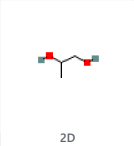
PubChem

COMPOUND SUMMARY

Propylene glycol

Cite Download

PubChem CID	1030
Structure	 2D  3D Find Similar Structures
Chemical Safety	Laboratory Chemical Safety Summary (LCSS) Datasheet
Molecular Formula	$C_3H_8O_2$ or $CH_3CHOHCH_2OH$
Synonyms	propylene glycol 1,2-propanediol propane-1,2-diol 57-55-6 1,2-Propylene glycol More...
Molecular Weight	76.09
Dates	Modify 2022-07-02 Create 2004-09-16

Propylene glycol is a synthetic liquid substance that absorbs water. Propylene glycol is also used to make polyester compounds, and as a base for deicing solutions. Propylene glycol is used by the chemical, food, and pharmaceutical industries as an antifreeze when leakage might lead to contact with food. The Food and Drug Administration (FDA) has classified propylene glycol as an additive that is "generally recognized as safe" for use in food. It is used to absorb extra water and maintain moisture in certain medicines, cosmetics, or food products. It is a solvent for food colors and flavors, and in the paint and plastics industries. Propylene glycol is also used to create artificial smoke or fog used in fire-fighting training and in theatrical productions. Other names for propylene glycol are 1,2-dihydroxypropane, 1,2-propanediol, methyl glycol, and trimethyl glycol. Propylene glycol is clear, colorless, slightly syrupy liquid at room temperature. It may exist in air in the vapor form, although propylene glycol must be heated or briskly shaken to produce a vapor. Propylene glycol is practically odorless and tasteless.

▸ CDC-ATSDR Toxic Substances Portal

Thick odorless colorless liquid. Mixes with water. (USCG, 1999)

▸ CAMEO Chemicals

Propylene glycol is a natural product found in Vitis vinifera, Pseudomonas putida, and Arabidopsis thaliana with data available.

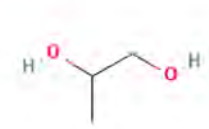
▸ LOTUS - the natural products occurrence database

Contents

1 Structures

1.1 2D Structure

Chemical Structure Depiction



PubChem

1.2 3D Conformer

PubChem

2 Names and Identifiers

2.1 Computed Descriptors

2.1.1 IUPAC Name

propane-1,2-diol

Computed by Lexichem TK 2.7.0 (PubChem release 2021.10.14)

PubChem

2.1.2 InChI

InChI=1S/C3H8O2/c1-3(5)2-4/h3-5H,2H2,1H3

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

PubChem

2.1.3 InChI Key

DNIAPMSPPWPWGF-UHFFFAOYSA-N

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

PubChem

2.1.4 Canonical SMILES

CC(CO)O

Computed by OEChem 2.3.0 (PubChem release 2021.10.14)

PubChem

2.2 Molecular Formula

C3H8O2

CAMEO Chemicals; EU Food Improvement Agents; Wikipedia; PubChem

C3H8O2

CH3CHOHCH2OH

ILO International Chemical Safety Cards (ICSC)

2.3 Other Identifiers

2.3.1 CAS

57-55-6

CAMEO Chemicals; CAS Common Chemistry; ChemIDplus; DrugBank; DTP/NCI; EPA Chemicals under the TSCA; EPA DSSTox; European Chemicals Agency (ECHA); Hazardous Substances Data Bank (HSDB); ILO International C

25322-68-3

DTP/NCI

63625-56-9

European Chemicals Agency (ECHA)

2.3.2 Related CAS

58858-91-6 (hydrochloride salt)

ChemIDplus

2.3.3 Deprecated CAS

190913-75-8, 4254-16-4, 63625-56-9, 1194046-20-2

ChemIDplus

1194046-20-2, 190913-75-8, 63625-56-9

EPA DSSTox

2.3.4 European Community (EC) Number

200-338-0

- EU Food Improvement Agents; European Chemicals Agency (ECHA)

613-293-0

- European Chemicals Agency (ECHA)

2.3.5 ICSC Number

0321

- ILO International Chemical Safety Cards (ICSC)

2.3.6 NSC Number

69860

- DTP/NCI

35749

- DTP/NCI

35748

- DTP/NCI

35747

- DTP/NCI

2.3.7 RTECS Number

TY2000000

- The National Institute for Occupational Safety and Health (NIOSH)

2.3.8 JECFA Number

925

- Joint FAO/WHO Expert Committee on Food Additives (JECFA)

2.3.9 FEMA Number

2940

- Flavor and Extract Manufacturers Association (FEMA); Joint FAO/WHO Expert Committee on Food Additives (JECFA)

2.3.10 DSSTox Substance ID

DTXSID0021206

- EPA DSSTox

2.3.11 Wikipedia

Propylene glycol

- Wikipedia

2.3.12 Wikidata

Q161495

- Wikidata

2.4 Synonyms

2.4.1 MeSH Entry Terms

1,2 Propanediol
1,2-Propanediol
Glycol, Propylene
Monohydrate, Propylene Glycol
Propan-1,2-Diol

Propylene Glycol
Propylene Glycol Monohydrate
Propylene Glycol Sodium Salt
Propylene Glycol, (+-)-Isomer
Propylene Glycol, (R)-Isomer
Propylene Glycol, (S)-Isomer

Medical Subject Headings (MeSH)

2.4.2 Depositor-Supplied Synonyms

propylene glycol	Sirlene	1,2-Propylenglykol	AI3-01898	S-(+)-Propylene glycol	(inverted exclamation markA)-1,2-Propanediol	S(
1,2-propanediol	Trimethyl glycol	(RS)-1,2-Propanediol	1,2-propandiol	1000PG	DSSTox_RID_76010	1,2
propane-1,2-diol	alpha-Propyleneglycol	(+-)-1,2-Propanediol	propylenglycol	CH3CH(OH)CH2OH	DSSTox_GSID_21206	Al
57-55-6	Propylene Glycol USP	PG 12	(+/-)-1,2-propanediol	HOCH2CH(OH)CH3	Prolugen	El
1,2-Propylene glycol	2,3-Propanediol	(+-)-Propylene glycol	NSC 69860	MFCD00064272	propylene-glycol	BF
1,2-dihydroxypropane	Solargard P	FEMA No. 2940	SDM No. 27	1,2-(RS)-Propanediol	Ilexan P	pr
2-Hydroxypropanol	Solar Winter BAN	Caswell No. 713	1,2-propane-diol	1,2-Propanediol (8CI,9CI)	General lube	Pr
Methylethyl glycol	dl-Propylene glycol	alpha-Propylene glycol	EPA Pesticide Chemical Code 068603	1, 2-propanediol	1,2-(RS)-Propanediol; 1,2-Dihydroxypropane; 1,2-Propylene glycol	Kc
Methylethylene glycol	Methyl glycol	1,2-Propylenglykol [German]	L-1,2-propanediol	NSC-69860	Propylene Glycol (Propane-1,2-diol)	Pr
Isopropylene glycol	DL-1,2-Propanediol	CCRIS 5929	CHEBI:16997	123120-98-9	CAS-57-55-6	Ce
Monopropylene glycol	Ucar 35	HSDB 174	HOCH2CH(OH)Me	NCGC00090739-02	1,2 Propanediol	1,2
Dowfrost	Sentry Propylene Glycol	.alpha.-Propylene glycol	MeCH(OH)CH2OH	DSSTox_CID_1206	Kilfrost ABC-S	1,2

PubChem

3 Chemical and Physical Properties

3.1 Computed Properties

Property Name	Property Value	Reference
Molecular Weight	76.09	Computed by PubChem 2.2 (PubChem release 2021.10.14)
XLogP3	-0.9	Computed by XLogP3 3.0 (PubChem release 2021.10.14)
Hydrogen Bond Donor Count	2	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Hydrogen Bond Acceptor Count	2	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Rotatable Bond Count	1	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Exact Mass	76.052429494	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Monoisotopic Mass	76.052429494	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Topological Polar Surface Area	40.5 Å²	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Heavy Atom Count	5	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	20.9	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Isotope Atom Count	0	Computed by PubChem
Defined Atom Stereocenter Count	0	Computed by PubChem
Undefined Atom Stereocenter Count	1	Computed by PubChem
Defined Bond Stereocenter Count	0	Computed by PubChem
Undefined Bond Stereocenter Count	0	Computed by PubChem
Covalently-Bonded Unit Count	1	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2021.10.14)

PubChem

3.2 Experimental Properties

3.2.1 Physical Description

Thick odorless colorless liquid. Mixes with water. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

CAMEO Chemicals

DryPowder, Liquid; Liquid; OtherSolid; OtherSolid, Liquid; WetSolid; WetSolid, Liquid; WetSolid, OtherSolid

EPA Chemicals under the TSCA

Clear, colourless, hygroscopic, viscous liquid

EU Food Improvement Agents

Clear, colorless, viscous liquid; [ChemIDplus]

Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

COLOURLESS ODOURLESS HYGROSCOPIC VISCOUS LIQUID.

ILO International Chemical Safety Cards (ICSC)

Thick odorless colorless liquid.

Occupational Safety and Health Administration (OSHA)

3.2.2 Color/Form

Colorless viscous liquid

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

3.2.3 Odor

Practically odorless

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

3.2.4 Taste

Practically tasteless

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

3.2.5 Boiling Point

370.8 °F at 760 mm Hg (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

CAMEO Chemicals

187.6 °C

PhysProp

DrugBank

187.6 °C

EPA DSSTox; Hazardous Substances Data Bank (HSDB)

188.2 °C

ILO International Chemical Safety Cards (ICSC)

370.8 °F

Occupational Safety and Health Administration (OSHA)

3.2.6 Melting Point

-76 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

CAMEO Chemicals

-60 °C

PhysProp

DrugBank

-60.0 °C

EPA DSSTox

-60 °C

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-444

Hazardous Substances Data Bank (HSDB)

-59 °C

ILO International Chemical Safety Cards (ICSC)

-76 °F

Occupational Safety and Health Administration (OSHA)

3.2.7 Flash Point

210 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

CAMEO Chemicals

99 °C

Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

104 °C Pensky-Martens closed cup

Martin AE, Murphy FH; Glycols, Propylene Glycols. Kirk-Othmer Encyclopedia of Chemical Technology (1994). John Wiley & Sons, Inc. Online Posting Date: December 4, 2000

Hazardous Substances Data Bank (HSDB)

210 °F (99 °C) (Closed cup)

Fire Protection Guide to Hazardous Materials. 13 ed. Quincy, MA: National Fire Protection Association, 2002., p. 325-102

Hazardous Substances Data Bank (HSDB)

225 °F (Open cup)

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

Hazardous Substances Data Bank (HSDB)

101 °C c.c.

ILO International Chemical Safety Cards (ICSC)

210 °F

Occupational Safety and Health Administration (OSHA)

3.2.8 Solubility

greater than or equal to 100 mg/mL at 70° F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

CAMEO Chemicals

1000000 mg/L (at 20 °C)

YALKOWSKY,SH & DANNENFELSER,RM (1992)

DrugBank

13.14 M

YALKOWSKY,SH & HE,Y (2003)

EPA DSSTox

Soluble in water, ethanol and acetone

EU Food Improvement Agents

Soluble in benzene

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-444

Hazardous Substances Data Bank (HSDB)

Miscible with acetone and chloroform; soluble in ether. Will dissolve many essential oils, but is immiscible with fixed oils.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1350

Hazardous Substances Data Bank (HSDB)

In water, 1X10+6 mg/L at 20 °C /miscible/

Yalkowsky SH, Dannenfelser RM; The AQUASOL dATAbASE of Aqueous Solubility. Ver 5. Tucson, AZ: Univ AZ, College of Pharmacy (1992)

Hazardous Substances Data Bank (HSDB)

Solubility in water: miscible

ILO International Chemical Safety Cards (ICSC)

3.2.9 Density

1.04 at 68 °F (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

CAMEO Chemicals

1.0361 g/cu cm at 20 °C

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-444

Hazardous Substances Data Bank (HSDB)

Relative density (water = 1): 1.04

ILO International Chemical Safety Cards (ICSC)

1.04

Occupational Safety and Health Administration (OSHA)

3.2.10 Vapor Density

2.62 (NTP, 1992) (Relative to Air)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

CAMEO Chemicals

Relative vapor density (air = 1): 2.6

ILO International Chemical Safety Cards (ICSC)

2.62

Occupational Safety and Health Administration (OSHA)

3.2.11 Vapor Pressure

0.08 mm Hg at 68 °F ; 0.13 mm Hg at 77° F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

- CAMEO Chemicals

0.13 mmHg

- EPA DSSTox

0.13 [mmHg]

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

0.13 mm Hg at 25 °C /Extrapolated/

Daubert, T.E., R.P. Danner. Physical and Thermodynamic Properties of Pure Chemicals Data Compilation. Washington, D.C.: Taylor and Francis, 1989.

