



CHEMICAL UPDATE WORKSHEET

Chemical Name:	Oxamyl
CAS #:	23135-22-0
Revised By:	RRD Toxicology Unit
Revision Date:	November 24, 2015

(A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	219.29	219.26	EPI	EXP
Physical State at ambient temp	Solid	Solid	MDEQ	
Melting Point (°C)	---	101.00	EPI	EXP
Boiling Point (°C)	---	NA	NA	
Solubility (ug/L)	2.80E+8	280000000	EPI	EXP
Vapor Pressure (mmHg at 25°C)	0.00023	2.30E-04	EPI	EXP
HLC (atm-m ³ /mol at 25°C)	2.37E-10	2.37E-10	PP	EST
Log Kow (log P; octanol-water)	-0.47	-0.47	EPI	EXP
Koc (organic carbon; L/Kg)	0.508	10	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm ² /s)	0.08	2.35E-02	W9	EST
Diffusivity in Water (Dw; cm ² /s)	8.0E-6	5.87E-06	W9	EST
Soil Water Partition Coefficient (Kd; inorganics)	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
Flash Point (°C)	NA	NA	NA	NA
Lower Explosivity Level (LEL; unitless)	NA	NA	NA	NA
Critical Temperature (K)		NA	NA	NA
Enthalpy of Vaporization (cal/mol)		NA	NA	NA
Density (g/mL, g/cm ³)		0.97	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm ²)	NA	2.71E-07	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm ²)	NA	2.71E-07	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm ²)	NA	2.88E-07	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm ²)	NA	2.88E-07	EMSOFT	EST

(B) Toxicity Values/Benchmarks

	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
Reference Dose (RfD) (mg/kg/day)	3.8E-2	6.9E-3	OPP, 2010	
RfD details	2-year rat feeding study, NOAEL=50 ppm (adjusted); UF=100. Critical effect = decreased body weight gain and food consumption (DuPont 1972a). RD calculation date: 12/9/86.	<p>Tier 1 Source: EPA-OPP: Basis: The acute RfD presented in the OPP information is lower than the chronic RfD presented in IRIS. In addition, the acute RfD is based on updated information. Selection of the acute RfD also protects for chronic effects. EPA-OPP (2010): 0.0069 mg/kg/day is an acute RfD. Due to the rapid recovery of ChE activity, the acute exposure from oxamyl is the main duration of concern and therefore a chronic assessment is not appropriate for oxamyl. Critical Study: McFarlane, P and Freestone S. (1999) A randomized double blind ascending oral dose study with oxamyl. Inveresk Clinical Research, Riaccarton, Edinburgh, EH14 4AP, Scotland. Laboratory Project ID: HLO-1998-01505, August 10, 1999. MRID 44912301. Unpublished. Methods: 40 healthy human male volunteers, aged 19-39 years, were each given a single oral dose of oxamyl technical in a gelatin capsule at dose of 0, 0.005, 0.015, 0.03, 0.06, 0.09, or 0.15 a.i. mg/kg bw. Critical effect: red blood cell cholinesterase activity inhibition End point or Point of Departure (POD): BMDL₁₀ = 0.069 mg/kg Uncertainty Factors: UF = 10; intraspecies variability Source and date: EPA-OPP Memorandum: Oxamyl: Updated Occupational and Residential Exposure Assessment. July 20, 2010.</p> <p>Tier 1 and 2 Sources: IRIS: chronic RfD = 2.5E-2 mg/kg-day Critical Study: E.I. du Pont de Nemours and Company. 1972a. MRID No. 00083352, 00113400. Available from EPA. Write to FOI, EPA, Washington, DC 20460. Methods: Four hundred twenty albino rats (55/sex/dose) were fed 0, 50, 100 and 150 ppm oxamyl in their diets for 2 years. At 100 and 150 ppm, there was a decreased rate of body weight gain.</p>	OPP, 2010	Complete



