Data Evaluation Report on the Hydrolysis of Orthosulfamuron (IR5878)

PMRA Submission Number {.....} EPA MRID Number 46219016

Data Requirement: PMRA Data Code:
EPA DP Barcode: D304186
OECD Data Point:
EPA Guideline: 161-1

Test material:

Common name:	Orthosulfamuron.
Chemical name:	
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 No.:	213464-77-8.
Synonyms:	o-Sulfamuron, 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 7/6/06.

Primary Reviewer: Leanne Ganser
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Company Code:
Active Code:
Use Site Category:
EPA PC Code: 108209

CITATION: Castoldi, F. and G. Pizzingrilli. 2000. Identification of Hydrolysis Compounds of [^{14}C-5-pyrimidinyl] IR5878 at pH 4, 7 and 9. Unpublished study performed by ISAGRO RICERCA Srl, Novara, Italy and sponsored by ISAGRO SpA, Milano, Italy. Study No.: ABT.00.16. Experiment started July 17, 2000 and completed November 2, 2000 (p. 11). Final reported issued November 7, 2000. 100 pp.

Data Evaluation Report on the hydrolysis of o-sulfamuron (IR5878)

PMRA Submission Number {.....} EPA MRID Number 46219016

Data Requirement: PMRA Data Code:
EPA DP Barcode: D319377
OECD Data Point:
EPA Guideline: 161-1

Test material:

Common name: O-Sulfamuron.

Chemical name:

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 No.: 213464-77-8.

Synonyms: Orthosulfamuron, 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 7/6/06.

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CITATION: Castoldi, F.C. and G. Pizzingrilli. 2000. Identification of hydrolysis compounds of [^{14}C-5-pyrimidinyl] IR5878 at pH 4, 7 and 9. Unpublished study performed by ISAGRO RICERCA Srl, Novara, Italy and sponsored by ISAGRO SpA, Milano, Italy. Study No.: ABT.00.16. Experiment started July 17, 2000 and completed November 2, 2000 (p. 11). Final reported issued November 7, 2000.

EXECUTIVE SUMMARY

The hydrolysis of [pyrimidinyl-5-^{14}C]-labeled 1-(4,6-dimethoxypyrimidin-2-yl)-3-[2-(dimethylcarbamoyl) phenylsulfamoyl]urea (orthosulfamuron, radiochemical purity >95%), at 1.25 µg a.i./mL, was studied in the dark at 50°C in sterile aqueous buffered pH 4 (0.01M acetate), pH 7 (0.01M citrate) and pH 9 (0.01M borate) solutions for 60 minutes, 52 hours and 13 days, respectively. The experiment was conducted in accordance with Council Directive 91/414/EEC Part A of Annex II, Section 2 as amended by Commission Directive 94/37/EC, Annex I, Section 2 and in compliance with OECD Principles of GLP. The test system consisted of sealed glass tubes (10 mL volume) containing treated buffer solution (3 mL). Single samples were collected for analysis at 0, 10, 15, 20, 25 and 60 minutes posttreatment at pH 4, at 0, 21, 25, 29, 45 and 52 hours posttreatment at pH 7 and at 0, 3, 6, 8, 10 and 13 days posttreatment at pH 9. The buffer solutions were analyzed directly by TLC without extraction or concentration. Orthosulfamuron and its transformation products were identified by cochromatography with reference standards. Identifications were confirmed using HPLC and LC/MS.

During the study, the temperature of the buffer solutions was 50°C and the buffer solutions were maintained at pH 4, 7 and 9 (no supporting records provided). The sterility of the test solutions was not reported.

Overall recoveries of [^{14}C]residues of the applied averaged 102 ± 1% (range 100-104%) from the pH 4 buffer solution, 102 ± 2% (range 100-104%) from the pH 7 buffer solution and 103 ± 1% (range 101-104%) from the pH 9 buffer solution. There was no pattern of loss of material over time from any of the buffer solutions.

Based on first-order linear regression analysis (Excel 2000), orthosulfamuron dissipated with a half-life of 0.015 days (21.6 minutes) in the pH 4 buffer, 1.2 days in the pH 7 buffer, and 8.6 days in the pH 9 buffer. Two transformation products were identified: N-(4,6-dimethoxypyrimidin-2-yl)urea (DOP urea; H5), which was a major transformation product at all pHs, and 2-amino-4,6-dimethoxypyrimidine (DOP amine; H6), which was a minor transformation product at pH 4 and a major product at pH 7 and 9.

In the pH 4 buffer solution, [^{14}C]orthosulfamuron decreased rapidly in the pH 4 buffer solution, decreasing from 96% of the applied at time 0 to 48% at 25 minutes and was 15% at 60 minutes. The only major transformation product was H5, at a maximum of 78% of the applied at 60 minutes posttreatment (study termination). H6 was a maximum of 4.1% of the applied at 60 minutes posttreatment.