- Hazardous Substances Data Bank (HSDB)

Vapor pressure, Pa at 20 °C: 10.6

- ILO International Chemical Safety Cards (ICSC)

0.08 mmHg

- Occupational Safety and Health Administration (OSHA)

3.2.12 LogP

-0.92

HANSCH,C ET AL. (1995)

- DrugBank

-0.92 (LogP)

HANSCH,C ET AL. (1995)

- EPA DSSTox

log Kow = -0.92

Hansch, C., Leo, A., D. Hoekman. Exploring QSAR - Hydrophobic, Electronic, and Steric Constants. Washington, DC: American Chemical Society., 1995., p. 7

- Hazardous Substances Data Bank (HSDB)

-0.92

- ILO International Chemical Safety Cards (ICSC)

3.2.13 Henrys Law Constant

Henry's Law constant = 1.3X10-8 atm-cu m/mol at 25 °C (est)

*US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from< as of Feb 12, 2010: **https://www.epa.gov/oppt/exposure/pubs/episuitedl.htm***

- Hazardous Substances Data Bank (HSDB)

3.2.14 Atmospheric OH Rate Constant

1.20e-11 cm3/molecule*sec

ATKINSON,R (1989)

- EPA DSSTox

3.2.15 Stability/Shelf Life

At cool temperatures, propylene glycol is stable in a well-closed container, but at high temperatures, in the open, it tends to oxidize, giving rise to products such as **propionaldehyde**, **lactic acid**, **pyruvic acid**, and **acetic acid**. Propylene glycol is chemically stable when mixed with **ethanol** (95%), **glycerin**, or **water**; aqueous solutions may be sterilized by autoclaving.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 592

- Hazardous Substances Data Bank (HSDB)

3.2.16 Autoignition Temperature

700 °F (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

- CAMEO Chemicals

700 °F (371 °C)

Fire Protection Guide to Hazardous Materials. 13 ed. Quincy, MA: National Fire Protection Association, 2002., p. 325-102

Hazardous Substances Data Bank (HSDB)

420 °C

ILO International Chemical Safety Cards (ICSC)

3.2.17 Decomposition

When heated to decomposition it emits acrid smoke and irritating fumes.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3061

Hazardous Substances Data Bank (HSDB)

3.2.18 Viscosity

0.581 cP at 20 °C

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

3.2.19 Heat of Combustion

431.0 kg cal/mole

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

3.2.20 Heat of Vaporization

168.6 cal/g at BP

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

3.2.21 Surface Tension

40.1 dynes/cm at 25 °C

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

3.2.22 Refractive Index

[n]D/20: 1,431-1,433

EU Food Improvement Agents

Index of refraction: 1.4324 at 20 °C/D

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-444

Hazardous Substances Data Bank (HSDB)

3.2.23 Dissociation Constants

pKa

14.9

SERJEANT,EP & DEMPSEY,B (1979)

DrugBank

pKa = 14.8 at 25 °C

Riddick, J.A., W.B. Bunger, Sakano T.K. Techniques of Chemistry 4th ed., Volume II. Organic Solvents. New York, NY: John Wiley and Sons., 1985., p. 266

Hazardous Substances Data Bank (HSDB)

3.2.24 Relative Evaporation Rate

0.01, relative to butyl acetate

Riddick, J.A., W.B. Bunger, Sakano T.K. Techniques of Chemistry 4th ed., Volume II. Organic Solvents. New York, NY: John Wiley and Sons., 1985., p. 266

Hazardous Substances Data Bank (HSDB)

3.2.25 Kovats Retention Index

Standard non-polar	722, 719, 753, 745, 710, 716, 711, 710, 710, 745
Semi-standard non-polar	705, 758, 764, 732, 740
Standard polar	1600, 1591, 1603, 1605, 1603, 1599, 1599, 1612, 1599, 1603, 1602, 1583, 1589, 1597, 1616.9, 1612, 1585, 1611, 1594

NIST Mass Spectrometry Data Center

3.2.26 Other Experimental Properties

Specific heat: 0.590 cal/g at 20 °C; hygroscopic

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

Heat of vaporization = 15.4 kcal/mol at 25 °C; heat of formation = -116.1 kcal/mol at 25 °C (liquid); heat capacity = 45.1 kcal/mol at 20 °C; viscosity = 56.0 cP at 20 °C; surface tension = 36.51 dyne/cm at 25 °C

Riddick, J.A., W.B. Bunger, Sakano T.K. Techniques of Chemistry 4th ed., Volume II. Organic Solvents. New York, NY: John Wiley and Sons., 1985., p. 266

Hazardous Substances Data Bank (HSDB)

BP: 88-90 °C at 12 mm Hg; 187-189 °C at 760 mm Hg. Specific optical rotation: -15 deg at 20 °C /l-form/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1350

Hazardous Substances Data Bank (HSDB)

BP: 95-96 °C at 14 mm Hg; Specific optical rotation: +15 (neat) deg at 20 °C; Density: 1.04 at 25 °C/4/ degC /d-form/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1350

Hazardous Substances Data Bank (HSDB)

Hydroxyl radical reaction rate constant = 1.2X10-11 cu cm/molec-sec at 25 °C

Atkinson R; J Phys Chem Ref Data Monograph 1 (1989)

Hazardous Substances Data Bank (HSDB)

3.2.27 Chemical Classes

Other Classes -> Alcohols and Polyols, Other

Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

4 Spectral Information

4.1 1D NMR Spectra

1D NMR Spectra	NMR: 45 (Varian Associates NMR Spectra Catalogue)

▶ Hazardous Substances Data Bank (HSDB)

4.1.1 1H NMR Spectra

Instrument Name	BRUKER AC-300
Source of Sample	Tokyo Kasei Kogyo Company, Ltd., Tokyo, Japan
Copyright	Copyright © 1991-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

▶ SpectraBase

Copyright	Database Compilation Copyright © 2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

▶ SpectraBase

4.1.2 13C NMR Spectra

Source of Sample	MCB Manufacturing Chemists, Norwood, Ohio
Copyright	Copyright © 1980, 1981-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

▶ SpectraBase

Copyright	Database Compilation Copyright © 2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

▸ SpectraBase

4.2 Mass Spectrometry

4.2.1 GC-MS

Showing 2 of 9 View More

Accession ID	OUF00428
Authors	Tsujimoto Y, Tsugawa H, Bamba T, Fukusaki E, engineering department, Osaka Univ.
Instrument	Pegasus III TOF-MS system, Leco; GC 6890, Agilent Technologies
Instrument Type	GC-EI-TOF
MS Level	MS
Ionization Mode	POSITIVE
Column Name	CP-SIL 8 CB LOW BLEED/MS
Retention Time	245.966 sec
Top 5 Peaks	117 999 147 581 118 109 148 94 133 84
SPLASH	splash10-014j-0900000000-d90655d5a614c4ddf998
Thumbnail	
License	CC BY-SA

▸ MassBank Europe

MoNA ID	JP001841
MS Category	Experimental
MS Type	GC-MS
MS Level	MS1
Instrument	HITACHI RMU-7M
Instrument Type	EI-B
Ionization Mode	positive
Top 5 Peaks	45 99.99 43 14.83 31 11.49 27 10.45 29 8.84
SPLASH	splash10-0002-9000000000-a18bede40461dace657b

Thumbnail	
Submitter	University of Tokyo Team, Faculty of Engineering, University of Tokyo

MassBank of North America (MoNA)

4.2.2 MS-MS

NIST Number	1051599
Instrument Type	IT/ion trap
Collision Energy	0
Spectrum Type	MS2
Precursor Type	[M-H]-
Precursor m/z	75.0452
Total Peaks	2
m/z Top Peak	31.1
m/z 2nd Highest	45.1
m/z 3rd Highest	0
Thumbnail	

NIST Mass Spectrometry Data Center

4.2.3 Other MS

Showing 2 of 3 View More

Other MS	MASS: 95 (Atlas of Mass Spectral Data, John Wiley & Sons, New York)

Hazardous Substances Data Bank (HSDB)

Accession ID	JP001841
Authors	TAJIMA S, GUNMA COLLEGE OF TECHNOLOGY
Instrument	HITACHI RMU-7M
Instrument Type	EI-B
MS Level	MS
Ionization Mode	POSITIVE
Ionization	ENERGY 70 eV
Top 5 Peaks	45 999 43 148 31 115 27 105 29 88
SPLASH	splash10-0002-9000000000-a18bede40461dace657b

Thumbnail	
License	CC BY-NC-SA

▸ MassBank Europe

4.3 UV Spectra

UV: 5-12 (Organic Electronic Spectral Data, Phillips et al, John Wiley & Sons, New York)

Lide, D.R., G.W.A. Milne (eds.). Handbook of Data on Organic Compounds. Volume I. 3rd ed. CRC Press, Inc. Boca Raton ,FL. 1994., p. V5: 4324

▸ Hazardous Substances Data Bank (HSDB)

4.4 IR Spectra

IR Spectra	IR: 5974 (Coblentz Society Spectral Collection)

▸ Hazardous Substances Data Bank (HSDB)

4.4.1 FTIR Spectra

Technique	CAPILLARY CELL: NEAT
Source of Sample	The Matheson Company, Inc., East Rutherford, New Jersey
Copyright	Copyright © 1980, 1981-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

▸ SpectraBase

Instrument Name	Bruker Tensor 27 FT-IR
Technique	Neat
Source of Spectrum	Bio-Rad Laboratories, Inc.
Source of Sample	Alfa Aesar, Thermo Fisher Scientific
Catalog Number	A18406
Lot Number	10188904
Copyright	Copyright © 2016-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

4.4.2 ATR-IR Spectra

Technique	ATR-Neat
Copyright	Copyright © 1980, 1981-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

Instrument Name	Bruker Tensor 27 FT-IR
Technique	ATR-Neat (DuraSamplIR II)
Source of Spectrum	Bio-Rad Laboratories, Inc.
Source of Sample	Alfa Aesar, Thermo Fisher Scientific
Catalog Number	A18406
Lot Number	10188904
Copyright	Copyright © 2016-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

4.4.3 Near IR Spectra

Instrument Name	BRUKER IFS 88
Technique	NIR
Source of Spectrum	Prof. Buback, University of Goettingen, Germany
Copyright	Copyright © 1989, 1990-2021 Wiley-VCH Verlag GmbH & Co. KGaA. All Rights Reserved.
Thumbnail	

SpectraBase

Instrument Name	BRUKER IFS 88
Technique	NIR
Source of Spectrum	Prof. Buback, University of Goettingen, Germany
Copyright	Copyright © 1989, 1990-2021 Wiley-VCH Verlag GmbH & Co. KGaA. All Rights Reserved.
Thumbnail	

SpectraBase

4.4.4 Vapor Phase IR Spectra

Instrument Name	DIGILAB FTS-14
Technique	Vapor Phase
Copyright	Copyright © 1980, 1981-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

Instrument Name	Bruker IFS 85
Technique	Gas-GC
Copyright	Copyright © 1989, 1990-2021 Wiley-VCH Verlag GmbH & Co. KGaA. All Rights Reserved.
Thumbnail	

