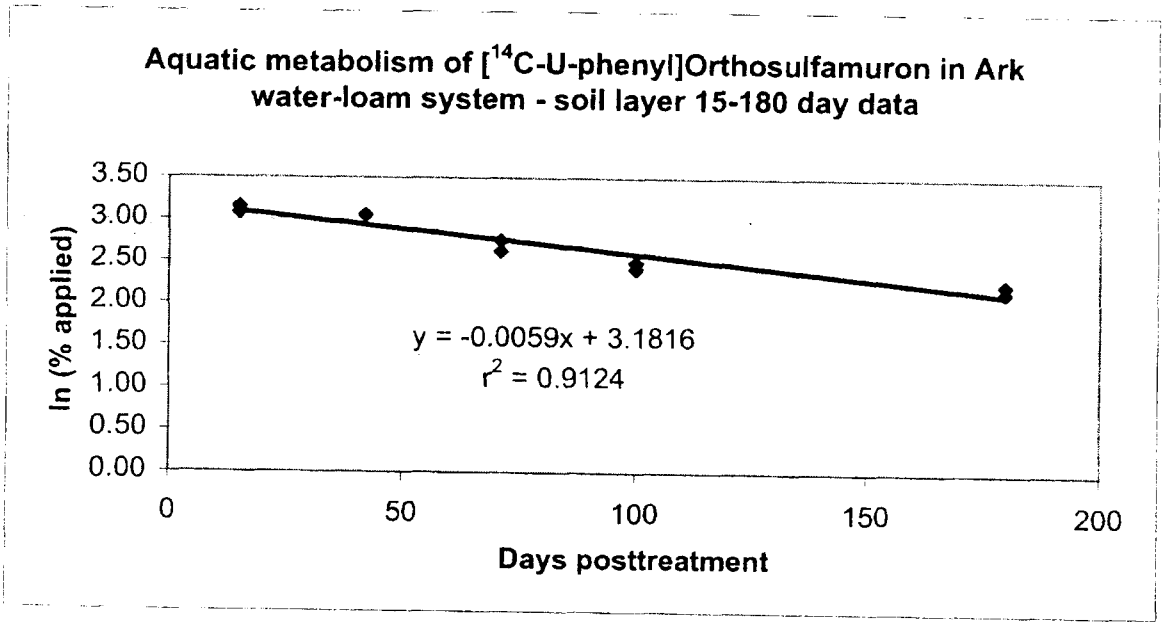


Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Soil layer
Phe-label Ark system

Days	Orthosulfamuron %AR	LN (%AR)	
0		#NUM!	
0		#NUM!	
8	19.24	2.9570	
8	20.66	3.0282	
15	23.30	3.1485	
15	21.66	3.0755	
42	21.20	3.0540	
42	21.02	3.0455	
71	15.66	2.7511	
71	13.73	2.6196	
100	11.13	2.4096	
100	12.04	2.4882	
180	9.35	2.2354	
180	8.58	2.1494	**Half-life (days):** 117.48

Data obtained from Appendix 8, Table XLVI, p. 256 of the study report.



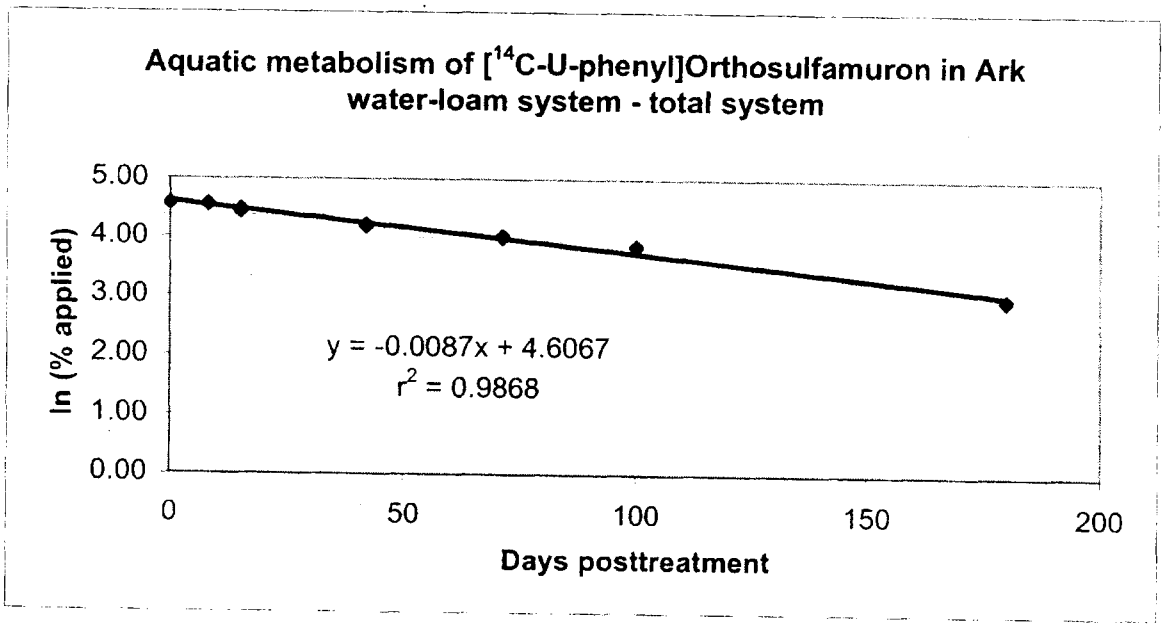
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Total System
Phe-label Ark system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0	96.77	4.5723
0	96.02	4.5646
8	94.04	4.5437
8	96.59	4.5705
15	88.24	4.4801
15	83.74	4.4277
42	65.42	4.1808
42	68.12	4.2213
71	56.27	4.0302
71	53.95	3.9881
100	46.62	3.8420
100	47.58	3.8624
180	19.16	2.9528
180	19.65	2.9781