In the pH 7 buffer solution, [^{14}C]orthosulfamuron decreased from 96% of the applied at time 0 to 51% at 25 hours and was 27% at 52 hours. Major transformation products H5 and H6 were maximums of 60% and 11% of the applied, respectively, at 52 hours posttreatment (study termination). No minor transformation products were identified.

In the pH 9 buffer solution, [^{14}C]orthosulfamuron decreased from 96% at time 0 to 53% at 8 days and was 33% at 13 days. Major transformation products H5 and H6 were maximums of 13% and

53% of the applied, respectively, at 52 hours posttreatment (study termination). No minor transformation products were identified.

The study authors provided a transformation pathway for orthosulfamuron. Orthosulfamuron hydrolyzes into 2-sulfoamino-N,N-dimethylbenzamide (H1), 2-sulfamoylamino-N,N-dimethylbenzamide (H2), 2-amino-N,N-dimethylbenzamide (H4), N-(4,6-dimethoxypyrimidin-2-yl)urea (H5), and 2-amino-4,6-dimethoxypyrimidine (H6). H1, H2, and H4 are products of the phenyl moiety and were not detected in this study. Under acidic and neutral conditions, H5 is the predominant pyrimidinyl moiety formed. Under basic conditions, H6 is the predominant pyrimidinyl moiety.

RESULTS SYNOPSIS:

pH	Half-life (days)	Transformation products	
		Major	Identified Minor
4	0.015	H5 (DOP urea)	H6 (DOP amine)
7	1.2	H5, H6	None.
9	8.6	H5, H6	None.

Study Acceptability: This study is classified as **supplemental**, as it was conducted only at 50°C and the sterility of the test solutions was not confirmed.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: This study was conducted in accordance with Council Directive 91/414/EEC Part A of Annex II, Section 2 as amended by Commission Directive 94/37/EC, Annex I, Section 2 (p. 1). Two significant deviations from the objectives of Subdivision N guidelines were noted:

The study was not conducted at 25±1°C.

The sterility of the test solutions was not confirmed.

COMPLIANCE: This study was conducted in compliance with OECD Principles of GLP (p. 3). Signed and dated Data Confidentiality, GLP, Quality Assurance, and Declaration and Signatures statements were provided (pp. 2, 3, 5, 6).

A. MATERIALS:

1. Test Material [^{14}C-5-Pyrimidinyl]Orthosulfamuron (p. 13).

Chemical Structure: See DER Attachment 1.

Description: Technical grade; solid (p. 13).

Purity: Radiochemical purity: >95% (pp. 13, 23 and Appendix 5, p. 94).
Lot No.: 180.
Analytical purity: Not reported.
Specific activity: 4.152 MBq/mg (249121 dpm/µg, 112.217 µCi/mg).
Location of the radiolabel: Labeled on the fifth carbon of the pyrimidinyl ring.

Storage conditions of test chemicals: The test substance was stored at -20°C (p. 14). The reference compound was stored at room temperature.

Physico-chemical properties of orthosulfamuron.

Parameter	Value	Comment
Molecular weight	424.44 g/mole	
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. 13 of the study report.

2. Buffer Solution: Buffer solutions were bubbled with nitrogen gas to remove oxygen (p. 16). Buffer solutions were prepared with CO_2 free distilled water as follows:

Table 1: Description of buffer solutions.

pH	Type and molarity of buffer	Composition
4	0.01M Acetate	0.1476 g of sodium acetate was dissolved in 500 mL of water. The pH was adjusted to 4.0 with 4.69 mL of 1.75N acetic acid.
7	0.01M Citrate	1.921 g of citric acid was dissolved in 250 mL of water. The pH was adjusted to 7.0 with 285 mL of 0.1N sodium hydroxide.
9	0.01M Borate	0.620 g of boric acid and 0.746 g of potassium chloride were dissolved in 500 mL of water. The pH was adjusted to 9.0 with 43 mL of 0.1N sodium hydroxide.

Data obtained from p. 16 of the study report.

B. EXPERIMENTAL CONDITIONS

1. Preliminary Study: No preliminary studies were performed.

2. Experimental conditions

Table 2: Experimental parameters.

