



CHEMICAL UPDATE WORKSHEET

Chemical Name:	Vinyl acetate (DD)
CAS #:	108-05-4
Revised By:	RRD Toxicology Unit
Revision Date:	September 21, 2015

(A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	86.09	86.09	EPI	EXP
Physical State at ambient temp	Liquid	Liquid	MDEQ	
Melting Point (°C)	---	-93.20	EPI	EXP
Boiling Point (°C)	72.5	72.80	EPI	EXP
Solubility (ug/L)	2.00E+7	2.00E+07	EPI	EXP
Vapor Pressure (mmHg at 25°C)	2812	9.02E+01	EPI	EXP
HLC (atm-m ³ /mol at 25°C)	5.11E-4	5.11E-04	SSG	EXP
Log Kow (log P; octanol-water)	0.73	0.73	EPI	EXP
Koc (organic carbon; L/Kg)	5.22	5.583	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm ² /s)	0.085	8.49E-02	W9	EST
Diffusivity in Water (Dw; cm ² /s)	9.2E-6	1.00E-05	W9	EST
Soil Water Partition Coefficient (Kd; inorganics)	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
Flash Point (°C)	18 F	-8	CRC	EXP
Lower Explosivity Level (LEL; unitless)	0.026	0.026	CRC	EXP
Critical Temperature (K)		5.19E+02	EPA2004	EXP
Enthalpy of Vaporization (cal/mol)		7.80E+03	EPA2004	EXP
Density (g/mL, g/cm ³)		0.9256	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm ²)	2.56E-05	2.73E-05	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm ²)	5.75E-05	6.38E-05	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm ²)	3.61E-05	4.31E-05	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm ²)	7.92E-05	9.91E-05	EMSOFT	EST

(B) Toxicity Values/Benchmarks

	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
Reference Dose (RfD) (mg/kg/day)	8.8E-2	8.8E-1	MDEQ, 1994	
RfD details	2-generation rat study, NOAEL = 88 mg/kg, UF = 1000; Critical effect = testicular atrophy, decreased reproductive performance, and weight gain reduction in high-dose F1 pups (Shaw, 1987). Source and date: CCD/RRD, 5/02/1994	<p>Tier 1 Source: MDEQ: Basis: MDEQ value based on a NOAEL for developmental effects from a 2-generation reproduction study (Shaw, 1987). The HEAST (1997) value is based on a NOAEL for altered body weight and kidney weight from a chronic study. MDEQ is preferred as the NOAEL protects for developmental effects. New Jersey and Texas adopted the HEAST value. See details below. RRD modified the original RfD of 8.8E-2 mg/kg by removing the 10-fold UF for the use of a less than chronic study. This is not necessary as the study is developmental. See details below.</p> <p>Tier 1 and 2 Sources: IRIS: Per IRIS (10/01/1990), no value at this time. PPRTV: No PPRTV record is available at this time. MRL: Per ATSDR (7/1992), no chronic oral MRL at this time.</p> <p>Tier 3 Sources: MDEQ: Per CCD/RRD (5/02/1994), RfD = 8.8E-2 mg/kg-day. Critical Study: Shaw, D.C. 1987. Vinyl acetate: Oral (drinking water) 2-generation reproduction study in the rat. Report prepared by Hazleton Laboratories Europe Ltd., North Yorkshire, England, for the Society of Plastics Industry, Inc., NY,NY. Report No. 4661-51/17a. December 1987. 91 p. (unpublished) Methods: CrI: CD (SD) BR Sprague-Dawley rats were given 0, 200, 1000, or 5000 ppm VA in drinking water (0, 30, 152, or 760 mg/kg/day for females, 0, 28, 139, or 693 mg/kg/day for males) in a 2- generation reproduction study. The parental (P) generation had 18 males and 36 females/group, the F1 generation 25 of each sex/group. The P animals were treated for 10 weeks prior to mating. Treatment was continued for females throughout mating, gestation, and lactation. Critical effect: testicular atrophy, decreased reproductive performance, and</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		<p>weight gain reduction in high-dose F1 pups End point or Point of Departure (POD): NOAEL = 88 mg/kg-day Uncertainty Factors: UF = 1,000 (10 each for interspecies and interspecies variability). Source and date: MDEQ-CCD/RRD, 5/02/1994</p> <p>HEAST: RfD= 1E+0 mg/kg/day: Key Study and references: 1) Shaw DC. 1988. Vinyl Acetate: 104-Week Oral (Drinking Water) Combined Chronic Toxicity And Carcinogenicity Study In The Rat Following In Vitro Exposure, Volume 1. Hazleton Laboratories. UK. Report NO. 5531-5/16. EPA DOC. NO. 86-0000265. Fiche NO OTS0514156. 2) US EPA. 1989. Health And Environmental Effects Document for Vinyl Acetate. Prepared By The Office of Health And Environmental Assessment. Environmental Criteria and Assessment Office. Cincinnati. OH For The Office of Solid Waste and Emergency Response. Washington DC. Methods: 2-year rat study; oral (water) Endpoint: NOAEL = 100 mg/kg-day Critical effect: altered whole body weight and altered kidney weight Uncertainty Factors: UF = 100 Source: HEAST Summary 1997 for Vinyl Acetate, p. 1-102</p> <p>New Jersey DEP: RfD= 1 mg/kg/day based on HEAST Summary 1997.</p> <p>Texas CEQ: RfD= 1.0E+00 mg/kg/day based on HEAST Summary 1997.</p> <p>Other Tier 3: No value is available at this time from these Tier 3 sources/databases: NTP ROC, health and environmental agencies of California, Massachusetts, Minnesota and New York, Canada, The Netherlands (RIVM), WHO (IARC), WHO (IPCS/INCHEM), ECHA (REACH) and OECD HPV.</p>		
Oral Cancer Slope Factor (CSF) (mg/kg-day)⁻¹	--	NA	MDEQ, 2015	



