

Date: May 28, 2003

SUBJECT: Product Chemistry Review of Penoxsulam Technical

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TO: Joanne Miller / Philip Errico, PM 23
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DP BARCODE: D288043
EPA REG. NO.: 62719-U00
PCCODE: 119031
REGISTRANT: Dow Agrosciences LLC
USE: Herbicide

SB Mathur
5/28/03
DM-62
5-2-03

INTRODUCTION:

The registrant has submitted the product chemistry data to support the registration application for the new active ingredient Penoxsulam technical. Penoxsulam technical is a manufacturing use product for formulation into an herbicide for use only on rice crops. The technical is manufactured by DowAgrowscience's facility located at Indianapolis, IN. The product chemistry data have been submitted under MRID Nos. 45830701 (Volumes 1 & 2), 45830705, 45830706, 45830707, and 45830708. The applicant has also submitted a CSF for basic formulation dated 07-30-02 and the product label. TRB has been asked to evaluate the product chemistry data submitted and determine whether data satisfy the requirements for registration with the Agency.

SUMMARY OF FINDINGS:

1. The registrant has submitted the Confidential Statement of Formula for basic formulation (dated 07-30-02), for Penoxsulam technical. The nominal concentration (98.0%) of the AI concurs with the product label claim nominal concentration of 98.0%. The product chemistry data submitted corresponding to guideline reference 830.1550 (Product identity & Composition) and 830.1750 (Certified limits) satisfy the data requirements of 40CFR§158.155 and 158.175 respectively.
2. The product chemistry data submitted corresponding to guideline reference 830.1600 (Description of material used to produce the product) satisfy the data requirements of 40CFR§ 158.160. The registrant has provided the product specifications data on all the starting materials used for the production of this herbicide. [MRID No. 458307- 01, Vol. 1]
3. The product chemistry data submitted corresponding to guideline reference 830.1620 (Description of production process) satisfy the data requirements for 40CFR§158.162. The details of the manufacturing process have been provided. [MRID No. 458307- 01, Vol. 2]
4. The product chemistry data submitted corresponding to guideline reference 830.1670 (Discussion on the formation of impurities) satisfy the data requirements for 40CFR§158.167. The identities and mechanisms for formation of these impurities have been provided. [MRID No. 458307- 01, Vol. 2]
5. The data submitted corresponding the guideline reference 830.1700 (Preliminary analysis) satisfy the data requirements of 40CFR§158.170. Six representative batches of the technical were analyzed for percent active ingredient using HPLC/UV (285nm) method. Some of the impurities were identified at UV detector operating at 265 nm and others at 360 nm. The structures of the active ingredient and some impurities were confirmed by LC/UV (280 nm) coupled to Waters ZMD quadrupole MS system via a Micromass Z-spray electrospray interface (ESI) operating in the PI and NI modes. The methods were validated for accuracy, linearity, and precision. [MRID No. 458307- 01, Vol. 2]

6. The data submitted corresponding the guideline reference 830.1800 (Enforcement Analytical method) satisfy the data requirements of 40CFR§158.180. The HPLC / UV (285 nm) method was used to assay the active ingredient in the technical. The method was validated for accuracy, linearity, and precision. [MRID No. 458307-01, Volume 1]

7. The registrant has submitted product chemistry data corresponding to guideline reference 830 Series Subgroup B (Physical/Chemical properties) for the technical. The data submitted satisfy the data requirements of 40CFR 158.190. [MRID No. 458307-05 to 458307-08]

8. The registrant has stated that data corresponding to guideline reference 830.6317 (one year storage stability) and 830.6320 (Corrosion characteristics) are in progress and the results will be submitted on completion to the Agency.

CONCLUSIONS:

The TRB has reviewed the product chemistry data submitted for the technical and has concluded that:

1. All the product chemistry data submitted corresponding to 830 Series Subgroup A and Subgroup B satisfy the data requirements of 40CFR§158.155 to 158.190 and are acceptable, except for one year storage stability (830.6317), and corrosion characteristics (830.6320) studies.