Parameters		pH 4	pH 7	pH 9
Duration of study		60 minutes	52 hours	13 days
Test concentrations Nominal: Measured:		1.25 µg/mL 1.117 µg/mL	1.306 µg/mL	1.341 µg/mL
No. of replications		Single samples were collected at each interval.		
Preparation of test medium	Volume used/treatment	0.14 mL of stock solution was added to 20 mL of buffer solution and 3 mL aliquots of the bulk solution were dispensed into glass tubes.		
	Method of sterilization	Glassware and materials necessary for the study were sterilized by autoclaving (20 minutes, 121°C). Buffer solutions were sterilized (method not reported).		
	Co-solvent	<1% Acetonitrile.		
Test apparatus (type/material/volume)		Glass tubes (10 mL) containing treated buffer solution (3 mL) were sealed with glass plugs.		
Details of traps for volatile, if any		Volatile traps were not used.		
If no traps were used, is the test system closed/open?		Closed.		
Is there any indication of the test material adsorbing to the walls of the test apparatus?		None.		
Experimental conditions Temperature (°C): Lighting: pH ranges:		 50°C. Dark. 4.0, 7.0, 9.0 (ranges not reported).		
Other details, if any		None.		

Data were obtained from pp. 16-18 and 23 of the study report.

3. Supplementary Experiments: A supplementary experiment was performed with a high concentration of unlabeled orthosulfamuron for identification of hydrolysis compounds (p. 18). Unlabeled orthosulfamuron was dissolved in acetonitrile (100 mg/500 µL) and added to 50 mL of pH 9 buffer solution. The solution (ULpH9) was incubated for 8 days at 50°C in the dark. Aliquots (20 µL) of the solution were analyzed by LC-MS (p. 22).

4. Sampling:

Table 3: Sampling details.

Criteria	pH 4	pH 7	pH 9
Sampling intervals	0, 10, 15, 20, 25 and 60 minutes.	0, 21, 25, 29, 45 and 52 hours.	0, 3, 6, 8, 10 and 13 days.
Sampling method	Single tube of each treatment was collected at each interval.		
Method of collection of CO_2 and organic volatile compounds	Volatiles were not collected.		
Sampling intervals/times for: pH measurement: Sterility check:	During incubation period on samples prepared with unlabeled test substance at experimental concentration in each buffered solution. None reported.		
Sample storage before analysis	Not reported.		
Other observation, if any:	None.		

Data were obtained from p. 17 of the study report.

C. ANALYTICAL METHODS

Extraction/clean up/concentration methods: Samples were analyzed directly without extraction or concentration by LSC, TLC and HPLC (p. 18).

Volatile residue determination: Volatiles were not trapped.

Total ^{14}C measurement: Duplicate aliquots (100 µL) of each sample were analyzed for total [^{14}C] residues using LSC (p. 19 and Appendix 3, Table II-IV, pp. 88-89).

Derivatization method, if used: A derivatization method was not employed.

Identification and quantification of parent compound: Aliquots (8-10 µL) of the samples were analyzed for orthosulfamuron using TLC on silica gel 60 F_{254} plates developed with two solvent systems (A) $CHCl_3$:CH_3OH:NH_4OH (75:22:3, v:v) and (B) n-hexane:$CHCl_3$:CH_3OH (50:40:10, v:v, p. 20). Radioactive zones were detected with Fuji BAS 1500 bio-imaging analyzer using imaging plates coated with photostimulable phosphor BaFBr:Eu^{2+}. [^{14}C]Orthosulfamuron was identified by cochromatography with ^{14}C-reference standards (p. 18, Figure 19, p. 59 and Figure 21, p. 61).

The TLC results were confirmed with HPLC under the following conditions (p. 21): Supelcosil LC-18 (250 x 4.6 mm, 5 µm) column, gradient mobile phase consisting of (A) 4mM KH_2PO_4 (pH 5) and (B) acetonitrile [percent A:B (v:v), 0-20 minutes, 80:20 to 10:90; 20-25 minutes, 10:90; 25-27 minutes, 10:90 to 80:20]; flow rate 0.8 mL/minute; 20 µL aliquots; with RAMONA-2000 radiodetector. A second method used a mobile phase of (A) 1 mM CH_3COONH_4 (pH 4.5) and (B) acetonitrile. [^{14}C]Orthosulfamuron was identified by cochromatography with ^{14}C-reference standards, [^{14}C]orthosulfamuron and [^{14}C-5-ring] DOP amine (radiochemical purity >97%), and by comparison to an unlabeled reference standard of orthosulfamuron (purity >98%; pp. 13, 18, Figure 20, p. 60, Figure 22, p. 62 and Appendix 6, p. 97).

Identification and quantification of transformation products: Transformation products were identified and quantified using TLC and HPLC as described for the parent compound (pp. 18, 20-21).

Detection limits (LOD, LOQ) for the parent compound: For LSC, the limit of determination was twice background (p. 19). The limit of detection and the limit of quantification were not reported for TLC and HPLC.