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		<p>Critical effect: Decreased body weight gain and food consumption.</p> <p>End point or Point of Departure (POD): NOAEL = 50 ppm (2.5 mg/kg/day)</p> <p>Uncertainty Factors: UF = 100 (10 each for inter- and interspecies differences) Although significant data gaps exist (studies must be repeated), an additional UF was not considered necessary since existing information on oxamyl indicates that the toxicological endpoints will not be affected by repeating the studies.</p> <p>Source and date: IRIS 3/1/1991.</p> <p>PPRTV: No PPRTV record available at this time.</p> <p>MRL: No MRL record available at this time.</p> <p>Tier 3 Sources: Office of Chemical Safety and Pollution Prevention. July 1, 2010 MEMORANDUM. SUBJECT: Updated toxicity endpoints for oxamyl. Oxamyl is a member of the N-Methyl Carbamate (NMC) common mechanism group and was therefore included in the NMC Cumulative Risk Assessment (CRA). NMCs share the ability to inhibit the acetyl cholinesterase enzyme (AChE) via carbamylation. Due to the rapid nature of NMC toxicity, the acute inhibition of AChE therefore, is the main exposure duration of concern.</p> <p>This memo will first highlight the changes in the database for oxamyl since the 1999 Reregistration Eligibility Decision (RED). These changes are followed by the results of the comparative cholinesterase study and the human RBC AChE study. A side-by-side comparison of all available AChE data for the point of departure is then presented followed by the updated FQPA factor. The memo further outlines the differences in the 2009 dose-response assessment (acute dietary, dermal, and inhalation) compared to the 1999 RED.</p> <p>Acute Dietary – All populations. POD = 0.069 mg/kg; UFH = 10x; FQPA SF = 2.65x (brain); aRfD = 0.0069 = 6.9E-3 mg/kg/d. Human study (MRID 44912301); BMD₁₀ = 0.083 mg/kg; BMDL₁₀ = 0.069 mg/kg, based on RBC AchE inhibition.</p>		

	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		MDEQ: Per DEQ-CCD-RRD, 12/9/1986: RfD = 0.038 mg/kg/day. 2 year rat feeding study, NOAEL = 50 ppm (adjusted). UF = 100. Critical effect is decreased body weight gain and food consumption (DuPont 1972a).		
Oral Cancer Slope Factor (CSF) (mg/kg-day)⁻¹	--	NA	MDEQ 2015	
CSF details	--	<p>EPA-OPP: Determined to be “not likely” a human carcinogen Source and date: EPA-OPP Memorandum: Oxamyl: Updated Occupational and Residential Exposure Assessment. July 20, 2010. IRIS, 3/1/1991: This substance has not undergone a complete evaluation and determination under EPA’s IRIS program for evidence of human carcinogenic potential.</p> <p>Tier 1 and 2 Sources: IRIS (1991): No value available at this time. EPA-OPP (2010): No value available at this time. PPRTV: No PPRTV record available at this time. MRL: NA; MRLs are for non-cancer effects only.</p> <p>Tier 3 Source: MDEQ-CCD-RRD, NA. US EPA, Office of Chemical Safety and Pollution Prevention, August 18, 2010 MEMORANDUM. SUBJECT: Oxamyl: Registration Review Scoping Document for Human Health Assessments. Oxamyl is classified as “not likely” to be a human carcinogen based on carcinogenicity studies in rats and mice.</p>		Complete
Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) (µg/m³)	--	2.5E+1	MDEQ, 2015	
RfC/ITSL details	--	Tier 3 Source:		



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		<p>MDEQ: Basis: MDEQ RfC is available; no Tier 1 and 2 available. Evaluation of other Tier 3 sources will be conducted in the next update cycle. See details below.</p> <p>Tier 1 Sources: IRIS, 3/1/1991: No RfC value available at this time. EPA-OPP: Due to the rapid recovery of ChE activity, the acute exposure from oxamyl is the main duration of concern and therefore a long-term assessment is not appropriate for oxamyl. An acute inhalation RfC <u>may</u> be determined. No RfC value is presented in the document. Critical study: O’Neil, AJ 2000. Cholinesterase inhibition determined in rats exposed to inhalation atmospheres of oxamyl technical (96.9%). The Haskell Lab of Toxicology & Industrial Medicine, El du Pont de Nemours Co. DuPont Study No. 4383 (6/27/2000) Unpublished. MRID 45155801. Methods: acute (single day, 4 hours) inhalation study in rats Critical effect: inhibition of cholinesterase in and red blood cells in box sexes End point or Point of Departure (POD): BMDL₁₀ =0.0018 mg/L; Occupational HEC = 2.25 mg/mw; Non-occupational HEC = 0.75 mg/m3. Uncertainty factors: Margin of error (MOE) = 30 for adult, occupational scenario Source and date: EPA-OPP Memorandum: Oxamyl: Updated Occupational and Residential Exposure Assessment. July 20, 2010.</p> <p>Tier 2 Sources: PPRTV: No PPRTV record available at this time. MRL: No MRL record available at this time.</p> <p>Tier 3 Source: MDEQ: AQD reviewed the information in the OPP document and generated an RfC of 2.5E+1 µg/m³ with a 24 hour averaging time. (7/15/2015). See AQD justification. Critical Study: Unpublished four-hour rat inhalation study by O’Neil AJ in EPA, 2000.</p>		<p>Complete.</p>