Half-life (days): 79.67

Data obtained from Appendix 8, Table XLVIII, p. 258 of the study report.



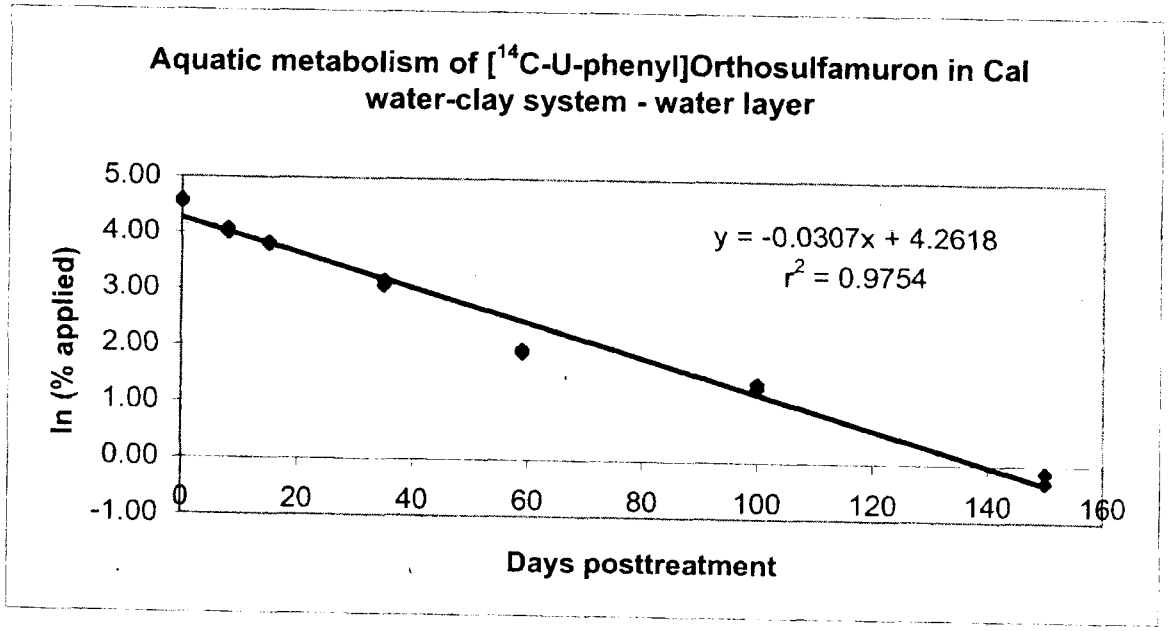
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Water layer
Phe-label Cal system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0	93.99	4.5432
0	98.03	4.5853
8	54.49	3.9980
8	59.10	4.0792
15	45.78	3.8238
15	44.05	3.7853
35	21.60	3.0727
35	23.71	3.1659
59	6.61	1.8886
59	7.04	1.9516
100	3.70	1.3083
100	4.00	1.3863
150	0.74	-0.3011
150	0.88	-0.1278

Half-life (days): 22.58

Data obtained from Appendix 8, Table LI, p. 261 of the study report.