Detection limits (LOD, LOQ) for the transformation products: The limits of detection and quantification were the same as for the parent compound (p. 19).

II. RESULTS AND DISCUSSION

A. TEST CONDITIONS: During the study, the temperature of the buffer solutions was 50°C and the buffer solutions were maintained at pH 4, 7 and 9 (no supporting records provided). The sterility of the test solutions was not reported.

B. MASS BALANCE: Overall recoveries of [^{14}C]residues of the applied averaged 102 ± 1% (range 100-104%) from the pH 4 buffer solution, 102 ± 2% (range 100-104%) from the pH 7 buffer solution and 103 ± 1% (range 101-104%) from the pH 9 buffer solution (Table 1, p. 35). There was no pattern of loss of material over time from any of the buffer solutions.

Table 4a: Hydrolysis of orthosulfamuron, expressed as percentage of the applied radioactivity (n = 1), at pH 4.

Compound	Sampling times (minutes)					
	0	10	15	20	25	60
Orthosulfamuron (H3)	95.73	78.95	67.33	60.40	48.26	14.88
N-(4,6-dimethoxy-pyrimidin-2-yl)urea (H5)	1.08	15.47	27.33	33.64	45.52	78.07
2-amino-4,6-dimethoxy-pyrimidine (H6)	0.50	1.25	1.70	2.26	2.90	4.08
Unidentified Radioactivity	2.69	4.33	3.64	3.69	3.32	2.97
CO_2	Volatiles were not collected.					
Volatile organics	Volatiles were not collected.					
Total Recovery	100.29	101.74	101.86	102.42	102.26	104.01

Data obtained from Table 1, p. 35, Table 2, p. 36 and Appendix 3, Table VI, p. 91 of the study report.

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Table 4b: Hydrolysis of orthosulfamuron, expressed as percentage of the applied radioactivity (n = 1), at pH 7.

Compound	Sampling times (hours)					
	0	21	25	29	45	52
Orthosulfamuron (H3)	95.73	56.06	51.25	44.19	35.53	26.82
N-(4,6-dimethoxy-pyrimidin-2-yl)urea (H5)	0.54	34.24	39.08	44.88	52.01	59.84
2-amino-4,6-dimethoxy-pyrimidine (H6)	0.44	6.28	6.56	8.18	9.85	10.82
Unidentified Radioactivity	3.28	3.42	3.10	2.74	2.60	2.53
CO_2	Volatiles were not collected.					
Volatile organics	Volatiles were not collected.					
Total Recovery	100.02	101.99	103.65	104.06	102.03	101.28

Data obtained from Table 1, p. 35, Table 3, p. 36 and Appendix 3, Table VII, p. 91 of the study report.

Table 4c: Hydrolysis of orthosulfamuron, expressed as percentage of the applied radioactivity (n = 1), at pH 9.

Compound	Sampling times (days)					
	0	3	6	8	10	13
Orthosulfamuron (H3)	95.69	78.19	63.76	52.77	47.06	32.66
N-(4,6-dimethoxy-pyrimidin-2-yl)urea (H5)	0.98	4.36	6.54	8.74	10.82	12.78
2-amino-4,6-dimethoxy-pyrimidine (H6)	0.61	14.42	27.18	35.91	40.29	52.57
Unidentified Radioactivity	2.72	3.02	2.54	2.60	1.83	1.99
CO_2	Volatiles were not collected.					
Volatile organics	Volatiles were not collected.					
Total Recovery	100.63	104.37	102.62	103.49	104.37	103.87

Data obtained from Table 1, p. 35, Table 4, p. 37 and Appendix 3, Table VIII, p. 92 of the study report.

C. TRANSFORMATION OF PARENT COMPOUND: The concentration of [^{14}C-5-pyrimidinyl] orthosulfamuron decreased rapidly in the pH 4 buffer solution, decreasing from 95.73% of the applied at time 0 to 48.26% at 25 minutes and was 14.88% at study termination (60 minutes; Table 2, p. 36 and Appendix 3, Table VI, p. 91). [^{14}C]Orthosulfamuron was hydrolyzed less rapidly in the pH 7 buffer solution, decreasing from 95.73% of the applied at time 0 to 51.25% at 25 hours and was 26.82% at study termination (52 hours; Table 3, p. 36 and Appendix 3, Table VII, p. 91). At pH 9, [^{14}C]orthosulfamuron decreased from 95.69% at time 0 to 52.77% at 8 days and was 32.66% at study termination (13 days; Table 4, p. 37 and Appendix 3, Table VIII, p. 92).

