CHEMICAL UPDATE WORKSHEET

Chemical Name:	**Diazinon**
CAS #:	**333-41-5**
Revised By:	RRD Toxicology Unit
Revision Date:	August 17, 2015

(A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	304.3	304.35	EPI	EXP
Physical State at ambient temp	Liquid	Solid	MDEQ	
Melting Point (˚C)	---	25.00	EPI	EXP
Boiling Point (˚C)	---	NA	NA	
Solubility (ug/L)	68800	4.0E+04	EPI	EXP
Vapor Pressure (mmHg at 25˚C)	0.000084	9.01E-05	EPI	EXP
HLC (atm-m^3/mol at 25˚C)	1.13E-7	1.13E-07	EPI	EXP
Log Kow (log P; octanol-water)	3.4	3.81	EPI	EXP
Koc (organic carbon; L/Kg)	2200	3034	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm^2/s)	0.08	2.10E-02	W9	EST
Diffusivity in Water (Dw; cm^2/s)	8.0E-6	5.2259E-06	W9	EST
Soil Water Partition Coefficient (Kd; inorganics)	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
Flash Point (˚C)	180 F	82.8	NPG	EXP
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)		1.1088	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm^2)	NA	1.47E-07	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm^2)	NA	1.47E-07	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm^2)	NA	1.82E-07	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm^2)	NA	1.82E-07	EMSOFT	EST

(B) Toxicity Values/Benchmarks

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
Reference Dose (RfD) (mg/kg/day)	1.8E-4	7.0E-04	ATSDR, 2008	
RfD details	Mice neurobehavioral teratology study (Spyker & Avery, 1977) LOAEL=0.18 mg/kg/day; UF=1000; HEAST has oral RFD of 9E-4 based on decreased cholinesterase activity (Critical effect) in rats fed diazinon for 35-42 days. CCD/SWQD date:	**Tier 2 Source:** **ATSDR:** **Basis:** ATSDR (9/2008) RfD = 7.0E-04 mg/kg-day. ATSDR assessment is more current than OPP. **Critical Study**: Kirchner FR, McCormick GC, Arthur AT. 1991. One/two year oral toxicity study in rats. Ciba-Geigy Corporation. Submitted to the U.S. Environmental Protection Agency. MRID41942002. **Method(s)**: Sprague-Dawley rats were exposed to 0, 0.1, 1.5, 125, or 250 ppm diazinon in diet (in acetone vehicle) for up to 98 weeks. The study included untreated and vehicle control groups. The corresponding doses were 0, 0.004, 0.06, 5, and 10 mg/kg/day for males and 0, 0.005, 0.07, 6, and 12 mg/kg/day for females. Averaged among male and female rats, the corresponding doses were 0, 0.0045, 0.065, 5.5, and 11 mg/kg/day. Twenty rats/sex/group were treated for the full 98 weeks. Ten rats/sex/group were treated for 52 weeks and sacrificed for interim assessment. Additional groups of 10 rats/sex were assigned to the untreated control, vehicle control, and 250 ppm groups and assessed for recovery 45 days following 52 weeks of treatment. **Critical effect**: decreased acetylcholinesterase (AChE) activity (neurological) **End point or Point of Departure (POD):** NOAEL = 0.065 mg/kg/day **Uncertainty Factors**: UF = 100 (10 each for intraspecies variability and interspecies extrapolation) **Source and date:** ATSDR, 9/2008 **Tier 1 and 2 Sources**: **IRIS:** No IRIS file available at this time. **EPA-OPP:** OPP (6/2008) chronic RfD = 2.0E-4 mg/kg-day **Critical Study**: 24-week, 90-day and 1-year studies in dog (MRIDs 40815004, 40815004, and 41942001 respectively); 4-week, 90-day feeding, 90-day neurotoxicity and 2-year studies in rat (MRIDs 43543901, 40815003,		Complete

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		43543802, and 41942002 respectively). 1) Kirchner FR, McCormick GC, Arthur AT. 1991. One/two year oral toxicity study in rats. Ciba-Geigy Corporation. Submitted to the U.S. Environmental Protection Agency. (MRID 41942002). 2) Chang, J. (1994) DZN Diazinon MG87 (percent): Cholinesterase Inhibition in 28 Day Study in Rats: Final Report: Lab Project Number: F/00186. Unpublished study prepared by Ciba Geigy Environmental Health Center. 125 p. (MRID 43543901) 3) Barnes, T. (1988) Diazinon (MG-8): 90-Day Oral Toxicity Study in Dogs: Project ID 882012. Unpublished study prepared by Ciba-Geigy Corp. 647 p. (MRID 40815004) 4) Rudzki, M.; McCormick, G.; Arthur, A. (1991) Diazinon (MG-8): 52- Week Oral Toxicity Study in Dogs: Lab Project Number: 882014. Unpublished study prepared by Ciga-Geigy. 621 p. (MRID 41942001) **Method(s)**: Seven oral feeding studies (in dogs from 4 week, 90-day, and 1 year feeding studies, and in rats from a 28-day feeding study, a 90day feeding study, a 90-day neurotoxicity study and a 2 year feeding study). **Critical effect**: consistent pattern of no adverse effect on acetylcholinesterase (AChE) inhibition **End point or Point of Departure (POD):** NOAEL = 0.02 mg/kg/day **Uncertainty Factors**: UF = 100 (10 each for intraspecies variability and interspecies extrapolation and FQPA = 1) **Source and date:** EPA-OPP Memorandum: Diazinon. Revised Human health Assessment Scoping Document in Support of Registration Review (Appendix 1), 6/20/2008; OPP 7/31/2006 Reregistration Eligibility Decision for DiazinonMemorandum. **PPRTV:** No PPRTV record is available at this time. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD/WRD (8/5/2004), RfD = 6.5E-4 mg/kg-day. **Critical Study:** Kirchner et al., 1991 **Method(s):** two-year oral rat study; Sprague-Dawley rats receiving up to 12 mg/kg/day for 98 weeks		