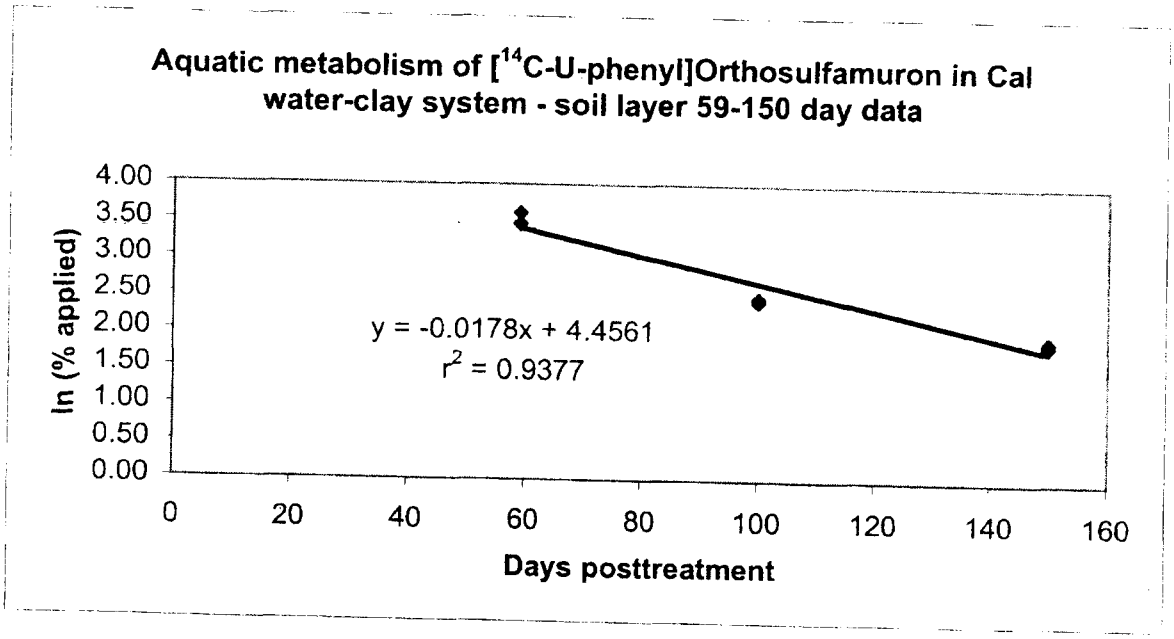
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Soil layer
Phe-label Cal system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0		#NUM!
0		#NUM!
8	19.38	2.9642
8	19.95	2.9932
15	29.08	3.3701
15	26.89	3.2918
35	28.43	3.3474
35	30.23	3.4088
59	36.78	3.6050
59	31.78	3.4588
100	11.25	2.4204
100	11.73	2.4621
150	6.42	1.8594
150	6.78	1.9140

Half-life (days): 38.94

Data obtained from Appendix 8, Table LIV, p. 264 of the study report.



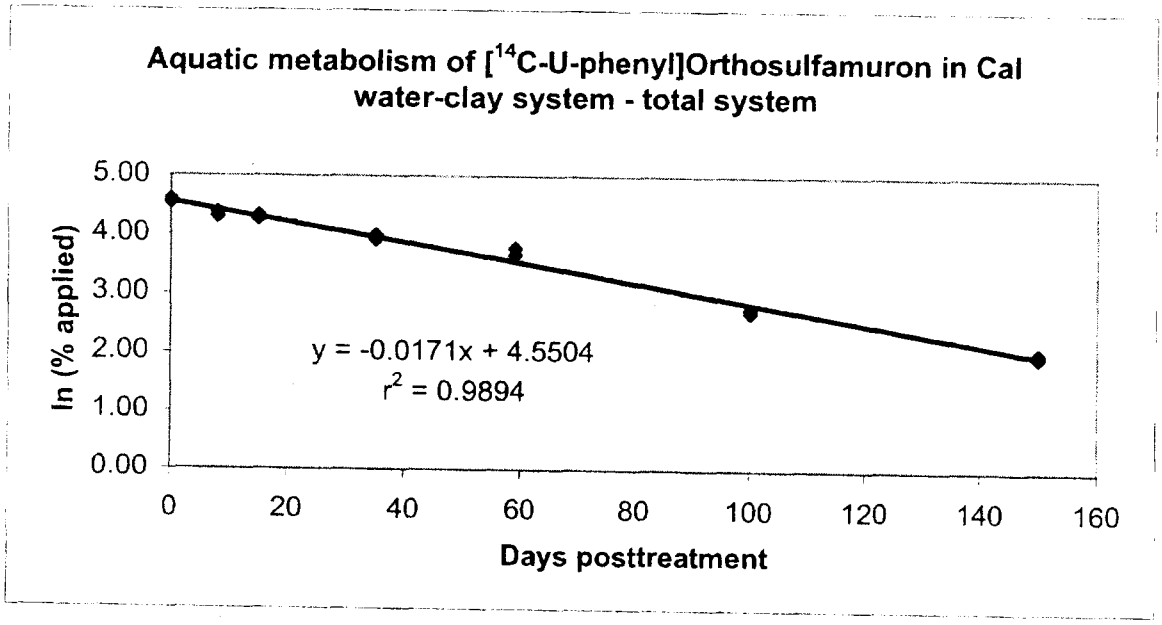
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Total System
Phe-label Cal system

Days	Orthosulfamuron %AR	LN (%AR)
0	93.99	4.5432
0	98.03	4.5853
8	73.87	4.3023
8	79.05	4.3701
15	74.86	4.3156
15	70.94	4.2618
35	50.03	3.9126
35	53.94	3.9879
59	43.39	3.7702
59	38.82	3.6589
100	14.95	2.7047
100	15.73	2.7556
150	7.16	1.9685
150	7.66	2.0360

Half-life (days): 40.53

Data obtained from Appendix 8, Table LVI, p. 266 of the study report.