2. The CSF for basic formulation (dated 07-30-02) is filled out correctly or completely. The nominal concentration of the active ingredient (98.0%) concurs with the product label claim nominal concentration 98.0%. The CSF for basic formulation is acceptable.

3. The applicant must submit the results for one year storage stability (830.6317) and corrosion characteristics (830.6320) studies to the Agency.

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830.1550. Product Identity: [MRID No.: 458307-01, Vol. 1]

Common Name: Penoxsulam technical, DE-638

Chemical Name: 2-(2,2-difluoroethoxy)-N-(5,8-dimethoxy[1,2,4]triazolo[1,5-c]pyrimidin-2-yl)-6-(trifluoromethyl)benzenesulfonamide

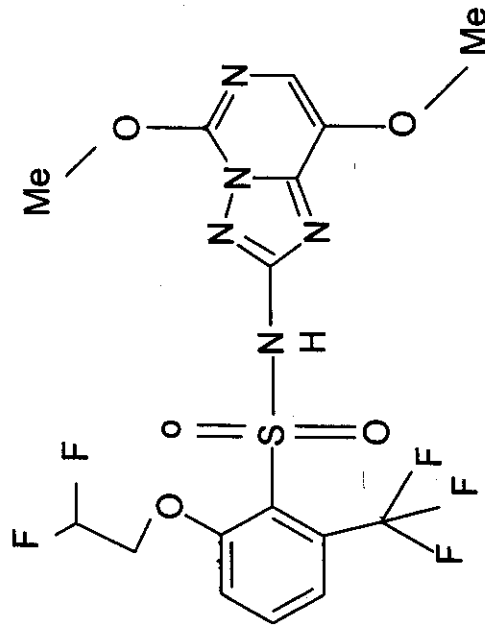
CAS No.: 219714-96-2

PC Code No.: 119031

Empirical formula: $C_{16}H_{14}F_5N_5O_5S$

Molecular Weight: 483.38

Structural formula:



REVIEW OF PRODUCT CHEMISTRY, OPPTS 830 SERIES

Chemical Name (IUPAC, CAS)	Penoxsulam
Chemical Number (CAS; PC Code)	CAS No. 219714-96-2 PC Code: 119031
Registration/Symbol No.	62719-UOO
Type of Product (T, MP, EP)	98.0% TGA/ MP
DP Barcode	D288043
Reviewer	Shyam B. Mathur
Branch Chief	Deborah McCall

Table 1: Manufacturing and Impurity Data for the Penoxsulam Technical				
GLN	Requirement	MRID	Status ¹	Details and/or Deficiency ²
830.1550	Product identity and composition	Basic CSF (07-30-02)	A	The NC of AI (98.0%) is supported by 6 batch analysis & concurs with the product label claim 98.0%.
830.1600	Description of materials used to produce product	458307-01 Vol. 1	A	The product specification sheets(MSDS) for all the starting materials have been provided by registrant.
830.1620	Description of production process	458307-01 Vol. 2	A	The production process has been described in full details. The reaction conditions, amounts of the reagents and the equipment used in each step have been provided. The yields of all the intermediate and the final product have been reported.
830.1670	Discussion of formation of impurities	458307-01 Vol. 2	A	The registrant has provided the complete mechanisms of formation, quantification and identification of all the impurities. Two toxicologically significant impurities have been identified and quantified.
830.1700	Preliminary analysis	" " "	A	Registrant has provided 6 batch analysis for the TGA/MP. The AI was assayed by using HPLC / UV(265 nm). The impurities were identified by using HPLC, HPLC/ESI/MS methods. The analytical methods have been validated for precision, linearity & accuracy.
830.1750	Certified limits	Basic CSF (07-30-02)	A	The proposed certified limits for the TGA/MP were within standard certified limits. The NC & UCL for the tox concern impurities have been provided.
830.1800	Enforcement analytical method	458307-01 Vol. 1	A	The HPLC / UV (285 nm) method was used for the assay of the AI in technical.
A = Acceptable; N = Unacceptable (see Deficiency); N/A = Not Applicable.; G = Data gap; I = In progress or need upgrade;				