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		Critical effect: brain cholinesterase inhibition **End point or Point of Departure (POD)***:* NOAEL = 0.065 mg/kg-day (average of NOAEL for of 0.06 mg/kg/d for males and 0.07 mg/kg/d for females) **Uncertainty Factors:** UF = 100 (10 each for intraspecies variability and interspecies extrapolation)		
Oral Cancer Slope Factor (CSF) (mg/kg-day)$^{-1}$)	--	NA	MDEQ, 2015	
CSF details	NA	**Carcinogen Weight-of-Evidence (WOE) Class and Basis**: Limited evidence of carcinogenicity in humans for non-Hodgkin lymphoma and lung cancer. The evidence in humans is from studies of agricultural exposures in the USA and Canada published since 2001. The classification of diazinon in Group 2A was also based on strong evidence that diazinon induced DNA or chromosomal damage. **Source and Date**: International Research Agency for Research on Cancer (IARC), 3/20/2015 (http://www.iarc.fr/en/media-centre/iarcnews/pdf/MonographVolume112.pdf) **Tier 1 and 2 Sources**: **IRIS:** No IRIS file is available at this time. **PPRTV:** No PPRTV record is 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
Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) (µg/m³)	--	1.0E+0	ATSDR, 2008	
RfC/ITSL details	NA	**Tier 2 Source:** **ATSDR:**		

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		Basis: ATSDR is the only available value. Per April 2017 MRL List; ATSDR's inhalation intermediate MRL = 0.01 mg/m^3 and additional UF applied by MDEQ of 10 for sub chronic to chronic extrapolation, RfC = 0.001 mg/m^3 **Intermediate MRL derivation:** **Critical Study**: Hartman HR. 1990. 21-Day repeated exposure inhalation toxicity in the rat. EPA guidelines no. 82-4. Laboratory study number 891205. Ciba-Geigy Corporation. Submitted to the U.S. Environmental Protection Agency. MRID41557402. **Method(s)**: albino rats (10/sex/group) were exposed (nose only) to aerosols of diazinon (in ethanol) at concentrations of 0, 0.05, 0.46, 1.57, or 11.6 mg/m3 for 6 hours/day, 5 days/week for 3 weeks. Two control groups were used, one exposed to humidified filtered air only and the other to the carrier vehicle ethanol. **Critical effect**: RBC AChE inhibition in male and female rats **End point or Point of Departure (POD):** NOAEL = 1.57 mg/m^3 **Uncertainty Factors**: UF = 30 (10 for intraspecies variability and 3 for interspecies extrapolation) **Source and date:** ATSDR, 9/2008 **Tier 1 and 2 Sources**: **IRIS:** No IRIS file is available at this time. **PPRTV:** No PPRTV record is available at this time. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD, no 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 and Basis**: Limited evidence of carcinogenicity in humans for non-Hodgkin lymphoma and lung cancer. The evidence in humans is from studies of agricultural exposures in the USA and Canada published since 2001. The classification of diazinon in Group 2A was also based on strong evidence that diazinon induced DNA or chromosomal damage.		Complete

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		Source and Date: International Research Agency for Research on Cancer (IARC), 3/20/2015 ((http://www.iarc.fr/en/media-centre/iarcnews/pdf/MonographVolume112.pdf) **Tier 1 and 2 Sources**: **IRIS:** No IRIS file is available at this time. **PPRTV:** No PPRTV record is 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.		
Mutagenic Mode of Action (MMOA)? (Y/N)	--	NO	USEPA, 2015	
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)	--	NO	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, 2015	
SMCL details	NA	SDWA, 1976 and USEPA SMCL List, 2015		
Is there an aesthetic value for	NO	Not evaluated.	NA	

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
drinking water? (Y/N)				
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, 2004	
ABSgi details		RAGS E (USEPA, 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)	1.0 (M); 0.004
Updated GSI value (µg/L)	1 (M); 0.004
Rule 57 Drinking Water Value (µg/L)	12

	Rule 57 Value (µg/L)	Verification Date
Human Non-cancer Values- Drinking water source (HNV-drink)	12	8/2004
Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)	37	8/2004
Wildlife Value (WV)	NA	NA
Human Cancer Values for Drinking Water Source (HCV-drink)	NA	NA
Human Cancer values for non-drinking water source (HCV-Non-drink)	NA	NA
Final Chronic Value (FCV)	0.004	10/2004
Aquatic maximum value (AMV)	0.064	10/2004
Final Acute Value (FAV)	0.13	10/2004

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)	1	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