HALF-LIVES/DT_{50}/DT_{90}: Based on first order linear regression analysis (Excel 2003), [^{14}C-5-pyrimidinyl]orthosulfamuron dissipated from the buffer solution of pH 4, pH 7 and pH 9 with a half-life of 0.015 days (21.6 minutes), 1.2 days (28.8 hours) and 8.6 days, respectively (DER Attachment 2). The observed DT_{50} was 20-25 minutes in pH 4, 25-29 hours in pH 7 and 8-10 days in pH 9 (Table 2-4, pp. 36-37).

Half-lives/DT_{50}/DT_{90}

pH	First order linear			DT_{50} (days)	DT_{90} (days)
	Half-life (days)	Regression equation	r^2		
4	0.015	y = -46.088x + 4.6631	0.9910	0.017	--
7	1.2	y = -0.5593x + 4.5302	0.9847	1.0	--
9	8.6	y = -0.0804x + 4.5994	0.9853	9	--

Calculated using data from Table 2-4, pp. 36-37 and Appendix 3, Table VI-VIII, pp. 91-92 in the study report (DER Attachment 2).

TRANSFORMATION PRODUCTS: At pH 4, pH 7 and pH 9, the major transformation product detected was N-(4,6-dimethoxypyrimidin-2-yl)urea (DOP urea; H5) with maximum concentrations at study termination of 78.07%, 59.84%, and 12.78% of the applied, respectively (Table 2-4, pp. 36-37). At pH 7 and pH 9, the major transformation product was 2-amino-4,6-dimethoxypyrimidine (DOP amine; H6) with a maximum concentration of 10.82% and 52.57% of the applied, respectively, at study termination. At pH 4, H6 was a minor transformation product with a maximum concentration at study termination of 4.08% of the applied. Unidentified radioactivity accounted for 2.97%, 2.53% and 1.99% of the applied at study termination at pH 4, 7 and 9, respectively (Appendix 3, Table VI-VIII, pp. 91-92).

Table 5: Chemical names and CAS numbers for the transformation products of orthosulfamuron.

Applicants Code Name	CAS Number	Chemical Name	Chemical Formula	MW (g/mol)	Smiles String
DOP urea; H5		N-(4,6-dimethoxypyrimidin-2-yl)urea			
DOP amine; H6		2-Amino-4,6-dimethoxypyrimidine			

Data obtained from pp. 26-27, 31 of study report.

VOLATILIZATION: Volatiles were not collected.

TRANSFORMATION PATHWAY: The study authors provided a transformation pathway for orthosulfamuron (p. 32). Orthosulfamuron hydrolyzes into five possible forms, consisting of 2-sulfoamino-N,N-dimethylbenzamide (H1), 2-sulfamoylamino-N,N-dimethylbenzamide (H2), 2-amino-N,N-dimethylbenzamide (H4), N-(4,6-dimethoxypyrimidin-2-yl)urea (H5) and 2-amino-4,6-dimethoxypyrimidine (H6; Reviewer's Comment 3). H1 and H2 hydrolyze to H4.

D. SUPPLEMENTARY EXPERIMENT-RESULTS: The supplementary experiment performed with a high concentration of unlabeled orthosulfamuron for identification of hydrolysis compounds identified unhydrolyzed orthosulfamuron and two transformation products (pp. 25-26 and Figure 24, pp. 64). Analysis by LC-MS of unlabeled orthosulfamuron incubated in pH 9 buffer solution (ULpH9) identified compounds H5 and H6 as N-(4,6-dimethoxypyrimidin-2-yl)urea and 2-amino-4,6-dimethoxypyrimidine respectively (pp. 26-27 and Figures 28-31, pp. 68-71).

III. STUDY DEFICIENCIES

1. The study was not conducted at 25±1°C, but at 50°C.

2. The sterility of the test solutions was not confirmed. This is not a concern in the pH 4 buffer, in which orthosulfamuron dissipated with a half-life of <1 hour. However, sterility may be a concern in the longer-term experiments.

3. No data were provided to support the reported temperatures and pH.

4. Study authors did not state the number of samples or the use of replication; therefore, single samples were assumed taken at each interval (pp. 17-18, Table 2-4, pp. 36-37 and Appendix 3, Table VI-VIII, pp. 91-92).

