CHEMICAL UPDATE WORKSHEET

Chemical Name:	**Aldicarb**
CAS #:	**116-06-3**
Revised By:	RRD Toxicology Unit
Revision Date:	August 12, 2105

(A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	190.25	190.26	EPI	EXP
Physical State at ambient temp	Solid	Solid	MDEQ	
Melting Point (˚C)	---	99.00	EPI	EXP
Boiling Point (˚C)	---	NA	NA	
Solubility (ug/L)	6.00E+6	6.030E+06	EPI	EXP
Vapor Pressure (mmHg at 25˚C)	0.0001	3.47E-05	EPI	EXP
HLC (atm-m³/mol at 25˚C)	4.17E-9	1.44E-09	PP	EST
Log Kow (log P; octanol-water)	1.1	1.13	EPI	EXP
Koc (organic carbon; L/Kg)	12.1	24.64	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm^2/s)	0.08	3.19E-02	W9	EST
Diffusivity in Water (Dw; cm^2/s)	8.0E-6	7.2458E-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; unit less)	NA	NA	NA	NA
Critical Temperature (K)		NA	NA	NA
Enthalpy of Vaporization (cal/mol)		NA	NA	NA
Density (g/mL, g/cm^3)		1.195	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm^2)	NA	5.86E-07	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm^2)	NA	5.86E-07	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm^2)	NA	6.93E-07	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm^2)	NA	6.93E-07	EMSOFT	EST

(B) Toxicity Values/Benchmarks

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
Reference Dose (RfD) (mg/kg/day)	1.0E-3	2.7E-4	OPP, 2012	
RfD details	Acute human oral exposure study NOAEL=0.01 mg/kg -d UF=10, Critical effect = sweating, as clinical sign of AChE inhibition (Rhone - Poulenc, 1992).	**Tier 1 Source:** **USEPA-OPP** **Basis: US**EPA-OPP acute population adjusted dose (aPAD) = 2.7E-4 mg/kg-day based on human oral study. An acute RfD = 0.001 based on the human study is also available. Per OPP (5/16/2012**), "**a chronic assessment was not conducted because the toxicity database for aldicarb indicates that cholinesterase inhibition (ChEI) does not increase with continued exposure, due to its reversibility (<24 hrs.)". OPP considered the human data reliable, scientifically valid and the most suitable for risk assessment. The ChEI is the most sensitive effect. Also, OPP is more recent than IRIS. **Critical Study**: MRID 43829602, 45068601, 43442302, 43442305, & 42373001 **Method(s)**: Acute oral study conducted in human volunteers **Critical effect**: RBC cholinesterase inhibition (ChEI) **End point or Point of Departure (POD):** $BMDL_{10}$ = 0.013 mg/kg **Uncertainty Factors:** UF = 10 (for intraspecies variability) and FQPA Safety Factor = 4.8 (based on the ratio of the BMD10adults to BMD10 PND11 pups for ChE. PND11 pups were 4-8 fold more sensitive than adult rats). **Source and date:** EPA-OPP Memorandums: 1) Aldicarb. Human health Scoping Document in Support of Registration (5/16/2012) and 2) Aldicarb: Review of Comparative Cholinesterase Assays (Dose-Response, Time Course, Comparative Dose and Range-finding Studies (7/13/2010). **Tier 1 and 2 Sources**: **IRIS:** Per IRIS, RfD = 1.0E-3 mg/kg-day **Critical Study**: Rhone-Poulenc Ag Company. 1992. A Safety and Tolerability Study of Aldicarb at Various Dose Levels in Healthy Male and Female Volunteers. Inveresk Clinical Research Report No. 7786. MRID No. 423730-01. HED Doc. No. 0010459. Available from EPA. (unpublished study) **Method(s)**: Acute double-blind, placebo-controlled human subject study; oral		Complete