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
CSF details	NA	<p>Tier 1 and 2 Sources: IRIS: Per IRIS (10/01/1990), no value at this time. PPRTV: No PPRTV record is available at this time. MRL: NA; MRLs are for non-cancer effects only.</p> <p>Tier 3 Source: MDEQ: Per DEQ-CCD, no value at this time.</p>		Complete
Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) ($\mu\text{g}/\text{m}^3$)	2.0E+2	2.0E+2	IRIS, 1990	
RfC/ITSL details	Based on EPAs RfC, from Owen 1988, Dreef-Vander Muelen 1988, and Beems 1988. Per IRIS: NOAEL(HEC) = NOAEL(ADJ) x RGDR = 5 mg/cu.m; UF = 30 CCD/AQD date - 8/23/1990	<p>Tier 1 Source: IRIS: Basis: The IRIS RfC was selected because it is based on a chronic inhalation study. IRIS is a Tier 1 source. IRIS RfC = 2.0E-1 mg/m³. Critical Studies: 1) Owen, P.E. 1988. Vinyl acetate: 104 week inhalation combined chronic toxicity and carcinogenicity study in the rat and mouse. Report prepared by Hazleton Laboratories Europe Ltd., Harrogate, England for the Society of the Plastics Industry, Inc., New York. Report No.: 5547-51/15. November 1988. 2) Dreef-van der Meulen, H.C. 1988. Report No. V 88.033/270836: Histopathology of the respiratory tract of rats used in a 104 week inhalation study (Owen, 1988) with vinyl acetate: Revised version. (TNO-CIVO Institutes, October 1988). 3) Beems, R.B. 1988. Report No. V 88.133: Histopathology of the respiratory tract of mice used in a 104-week inhalation study (Owen, 1988) with vinyl acetate. (TNO-CIVO Institutes, April 1988). Methods: Sprague-Dawley rats (CrI:CD[SD]BR) and mice (CrI:CD-1[ICR]BR) (90 animals/sex/dose, 60 for the main study and 30 for laboratory testing) were exposed to 0, 50, 200, or 600 ppm of 99.9% vinyl acetate (VA) for 6 hours/day, 5 days/week for 104 weeks. Interim sacrifices were done at 51 and 81 weeks and recovery. Values corresponded to 0, 176, 704, and 2113 mg/m³, and duration-</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<p>adjusted values were 0, 31, 126, and 378 mg/m³. Critical effect: nasal epithelial lesions End point or Point of Departure (POD): NOAEL = 176 mg/m³ (50 ppm); NOAEL(HEC) = 5 mg/m³ Uncertainty Factors: UF = 30 (10 each for interspecies variability and 3 for interspecies extrapolation) Source and date: IRIS, Last revision date - 10/01/1990</p> <p>Tier 2 Sources: PPRTV: No PPRTV record is available at this time. MRL: Per ATSDR (7/1992), no chronic inhalation MRL at this time. Intermediate inhalation MRL =0.01 ppm Critical Study: Hazleton. 