5. The limits of detection and quantification were not reported for TLC and HPLC.

IV. REVIEWER'S COMMENTS

1. In MRID 46219015, a companion hydrolysis study in which [phenyl-^{14}C]orthosulfamuron was studied at 50°C under similar conditions, orthosulfamuron dissipated with a half-life of 0.5 hours in the pH 4 buffer, 1.5 days in the pH 7 buffer, and 8 days in pH 9 buffer. In the pH 4 solution, 2-sulfoamino-N,N-dimethylbenzamide (DBS acid; H1) was a maximum of 90.44% of the applied (1 day post-treatment) and declined to 86.34% at study termination (5 days); 2-sulfamoylamino-N,N-dimethylbenzamide (DBS amide; H2) was 8.54% (3 hours) and declined to 1.16%; and 2-amino-N,N-dimethylbenzamide (DB amine; H4) was 12.50% (5 days). In the pH 7 solution, H1 was a maximum of 80.94% of the applied (166 hours post-treatment, study termination); H2 was 6.67% (48 hours) and declined to 2.32%; and H4 was 13.62% (166 hours). In the pH 9 solution, H1 was a maximum of 41.22% of the applied (29 days post-treatment, study termination); H2 was 17.00% (6 days) and declined to 2.62%; and H4 was 49.32% (29 days).

   In MRID 46219015, the hydrolysis of orthosulfamuron at 25°C and pH 7 or pH 9 was also examined. [^{14}C]Orthosulfamuron dissipated with half-lives of 22.1 and 231 days, respectively.

V. REFERENCES

1. U.S. Environmental Protection Agency. 1982. Pesticide Assessment Guidelines, Subdivision N, Chemistry: Environmental Fate, Section 161-1. Hydrolysis 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.

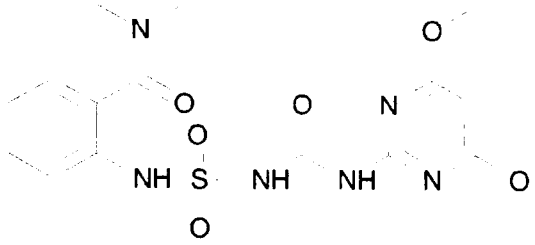
3. U.S. Environmental Protection Agency. 1993. Pesticide Registration Rejection Rate Analysis - Environmental Fate. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 738-R-93-010.

Attachment 1: Structure of Parent Compound and Transformation Products

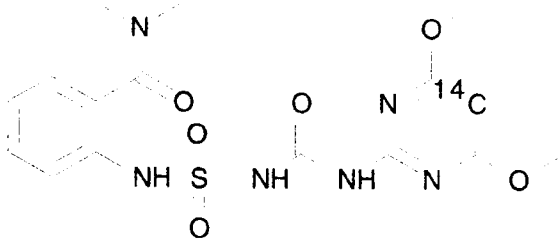
Orthosulfamuron [IR5878; S3; H3]

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 7/6/06.

Unlabeled



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

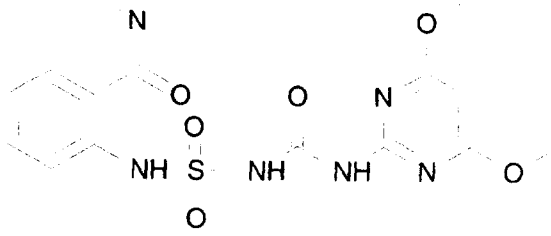


^{14}C = Location of the radiolabel.

Identified Compounds

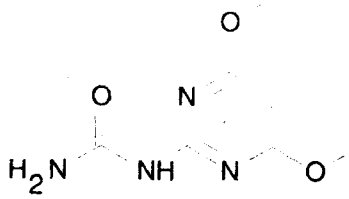
Orthosulfamuron [IR5878; S3; H3]

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 7/6/06.



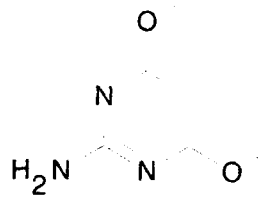
DOP urea [IR7825; S12; H5]

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



DOP amine [S13; H6]

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



Attachment 2: Excel Spreadsheets

Chemical:Orthosulfamuron
MRID: 46219016
PC Code: 108209
Guideline: 161-1

Recovery of Radioactivity after Incubation at 50 C.

pH 4

Minutes posttreatment	% applied radioactivity Total
0	100.29
10	101.74
15	101.86
20	102.42
25	102.26
60	104.01
Average	102.10
SD	1.20

Data obtained from Table 1, p. 35 of the study report.

pH 7

Hours posttreatment	% applied radioactivity Total
0	100.02
21	101.99
25	103.65
29	104.06
45	102.03
52	101.28
Average	102.17
SD	1.50

Data obtained from Table 1, p. 35 of the study report.

pH 9

Days posttreatment	% applied radioactivity Total
0	100.63
3	104.37
6	102.62
8	103.49
10	104.37
13	103.87
Average	103.23
SD	1.43

Data obtained from Table 1, p. 35 of the study report.