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		administration to 38 male and 9 female healthy volunteers. **Critical effect**: sweating in males (consistent with cholinesterase inhibition). **End point or Point of Departure (POD):** NOEL = 0.01 mg/kg/day **Uncertainty Factors**: UF =10; variation in sensitivity among persons in the population **Source and date:** IRIS, last revision date - 11/1/1993. **PPRTV:** No PPRTV record available at this time. **MRL:** No MRL record available at this time. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD (date), value is based on IRIS.		
Oral Cancer Slope Factor (CSF) (mg/kg-day)$^{-1}$)	--	NA	MDEQ, 2015	
CSF details	NA	**Carcinogen Weight-of-Evidence (WOE) Class**: Category E, evidence of non-carcinogenicity for humans **IRIS WOE Basis**: based on the lack of evidence of carcinogenicity in rats and mice studies. **Source and Date**: EPA-OPP, 5/16/2012 **Tier 1 and 2 Sources**: **IRIS:** Per IRIS (11/01/1991), no value at this time. EPA classification D (not classifiable as to human carcinogenicity) based on inadequate human and animal data to assess carcinogenic potential. **EPA-OPP**: Per OPP (5/16/2012), aldicarb is not carcinogenic. **PPRTV:** No PPRTV record available at this time. **MRL:** NA; MRLs are for non-cancer effects only. **Tier 3 sources:** **MDEQ:** Per DEQ-CCD, no value at this time.		Complete
Reference Concentration	--	NA	MDEQ, 2015	

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
(RfC) or Initial Threshold Screening Level (ITSL) (µg/m³)				
RfC/ITSL details	NA	**Tier 1 and 2 Sources**: **IRIS:** Per IRIS (11/01/1991), no value at this time. **EPA-OPP**: Per OPP (5/16/2012), toxicity via inhalation route is assumed to be equivalent to oral toxicity. **PPRTV:** No PPRTV record available at this time. **MRL:** No MRL record available at this time. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD, no AQD value at this time.		Complete.
Inhalation Unit Risk Factor (IURF) ((µg/m^3)$^{-1}$)	--	NA	MDEQ, 2015	
IURF details	NA	**Carcinogen Weight-of-Evidence (WOE) Class**: Category E, evidence of non-carcinogenicity for humans **IRIS WOE Basis**: based on the lack of evidence of carcinogenicity in rats and mice studies. **Source and Date**: EPA-OPP, 5/16/2012 **Tier 1 and 2 Sources**: **IRIS:** Per IRIS (11/01/1991), no value at this time. EPA classification D (not classifiable as to human carcinogenicity) based on inadequate human and animal data to assess carcinogenic potential. **EPA-OPP**: Per OPP (5/16/2012), aldicarb is not carcinogenic. **PPRTV:** No PPRTV record available at this time. **MRL:** NA; MRLs are for non-cancer effects only. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD, no value at this time.		Complete
Mutagenic Mode	--	NO	USEPA, 2015	

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
of Action (MMOA)? (Y/N)				
MMOA Details	--	NA Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List.		
Developmental or Reproductive Effector? (Y/N)	No	No, the RfD is not based on a reproductive-developmental effect.	MDEQ, 2015	
Developmental or Reproductive Toxicity Details	NA	NA		
State Drinking Water Standard (SDWS) (ug/L)	--	3	SDWA, 1976	
SDWS details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399		
Secondary Maximum Contaminant Level (SMCL) (ug/L)	--	NO	SDWA, 1976 and USEPA SMCL List	
SMCL details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA SMCL List		
Is there an aesthetic value for drinking water? (Y/N)	NO	Not evaluated	NA	
Aesthetic value (ug/L)	NA	NA	NA	
Aesthetic Value details	NA	NA		
Phytotoxicity Value? (Y/N)	NO	Not evaluated	NA	
Phytotoxicity details	NA	NA	NA	
Others				

(C) Chemical-specific Absorption Factors

	Part 201 Value	Update	Source/Reference/ Dates	Comments/Notes /Issues
Gastrointestinal absorption efficiency value (ABSgi)	---	1.0	MDEQ, 2015/USEPA RAGS-E	
ABSgi details		RAGS E (EPA, 2004) Default Value		
Skin absorption efficiency value (AEd)	---	0.1	MDEQ, 2015	
AEd details				
Ingestion Absorption Efficiency (AEi)		1.0	MDEQ, 2015	
AEi 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 (μg/kg)	50	MDEQ, 2015
Target Detection Limit – Water (μg/L)	2	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