1980b. Vinyl acetate: 3 month inhalation toxicity study in the mouse. U.S. EPA/OTS public files. Hazleton Labs Europe Ltd. Document no. FYI-OTS-0184-0278. Methods: Mice were exposed to vinyl acetate in drinking water at doses up to 950 mg/kg-day 6hr/day, 5days/week for 3 months. Critical effect: inflammation of nasal turbinate epithelium; mild multi-focal bronchitis End point or Point of Departure (POD): NOAEL = 50 ppm concentration corrected for intermittent exposure and HEC) Uncertainty Factors: UF = 100 (10 each for interspecies variability and interspecies extrapolation) Source and date: ATSDR, 7/1992</p> <p>Tier 3 Source: MDEQ: Per DEQ-CCD, AQD adopted IRIS value. See Part 201 Value RfC/ITSL details.</p>		
Inhalation Unit Risk Factor (IURF) ((µg/m ³) ⁻¹)	--	NA	MDEQ, 2015	
IURF details	NA	<p>Tier 1 and 2 Sources: IRIS: Per IRIS (10/01/1990), no value at this time.</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<p>PPRTV: No PPRTV record is available at this time. MRL: NA; MRLs are for non-cancer effects only.</p> <p>Tier 3 Source: MDEQ: Per DEQ-CCD, no value at this time.</p>		
Mutagenic Mode of Action (MMOA)? (Y/N)	--	NO	USEPA, 2015	
MMOA Details	--	<p>NA Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List.</p>		
Developmental or Reproductive Effector? (Y/N)	Yes	<p>YES-, the RfD is based on a reproductive-developmental effect. Oral Exposure Pathways- Single Exposure oral No-inhalation, the RfC is not based on a reproductive-developmental effect.</p>	MDEQ, 2015	
Developmental or Reproductive Toxicity Details	NA	<p>Reproductive effect: testicular atrophy, decreased reproductive performance, and weight gain reduction in high-dose F1 pups Critical Study: Shaw, D.C. 1987. Vinyl acetate: Oral (drinking water) 2 generation reproduction study in the rat. Report prepared by Hazleton Laboratories Europe Ltd., North Yorkshire, England, for the Society of Plastics Industry, Inc., NY,NY. Report No. 4661-51/17a. December 1987. 91 p.</p>		
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	MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA SMCL List, 2015.		
Is there an aesthetic value for drinking water?	NO	Not evaluated.	NA	



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
(Y/N)				
Aesthetic value (ug/L)	NA	NA	NA	
Aesthetic Value details	NA	NA		
Phytotoxicity Value? (Y/N)	NO	NO	NA	
Phytotoxicity details	NA	Not evaluated.	NA	
Others				

(C) Chemical-specific Exposure 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) Analytical Information

	Value	Source
Target Detection Limit – Soil ($\mu\text{g}/\text{kg}$)	5,000	MDEQ, 2015
Target Detection Limit – Water ($\mu\text{g}/\text{L}$)	100	MDEQ, 2015
Target Detection Limit – Air (ppbv)	5.60E+01	MDEQ, 2015
Target Detection Limit – Soil Gas (ppbv)	1.90E+03	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