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		<p>Methods: Two groups (10 per sex per group) of rats were exposed in a nose only inhalation chamber for 4 hours at 0.0049 mg/L (gravimetrically determined) and the other group at 0.024 mg/L (also gravimetrically determined).</p> <p>Critical Effect: tremors and lethargy; acetylcholinesterase inhibitor at 4.9 mg/m³; EPA Benchmark Dose results for the POD for RBC cholinesterase = 1.8 mg/m³.</p> <p>Point of Departure: BMDL₁₀ (NOAEL)_{HEC} = 0.75 mg/m³</p> <p>Uncertainty Factors: 30 (3 for intraspecies variability and 10 for intraspecies variability).</p> <p>Source and Date: EPA. 2010. Memorandum entitled "Updated Toxicity Endpoints for Oxamyl". PC Code: 103901; TXR No.: 0055406; DP Barcode: D379814; Registration No.: 352-400; CAS No.: 23135-22-0. Elissa Reaves, PhD., Senior Toxicologist RAB VI Health Effects Division (7509P). United States Environmental Protection Agency Washington, D.C. 20460. Office of Chemical Safety and Pollution Prevention. Dated July 1, 2010 <i>as evaluated by AQD 7/15/2015</i>.</p> <p>Note: Evaluation of other Tier 3 sources will be conducted in the next update cycle.</p>		
Inhalation Unit Risk Factor (IURF) ((μg/m ³) ⁻¹)	--	NA	MDEQ, 2015	
IURF details	--	<p>Tier 1 and 2 Sources:</p> <p>IRIS, 3/1/1991: No IURF value available at this time.</p> <p>PPRTV: No PPRTV record available at this time.</p> <p>MRL: No MRL record available at this time.</p> <p>Tier 3 Source:</p> <p>MDEQ: Per DEQ-CCD-AQD, no value available.</p>		Complete
Mutagenic Mode of Action (MMOA)? (Y/N)	--	No	USEPA, 2015	
MMOA Details	--	Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List		
Developmental or Reproductive	--	No, the RfD or RfC is not based on a reproductive-	MDEQ, 2015	

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
Effector? (Y/N)		developmental effect.		
Developmental or Reproductive Toxicity Details	--	NA		
State Drinking Water Standard (SDWS) (µg/L)	2.0E+2	2.0E+2	SDWA, 1976	
SDWS details	MI SDWA	MI Safe Drinking Water Act (SDWA) 1976 PA 399		
Secondary Maximum Contaminant Level (SMCL) (µg/L)	NA	NO	SDWA, 1976 and USEPA SMCL List	
SMCL details	--	MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA SMCL List, 2015		
Is there an Aesthetic Value? (Y/N)	NA	Not evaluated.	NA	
Aesthetic value details	NA	NA		
Is there a Phytotoxicity Value? (Y/N)	No	Not evaluated.	NA	
Phytotoxicity details	NA	NA		
Others:				

(C) Chemical-specific Absorption Factors

	Part 201 Value	Update	Source/Reference/ Dates	Comments/Notes /Issues
Gastrointestinal absorption efficiency value (ABS _{gi})	---	1.0	MDEQ, 2015/USEPA RAGS-E, 2004	
ABS _{gi} details		RAGS E (USEPA, 2004) Default Value		
Skin absorption efficiency value (AE _d)	---	0.1	MDEQ, 2015	
AE _d details				
Ingestion Absorption Efficiency (AE _i)		1.0	MDEQ, 2015	
AE _i Details				
Relative Source Contribution for Water (RSC _w)		0.2	MDEQ, 2015	
Relative Source Contribution for Soil (RSC _s)		1.0	MDEQ, 2015	
Relative Source Contribution for Air (RSC _A)		1.0	MDEQ, 2015	
Others				

(D) Rule 57 Water Quality Values and GSI Criteria

Current GSI value (µg/L)	NA
Updated GSI value (µg/L)	NA
Rule 57 Drinking Water Value (µg/L)	NA

	Rule 57 Value (µg/L)	Verification Date
Human Non-cancer Values- Drinking water source (HNV-drink)		
Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)		
Wildlife Value (WV)		
Human Cancer Values for Drinking Water Source (HCV-drink)		
Human Cancer values for non-drinking water source (HCV-Non-drink)		
Final Chronic Value (FCV)		
Aquatic maximum value (AMV)		
Final Acute Value (FAV)		

Sources:

1. MDEQ Surface Water Assessment Section Rule 57 [website](#)
2. MDEQ Rule 57 [table](#)



(E) Target Detection Limits (TDL)

	Value	Source
Target Detection Limit – Soil ($\mu\text{g}/\text{kg}$)	1,000	MDEQ, 2015
Target Detection Limit – Water ($\mu\text{g}/\text{L}$)	100	MDEQ, 2015
Target Detection Limit – Air (ppbv)	NA	MDEQ, 2015
Target Detection Limit – Soil Gas (ppbv)	NA	MDEQ, 2015

CHEMICAL UPDATE WORKSHEET ABBREVIATIONS:

CAS # - Chemical Abstract Service Number.

