



CHEMICAL UPDATE WORKSHEET

Chemical Name:	Diethyl phthalate
CAS #:	84-66-2
Revised By:	RRD Toxicology Unit
Revision Date:	September 16, 2015

(A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	222.23	222.24	EPI	EXP
Physical State at ambient temp	Liquid	Liquid	MDEQ	
Melting Point (°C)	233	-40.50	EPI	EXP
Boiling Point (°C)	295	295.00	EPI	EXP
Solubility (ug/L)	1.08E+6	1.080E+06	EPI	EXP
Vapor Pressure (mmHg at 25°C)	0.001672	2.10E-03	EPI	EXP
HLC (atm-m ³ /mol at 25°C)	4.50E-7	6.10E-07	PP	EST
Log Kow (log P; octanol-water)	2.5	2.42	EPI	EXP
Koc (organic carbon; L/Kg)	287	104.9	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm ² /s)	0.0256	2.49E-02	W9	EST
Diffusivity in Water (Dw; cm ² /s)	6.35E-6	6.3491E-06	W9	EST
Soil Water Partition Coefficient (Kd; inorganics)	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
Flash Point (°C)	322 F	161	CRC	EXP
Lower Explosivity Level (LEL; unit less)	NA	0.007	CRC	EXP
Critical Temperature (K)		757.00	EPA2001	EXP
Enthalpy of Vaporization (cal/mol)		1.37E+04	EPA2001	EXP
Density (g/mL, g/cm ³)		1.120	PC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm ²)	6.19E-07	1.83E-06	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm ²)	6.19E-07	1.83E-06	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm ²)	7.37E-07	2.32E-06	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm ²)	7.37E-07	2.32E-06	EMSOFT	EST

(B) Toxicity Values/Benchmarks

	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
Reference Dose (RfD) (mg/kg/day)	7.5E-1	8.0E-1	IRIS, 1993	
RfD details	<p>Rat subchronic feeding study (Brown et al., 1978); NOAEL = 750mg/kg/day; UF = 1000; Critical effect = decreased growth, food consumption and altered organ weights. Source: IRIS CCD date: 7/16/1987 The IRIS RfD of 8.0E-1 mg/kg/day was replaced with 7.5E-1 mg/kg/day in accordance with the 2 significant figures for rounding up numbers policy.</p>	<p>Tier 1 Source: IRIS: Basis: IRIS is a tier 1 source. IRIS (1993) chronic RfD = 8.0E-1 mg/kg-day (see derivation below). ATSDR (1996) derived an intermediate (subchronic exposure) MRL = 6.0 mg/kg-day based on a 3-week study (Moody and Reddy, 1978). Critical Study: Brown, D., K.R. Butterworth, I.F. Gaunt, P. Grasso and S.D. Gangolli. 1978. Short-term oral toxicity study of diethyl phthalate in the rat. Food Cosmet. Toxicol. 16: 415-422. Method(s): CD rats (15/sex) were exposed to 0, 0.2, 1.0, or 5.0% diethyl phthalate in diets for 16 weeks. Critical effect: decreased body weight and food consumption and increased organ (brain, liver, kidneys, stomach, small intestines, and full caecum) weight End point or Point of Departure (POD): NOAEL = 1% (750 mg/kg-day) Uncertainty Factors: UF = 1,000 (10 each for intraspecies variability, interspecies extrapolation and use of a subchronic study) Source and date: IRIS, Last revision date - 2/01/1993. An EPA screening-level review in 2002 identified new significant studies.</p> <p>Tier 2 Sources: PPRTV: No PPRTV record available at this time. MRL: Per ATSDR (6/1995), oral intermediate MRL = 6 mg/kg-day Critical Study: Moody DE, Reddy JK. 1978. Hepatic peroxisome (micro body) proliferation in rats fed plasticizers and related compounds. Toxicol Appl Pharmacol 45(2):497-504. Method: F-344 rats exposed to diethyl phthalate at dietary concentration of 2% for 3 weeks. Critical effect: peroxisomal proliferation, slightly elevated liver weight, and changes in hepatic enzyme activities in male rats End point or Point of Departure (POD): LOAEL = 1,753 mg/kg/day</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<p>Uncertainty Factors: UF = 300 (10 each for intraspecies variability and interspecies extrapolation and 3 for use of a LOAEL)</p> <p>Additional Note: An acute oral MRL = 7 mg/kg/day is available. This MRL is based on a reproductive study (Jones et al. 1993) in which rats had Leydig cell ultrastructural changes after receiving 2,000 mg/kg/day diethyl phthalate for 2 days by gavage. The LOAEL (2,000 mg/kg/day) was divided by an UF = 300 (10 each for intraspecies variability and interspecies extrapolation and 3 for use of a LOAEL).</p> <p>Source and date: ATSDR, 6/1995. A Toxicological Profile is available.</p> <p>Tier 3 Sources: MDEQ: 1) Per DEQ-CCD (7/16/1987), RRD used a modified IRIS value. See Part 201 Value RfD details. 2) Per DEQ-CCD (3/26/2001), WRD derived a RfD = 0.75 mg/kg-day based on NOAEL of 750 mg/kg/d in female CD (Sprague-Dawley) rats in a subchronic feeding study (Brown et al., 1978). A total UF=1000 to account for was applied to account for intraspecies variability, interspecies extrapolation and subchronic to chronic extrapolation).</p>		
Oral Cancer Slope Factor (CSF) (mg/kg-day)⁻¹	--	NA	MDEQ, 2015	
CSF details	NA	<p>Carcinogen Weight-of-Evidence (WOE) Class: D; not classifiable as a human carcinogen</p> <p>IRIS WOE Basis: Pertinent data regarding carcinogenicity were not located in the available literature. An EPA screening-level review in 2002 did not identify any critical new study.</p> <p>Source and Date: IRIS, 2/01/1993</p> <p>Tier 1 and 2 Sources: IRIS: Per IRIS (2/01/1993), no value at this time. PPRTV: No PPRTV record available at this time. MRL: NA; MRLs are for non-cancer effects only.</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		Tier 3 Source: MDEQ: Per DEQ-CCD, no value at this time.		
Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) ($\mu\text{g}/\text{m}^3$)	5.0E+1	2.8E+3	MDEQ, 1993	
RfC/ITSL details	Source: Interim CCD/AQD date: 4/15/1993	Tier 3 Source: MDEQ: Basis: MDEQ value based on extrapolated IRIS oral RfD value, which is based on a 16-week feeding study. The ECHA value of $2.6\text{E}+3 \mu\text{g}/\text{m}^3$ is also based on the same study. MDEQ value selected because use of uncertainty factors more consistent with EPA/IRIS approach. See details below. Tier 1 and 2 Sources: IRIS: Per IRIS (2/01/1993), no value at this time PPRTV: No PPRTV record available at this time. MRL: Per ATSDR (6/1995), no value available at this time. Tier 3 Sources: MDEQ: Per DEQ-CCD/AQD (1993) ITSL = $5.0\text{E}+1 \mu\text{g}/\text{m}^3$: Averaging time = 8 hours. Second ITSL = $2800 \mu\text{g}/\text{m}^3$ averaging time = 24 hours. Basis: 1) $5.0\text{E}+1 \mu\text{g}/\text{m}^3$: ACGIH 1992 TLV; the inhalation critical effect appears to be upper respiratory irritation. Subchronic oral toxicity studies found testicular and liver cell toxicity. Footnote 13; This chemical has two ITSLs with different averaging times. Ambient air impacts cannot exceed either ITSL. 2) $2800 \mu\text{g}/\text{m}^3$: extrapolated from the IRIS RfD of 0.8 mg/kg-day. RfD is based on a rat NOAEL of 750 mg/kg found in a 16 week feeding study by Brown et al (1978). Critical effects: decreased growth, reduced food consumption, and lowered organ weights.		Complete