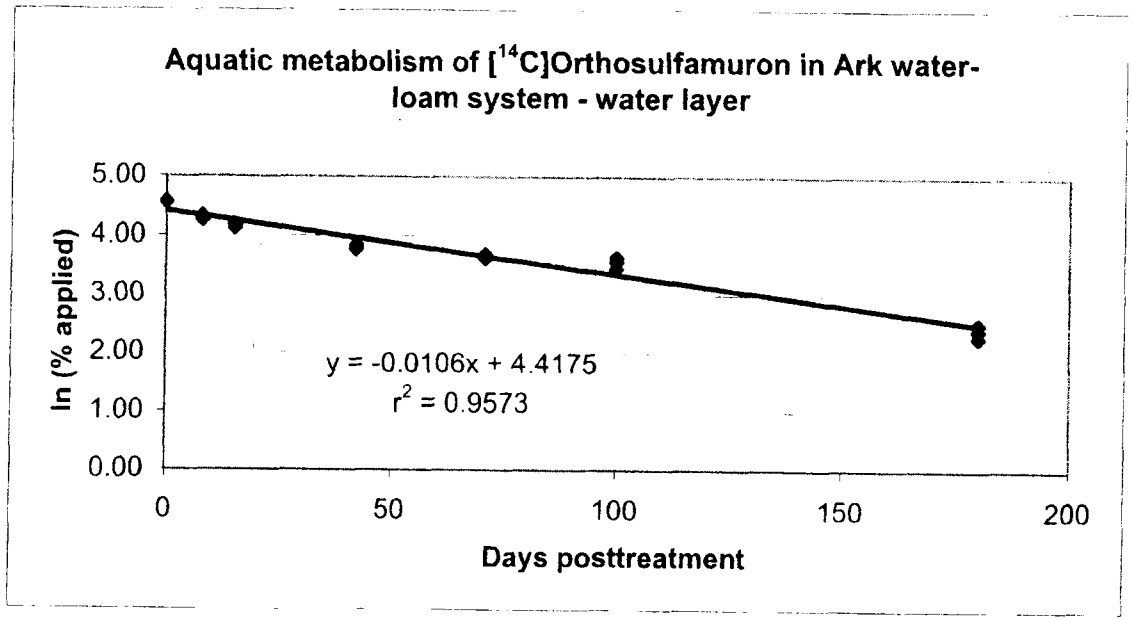


Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Water layer
Combined Radiolabels Ark system

Days	Orthosulfamuron	
	%AR	LN (%AR)
0	95.91	4.5634
0	94.73	4.5510
8	70.86	4.2607
8	71.47	4.2693
15	65.75	4.1859
15	65.97	4.1892
42	43.54	3.7737
42	44.41	3.7935
71	37.54	3.6254
71	40.33	3.6971
100	31.55	3.4516
100	38.48	3.6501
180	12.35	2.5137
180	12.43	2.5201
0	96.77	4.5723
0	96.02	4.5646
8	74.80	4.3148
8	75.93	4.3298
15	64.94	4.1735
15	62.08	4.1284
42	44.22	3.7892
42	47.10	3.8523
71	40.61	3.7040
71	40.22	3.6944
100	35.49	3.5693
100	35.54	3.5707
180	9.81	2.2834
180	11.07	2.4042