SpectraBase

4.5 Raman Spectra

Catalog Number	134368
Copyright	Copyright © 2017-2021 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2017-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

Catalog Number	202304
Copyright	Copyright © 2017-2021 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2017-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

SpectraBase

4.6 Other Spectra

SADTLER REFERENCE NUMBER: 267 (IR, PRISM); 92 (IR, GRATING)

Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. C-450

Hazardous Substances Data Bank (HSDB)

5 Related Records

5.1 Related Compounds with Annotation

PubChem

5.2 Related Compounds

Same Connectivity	16 Records
Same Stereo	12 Records
Same Isotope	3 Records
Same Parent, Connectivity	208 Records
Same Parent, Stereo	188 Records
Same Parent, Isotope	195 Records
Same Parent, Exact	177 Records
Mixtures, Components, and Neutralized Forms	4,196 Records
Similar Compounds	292 Records
Similar Conformers	1,475 Records

PubChem

5.3 Substances

5.3.1 Related Substances

All	6,656 Records
Same	601 Records
Mixture	6,055 Records

PubChem

5.3.2 Substances by Category

PubChem

5.4 Entrez Crosslinks

PubMed	328 Records
Protein Structures	1 Record

Taxonomy	3 Records
OMIM	1 Record
Gene	28 Records

PubChem

5.5 Associated Chemicals

(+)-Propylene glycol; 4254-15-3

Hazardous Substances Data Bank (HSDB)

(-)-Propylene glycol; 4254-14-2

Hazardous Substances Data Bank (HSDB)

5.6 NCBI LinkOut

NCBI

6 Chemical Vendors

PubChem

7 Drug and Medication Information

7.1 FDA National Drug Code Directory

National Drug Code (NDC) Directory

CENTELLA ASIATICA is an active ingredient in 56 products including: 'ACNE - CYSTIC ACNE', 'ACNE TONIC', and 'AFRICAN BLACK ACNE-PRONE FACE AND BODY BAR'.

National Drug Code (NDC) Directory

PROPYLENE GLYCOL is an active ingredient in 77 products including: 'ADVANCED EYE RELIEF DRY EYE REJUVENATION', 'ARTIFICAL TEARS', and 'ARTIFICIAL TEARS LUBRICANT EYE DROPS'.

National Drug Code (NDC) Directory

7.2 Clinical Trials

7.2.1 ClinicalTrials.gov

ClinicalTrials.gov

7.2.2 EU Clinical Trials Register

EU Clinical Trials Register

7.2.3 NIPH Clinical Trials Search of Japan

NIPH Clinical Trials Search of Japan

7.3 Therapeutic Uses

Propylene glycol is used as a vehicle for IV administration of drugs such as lorazepam, etomidate, phenytoin, diazepam, digoxin, hydralazine, esmolol, chlordiazepoxide, multivitamins, nitroglycerin, pentobarbital sodium, phenobarbital sodium, and trimethoprim-sulfamethoxazole.

DHHS/NTP-CERHR; NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Propylene Glycol (March 2004) NIH Pub No. 04-4482 p.II-30 . Available from, as of January 11, 2010: https://cerhr.niehs.nih.gov/evals/egpg/propylene/PG_Monograph.pdf

Hazardous Substances Data Bank (HSDB)

As an antiseptic it is similar to ethanol, and against molds it is similar to glycerin and only slightly less effective than ethanol.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 592

Hazardous Substances Data Bank (HSDB)

Hydroscopic agents (eg, propylene glycol...) are added /to respiratory inhalants/ to reduce viscosity of bronchial secretions.

American Medical Association, AMA Department of Drugs, AMA Drug Evaluations. 3rd ed. Littleton, Massachusetts: PSG Publishing Co., Inc., 1977., p. 656

Hazardous Substances Data Bank (HSDB)

Ointment containing approx 70% propylene glycol has been used as osmotic agent with good results in treatment of edema of cornea.

Grant, W. M. Toxicology of the Eye. 2nd ed. Springfield, Illinois: Charles C. Thomas, 1974., p. 862

Hazardous Substances Data Bank (HSDB)

For more Therapeutic Uses (Complete) data for Propylene glycol (9 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

7.4 Drug Warnings

Hyperosmolality has been induced by propylene glycol (PG) in a number of clinical settings ..., particularly in intensive care unit patients during the administration of nitroglycerin solutions that contain PG ...

Cosmetic Ingredient Review Expert Panel; J Am Coll Toxicol 13 (6): 437-91 (1994)

Hazardous Substances Data Bank (HSDB)

Formulations containing 35% propylene glycol can cause hemolysis in humans.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 593

Hazardous Substances Data Bank (HSDB)

Hemolysis, CNS depression, hyperosmolality, and lactic acidosis have been reported after IV administration of propylene glycol.

DHHS/NTP-CERHR; NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Propylene Glycol (March 2004) NIH Pub No. 04-4482 p.II-30 . Available from, as of January 11, 2010: https://cerhr.niehs.nih.gov/evals/egpg/propylene/PG_Monograph.pdf

Hazardous Substances Data Bank (HSDB)

Propylene glycol is a commonly used solvent for oral, intravenous, and topical pharmaceutical preparations. Although it is considered safe, large intravenous doses given over a short period of time can be toxic. Underlying renal insufficiency and hepatic dysfunction raise risk for toxicity. Toxic effects include hyperosmolality, increased anion gap metabolic acidosis (due to lactic acidosis), acute kidney injury, and sepsis-like syndrome. Treatment of toxicity includes hemodialysis to effectively remove propylene glycol. Prevention is best achieved by limiting the dose of propylene glycol infused.

Zar T et al; Seminars in Dialysis 20 (3): 217-9 (2007). Available from, as of February 23, 2010: https://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=17555487

Hazardous Substances Data Bank (HSDB)

For more Drug Warnings (Complete) data for Propylene glycol (41 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

7.5 Reported Fatal Dose

1 = practically nontoxic: probable oral lethal dose (human) is above 15 g/kg; for 70 kg person (150 lb), more than 1 qt (2.2 lb).

Gosselin, R.E., H.C. Hodge, R.P. Smith, and M.N. Gleason. Clinical Toxicology of Commercial Products. 4th ed. Baltimore: Williams and Wilkins, 1976., p. II-120

- Hazardous Substances Data Bank (HSDB)

8 Food Additives and Ingredients

8.1 Food Additive Classes

JECFA Functional Classes

Food Additives -> CARRIER_SOLVENT; GLAZING_AGENT; HUMECTANT;

Joint FAO/WHO Expert Committee on Food Additives (JECFA)

8.2 FDA Substances Added to Food

Substance	PROPYLENE GLYCOL
Used for (Technical Effect)	SOLVENT OR VEHICLE
Document Number (21 CFR)	73.30 175.300 175.320 176.180 176.210 177.1390 177.1680 177.2420 177.2600 177.2800 178.3300 184.1666

FDA Center for Food Safety and Applied Nutrition (CFSAN)

8.3 FDA Indirect Additives used in Food Contact Substances

Indirect Additives	PROPYLENE GLYCOL
Title 21 of the U.S. Code of Federal Regulations (21 CFR)	175.300 175.320 176.180 176.210 177.1390 177.1680 177.2420 177.2600 177.2800 178.3300 184.1666 73.30

FDA Center for Food Safety and Applied Nutrition (CFSAN)

8.4 Food Additive Status

FDA Food Additive Status

Propylene glycol - MISC, GRAS/FS - 184.1666; Part 169 (169.175, 169.176, 169.177, 169.178, 169.180, 169.181), Vanilla Extract; Carrier for enzyme modified soy protein; Part 582.1666 - In animal feeds

FDA Center for Food Safety and Applied Nutrition (CFSAN)

8.5 Evaluations of the Joint FAO/WHO Expert Committee on Food Additives - JECFA

Chemical Name	1,2-DIHYDROXYPROPANE
Evaluation Year	2002
ADI	0-25 mg/kg bw (1973)
Comments	Evaluation not finalized, pending definition of "flavouring agent"
Report	TRS 913-JECFA 59/112
Tox Monograph	FAS 48-JECFA 57/333 (2001)

Joint FAO/WHO Expert Committee on Food Additives (JECFA)

9 Agrochemical Information

9.1 Agrochemical Category

Insecticide

- EPA Pesticide Ecotoxicity Database

10 Pharmacology and Biochemistry

10.1 MeSH Pharmacological Classification

Solvents

Liquids that dissolve other substances (solutes), generally solids, without any change in chemical composition, as, water containing sugar. (Grant and Hackh's Chemical Dictionary, 5th ed) (See all compounds classified as Solvents.)

- Medical Subject Headings (MeSH)

Pharmaceutical Vehicles

A carrier or inert medium used as a solvent (or diluent) in which the medicinally active agent is formulated and or administered. (Dictionary of Pharmacy, 1986) (See all compounds classified as Pharmaceutical Vehicles.)

- Medical Subject Headings (MeSH)

10.2 Absorption, Distribution and Excretion

Absorption of orally administered propylene glycol from the gastrointestinal tract, and its removal from the body, follow first order kinetics. Clearance from blood is rapid in humans, with a mean half-life of approx. 2 hr. Its metabolism is inhibited by pyrazole, indicating a role for alcohol dehydrogenase in this process. Once absorbed it is readily converted into lactic and pyruvic acids, which then enter the general metabolic pool.

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.20 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

- Hazardous Substances Data Bank (HSDB)

Propylene glycol is readily absorbed from the GI tract and distributed throughout total body water. Propylene glycol accumulation is reported to differ significantly among people maintained on a repetitive oral dosing schedule, due to intersubject variability in clearance.

Klaassen, C.D. (ed). Casarett and Doull's Toxicology. The Basic Science of Poisons. 6th ed. New York, NY: McGraw-Hill, 2001., p. 897

- Hazardous Substances Data Bank (HSDB)

The uptake of propylene glycol mist by humans was studied using 10% solution in labeled deionized water nebulized into a mist tent. Less than 5% of the mist entered the body, and of this 90% lodged in the nasopharynx and rapidly disappeared into the stomach. Very little was found in the lungs.

Cavender FL, Sowinski EJ; Patty's Toxicology CD-ROM (2005). NY, NY: John Wiley & Sons; Glycols. Online Posting Date: April 16, 2001

- Hazardous Substances Data Bank (HSDB)

Intravenous administration of propylene glycol in amounts of 3-15 g/sq m is followed by plasma concentration of 60 to 425 ug/mL, respectively, with ... a volume of distribution of 0.51 to 0.88 L/kg, and a clearance rate of about 300 mL/min/1.73 sq m. Cerebrospinal fluid concentrations are as high as 85% of the serum concentrations.

Ellenhorn, M.J., S. Schonwald, G. Ordog, J. Wasserberger. Ellenhorn's Medical Toxicology: Diagnosis and Treatment of Human Poisoning. 2nd ed. Baltimore, MD: Williams and Wilkins, 1997., p. 1156

- Hazardous Substances Data Bank (HSDB)

For more Absorption, Distribution and Excretion (Complete) data for Propylene glycol (20 total), please visit the HSDB record page.

- Hazardous Substances Data Bank (HSDB)

10.3 Metabolism/Metabolites

Propylene glycol undergoes metabolic oxidation to pyruvic acid, acetic acid, lactic acid, and propionaldehyde.

IPCS; Poisons Information Monograph 443: Propylene glycol (May 1994). Available from, as of January 4, 2009: https://www.inchem.org/documents/pims/chemical/pim443.htm

- Hazardous Substances Data Bank (HSDB)

In what is considered to be the main pathway of propylene glycol metabolism in mammals, propylene glycol is oxidized by alcohol dehydrogenase to lactaldehyde, then to lactate by aldehyde dehydrogenase. The lactate is further metabolized to pyruvate, carbon dioxide, and water. Lactate also contributes to glucose formation through gluconeogenic pathways. Lactate, via phosphoenol pyruvate, can be detoxified into glucose and stored as glycogen ... Excess production of lactic acid resulting from very large exposures to propylene glycol can produce a metabolic anion gap [anion gap = (Na+) - (Cl - + total CO2)] and metabolic acidosis. Serum levels of >180 mg/L [2.37mM] can result in toxicity.