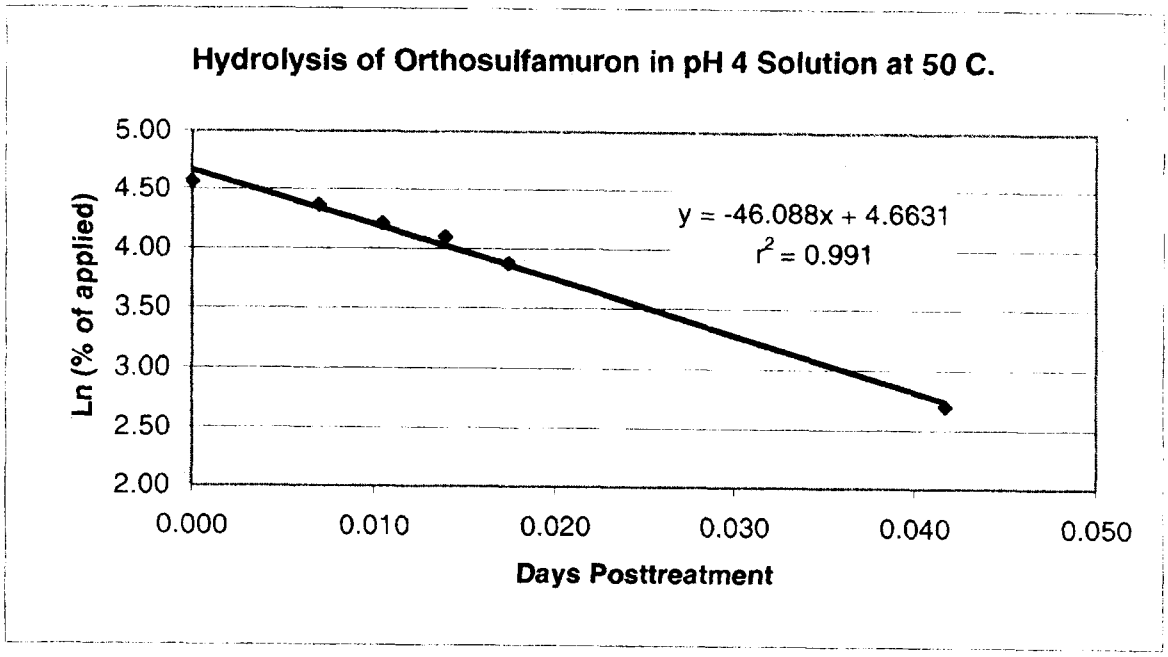
Chemical: Orthosulfamuron
MRID: 46219016
PC Code: 108209
Guideline: 161-1

pH 4, 50 C

Half-life (days) **0.015**

Minutes posttreatment	Days posttreatment	% applied radioactivity	
		orthosulfamuron	LN
0	0.000	95.73	4.5615
10	0.007	78.95	4.3688
15	0.010	67.33	4.2096
20	0.014	60.40	4.1010
25	0.017	48.26	3.8766
60	0.042	14.88	2.7000

Data obtained from Table 2, p. 36 of the study report.



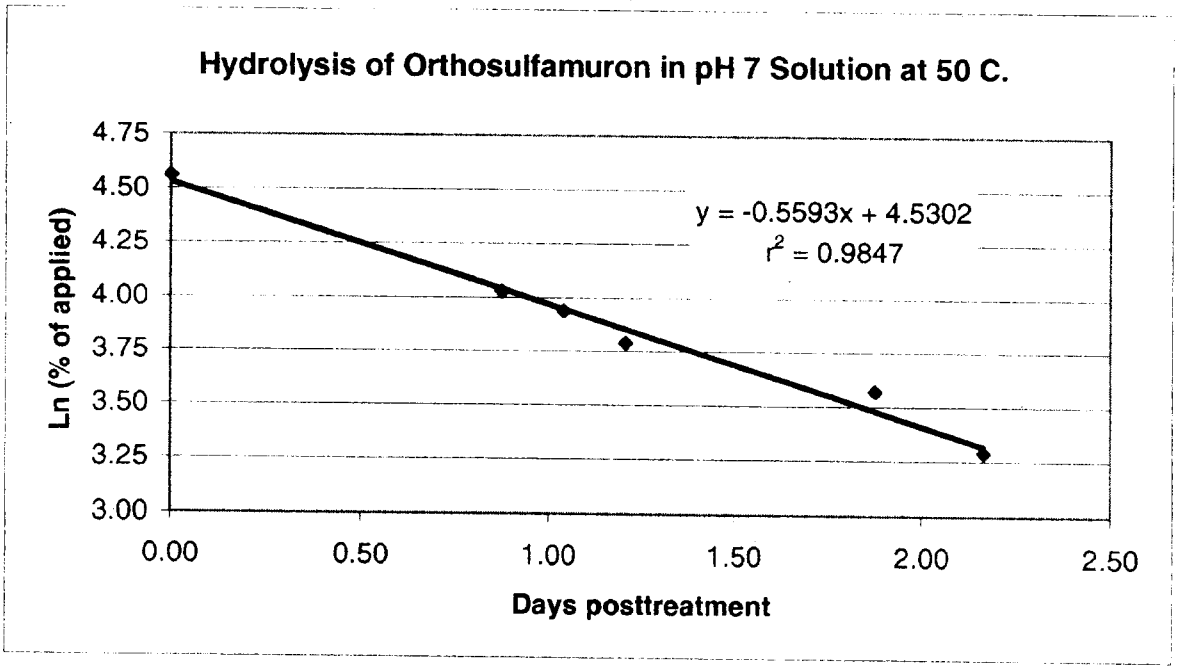
Chemical: Orthosulfamuron
MRID: 46219016
PC Code: 108209
Guideline: 161-1