Half-life (days):	65.39



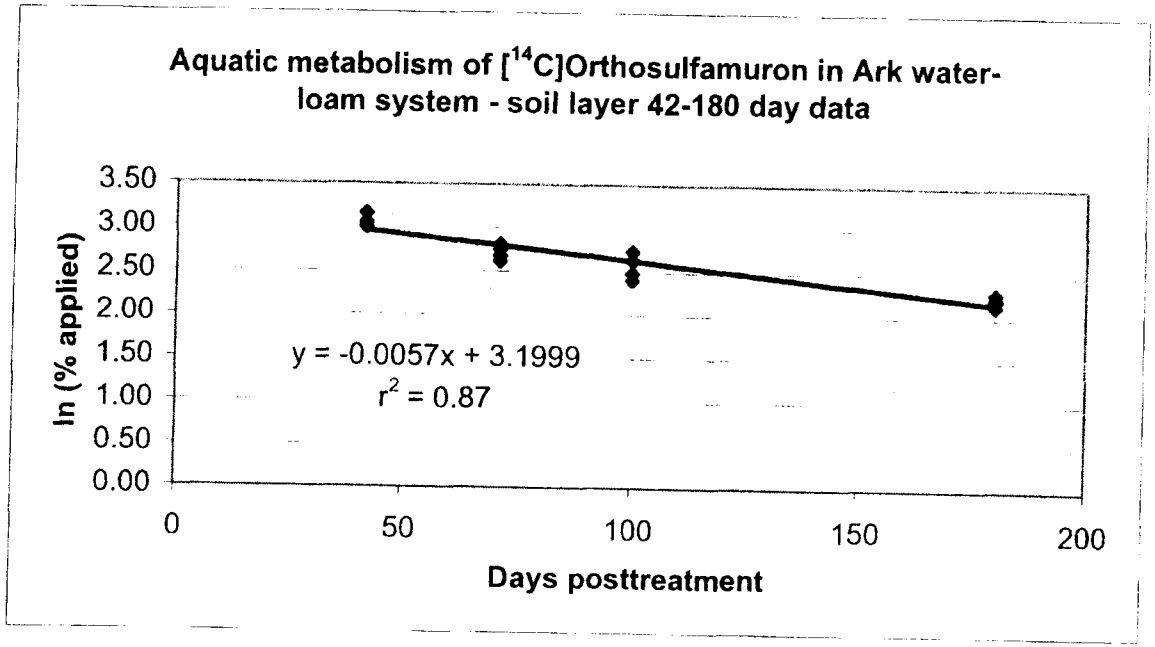
Data obtained from Appendix 8, Table XXVII, p. 237 and Table XLIII, p. 253 of the study report.

85

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Soil layer
Combined Radiolabels Ark system

Days	IR5878	
	%AR	LN (%AR)
42	19.97	2.9942
42	23.59	3.1608
71	16.68	2.8142
71	14.57	2.6790
100	15.41	2.7350
100	13.91	2.6326
180	9.93	2.2956
180	9.13	2.2116
42	21.20	3.0540
42	21.02	3.0455
71	15.66	2.7511
71	13.73	2.6196
100	11.13	2.4096
100	12.04	2.4882
180	9.35	2.2354
180	8.58	2.1494



Half-life (days):	121.60

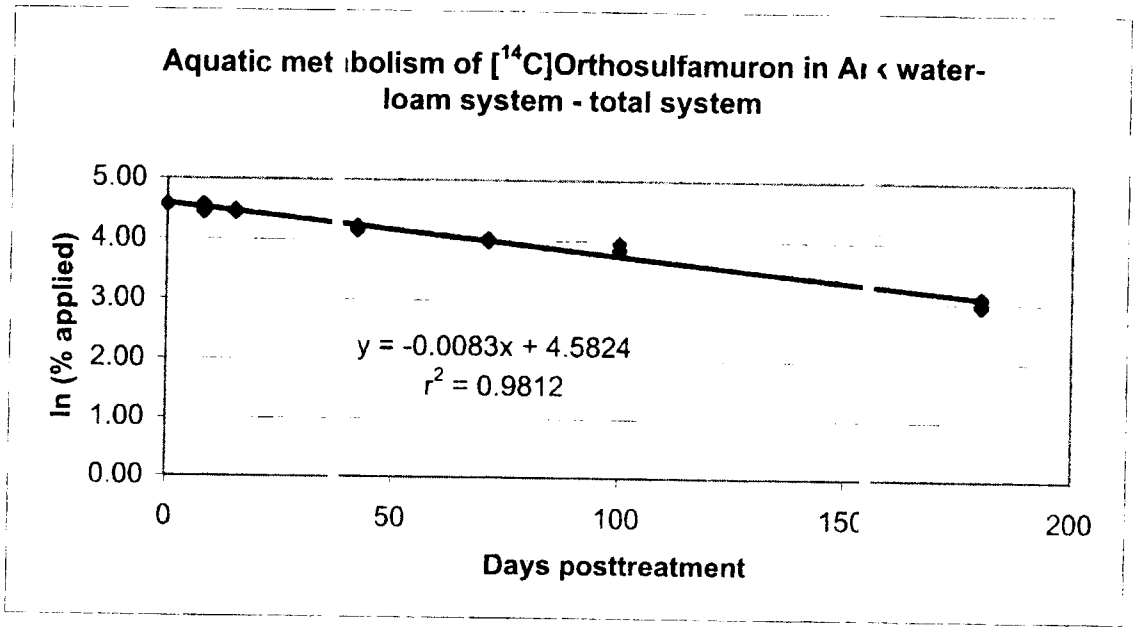
Data obtained from Appendix 8, Table XXX, p. 240 and Table XLVI, p. 256 of the study report.