DHHS/NTP-CERHR; NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Propylene Glycol (March 2004) NIH Pub No. 04-4482 p.II-15 . Available from, as of January 11, 2010: https://cerhr.niehs.nih.gov/evals/egpg/propylene/PG_Monograph.pdf

- Hazardous Substances Data Bank (HSDB)

Synthesis of propylene glycol results in a 1:1 ratio of D and L stereoisomer forms. There is some, although incomplete, information in the literature about stereospecificity of the enzymes in the propylene glycol metabolic pathways ... In the main metabolic pathway, D and L forms of lactaldehyde and lactate are formed. In the horse and rabbit, ADH will oxidize the L form of propylene glycol and lactaldehyde more efficiently than the D form. L-lactic acidosis has been observed in both humans and animals following exposure to propylene glycol). The conversion of lactaldehyde to methylglyoxal by ADH and then to D-lactate by glyoxalase and reduced glutathione is thought to be an alternate route of metabolism ... D-lactate is cleared more slowly than L-lactate and is considered a poor substrate for gluconeogenesis. Methylglyoxal synthetase can convert the substrate, dihydroxyacetone phosphate, to methylglyoxal. However, in conditions where ketone levels are high, such as diabetes or starvation, methylglyoxal synthetase activity is increased, producing more methylglyoxal and D-lactate. Excessive production of D-lactate may result in its accumulation, especially in the brain, which has a low level of catabolizing enzymes. Therefore, in cases of ketosis, excess levels of D-lactate may be exacerbated by propylene glycol. In a third possible metabolic pathway, propylene glycol can be phosphorylated, converted to acetol phosphate, lactaldehyde phosphate, lactyl phosphate, and lactic acid ... Metabolism of D and L forms of propylene glycol in this pathway is species-specific. The rabbit converts the L form of phosphorylated propylene glycol to lactic acid, whereas the rat and mouse can convert both forms. /D and L isomers/

DHHS/NTP-CERHR; NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Propylene Glycol (March 2004) NIH Pub No. 04-4482 pp.II-17-18 . Available from, as of January 11, 2010: https://cerhr.niehs.nih.gov/evals/egpg/propylene/PG_Monograph.pdf

- Hazardous Substances Data Bank (HSDB)

Studies in humans and rodents suggest that the placenta has extremely limited capacity to metabolize propylene glycol. Class III ADH /was isolated/ from full term human placenta and found /to have/ low activity for ethanol and a Km value for octanol that was 100-times higher than the Class I ADH enzyme found in human liver ... ALDH from full-term human placentas had a lower activity and Vmax, and a higher Km value than ALDH isoenzymes from liver. In rats, placenta was found to have no ADH activity and ALDH activity in placenta was found to be 4-7% of liver activity

DHHS/NTP-CERHR; NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Propylene Glycol (March 2004) NIH Pub No. 04-4482 p.II-23 . Available from, as of January 11, 2010: ***https://cerhr.niehs.nih.gov/evals/egpg/propylene/PG_Monograph.pdf***

▸ Hazardous Substances Data Bank (HSDB)

For more Metabolism/Metabolites (Complete) data for Propylene glycol (12 total), please visit the **HSDB record page**.

▸ Hazardous Substances Data Bank (HSDB)

10.4 Biological Half-Life

Whole body: 1.4-30.5 hours (longer in infants and shorter in adults); [TDR, p. 1056]

TDR - Ryan RP, Terry CE, Leffingwell SS (eds). Toxicology Desk Reference: The Toxic Exposure and Medical Monitoring Index, 5th Ed. Washington DC: Taylor & Francis, 1999., p. 1056

▸ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

Intravenous administration of propylene glycol in amounts of 3-15 g/sq m is followed by plasma concentration of 60 to 425 ug/mL, respectively, with a half-life of 1.8 to 3.3 hours ...

Ellenhorn, M.J., S. Schonwald, G. Ordog, J. Wasserberger. Ellenhorn's Medical Toxicology: Diagnosis and Treatment of Human Poisoning. 2nd ed. Baltimore, MD: Williams and Wilkins, 1997., p. 1156

▸ Hazardous Substances Data Bank (HSDB)

/Infant, premature/ Oral: Mean half-life in premature infants was 19.3 hours (range 108-30.5).

IPCS; Poisons Information Monograph 443: Propylene glycol (May 1994). Available from, as of January 4, 2009: ***https://www.inchem.org/documents/pims/chemical/pim443.htm***

▸ Hazardous Substances Data Bank (HSDB)

/Infant/ Dermal: 16.9 hours in an 8-month-old infant.

IPCS; Poisons Information Monograph 443: Propylene glycol (May 1994). Available from, as of January 4, 2009: ***https://www.inchem.org/documents/pims/chemical/pim443.htm***

▸ Hazardous Substances Data Bank (HSDB)

Parenteral: 2.4 - 5.2 hr, 1.4 - 3.3 hr (mean 2.3 +/- 0.7 hr).

IPCS; Poisons Information Monograph 443: Propylene glycol (May 1994). Available from, as of January 4, 2009: ***https://www.inchem.org/documents/pims/chemical/pim443.htm***

▸ Hazardous Substances Data Bank (HSDB)

For more Biological Half-Life (Complete) data for Propylene glycol (7 total), please visit the **HSDB record page**.

▸ Hazardous Substances Data Bank (HSDB)

10.5 Biochemical Reactions

▸ Rhea - Annotated Reactions Database

▸ PubChem

11 Use and Manufacturing

11.1 Uses

EPA CPDat Chemical and Product Categories

*The Chemical and Products Database, a resource for exposure-relevant data on chemicals in consumer products, Scientific Data, volume 5, Article number: 180125 (2018), **DOI:10.1038/sdata.2018.125***

▸ EPA Chemical and Products Database (CPDat)

Sources/Uses

Used in antifreeze and deicing solutions for cars, boats, and aircraft; also used as a solvent for paints and plastics and to create harmless, artificial smoke for training and theatrical purposes; [ATSDR ToxFAQs]

▸ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

Industrial Processes with risk of exposure

Painting (Solvents) [Category: Paint]

Photographic Processing [Category: Other]

▸ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

For propylene glycol (USEPA/OPP Pesticide Code: 068603) ACTIVE products with label matches. /SRP: Registered for use in the U.S. but approved pesticide uses may change periodically and so federal, state and local authorities must be consulted for currently approved uses./

*U.S. Environmental Protection Agency/Office of Pesticide Program's Chemical Ingredients Database on Propylene Glycol (57-55-6). Available from, as of February 13, 2010: **https://npirspublic.ceris.purdue.edu/ppis/***

▸ Hazardous Substances Data Bank (HSDB)

Bacteriostat, Fungistat

*USEPA/Office of Pesticide Programs; Reregistration Eligibility Decision Document - Propylene Glycol and Dipropylene Glycol p.4 EPA 739-R-06-002 (September 2006). Available from, as of February 15, 2010: **https://www.epa.gov/pesticides/reregistration/status.htm***

▸ Hazardous Substances Data Bank (HSDB)

Propylene glycol has become widely used as a solvent, extractant, and preservative in a variety of parenteral and nonparenteral pharmaceutical formulations. It is a better general solvent than glycerin and dissolves a wide variety of materials, such as corticosteroids, phenols, sulfa drugs, barbiturates, vitamins (A and D), most alkaloids, and many local anesthetics ... Propylene glycol is commonly used as a plasticizer in aqueous film-coating formulations. Propylene glycol is also used in cosmetics and in the food industry as a carrier for emulsifiers and as a vehicle for flavors in preference to ethanol, since its lack of volatility provides a more uniform flavor.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 592

▸ Hazardous Substances Data Bank (HSDB)

Propylene glycol is used as a skin-conditioning agent-humectant, solvent, viscosity-decreasing agent, and humectant in cosmetic formulations.

Anderson FA; J Am Col Toxicol 13 (6): 437-91 (1994)

▸ Hazardous Substances Data Bank (HSDB)

For more Uses (Complete) data for Propylene glycol (29 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

11.1.1 Use Classification

EPA Safer Chemical Functional Use Classes -> Enzymes and Enzyme Stabilizers;Solvents

▸ EPA Safer Choice

Safer Chemical Classes -> Green circle - The chemical has been verified to be of low concern

▸ EPA Safer Choice

Food additives

▸ EU Food Improvement Agents

Food Additives -> CARRIER_SOLVENT; GLAZING_AGENT; HUMECTANT; -> JECFA Functional Classes

- Joint FAO/WHO Expert Committee on Food Additives (JECFA)

Cosmetics -> Humectant; Skin conditioning; Solvent; Viscosity controlling

S13 | EUCOSMETICS | Combined Inventory of Ingredients Employed in Cosmetic Products (2000) and Revised Inventory (2006) | DOI:10.5281/zenodo.2624118

- NORMAN Suspect List Exchange

SOLVENTS

- USGS Columbia Environmental Research Center

11.1.2 Industry Uses

Adhesives and sealant chemicals
Agricultural chemicals (non-pesticidal)
Brazing Paste Component for joining carbon and stainless steel components.
Brazing paste component for joining carbon and stainless steel components.
Carpet
Dyes
Fillers
Finishing agents
Flooring
Functional fluids (closed systems)
Functional fluids (open systems)
Intermediates
Lubricants and lubricant additives
Odor agents
Paint additives and coating additives not described by other categories
Photosensitive chemicals
Pigments
Plastic additive
Plasticizers
Process regulators
Processing aids, not otherwise listed
Processing aids, specific to petroleum production
Solvents (for cleaning and degreasing)
Solvents (which become part of product formulation or mixture)
Surface active agents
Viscosity adjustors
decant water and filtering
metal working fluid and cooling tower fluid

https://www.epa.gov/chemical-data-reporting

- EPA Chemicals under the TSCA

11.1.3 Consumer Uses

Adhesives and sealants
Agricultural products (non-pesticidal)
Air care products
Anti-freeze and de-icing products
Arts, crafts, and hobby materials
Automotive care products
Brazing Paste Component for joining carbon and stainless steel components.
Building/construction materials not covered elsewhere
Cleaning and furnishing care products
Corrosion and scale inhibitors in oilfield
Electrical and electronic products
Fabric, textile, and leather products not covered elsewhere
Food packaging
Golf and Sports Turf
Ink, toner, and colorant products
Laundry and dishwashing products
Lubricants and greases
Non-TSCA use
Paints and coatings
Paper products
Personal care products
Plastic and rubber products not covered elsewhere
Water treatment products

https://www.epa.gov/chemical-data-reporting

- EPA Chemicals under the TSCA

11.1.4 Household Products

Household & Commercial/Institutional Products

Information on 1912 consumer products that contain Propylene glycol in the following categories is provided:

- Auto Products
- Commercial / Institutional
- Hobby/Craft
- Home Maintenance
- Inside the Home
- Landscaping/Yard
- Personal Care
- Pesticides
- Pet Care

- Consumer Product Information Database (CPID)

11.2 Methods of Manufacturing

Preparation of levorotary propylene glycol from hydroxyacetone by yeast reduction.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1350

- Hazardous Substances Data Bank (HSDB)

Propylene glycol is produced by the non-catalytic liquid-phase hydration of propylene oxide at 100-200 °C

CHEMICAL PRODUCTS SYNOPSIS: Propylene Glycol, 1984

Hazardous Substances Data Bank (HSDB)

Manufactured by treating propylene with chlorinated water to form the chlorohydrin, which is converted to the glycol by treatment with sodium carbonate solution. It is also prepared by heating glycerol with sodium hydroxide.

Burdock, G.A. (ed.). Fenaroli's Handbook of Flavor Ingredients. 6th ed.Boca Raton, FL 2010, p. 1749

Hazardous Substances Data Bank (HSDB)

The only industrial process for manufacturing propylene glycol is direct hydrolysis of propylene oxide with water. Dipropylene glycol and tripropylene glycol are formed by sequential addition of propylene oxide to propylene glycol. Consequently, all three products are produced simultaneously and separated by distillation.

