



CHEMICAL UPDATE WORKSHEET

Chemical Name:	Ethanol (Ethyl alcohol) (DD)
CAS #:	64-17-5
Revised By:	RRD Toxicology Unit
Revision Date:	September 24, 2015

(A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	46.07	46.07	EPI	EXP
Physical State at ambient temp	Liquid	Liquid	MDEQ	
Melting Point (°C)	---	-114.10	EPI	EXP
Boiling Point (°C)	78.293	78.20	EPI	EXP
Solubility (ug/L)	1.0E+9	1E+09	EPI	EXP
Vapor Pressure (mmHg at 25°C)	59.03	5.93E+01	EPI	EXP
HLC (atm-m³/mol at 25°C)	6.29E-6	5.00E-06	EPI	EXP
Log Kow (log P; octanol-water)	-0.31	-0.31	EPI	EXP
Koc (organic carbon; L/Kg)	0.496	1.045	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm²/s)	0.08	1.24E-01	W9	EST
Diffusivity in Water (Dw; cm²/s)	8.0E-6	1.323E-05	W9	EST
Soil Water Partition Coefficient (Kd; inorganics)	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
Flash Point (°C)	55	13	CRC	EXP
Lower Explosivity Level (LEL; unit less)	0.033	0.033	CRC	EXP
Critical Temperature (K)		515	CRC	EXP
Enthalpy of Vaporization (cal/mol)		9.22E+03	CRC	EST
Density (g/mL, g/cm ³)		0.7893	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm ²)	1.52E-05	2.01E-05	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm ²)	1.74E-05	2.87E-05	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm ²)	1.93E-05	2.91E-05	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm ²)	2.08E-05	3.70E-05	EMSOFT	EST

(B) Toxicity Values/Benchmarks

	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
Reference Dose (RfD) (mg/kg/day)	6.2E+1	6.2E+1	MDEQ, 1998	
RfD details	<p>LOAEL for human developmental effects = 11.5 g/day, UF = 3 for interspecies variation, RfD = 3833 mg/day divided by 62 Kg body weight (average human maternal weight from study) = 62 mg/Kg-day. Endpoint = fetal alcohol syndrome. CCD/RRD date: 10/28/1998.</p>	<p>Tier 3 Source: MDEQ: Basis: MDEQ is the chosen value because it is a more recent RfD assessment based on human data than ECHA and RIVM details are not able to be evaluated.</p> <p>Tier 1 and 2 Sources: IRIS: No IRIS file is available at this time. PPRTV: No PPRTV record is available at this time. MRL: No MRL record is available at this time.</p> <p>Tier 3 Sources: MDEQ: RfD = 6.2E+1 mg/kg-day: Basis: Per MDEQ/RRD (1998), several studies report reduced infant or neonatal weight, reduced head circumference and spontaneous abortion associated with maternal ingestion rates as low as 1-2 drinks per day (0.5-1.0 oz./day). The LOAEL dose was based on a 0.5 oz. /day acceptable ingestion rate or 11.5 grams/day. Critical Studies: Lumley et al., 1985; Scher et al., 1988; Hanson et al., 1978; Streissguth et al., 1981; Tennes and Blackard (1980) Critical effect: fetal alcohol syndrome End point or Point of Departure (POD): LOAEL = 11.5 g/day Uncertainty Factors: UF = 3 (for LOAEL to NOAEL extrapolation) The final RfD = 3833 mg/day is adjusted by dividing by 62 kg (average human maternal body weight from study) RfD_{ADJ} = 62 mg/kg-day Source and date: MDEQ-CCD/RRD, 10/28/1998</p> <p>RIVM: RfD= 2.50E+04 µg/kg bw/d. The supporting information is in Dutch and could not be adequately evaluated.</p> <p>ECHA (REACH): RfD= 87 mg/kg bw/day; reported 4/7/1982</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<p>Critical study: source not listed; OECD Guideline 408 (Repeated Dose 90-Day Oral Toxicity in Rodents)</p> <p>Methods: In this sub chronic study, five groups of rats (16 or 21 per sex/dose-level) received oral gavage doses of 0, 5, 10, 20 ml/kg of a mixture containing 16.25% ethanol (5 and 10 ml/kg dose groups were diluted 15 and 10 ml/kg distilled water to make up a dose volume of 20 mg/kg per day) for a period of 7 or 14 weeks. An additional group of rats (21 rats per sex per group) was dosed with 4 ml/kg of USP Ethanol-190proof-100% ethanol diluted with 16 ml/kg distilled water to make up to a dose volume of 20ml/kg/day).</p> <p>Critical effect: increased kidney weight and renal tubular epithelial hyperplasia in male rats</p> <p>End point or Point of Departure (POD): NOAEL = 10 ml/kg/day</p> <p>Uncertainty factors: not listed</p> <p>Other Tier 3: No value is available at this time from these Tier 3 sources/databases: HEAST, NTP ROC, health and environmental agencies of California, Massachusetts, Minnesota, New Jersey, New York, and Texas, WHO (IARC), WHO (IPCS/INCHEM), Canada, and OECD HPV.</p>		
Oral Cancer Slope Factor (CSF) (mg/kg-day ⁻¹)	--	NA	MDEQ, 2015	
CSF details	NA	<p>Tier 1 and 2 Sources:</p> <p>IRIS: No IRIS file is available at this time.</p> <p>PPRTV: No PPRTV record is available at this time.</p> <p>MRL: NA; MRLs are for non-cancer effects only.</p> <p>Tier 3 Source:</p> <p>MDEQ: Per DEQ-CCD, no value at this time.</p>		Complete
Reference Concentration (RfC) or Initial Threshold Screening Level	1.9E+4	1.9E+4	MDEQ, 1992	