Chemical Name: Orthosu amuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Total System
Combined Radiolabels Ark system

Days	IR5878 %AR	LN (%AR)
0	95.91	4.5634
0	94.73	4.5510
8	84.14	4.4325
8	87.74	4.4744
15	85.42	4.4476
15	87.72	4.4741
42	63.51	4.1512
42	68.00	4.2195
71	54.22	3.9930
71	54.90	4.0055
100	46.96	3.8493
100	52.39	3.9587
180	22.28	3.1037
180	21.56	3.0708
0	96.77	4.5723
0	96.02	4.5646
8	94.04	4.5437
8	96.59	4.5705
15	88.24	4.4801
15	83.74	4.4277
42	65.42	4.1808
42	68.12	4.2213
71	56.27	4.0302
71	53.95	3.9881
100	46.62	3.8420
100	47.58	3.8624
180	19.16	2.9528
180	19.65	2.9781

Half-life (days): 83.51



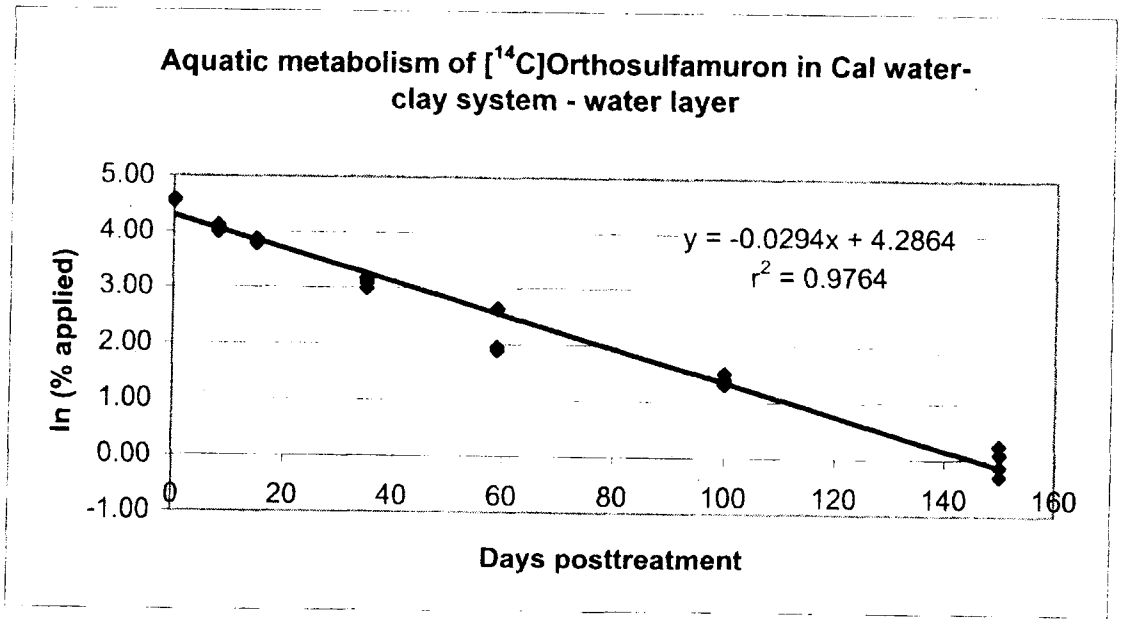
Data obtained from Appendix 8, Table XXXII, p. 242 and Table XLVIII, p. 258 of the study report.

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Water layer
Combined Radiolabels Cal system

Days	IR5878	
	%AR	LN (%AR)
0	95.78	4.5621
0	94.50	4.5486
8	61.42	4.1177
8	58.20	4.0639
15	47.70	3.8649
15	48.30	3.8774
35	22.38	3.1082
35	19.69	2.9801
59	14.09	2.6455
59	13.86	2.6290
100	4.50	1.5041
100	4.04	1.3962
150	1.29	0.2546
150	1.11	0.1044
0	93.99	4.5432
0	98.03	4.5853
8	54.49	3.9980
8	59.10	4.0792
15	45.78	3.8238
15	44.05	3.7853
35	21.60	3.0727
35	23.71	3.1659
59	6.61	1.8886
59	7.04	1.9516
100	3.70	1.3083
100	4.00	1.3863
150	0.74	-0.3011
150	0.88	-0.1278
Half-life (days):		23.58