Sullivan CJ; Ullmann's Encyclopedia of Industrial Chemistry 7th ed. (2008). New York, NY: John Wiley & Sons; Propanediols. Online Posting Date: June 15, 2000.

Hazardous Substances Data Bank (HSDB)

For more Methods of Manufacturing (Complete) data for Propylene glycol (6 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

11.3 Impurities

... Impurities of propylene glycol include chlorides (1 ppm max), iron (1.0 ppm max), water (0.2 wt% max), and dipropylene glycol (<0.2%).

DHHS/NTP-CERHR; NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Propylene Glycol (March 2004) NIH Pub No. 04-4482 p. . Available from, as of January 11, 2010: https://cerhr.niehs.nih.gov/evals/egpg/propylene/PG_Monograph.pdf

Hazardous Substances Data Bank (HSDB)

11.4 Formulations/Preparations

GRADE: refined, technical, USP, FCC, feed

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1050

Hazardous Substances Data Bank (HSDB)

Both the industrial-grade and USP grade have at least 99.5% purity. /From table/

Ullmann's Encyclopedia of Industrial Chemistry. 6th ed.Vol 1: Federal Republic of Germany: Wiley-VCH Verlag GmbH & Co. 2003 to Present, p. V30: 203 (2003)

Hazardous Substances Data Bank (HSDB)

11.5 Consumption Patterns

52% for polyester resins; 11% exported(1973); 8.5% for cellophane; 7.5% as a tobacco humectant; 7% for synthesis of polymeric plasticizers; 4% as a component of brake and other functional fluids; 10% for misc applications (1973)

Hazardous Substances Data Bank (HSDB)

Unsaturated polyester resins, 47%; Foods, pharmaceuticals, cosmetics, 11%; Pet foods, 10%; Tobacco, 6%; Plasticizers, 3%; Cellophane, 3%; Functional fluids, 8%; Coatings, 6%; Miscellaneous and other, 6% (1983)

CHEMICAL PRODUCTS SYNOPSIS: Propylene Glycol, 1984

Hazardous Substances Data Bank (HSDB)

CHEMICAL PROFILE: Propylene Glycol. US End-use Pattern for Propylene Glycol in 1986.

Table: End-use pattern for propylene glycol in 1986

End-use	Percent
Unsaturated polyester resins	46
Exports	18
Pharmaceuticals and food	8
Semi-moist pet food	7
Humectant for tobacco	5
Polymeric plasticizers	5
Paint and coatings	4
Functional fluids	3
Cellophane	2
Miscellaneous	2

Anonymous; Chemical Marketing Reporter 231 (6): 50 (1987); 9 February 1987

Hazardous Substances Data Bank (HSDB)

CHEMICAL PROFILE: Propylene Glycol. US End-use Pattern for Propylene Glycol in 1989.

Table: End-use pattern for propylene glycol in 1989

End-use	Percent
Unsaturated polyester resins	41
Exports	29
Food, pharmaceuticals and cosmetics	11
Semi-moist pet food	7

End-use	Percent
Humectant for tobacco	4
Functional fluids	4
Miscellaneous	4

Anonymous; Chemical Marketing Reporter 237 (1): 46 (1990); 1 January 1990

Hazardous Substances Data Bank (HSDB)

For more Consumption Patterns (Complete) data for Propylene glycol (21 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

11.6 U.S. Production

Aggregated Product Volume (EPA CDR 2016)

1,000,000,000 - 5,000,000,000 lb

https://www.epa.gov/chemical-data-reporting

EPA Chemicals under the TSCA

(1972) 2.60 X 10+11 g

Hazardous Substances Data Bank (HSDB)

(1975) 1.77 X 10+11 g

Hazardous Substances Data Bank (HSDB)

(1984) 2.10 X 10+10+11 g

USITC Syn Org Chem-U.S. Prod/Sales 1984 p.257

Hazardous Substances Data Bank (HSDB)

(1989) Western Europe produced 708 million pounds (325 kilotons) and consumed 660 million pounds (300 kilotons).

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.9 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

For more U.S. Production (Complete) data for Propylene glycol (23 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

11.7 U.S. Imports

(1984) 2.56 X 10+11 g

Bureau Of The Census. U.S. Imports For Consumption And General Imports 1984 p.1-360

Hazardous Substances Data Bank (HSDB)

CHEMICAL PROFILE: Propylene glycol. US Imports: 1994: 12 million pounds.

Anonymous; Chemical Marketing Reporter 249 (7): 37 (1996); 12 February 1996

Hazardous Substances Data Bank (HSDB)

CHEMICAL PROFILE: Propylene glycol. US Imports: 1996: 31 million pounds; averaged 10 million pounds per year for the five year period 1992-1996.

Anonymous; Chemical Market Reporter 254 (3): 37 (1998); 20 July 1998

Hazardous Substances Data Bank (HSDB)

CHEMICAL PROFILE: Propylene glycol. US Imports: 1999: 43 million pounds; 2000: 32 million pounds.

Kirschner M; Chemical Market Reporter 260 (11): 30 (2001); 24 September 2001

Hazardous Substances Data Bank (HSDB)

For more U.S. Imports (Complete) data for Propylene glycol (6 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

11.8 U.S. Exports

(1972) 4.90 X 10+10 g

Hazardous Substances Data Bank (HSDB)

(1976) 2.91 X 10+10 g

Hazardous Substances Data Bank (HSDB)

(1984) 2.18 X 10+11 g

Bureau Of The Census. U.S. Exports, Schedule E, 1984 p.2-76

Hazardous Substances Data Bank (HSDB)

(1986-1989) avg 75,000 tons/yr

Martin AE, Murphy FH; Glycols, Propylene Glycols. Kirk-Othmer Encyclopedia of Chemical Technology (1994). John Wiley & Sons, Inc. Online Posting Date: December 4, 2000

Hazardous Substances Data Bank (HSDB)

For more U.S. Exports (Complete) data for Propylene glycol (10 total), please visit the **HSDB record page**.

Hazardous Substances Data Bank (HSDB)

11.9 General Manufacturing Information

Industry Processing Sectors

Adhesive manufacturing
Agriculture, forestry, fishing and hunting
All other basic inorganic chemical manufacturing
All other basic organic chemical manufacturing
All other chemical product and preparation manufacturing
Fabricated metal product manufacturing
Food, beverage, and tobacco product manufacturing
Miscellaneous manufacturing
Oil and gas drilling, extraction, and support activities
Paint and coating manufacturing
Paper manufacturing
Pesticide, fertilizer, and other agricultural chemical manufacturing
Petrochemical manufacturing
Petroleum lubricating oil and grease manufacturing
Pharmaceutical and medicine manufacturing
Plastic material and resin manufacturing
Plastics product manufacturing
Printing and related support activities
Printing ink manufacturing
Rubber product manufacturing
Services
Soap, cleaning compound, and toilet preparation manufacturing
Synthetic dye and pigment manufacturing
Textiles, apparel, and leather manufacturing
Transportation equipment manufacturing
Wholesale and retail trade

EPA Chemicals under the TSCA

EPA TSCA Commercial Activity Status

1,2-Propanediol: ACTIVE
https://www.epa.gov/tsca-inventory

EPA Chemicals under the TSCA

Dipropylene glycol represents 10% and **tripropylene glycol** represents 1% of propylene glycol produced

CHEMICAL PRODUCTS SYNOPSIS: Propylene Glycol, 1984

Hazardous Substances Data Bank (HSDB)

At least two commercial grades exist - a high-purity industrial grade, and a higher-purity grade called "super-pure" or USP grade.

Ullmann's Encyclopedia of Industrial Chemistry. 6th ed.Vol 1: Federal Republic of Germany: Wiley-VCH Verlag GmbH & Co. 2003 to Present, p. V30: 202 (2003)

Hazardous Substances Data Bank (HSDB)

1,2-Propanediol is available in the List of authorized monomers and other starting substances which shall be used for the manufacture of plastic materials and articles intended to come into contact with foodstuffs /from the EU (1990)/.

Sheftel, V.O.; Indirect Food Additives and Polymers. Migration and Toxicology. Lewis Publishers, Boca Raton, FL. 2000., p. 275

Hazardous Substances Data Bank (HSDB)

12 Identification

12.1 Analytic Laboratory Methods

Method: OSHA PV2051; Prodecure: gas chromatography using a flame ionization detector; Analyte: propylene glycol; Matrix: air; Detection Limit: 0.011 ppm (0.035 mg/cu m).

U.S. Department of Labor/Occupational Safety and Health Administration's Index of Sampling and Analytical Methods. Propylene Glycol (57-55-6). Available from, as of February 15, 2010: ***https://www.osha.gov/dts/sltc/methods/toc.html***

▸ Hazardous Substances Data Bank (HSDB)

Method: AOAC 971.02, **Glycerol**, Propylene Glycol, and **Triethylene Glycol**, Gas Chromatographic Method; Analyte: propylene glycol; Matrix: cased cigarette cut filler and ground tobacco; Detection Level: not provided.

Horwitz W, ed.; Official Methods of Analysis of AOAC International 17th ed. (2000). CD-ROM, AOAC International, Gaithersburg, MD

▸ Hazardous Substances Data Bank (HSDB)

Method: AOAC 947.09, Propylene Glycol in Vanilla Extract, Titrimetric Method; Analyte: propylene glycol; Matrix: vanilla extract; Detection Level: not provided.

Horwitz W, ed.; Official Methods of Analysis of AOAC International 17th ed. (2000). CD-ROM, AOAC International, Gaithersburg, MD

▸ Hazardous Substances Data Bank (HSDB)

Method: AOAC 970.61, Propylene Glycol in Cosmetics, Gas Chromatographic Method; Analyte: propylene glycol; Matrix: applicable to all types of cosmetics; Detection Level: not provided.

Horwitz W, ed.; Official Methods of Analysis of AOAC International 17th ed. (2000). CD-ROM, AOAC International, Gaithersburg, MD

▸ Hazardous Substances Data Bank (HSDB)

For more Analytic Laboratory Methods (Complete) data for Propylene glycol (6 total), please visit the **HSDB record page**.

▸ Hazardous Substances Data Bank (HSDB)

12.2 NIOSH Analytical Methods

GLYCOLS 5523

▸ NIOSH Manual of Analytical Methods

13 Safety and Hazards

13.1 Hazards Identification

13.1.1 GHS Classification

GHS Hazard Statements	Not Classified Reported as not meeting GHS hazard criteria by 6655 of 6790 companies (only ~ 2% companies provided GHS information). For more detailed information, please visit ECHA C&L website.

▸ European Chemicals Agency (ECHA)

13.1.2 NFPA Hazard Classification

Showing 1 of 2 View More

NFPA 704 Diamond

0-1-0

NFPA Health Rating	0 - Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials.
NFPA Fire Rating	1 - Materials that must be preheated before ignition can occur. Materials require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur.
NFPA Instability Rating	0 - Materials that in themselves are normally stable, even under fire conditions.

▸ Hazardous Substances Data Bank (HSDB)

13.1.3 EPA Safer Chemical

Chemical: 1,2-Propanediol

Green circle - The chemical has been verified to be of low concern based on experimental and modeled data.

▸ EPA Safer Choice

13.1.4 Health Hazards

Liquid may irritate eyes. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

13.1.5 Fire Hazards

This chemical is combustible. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▸ CAMEO Chemicals

Combustible.