pH 7, 50 C

Half-life (days) **1.2**

Hours posttreatment	Days posttreatment	% applied radioactivity	
		orthosulfamuron	LN
0	0.000	95.73	4.5615
21	0.875	56.06	4.0264
25	1.042	51.25	3.9367
29	1.208	44.19	3.7885
45	1.875	35.53	3.5704
52	2.167	26.82	3.2891

Data obtained from Table 3, p. 36 of the study report.



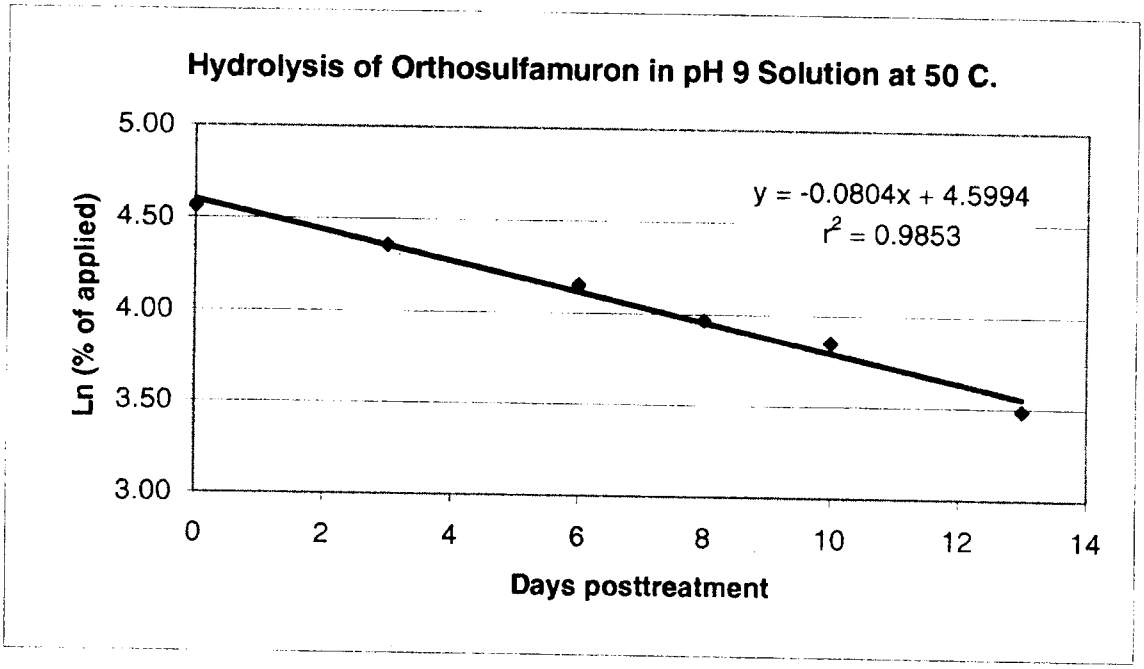
Chemical: orthosulfamuron
MRID: 46219016
PC Code: 108209
Guideline: 161-1

pH 9, 50 C

Half-life (days) **8.6**

Days posttreatment	% applied radioactivity	
	orthosulfamuron	LN
0	95.7	4.5611
3	78.2	4.3591
6	63.8	4.1551
8	52.8	3.9659
10	47.1	3.8514
13	32.7	3.4862

Data obtained from Table 4, p. 37 of the study report.



Attachment 3: Transformation Pathway Presented by Registrant

DER for MRID # 46019016

Page 24 is not included in this copy.

Pages _____ through _____ 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.

_____ The document is a duplicate of page(s) _____.

_____ The document is not responsive to the request.

_____ Internal deliberative information.

_____ Attorney-Client work product.

_____ Claimed Confidential by submitter upon submission to the Agency.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.