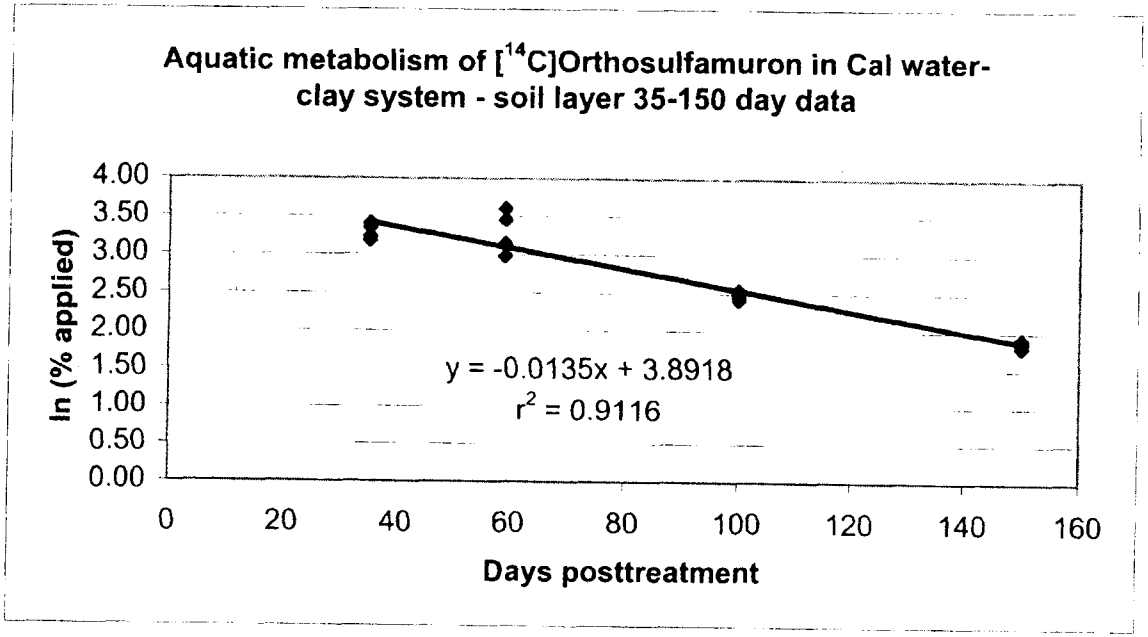
Data obtained from Appendix 8, Table XXXV, p. 245 and able LI, p. 261 of the study report.



Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Soil layer
Combined Radiolabels Cal system

Days	IR5878	
	%AR	LN (%AR)
35	25.20	3.2268
35	23.97	3.1768
59	19.67	2.9791
59	23.07	3.1385
100	12.74	2.5447
100	12.33	2.5120
150	6.10	1.8083
150	6.53	1.8764
35	28.43	3.3474
35	30.23	3.4088
59	36.78	3.6050
59	31.78	3.4588
100	11.25	2.4204
100	11.73	2.4621
150	6.42	1.8594
150	6.78	1.9140



Half-life (days):	51.34

Data obtained from Appendix 8, Table XXXVIII, p. 248 and Table LIV, p. 264 of the study report.

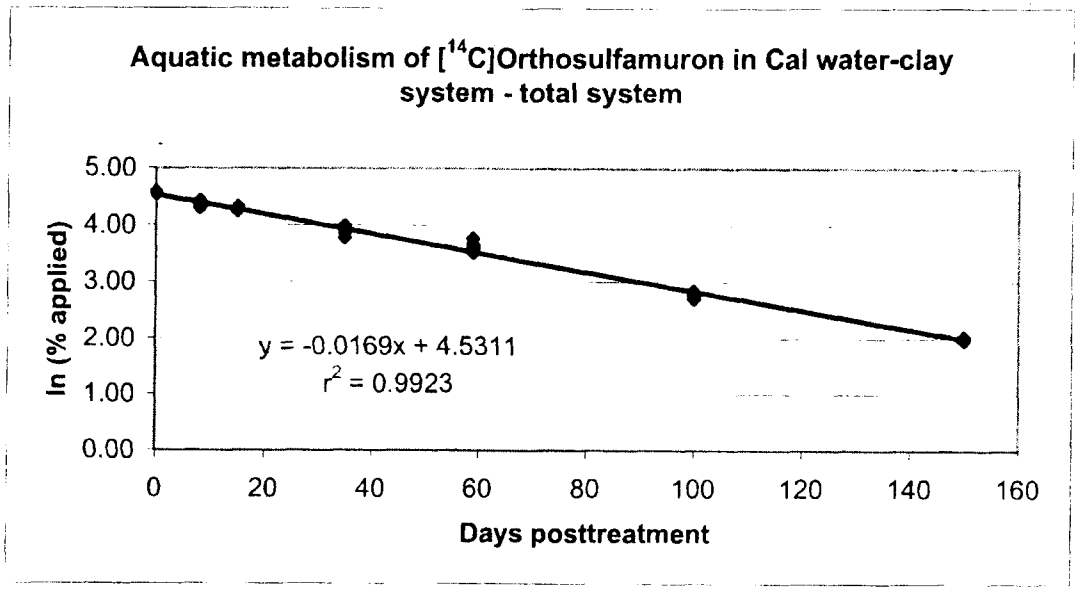
Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967
Guideline No.: 162-3