▸ ILO International Chemical Safety Cards (ICSC)

13.1.6 Hazards Summary

Propylene glycol is a synthetic liquid substance that absorbs **water**. Propylene glycol is also used to make polyester compounds, and as a base for deicing solutions. Propylene glycol is used by the chemical, food, and pharmaceutical industries as an antifreeze when leakage might lead to contact with food. The Food and Drug Administration (FDA) has classified propylene glycol as an additive that is "generally recognized as safe" for use in food. It is used to absorb extra **water** and maintain moisture in certain medicines, cosmetics, or food products. It is a solvent for food colors and flavors, and in the paint and plastics industries. Propylene glycol is also used to create artificial smoke or fog used in fire-fighting training and in theatrical productions. Other names for propylene glycol are 1,2-dihydroxypropane, 1,2-propanediol, **methyl glycol**, and trimethyl glycol. Propylene glycol is clear, colorless, slightly syrupy liquid at room temperature. It may exist in air in the vapor form, although propylene glycol must be heated or briskly shaken to produce a vapor. Propylene glycol is practically odorless and tasteless.

▸ CDC-ATSDR Toxic Substances Portal

Propylene glycol is designated by the FDA as GRAS (generally recognized as safe) for use as a food additive. It is commonly used in cosmetics and topical medications. Patch testing with propylene glycol is difficult because of irritant effects. It may cause allergic contact dermatitis in a small percentage of cases. It may also cause non-immunologic contact urticaria. [Marks, p. 156-7] Allergic contact dermatitis in a photographic developer using Flexicolor; [Kanerva, p. 1830] An eye irritant; [ICSC] Oral LD50 = 21,000 mg/kg in dogs; Causes CNS depression and coma in high-dose, animal-feeding studies; [AIHA] See **Ethylene glycol**.

Marks - Marks JG, DeLeo VA. Contact and Occupational Dermatology, 2nd Ed. St. Louis: Mosby, 1997., p. 156-7
Kanerva - Rustemeyer L, Elsner P, John SM, Maibach HI (eds). Kanerva's Occupational Dermatology, 2nd Ed. Berlin: Springer-Verlag, 2012., p. 1830
AIHA - Workplace Environmental Exposure Level Guides, Complete Set and Update Set. Fairfax, VA: AIHA, 2008.

▸ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

13.1.7 Fire Potential

Combustible liquid when exposed to heat or flame ...

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3061

Hazardous Substances Data Bank (HSDB)

13.1.8 Skin, Eye, and Respiratory Irritations

Mildly irritating to the eyes.

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p. (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

May cause primary skin irritation in some people, possibly due to dehydration, but the material is not a sensitizer.

Cavender FL, Sowinski EJ; Patty's Toxicology CD-ROM (2005). NY, NY: John Wiley & Sons; Glycols. Online Posting Date: April 16, 2001

Hazardous Substances Data Bank (HSDB)

May cause transitory stinging, blepharospasm, and lacrimation.

Bingham, E.; Cohrssen, B.; Powell, C.H.; Patty's Toxicology Volumes 1-9 5th ed. John Wiley & Sons. New York, N.Y. (2001)., p. V7 33

Hazardous Substances Data Bank (HSDB)

13.2 Safety and Hazard Properties

13.2.1 Flammable Limits

Lower flammable limit: 2.6% by volume; Upper flammable limit: 12.5% by volume

Fire Protection Guide to Hazardous Materials. 13 ed. Quincy, MA: National Fire Protection Association, 2002., p. 325-102

Hazardous Substances Data Bank (HSDB)

13.2.2 Lower Explosive Limit (LEL)

2.6 % (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

CAMEO Chemicals

2.6%

Occupational Safety and Health Administration (OSHA)

13.2.3 Upper Explosive Limit (UEL)

12.6 % (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

CAMEO Chemicals

12.6%

Occupational Safety and Health Administration (OSHA)

13.2.4 Explosive Limits and Potential

Above 99 °C explosive vapor/air mixtures may be formed.

International Program on Chemical Safety/Commission of the European Communities; International Chemical Safety Card on Propylene glycol (July, 1997). Available from, as of January 4, 2010: https://www.inchem.org/pages/icsc.html

Hazardous Substances Data Bank (HSDB)

Explosive in the form of vapor when exposed to heat or flame. May react with **hydrofluoric acid** + **nitric acid** + **silver nitrate** to form the explosive **silver fulminate**.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3061

Hazardous Substances Data Bank (HSDB)

Lower explosive limit: 2.6%; Upper explosive limit: 12.6%

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3061

Hazardous Substances Data Bank (HSDB)

Explosive limits , vol% in air: 2.6-12.6

ILO International Chemical Safety Cards (ICSC)

13.3 First Aid Measures

13.3.1 First Aid

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with **water** or **normal saline** solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no

symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▸ CAMEO Chemicals

13.3.2 Inhalation First Aid

Fresh air, rest.

▸ ILO International Chemical Safety Cards (ICSC)

13.3.3 Skin First Aid

Remove contaminated clothes. Rinse skin with plenty of water or shower.

▸ ILO International Chemical Safety Cards (ICSC)

13.3.4 Eye First Aid

Rinse with plenty of water (remove contact lenses if easily possible).

▸ ILO International Chemical Safety Cards (ICSC)

13.3.5 Ingestion First Aid

Rinse mouth. Seek medical attention if you feel unwell.

▸ ILO International Chemical Safety Cards (ICSC)

13.4 Fire Fighting

Fire Extinguishing Agents: Water fog, alcohol foam, carbon dioxide, dry chemical. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

Use water spray, powder, alcohol-resistant foam, carbon dioxide.

▸ ILO International Chemical Safety Cards (ICSC)

13.4.1 Fire Fighting Procedures

Water fog, alcohol foam, carbon dioxide, dry chemical.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▸ Hazardous Substances Data Bank (HSDB)

In case of fire, keep drums, etc, cool by spraying water.

International Program on Chemical Safety/Commission of the European Communities; International Chemical Safety Card on Propylene glycol (July, 1997). Available from, as of January 4, 2010: https://www.inchem.org/pages/icsc.html

▸ Hazardous Substances Data Bank (HSDB)

13.4.2 Firefighting Hazards

Vapor is heavier than air.

International Program on Chemical Safety/Commission of the European Communities; International Chemical Safety Card on Propylene glycol (July, 1997). Available from, as of January 4, 2010: https://www.inchem.org/pages/icsc.html

▸ Hazardous Substances Data Bank (HSDB)

13.5 Accidental Release Measures

13.5.1 Spillage Disposal

Absorb liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

▸ ILO International Chemical Safety Cards (ICSC)

13.5.2 Cleanup Methods

SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.

- Hazardous Substances Data Bank (HSDB)

Collect leaking and spilled liquid in sealable containers as far as possible. Wash away spilled liquid with plenty of water.

International Program on Chemical Safety/Commission of the European Communities; International Chemical Safety Card on Propylene glycol (July, 1997). Available from, as of January 4, 2010: https://www.inchem.org/pages/icsc.html

- Hazardous Substances Data Bank (HSDB)

13.5.3 Disposal Methods

SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal and plant life; and conformance with environmental and public health regulations.

- Hazardous Substances Data Bank (HSDB)

13.5.4 Preventive Measures

SRP: The scientific literature for the use of contact lenses by industrial workers is inconsistent. The benefits or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place.

- Hazardous Substances Data Bank (HSDB)

SRP: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. Ensure that the local ventilation moves the contaminant away from the worker.

- Hazardous Substances Data Bank (HSDB)

Above 99 °C use a closed system, ventilation.

International Program on Chemical Safety/Commission of the European Communities; International Chemical Safety Card on Propylene glycol (July, 1997). Available from, as of January 4, 2010: https://www.inchem.org/pages/icsc.html

- Hazardous Substances Data Bank (HSDB)

Propylene glycol should be handled in a well-ventilated environment; eye protection is recommended.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 593

- Hazardous Substances Data Bank (HSDB)

13.6 Handling and Storage

13.6.1 Nonfire Spill Response

SMALL SPILLS AND LEAKAGE: If you should spill this chemical, use absorbent paper to pick up all liquid spill material. Seal the absorbent paper, as well as any of your clothing which may be contaminated, in a vapor-tight plastic bag for eventual disposal. Wash any surfaces you may have contaminated with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned. STORAGE PRECAUTIONS: You should protect this material from exposure to light and moisture. Keep it away from oxidizing materials and store it under refrigerated temperatures. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

- CAMEO Chemicals

13.6.2 Safe Storage

Separated from strong oxidants and alkalis. Dry. Well closed. Ventilation along the floor.

- ILO International Chemical Safety Cards (ICSC)

13.6.3 Storage Conditions

Propylene glycol is hygroscopic and should be stored in a well-closed container, protected from light, in a cool, dry place.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 593

- Hazardous Substances Data Bank (HSDB)

Propylene glycol, dipropylene glycol, and tripropylene glycol are stable materials that require no special handling procedures. They are noncorrosive and can be transported or stored in stainless steel, aluminum, and lined steel containers. Carbon steel is also acceptable, although slight iron contamination may occur upon extended periods of storage. U.S.P.-grade propylene glycol is typically stored in stainless steel.

Sullivan, CJ; Ullmann's Encyclopedia of Industrial Chemistry 7th ed. (2008). NY, NY: John Wiley & Sons; Propanediols. Online Posting Date: June 15, 2000.

- Hazardous Substances Data Bank (HSDB)

13.7 Exposure Control and Personal Protection

13.7.1 Other Standards Regulations and Guidelines

Workplace Environmental Exposure Level (WEEL): 8-hr Time-weighted Average (TWA) 10vmg/cu m.

American Industrial Hygiene Association; Emergency Response Planning Guidelines & Workplace Enviromental Exposure Levels. Fairfax, VA 2009, p. 42

▸ Hazardous Substances Data Bank (HSDB)

13.7.2 Inhalation Risk

No indication can be given whether a harmful concentration in the air will be reached.

▸ ILO International Chemical Safety Cards (ICSC)

13.7.3 Effects of Short Term Exposure

The substance is mildly irritating to the eyes and respiratory tract. Ingestion of large amounts could cause metabolic acidosis.

▸ ILO International Chemical Safety Cards (ICSC)

13.7.4 Acceptable Daily Intakes

JECFA: ADI: 0 to 25 mg/kg bw

Burdock, G.A. (ed.). Fenaroli's Handbook of Flavor Ingredients. 6th ed.Boca Raton, FL 2010, p. 1748

▸ Hazardous Substances Data Bank (HSDB)

13.7.5 Allowable Tolerances

Residues of propylene glycol are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest. Use: solvent, cosolvent.

*40 CFR 180.910 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 7, 2010: **https://www.ecfr.gov***

▸ Hazardous Substances Data Bank (HSDB)

Residues of propylene glycol are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to animals. Use: solvent, cosolvent.

*40 CFR 180.930 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 7, 2010: **https://www.ecfr.gov***

▸ Hazardous Substances Data Bank (HSDB)

13.7.6 Personal Protective Equipment (PPE)

Goggles. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

Protective gloves, safety spectacles.

*International Program on Chemical Safety/Commission of the European Communities; International Chemical Safety Card on Propylene glycol (July, 1997). Available from, as of January 4, 2010: **https://www.inchem.org/pages/icsc.html***

▸ Hazardous Substances Data Bank (HSDB)

13.7.7 Fire Prevention

NO open flames.

▸ ILO International Chemical Safety Cards (ICSC)

13.7.8 Inhalation Prevention

Avoid inhalation of mist and vapour. Use ventilation.

▸ ILO International Chemical Safety Cards (ICSC)

13.7.9 Skin Prevention

Protective gloves.

▸ ILO International Chemical Safety Cards (ICSC)

13.7.10 Eye Prevention

Wear safety spectacles.

▸ ILO International Chemical Safety Cards (ICSC)

13.7.11 Ingestion Prevention

Do not eat, drink, or smoke during work.

- ILO International Chemical Safety Cards (ICSC)

13.8 Stability and Reactivity

13.8.1 Air and Water Reactions

Water soluble.