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Table 2: Physical and Chemical Properties of the Bromadiolone Technical. *See Note for acceptance condition				
GLN	Requirement	MRID	Status ¹	Result ² or Deficiency
830.6302	Color	458307-05 458307-07	A	Off white
830.6303	Physical state	" "	"	Solid
830.6304	Odor	" "	"	Musty
830.6313	Stability to normal and elevated temperatures, metals, and metal ions	458307-05	A	See Note 1
830.6314	Oxidation/reduction: chemical incompatibility	" "	A	See Note 2
830.6315	Flammability	" "	NA	
830.6316	Explosibility	" "	A	Not explosive
830.6317	Storage stability	" "	I	In progress, results will be submitted
830.6319	Miscibility		NA	
830.6320	Corrosion characteristics	" "	I	In progress, results will be submitted
830.7000	pH	" "	A	5.20 (1% slurry)
830.7050	UV/Visible absorption	" "	A	See Note 3
830.7100	Viscosity	NA		
830.7200	Melting point/ Melting range	458307-05	A	212 °C
830.7220	Boiling point/ Boiling range	" "		Decomposes on melting
830.7300	Bulk Density	458307-07 458307-05	A	Relative density = 1.61 at 21 °C
830.7370	Dissociation constants in water	458307-05	A	pKa = 5.1
830.7550	Partition coefficient (n-octanol/water), shake flask method	" "	A	unbuffered water: Log K _{ow} = -0.354 pH 5: Log K _{ow} = 1.137 pH 7 Log K _{ow} = -0.602 pH 9 Log K _{ow} = -1.418
830.7840	Water solubility: column elution method; shake flask method	" "	A	See Note 4
830.7950	Vapor pressure	"	A	9.55 x 10 ⁽⁻¹⁴⁾ Pa at 25 °C 2.49 x 10 ⁽⁻¹⁴⁾ Pa at 20 °C
A = Acceptable; N = Unacceptable (see Deficiency); N/A = Not applicable ; G = Data gap ; W = waiver request I = Incomplete or in progress; U = Needs upgrading				

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Note 1. 830.6313. Stability:

No chemical degradation at elevated temperatures or in the presence of metals and cuprous chloride and Nickel (II)chloride was noted at 20°C or 50°C. DE-638 was found to degrade in the presence of ferric chloride 20°C or 50°C.

Note 2. 830.6314. Oxidation/Reduction: A color change was noted after addition of KMnO_4 reagent, but no significant increase in temperature was noted. No significant changes in temperature were observed after addition of ammonium phosphate, zinc or water.

Note 3. UV/Vis. 830.7050.

Solution	Lambda max (nm)	e, L/(mol cm)
Neutral	284	9530
Basic (pH =12)	228	44300
	284	9380
Acidic (pH=1)	251	7450
	284	9520

Note 4. Solubility. 830.7840:

Organic solvents (g/L): 1,2-dichloroethane (1.99); Ethyl acetate (3.23); N,N-DMF (39.8); N-methylpyrrolidinone (40.3); Acetonitrile (15.3); Acetone (20.3); Dimethyl sulfoxide (78.4); Methanol (1.48); Octanol (0.035); Xylene (0.017); Heptane (< 1 ug/L).

Water at 19°C:

Unbuffered water (4.91 mg/L); pH 5 buffer (5.66 mg/L); pH 7 buffer (0.408 mg/L); pH 9 buffer (1.46 g/L).

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DER FOR:

MRTID #'S 45830705, 06, 07 + 08

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Pages 7 through 16 are not included.

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.

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.