Half-life Calculations
Total System
Combined Radiolabels Cal system

Days	IR5878	
	%AR	LN (%AR)
0	95.78	4.5621
0	94.50	4.5486
8	83.39	4.4235
8	79.25	4.3726
15	71.73	4.2729
15	69.79	4.2455
35	47.58	3.8624
35	43.66	3.7764
59	33.76	3.5193
59	36.93	3.6090
100	17.24	2.8472
100	16.37	2.7955
150	7.39	2.0001
150	7.64	2.0334
0	93.99	4.5432
0	98.03	4.5853
8	73.87	4.3023
8	79.05	4.3701
15	74.86	4.3156
15	70.94	4.2618
35	50.03	3.9126
35	53.94	3.9879
59	43.39	3.7702
59	38.82	3.6589
100	14.95	2.7047
100	15.73	2.7556
150	7.16	1.9685
150	7.66	2.0360

Half-life (days):	41.01

Data obtained from Appendix 8, Table XL, p. 250 and Table LVI, p. 266 of the study report.



Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967 **Arkansas water-loam sediment system**
Guideline No.: 162-3

Nonlinear half-lives (exponential decay/single, 2 parameter)

Pyrimidinyl label
Water layer
Half-life (days): 61.51
r^2: 0.9266
Sigma Plot: 108209 46578967 pyr Ark W vers 6.0
Sediment layer (42-180 day data)
Half-life (days): 113.63
r^2: 0.881
Sigma Plot: 108209 46578967 pyr Ark S vers 6.0
Total system
Half-life (days): 93.00
r^2: 0.9815
Sigma Plot: 108209 46578967 pyr Ark TS vers 6.0

Phenyl label
Water layer
Half-life (days): 60.79
r^2: 0.9316
Sigma Plot: 108209 46578967 phe Ark W vers 6.0
Sediment layer (15-180 day data)
Half-life (days): 123.16
r^2: 0.8697
Sigma Plot: 108209 46578967 phe Ark S vers 6.0
Total system
Half-life (days): 84.31
r^2: 0.9881
Sigma Plot: 108209 46578967 phe Ark TS vers 6.0

Combined radiolabels
Water layer
Half-life (days): 61.15
r^2: 0.9288
Sigma Plot: 108209 46578967 comb Ark W vers 6.0
Sediment layer (42-180 day data)
Half-life (days): 105.12
r^2: 0.8626
Sigma Plot: 108209 46578967 comb Ark S vers 6.0
Total system
Half-life (days): 88.43
r^2: 0.9826
Sigma Plot: 108209 46578967 comb Ark TS vers 6.0

Chemical Name: Orthosulfamuron
PC Code: 108209
MRID: 46578967 **California water-clay sediment system**
Guideline No.: 162-3

Nonlinear half-lives (exponential decay/single, 2 parameter)

Pyrimidinyl label
Water layer
Half-life (days): 16.45
r^2: 0.9861
Sigma Plot: 108209 46578967 pyr Cal W vers 6.0
Sediment layer (35-150 day data)
Half-life (days): 102.85
r^2: 0.7803
Sigma Plot: 108209 46578967 pyr Cal S vers 6.0
Total system
Half-life (days): 38.68
r^2: 0.9932
Sigma Plot: 108209 46578967 pyr Cal TS vers 6.0

Phenyl label
Water layer
Half-life (days): 14.69
r^2: 0.986
Sigma Plot: 108209 46578967 phe Cal W vers 6.0
Sediment layer (59-150 day data)
Half-life (days): 30.12
r^2: 0.9655
Sigma Plot: 108209 46578967 phe Cal S vers 6.0
Total system
Half-life (days): 42.97
r^2: 0.9846
Sigma Plot: 108209 46578967 phe Cal TS vers 6.0

Combined radiolabels
Water layer
Half-life (days): 15.54
r^2: 0.9852
Sigma Plot: 108209 46578967 comb Cal W vers 6.0
Sediment layer (35-150 day data)
Half-life (days): 59.27
r^2: 0.7625
Sigma Plot: 108209 46578967 comb Cal S vers 6.0
Total system
Half-life (days): 40.85
r^2: 0.9877
Sigma Plot: 108209 46578967 comb Cal TS vers 6.0

Attachment 3: Transformation Pathway Presented
Illustration of Test System
Analysis Schemes

DER FOR MRID # 46578967

Page _____ is not included in this copy.

Pages 89 through 94 are not included in this copy.

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.

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_____ The document is not responsive to the request.

_____ Internal deliberative information.

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