Section (A) Chemical-Physical Properties**Reference Source(s):**

CRC	Chemical Rubber Company Handbook of Chemistry and Physics, 95th edition, 2014-2015
EMSOFT	USEPA Exposure Model for Soil-Organic Fate and Transport (EMSOFT) (EPA, 2002)
EPA2001	USEPA (2001) Fact Sheet, Correcting the Henry's Law Constant for Soil Temperature. Office of Solid Waste and Emergency Response, Washington, D.C.
EPA4	USEPA (2004) User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. February 22, 2004.
EPI	USEPA's Estimation Programs Interface SUITE 4.1, Copyright 2000-2012
HSDB	Hazardous Substances Data Bank
MDEQ	Michigan Department of Environmental Quality
NPG	National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards
PC	National Center for Biotechnology Information's PubChem database
PP	Syracuse Research Corporation's PhysProp database
SCDM	USEPA's Superfund Chemical Data Matrix
SSG	USEPA's Soil Screening Guidance: Technical Background Document, Second Edition, 1996
USEPA/EPA	United States environmental protection agency's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July, 2004.

W9 USEPA's User Guide for Water9 Software, Version 2.0.0, 2001

Basis/Comments:

EST	estimated
EXP	experimental
EXT	extrapolated
NA	not available or not applicable
NR	not relevant

Section (B) Toxicity Values/Benchmarks**Sources/References:**

ATSDR	Agency for Toxic Substances and Disease Registry
CALEPA	California Environmental Protection Agency
CAL DTSC	California Department of Toxic Substances Control
CAL OEHHA	CAEPA Office of Environmental Health Hazard Assessment
CCD	MDEQ Chemical Criteria Database
ECHA	European Chemicals Agency (REACH)
OECD HPV	Organization for Economic Cooperation and Development HPV Database
HEAST	USEPA's Health Effects Assessment Summary Tables
IRIS	USEPA's Integrated Risk Information System
MADEP	Massachusetts Department of Environmental Protection
MDEQ/DEQ	Michigan Department of Environmental Quality
DEQ-CCD/AQD	MDEQ Air Quality Division
DEQ-CCD/RRD	MDEQ Remediation and Redevelopment Division
DEQ-CCD/WRD	MDEQ Water Resources Division
MNDOH	Minnesota Department of Health

NJDEP	New Jersey Department of Environmental Protection
NYDEC	New York State Department of Environmental Conservation
OPP/OPPT	USEPA's Office of Pesticide Programs
PPRTV	USEPA's Provisional Peer Reviewed Toxicity Values
RIVM	The Netherlands National Institute of Public Health and the Environment
TCEQ	Texas Commission on Environmental Quality
USEPA	United States Environmental Protection Agency
USEPA OSWER	USEPA Office of Solid Waste and Emergency Response
USEPA MCL	USEPA Maximum Contaminant Level
WHO	World Health Organization
WHO IPCS	International Programme on Chemical Safety (IPCS/INCHEM)
WHO IARC	International Agency for Research on Cancers
NA	Not Available.
NR	Not Relevant.

Toxicity terms:

BMC	Benchmark concentration
BMCL	Lower bound confidence limit on the BMC
BMD	benchmark dose
BMDL	Lower bound confidence limit on the BMD
CSF	Cancer slope Factor
CNS	Central nervous system
IURF or IUR	Inhalation unit risk factor
LOAEL	Lowest observed adverse effect level
LOEL	Lowest observed effect level
MRL	Minimal risk level (ATSDR)
NOAEL	No observed adverse effect level
NOEL	No observed effect level

RfC	Reference concentration
RfD	Reference dose
p-RfD	Provisional RfD
aRfD	Acute RfD
UF	Uncertainty factor
WOE	Weight of evidence

Section (C) Chemical-specific Absorption Factors

MDEQ	Michigan Department of Environmental Quality
USEPA RAGS-E	United States Environmental Protection Agency's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July, 2004.

Section (D) Rule 57 Water Quality Values and GSI Criteria

GSI	Groundwater-surface water interface
NA	A value is not available or not applicable.
ID	Insufficient data to derive value
NLS	No literature search has been conducted