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
(ITSL) (µg/m³)				
RfC/ITSL details	<p>Best is available data is ACGIH TLV. The TLV is also sufficiently protective of most sensitive human endpoint - Fetal Alcohol Syndrome. CCD/AQD date: 4/16/1992</p>	<p>Tier 3 Source: MDEQ: Basis: MDEQ was chosen due to availability of supporting information. Documents for MA, MN, RIVM and ECHA are not available.</p> <p>Tier 1 and 2 Sources: IRIS: No IRIS file is available at this time. PPRTV: No PPRTV record is available at this time. MRL: No MRL record is available at this time.</p> <p>MDEQ: AQD (1992) ITSL = 1.9E+4 µg/m³: Basis: Best available data is MDEQ ACGIH TLV. The TLV is also sufficiently protective of most sensitive human endpoint - Fetal Alcohol Syndrome Source and date: MDEQ-CCD/AQD, 4/16/1992</p> <p>Massachusetts DEP: RfC= 51.24 µg/m³ based on 1990 Method. Supporting information could not be found.</p> <p>Minnesota: RfC= 15000 µg/m³. Supporting information could not be found.</p> <p>RIVM: RfC= 30800 µg/m³. Supporting information could not be found.</p> <p>ECHA (REACH): RfC= 114 mg/m³. A critical study with supporting information could not be found.</p> <p>Other Tier 3: No value is available at this time from these Tier 3 sources/databases: HEAST, NTP ROC, health and environmental agencies of California, New Jersey, New York, and Texas, WHO (IARC), WHO (IPCS/INCHEM), Canada, and OECD HPV.</p>		Complete
Inhalation Unit Risk Factor	--	NA	MDEQ, 2015	



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
(IURF) (($\mu\text{g}/\text{m}^3$) ⁻¹)				
IURF details	NA	<p>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.</p> <p>Tier 3 Source: MDEQ: Per DEQ-CCD, no value at this time.</p>		Complete
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)	Yes	<p>YES-oral, the RfD is based on a reproductive-developmental effect. Oral Exposure Pathways- Single Exposure</p> <p>NO- for inhalation exposure.</p>	MDEQ, 2015	
Developmental or Reproductive Toxicity Details	NA	<p>RfD: Critical effect - fetal alcohol syndrome Critical studies: Lumley et al., 1985; Scher et al., 1988; Hanson et al., 1978; Streissguth et al., 1981; Tennes and Blackard (1980)</p> <p>ITSL: Basis is an ACGIH TLV (date). The TLV is sufficiently protective of most sensitive human endpoint - fetal alcohol syndrome.</p> <p>Fetal Alcohol Syndrome (FAS) describes changes in a baby born to a mother whose pregnancy was complicated by alcohol consumption. The changes depend on the amount, frequency and the timing of the consumption of alcohol during pregnancy. The first three months of pregnancy is the time in which vital organs like the heart and the kidney are developing (American Assoc for Pediatric Ophthalmology and Strabismus http://www.aapos.org/terms/conditions/51). Per CDC (2015), there is no known safe amount of alcohol during pregnancy or when trying to get pregnant. There is also no safe time to drink during pregnancy.</p>		



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		Alcohol can cause problems for a developing baby throughout pregnancy, including before a woman knows she's pregnant (CDC FASD Fact Sheet; http://www.cdc.gov/ncbddd/fasd/facts.html)		
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	
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? (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 (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)		1.0	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)	ID
Updated GSI value (µg/L)	ID
Rule 57 Drinking Water Value (µg/L)	1,500,000

	Rule 57 Value (µg/L)	Verification Date
Human Non-cancer Values- Drinking water source (HNV-drink)	1,500,000	10/1998
Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)	120,000,000	10/1998
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)	NLS	NA
Aquatic maximum value (AMV)	NLS	NA
Final Acute Value (FAV)	NLS	NA

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 ($\mu\text{g}/\text{kg}$)	2,500	MDEQ, 2015
Target Detection Limit – Water ($\mu\text{g}/\text{L}$)	1,000	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