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		<p>Critical effects of workers: throat and nose irritation References: ACGIH. 1992. Documentation of the TLV's and BEI's; EPA. 1993, IRIS2 database. Source and date: MDEQ-AQD Communication, 4/15/1993</p> <p>ECHA: Derived No Effect Level (DNEL) = 2.6E+3 µg/m³: Key study: Publication, 1978 (Brown et al.) Methods: Standard study: Groups of 15 Sprague-Dawley rats of each sex were given diets containing 0 (control), 0.2, 1.0 or 5.0% DEP for 16 weeks. Additional groups of 5 rats of each sex were fed similar diets for 2 or 6 weeks. Pair feeding study: Groups of 6 rats of each sex individually housed and fed untreated diet (controls) or diet containing 5% DEP for 16 weeks. Each control animal was from the same litter as one of the treated rats of the same sex. The treated rats were fed ad libitum and the weight consumed by each one was recorded daily. Each control rat was given a weight equal to that consumed by its paired litter mate in the previous 24 h period. NOAEL: 150 mg/kg diet Critical effects: Effects on body weight and organ weight Oral DNEL: 0.75 mg/kg bw/day Dose descriptor starting point (after route to route extrapolation): NOAEC - 130 mg/m³ Overall assessment factor (AF): 50 Justification for: Undertaken as described in REACH Guidance R.8 AF for differences in duration of exposure: 2 AF for other interspecies differences: 2.5 AF for intraspecies differences: 10 Source: ECHA REACH Dossier for Diethyl Phthalate</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</p>		



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		(IARC), WHO (IPCS/INCHEM), Canada, ECHA (REACH) and OECD HPV.		
Inhalation Unit Risk Factor (IURF) (($\mu\text{g}/\text{m}^3$) ⁻¹)	--	NA	MDEQ, 2015	
IURF details	NA	<p>Carcinogen Weight-of-Evidence (WOE) Class: D; not classifiable as a human carcinogen IRIS WOE Basis: Pertinent data regarding carcinogenicity were not located in the available literature. An EPA screening-level review in 2002 did not identify any critical new study. Source and Date: IRIS, 2/01/1993</p> <p>Tier 1 and 2 Sources: IRIS: Per IRIS (2/01/1993), no value at this time. PPRTV: No PPRTV record available at this time. MRL: NA; MRLs are for non-cancer effects only.</p> <p>Tier 3 Sources: MDEQ: Per DEQ-CCD, no value at this time.</p>		Complete
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)	No	No, the RfD or RfC is not based on a reproductive-developmental effect.	MDEQ, 2015	
Developmental or Reproductive Toxicity Details	NA	The acute ATSDR MRL is based on reproductive effects (Leydig cell disruptions) in male rats		
State Drinking Water Standard (SDWS) (ug/L)	--	NO	SDWA, 1976	



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
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 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)		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)	110
Updated GSI value (µg/L)	110
Rule 57 Drinking Water Value (µg/L)	14,000

	Rule 57 Value (µg/L)	Verification Date
Human Non-cancer Values- Drinking water source (HNV-drink)	14,000	1/2001
Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)	40,000	1/2001
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)	110	1/2001
Aquatic maximum value (AMV)	980	1/2001
Final Acute Value (FAV)	2,000	1/2001

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 ($\mu\text{g}/\text{kg}$)	330	MDEQ, 2015
Target Detection Limit – Water ($\mu\text{g}/\text{L}$)	5	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