- CAMEO Chemicals

13.8.2 Reactive Group

Alcohols and Polyols

- CAMEO Chemicals

13.8.3 Reactivity Profile

PROPYLENE GLYCOL is hygroscopic. It is sensitive to excessive heat (tends to oxidize at high temperatures). This compound can react with oxidizing materials. It is incompatible with acid chlorides, acid anhydrides, chloroformates, and reducing agents. It dissolves many essential oils. A mixture of this compound with **hydrofluoric acid** and **silver nitrate** was put in a glass bottle which burst 30 minutes later. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

- CAMEO Chemicals

13.8.4 Hazardous Reactivities and Incompatibilities

Reacts with strong oxidants, causing fire hazard.

*International Program on Chemical Safety/Commission of the European Communities; International Chemical Safety Card on Propylene glycol (July, 1997). Available from, as of January 4, 2010: **https://www.inchem.org/pages/icsc.html***

- Hazardous Substances Data Bank (HSDB)

Propylene glycol is incompatible with oxidizing reagents such as **potassium permanganate**.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 593

- Hazardous Substances Data Bank (HSDB)

No significantly dangerous substances are produced after contact with light, humidity or commonly available chemicals. Propylene glycol may react with **hydrofluoric acid** + **nitric acid** + **silver nitrate** to form the explosive **silver fulminate**.

*IPCS; Poisons Information Monograph 443: Propylene glycol (May 1994). Available from, as of January 4, 2009: **https://www.inchem.org/documents/pims/chemical/pim443.htm***

- Hazardous Substances Data Bank (HSDB)

A chemical polishing mixture /of **hydrofluoric acid**, propylene glycol, and **silver nitrate**/ was put into a closed glass bottle which burst 30 min later, and formation of **silver fulminate** was suggested. However, in absence of the **silver** salt such mixtures evolve gas and should not be stored in any event, especially after use for metal polishing, when the dissolved metal(s) tend to further destabilize the mixture.

Bretherick, L. Handbook of Reactive Chemical Hazards. 4th ed. Boston, MA: Butterworth-Heinemann Ltd., 1990, p. 1167

- Hazardous Substances Data Bank (HSDB)

13.9 Regulatory Information

13.9.1 Atmospheric Standards

This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry (SOCMI). The intended effect of these standards is to require all newly constructed, modified, and reconstructed SOCMI process units to use the best demonstrated system of continuous emission reduction for equipment leaks of VOC, considering costs, non air quality health and environmental impact and energy requirements. Propylene glycol is produced, as an intermediate or a final product, by process units covered under this subpart.

*40 CFR 60.489 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 7, 2010: **https://www.ecfr.gov***

- Hazardous Substances Data Bank (HSDB)

13.9.2 State Drinking Water Standards

(NY) NEW YORK 1,000 ug/L

USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present

- Hazardous Substances Data Bank (HSDB)

13.9.3 State Drinking Water Guidelines

(NH) NEW HAMPSHIRE 140,000 ug/ L

USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present

Hazardous Substances Data Bank (HSDB)

13.9.4 FIFRA Requirements

Residues of propylene glycol are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest. Use: solvent, cosolvent.

*40 CFR 180.910 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 7, 2010: **https://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

Residues of propylene glycol are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to animals. Use: solvent, cosolvent.

*40 CFR 180.930 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 7, 2010: **https://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

The Agency has completed its assessment of the dietary, drinking **water**, residential, ecological and occupational risks associated with the use of pesticide products containing the active ingredients propylene glycol and dipropylene glycol. Based on a review of these data, the Agency has sufficient information on the human health and ecological effects of propylene glycol and dipropylene glycol to make a decision as part of the tolerance reassessment process under FFDCA and reregistration under FIFRA, as amended by FQPA. The Agency has determined that propylene glycol and dipropylene glycol containing products are eligible for reregistration.

*USEPA/Office of Pesticide Programs; Reregistration Eligibility Decision Document - Propylene Glycol and Dipropylene Glycol p.15 EPA 739-R-06-002 (September 2006). Available from, as of February 15, 2010: **https://www.epa.gov/pesticides/reregistration/status.htm***

Hazardous Substances Data Bank (HSDB)

EPA has determined that the established exemption from a requirement for a tolerance for propylene glycol and dipropylene glycol, meet the safety standards under the FQPA amendments to section 408(b)(2)(C) of the FFDCA, that there is a reasonable certainty of no harm for infants and children. ... In determining whether or not infants and children are particularly susceptible to toxic effects from propylene glycol and dipropylene glycol residues, the Agency considered the completeness of the database for developmental and reproductive effects, the nature of the effects observed, and other information. The FQPA Safety Factor has been removed (i.e., reduced to 1X) for propylene glycol and dipropylene glycol because there is no pre- or post-natal evidence for increased susceptibility following exposure.

*USEPA/Office of Pesticide Programs; Reregistration Eligibility Decision Document - Propylene Glycol and Dipropylene Glycol p.16 EPA 739-R-06-002 (September 2006). Available from, as of February 15, 2010: **https://www.epa.gov/pesticides/reregistration/status.htm***

Hazardous Substances Data Bank (HSDB)

As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their future use. Under this pesticide reregistration program, EPA examines newer health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether the use of the pesticide does not pose unreasonable risk in accordance to newer saftey standards, such as those described in the Food Quality Protection Act of 1996. Pesticides for which EPA had not issued Registration Standards prior to the effective date of FIFRA '88 were divided into three lists based upon their potential for human exposure and other factors, with List B containing pesticides of greater concern than those on List C, and with List C containing pesticides of greater concern than those on List D. Propylene glycol is found on List C. Case No: 3126; Pesticide type: insecticide, fungicide, antimicrobial; Case Status: OPP is reviewing data from the pesticide's producers regarding its human health and/or environmental effects, or OPP is determining the pesticide's eligibility for reregistration and developing the Reregistration Eligibility Decision (RED) document.; Active ingredient (AI): Propylene glycol; Data Call-in (DCI) Date(s): 08/02/93; AI Status: The producers of the pesticide have made commitments to conduct the studies and pay the fees required for reregistration, and are meeting those commitments in a timely manner.

USEPA/OPP; Status of Pesticides in Registration, Reregistration and Special Review p.276 (Spring, 1998) EPA 738-R-98-002

Hazardous Substances Data Bank (HSDB)

13.9.5 FDA Requirements

Substance added directly to human food affirmed as generally recognized as safe (GRAS).

*21 CFR 184.1666 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 7, 2010: **https://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

Propylene glycol used as an emulsifying agent in animal drugs, feeds, and related products is generally recognized as safe when used in accordance with good manufacturing or feeding practice.

*21 CFR 582.4666 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of November 10, 2003: **https://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

Propylene glycol used as a general purpose food additive in animal drugs, feeds, and related products is generally recognized as safe when used in accordance with good manufacturing or feeding practice.

*21 CFR 582.1666 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 7, 2010: **https://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

Drug products containing certain active ingredients offered over-the-counter (OTC) for certain uses. A number of active ingredients have been present in OTC drug products for various uses, as described below. However, based on evidence currently available, there are inadequate data to establish general recognition of the safety and effectiveness of these ingredients for the specified uses: propylene glycol is included in pediculicide drug products.

*21 CFR 310.545 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 7, 2010: **https://www.ecfr.gov***

Hazardous Substances Data Bank (HSDB)

For more FDA Requirements (Complete) data for Propylene glycol (7 total), please visit the **HSDB record page**.

Hazardous Substances Data Bank (HSDB)

13.10 Other Safety Information

13.10.1 Special Reports

DHHS/NTP-CERHR; Propylene Glycol (CAS No. 57-55-6): Reproduction and Fertility Assessment in CD-1 Mice When Administered in Drinking **Water**, NTP Study No. RACB84068 (September 1985). NTP-CERHR monographs are transmitted to federal and state agencies, interested parties, and the public and are available in electronic PDF format on the CERHR web site and in printed text or CD-ROM from the CERHR.[Available from, as of August 14, 2002: http://ntp.niehs.nih.gov/index.cfm?objectid=0847F35A-0850-D1E7-B02ED4DDD150F990]

- **Hazardous Substances Data Bank (HSDB)**

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane, CAS No. 57-55-6 (May 2001). This OECD Initial Assessment of HPV Chemicals is part of a series of OECD SIDS documents published by UNEP Chemicals to facilitate the access to information needed for health and environmental risk assessments of chemicals.[Available from, as of March 8, 2010: http://www.chem.unep.ch/irptc/sids/OECDSIDS/57-55-6.pdf]

- **Hazardous Substances Data Bank (HSDB)**

European Commission, ESIS; IUCLID Dataset, **Propane-1,2-diol** (57-55-6) (2000 CD-ROM edition) contains information on use, toxicology, and environmental effects of this chemical as supplied to the European Union by industry.[Available from, as of January 12, 2009: http://esis.jrc.ec.europa.eu/]

- **Hazardous Substances Data Bank (HSDB)**

IPCS; Poisons Information Monograph 443: Propylene glycol (May 1994). Poisons Information Monographs (PIM) are a global database with evaluated information on substances commonly involved in cases of poisoning.[Available from, as of March 8, 2010: http://www.inchem.org/documents/pims/chemical/pim443.htm]

- **Hazardous Substances Data Bank (HSDB)**

For more Special Reports (Complete) data for Propylene glycol (9 total), please visit the **HSDB record page**.

- **Hazardous Substances Data Bank (HSDB)**

14 Toxicity

14.1 Toxicological Information

CDC-ATSDR Toxicological Profile

- CDC-ATSDR Toxic Substances Portal

14.1.1 Toxicity Summary

EXPOSURE. Propylene glycol (PG) production capacity in the US was 1312 million pounds (596 kilotons) in 1998. Domestic demand was 1050 million pounds (477 kilotons). PG is used as an ingredient in cosmetics at concentrations of <0.1% to >50%. Approximately 4000 cosmetic products contained PG in 1994. Uses of PG, with percent of demand, are: unsaturated polyester resins, 26 percent; antifreeze and de- icing fluids, 22 percent; food, drug and cosmetics uses, 18 percent; liquid detergents, 11 percent; functional fluids (inks, specialty anti-freeze, de-icing lubricants), 4 percent; pet foods, 3 percent; paints and coatings, 5 percent; tobacco, 3 percent; miscellaneous, including plasticizer use, 8 percent. HEALTH. Propylene glycol (PG) is not acutely toxic. The lowest oral LD50 values range between 18 and 23.9 mg/kg (5 different species) and the reported dermal LD50 is 20.8 mg/kg. PG is essentially nonirritating to the skin and mildly irritating to the eyes. Numerous studies support that PG is not a skin sensitizer. Repeated exposures of rats to propylene glycol in drinking water or feed did not result in adverse effects at levels up to 10% in water (estimated at about 10 g/kg bw/day) or 5% in feed (dosage reported as 2.5 g/kg bw/day) for periods up to 2 years. In cats, two studies of at least 90 days duration show that a species-specific effect of increased Heinz bodies was observed (NOAEL = 80 mg/kg bw/day; LOAEL = 443 mg/kg bw/day), with other hematological effects (decrease in number of erythrocytes and erythrocyte survival) reported at higher doses (6-12% in diet, or 3.7-10.1 g/cat/day). Propylene glycol did not cause fetal or developmental toxicity in rats, mice, rabbits, or hamsters (NOAELs range from 1.2 to 1.6 g/kg bw/day in four species). No reproductive effects were found when propylene glycol was administered at up to 5% in the drinking water (reported as 10.1 g/kg bw/day) of mice. Propylene glycol was not a genetic toxicant as demonstrated by a battery of in vivo (micronucleus, dominant lethal, chromosome aberration) and in vitro (bacterial and mammalian cells and cultures) studies. No increase in tumors was found in all tissues examined when propylene glycol was administered in the diet of rats (2.5 g/kg bw/day for 2 years), or applied to the skin of female rats (100% PG; total dose not reported; 14 months) or mice (mouse dose estimated at about 2 g/kg bw/week; lifetime). These data support a lack of carcinogenicity for PG. ENVIRONMENT. ... Measured freshwater aquatic toxicity data for fish, daphnia and algae report LC/EC50 values of >18,000 mg/L. Therefore, PG is not acutely toxic to aquatic organisms except at very high concentrations. Using an assessment factor of 100 and the Ceriodaphnia data (48- hour EC 50 = 18,340 mg/l), the predicted no effect concentration is 183 mg/L.

*Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) pp.3-4 (2001). Available from, as of December 31, 2009: **https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html***

- Hazardous Substances Data Bank (HSDB)

14.1.2 NIOSH Toxicity Data

- The National Institute for Occupational Safety and Health (NIOSH)

14.1.3 Inhalation Symptoms

Dry throat. Cough.

- ILO International Chemical Safety Cards (ICSC)

14.1.4 Eye Symptoms

Dryness of eyes. Pain. Itching.

- ILO International Chemical Safety Cards (ICSC)

14.1.5 Ingestion Symptoms

See Effects of short-term exposure

- ILO International Chemical Safety Cards (ICSC)

14.1.6 Target Organs

Respiratory (From the Nose to the Lungs)

- CDC-ATSDR Toxic Substances Portal

14.1.7 Acute Toxicity Link

Chemical: PROPYLENE GLYCOL

- USGS Columbia Environmental Research Center

14.1.8 Adverse Effects

Neurotoxin - Acute solvent syndrome

Skin Sensitizer - An agent that can induce an allergic reaction in the skin or lungs.

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

14.1.9 Acute Effects

- ChemIDplus

14.1.10 Interactions

The effects of propylene-glycol (PG) alone and the interactions between PG and calcium channel blockers were investigated on the inward calcium current at motor nerve terminals in mice. Phrenic nerve/diaphragm preparations from male ICR-mice were used. Examining the effect of 5% PG on the potassium current at the nerve terminal showed two positive spikes generated by treatment with d-tubocurarine (d-Tc) at the terminal part of the nerve terminal. The second positive spike is ascribed to the outward potassium current. PG did not change this spike at all, suggesting that this compound had no effect on the potassium channels. Pretreatments with d-Tc, tetraethylammonium (TEA), and 3,4-diaminopyridine (DAP) evoked the prolonged negative component of the action potential at the terminal part of the nerve terminal. PG augmented this component which is ascribed to the inward calcium current. The effects of calcium channel blockers were examined to determine whether the calcium channel blockers antagonize PG. Cumulative addition of cadmium-chloride, manganese-chloride, or cobalt-chloride suppressed the prolonged negative component that had been augmented by treatment with PG.

Hattori T, Maehashi H; J Mol Cell Toxicol 9 (4): 373-5 (1996)

- Hazardous Substances Data Bank (HSDB)

14.1.11 Antidote and Emergency Treatment

Check the anion gap, arterial pH, renal function, and glucose level. Serum propylene glycol levels up to 1,000 mg/dL do not correlate well with clinical status. Patients have been conscious with serum levels of 760 mg/dL.

Ellenhorn, M.J. and D.G. Barceloux. Medical Toxicology - Diagnosis and Treatment of Human Poisoning. New York, NY: Elsevier Science Publishing Co., Inc. 1988., p. 810

- Hazardous Substances Data Bank (HSDB)

Maintain an open airway and assist ventilation if necessary. Administer supplemental oxygen. Treat coma, convulsions, cardiac arrhythmias, and metabolic acidosis if they occur. Observe the patient for several hours to monitor for for development of metabolic acidosis, especially if the patient is symptomatic or there is known co-ingestion of ethanol. Treat hypocalcemia with intravenous calcium gluconate or calcium chloride

Olson, K.R. (ed.) Poisoning & Drug Overdose. 3rd edition. Lange Medical Books/McGraw-Hill, New York, NY. 1999., p. 169

- Hazardous Substances Data Bank (HSDB)

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Ethylene glycol, glycols, and related compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 262

- Hazardous Substances Data Bank (HSDB)

Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary ... . Monitor for shock and treat if necessary ... . Anticipate seizures and treat if necessary ... . For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with 0.9% saline (NS) during transport ... . Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated charcoal ... . /Ethylene glycol, glycols, and related compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 262-3

- Hazardous Substances Data Bank (HSDB)

Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in severe respiratory distress. Positive-pressure ventilation techniques with a bag-valve-mask device may be beneficial. Consider drug therapy for pulmonary edema ... . Monitor cardiac rhythm and treat arrhythmias if necessary ... . Start IV administration of D5W /SRP: "To keep open", minimal flow rate/. Use 0.9% saline (NS) lactated Ringer's (LR) if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer

fluid cautiously. Consider vasopressors if patient is hypotensive with a normal fluid volume. Watch for signs of fluid overload ... . Treat seizures with diazepam or lorazepam ... . Use proparacaine hydrochloride to assist eye irrigation ... . /Ethylene glycol, glycols, and related compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 263

Hazardous Substances Data Bank (HSDB)

14.1.12 Human Toxicity Excerpts

/HUMAN EXPOSURE STUDIES/ Results from human patch testing show no sensitization potential after semi-occlusive or occlusive epicutaneous application to the skin of volunteers (in excess of 300 subjects in total). These studies demonstrate that it is not irritating to skin or eye, nor does it cause sensitization by skin contact.

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.17 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

/HUMAN EXPOSURE STUDIES/ Patch-test in humans, 15 uL 100% propylene glycol/test chamber for 48 hr. Results: not irritating.

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.56 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

/HUMAN EXPOSURE STUDIES/ In 6 human volunteers, pads containing /propylene glycol/ test substance were fixed to the forearm for 2 hr, observation time: 7 days. Results: not irritating.

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.56 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

/HUMAN EXPOSURE STUDIES/ Cream containing 12% propylene glycol was tested on 204 persons. Results: not sensitizing.

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.60 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

For more Human Toxicity Excerpts (Complete) data for Propylene glycol (45 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

14.1.13 Non-Human Toxicity Excerpts

/LABORATORY ANIMALS: Acute Exposure/ Acute oral toxicity studies yielded similar, low acute toxicities with relatively high LD50 values ranging from 8000-46000 mg/kg/day propylene glycol for rodents and 18000-20000 mg/kg/day for both rabbits and guinea pigs. Clinical signs (loss of balance, marked depression, and analgesia) were reported in the rabbit and guinea pig only at extremely high doses that exceeded the established limit dose (5000 mg/kg) for an acute oral toxicity study. Similar effects were also evident in one study with mice only at doses that resulted in lethality (LD50 value of 24800 mg/kg/day).

US EPA; Revised Toxicology Chapter in Support of Issuance of the Reregistration Eligibility Decision (RED) Document. PC Code for Propylene Glycol: 068603; PC Code for Dipropylene Glycol: 068604. Reregistration Case Number: 3126. (February 5, 2007). Available from, as of February 24, 2010: https://www.regulations.gov/search/Regs/home.html#home

Hazardous Substances Data Bank (HSDB)

/LABORATORY ANIMALS: Acute Exposure/ Propylene glycol induced degeneration of goblet cells (+69%) in tracheal lining of rabbits after 20 and 120 minutes of aerosol exposure to 10% aerosol in an acute inhalation toxicity study; no other toxicological effects were observed.

US EPA; Revised Toxicology Chapter in Support of Issuance of the Reregistration Eligibility Decision (RED) Document. PC Code for Propylene Glycol: 068603; PC Code for Dipropylene Glycol: 068604. Reregistration Case Number: 3126. (February 5, 2007). Available from, as of February 24, 2010: https://www.regulations.gov/search/Regs/home.html#home

Hazardous Substances Data Bank (HSDB)

/LABORATORY ANIMALS: Acute Exposure/ In primary eye irritation studies, propylene glycol was instilled in the eyes of rabbits (0.1-0.5 mL). There were no treatment-related effects on the corneas of the animals and propylene glycol was classified as a non-irritant.

US EPA; Revised Toxicology Chapter in Support of Issuance of the Reregistration Eligibility Decision (RED) Document. PC Code for Propylene Glycol: 068603; PC Code for Dipropylene Glycol: 068604. Reregistration Case Number: 3126. (February 5, 2007). Available from, as of February 24, 2010: https://www.regulations.gov/search/Regs/home.html#home

Hazardous Substances Data Bank (HSDB)

/LABORATORY ANIMALS: Acute Exposure/ In a series of skin sensitization tests, no reactions were observed in guinea pigs exposed to solutions up to 70% propylene glycol.

US EPA; Revised Toxicology Chapter in Support of Issuance of the Reregistration Eligibility Decision (RED) Document. PC Code for Propylene Glycol: 068603; PC Code for Dipropylene Glycol: 068604. Reregistration Case Number: 3126. (February 5, 2007). Available from, as of February 24, 2010: https://www.regulations.gov/search/Regs/home.html#home

Hazardous Substances Data Bank (HSDB)

For more Non-Human Toxicity Excerpts (Complete) data for Propylene glycol (102 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

14.1.14 Non-Human Toxicity Values

LD50 Rat oral 21000 - 33700 mg/kg

Cavender FL, Sowinski EJ; Patty's Toxicology CD-ROM (2005). NY, NY: John Wiley & Sons; Glycols. Online Posting Date: April 16, 2001

Hazardous Substances Data Bank (HSDB)

LD50 Rat oral 22,000 mg/kg

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.6 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

LD50 Rat ip 6660 mg/kg

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3061

Hazardous Substances Data Bank (HSDB)

LD50 Rat iv 6423 mg/kg

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3061

Hazardous Substances Data Bank (HSDB)

For more Non-Human Toxicity Values (Complete) data for Propylene glycol (20 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

14.1.15 Ecotoxicity Values

EC50; Species: Selenastrum capricornutum (green algae); Concentration: 19,000 mg/L for 96 hr; Effect: 14-day growth rate /Conditions of bioassay not specified/

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.6 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

EC50; Species: Selenastrum capricornutum (green algae); Concentration: 18,100 mg/L for 14 days; Effect: 14-day growth rate /Conditions of bioassay not specified/

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.6 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

EC50; Species: Daphnia magna (Water flea, age 6-24 hr); Conditions: freshwater, static, 20 °C, pH > or =7.0; Concentration: >10000000 ug/L for 24, 48 hr; Effect: intoxication, immobilization /formulation/

Kuhn R et al; Water Res 23 (4): 495-9 (1989) as cited in the ECOTOX database. Available from, as of December 31, 2009

Hazardous Substances Data Bank (HSDB)

LC50; Species: Daphnia magna (water flea); Conditions: static; Concentration: 43,500 mg/L for 48 hr

Organization for Economic Cooperation and Development; Screening Information Data Set for 1,2-Dihydroxypropane (57-55-6) p.5 (2001). Available from, as of December 31, 2009: https://www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html

Hazardous Substances Data Bank (HSDB)

For more Ecotoxicity Values (Complete) data for Propylene glycol (23 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

14.1.16 Ecotoxicity Excerpts

/BIRDS and MAMMALS/ Due to the low likelihood of exposure and low toxicity of propylene glycol ..., the /Environmental Protection/ Agency expects no effects to listed species or critical habitats and therefore makes a "No Effect" determination for this chemical.

USEPA/Office of Pesticide Programs; Reregistration Eligibility Decision Document - Propylene glycol and Dipropylene glycol p.15 EPA-739-R-06-002 (September 2006). Available from, as of December 31, 2009: https://www.epa.gov/pesticides/reregistration/status.htm

Hazardous Substances Data Bank (HSDB)

/AQUATIC SPECIES/ The very low toxicity of propylene glycol to aquatic organisms, as indicated by the high LC50 values ..., further supports the unlikelihood of adverse effects to fish and aquatic invertebrates.

USEPA/Office of Pesticide Programs; Reregistration Eligibility Decision Document - Propylene glycol and Dipropylene glycol p.14 EPA-739-R-06-002 (September 2006). Available from, as of December 31, 2009: https://www.epa.gov/pesticides/reregistration/status.htm

Hazardous Substances Data Bank (HSDB)

/AQUATIC SPECIES/ ...This research investigated the contributions of environmentally significant concentrations of selected /aircraft deicing fluid/ (ADF) components to the toxicity of ADF-containing waste streams, and to the inhibition of biodegradation of propylene glycol (PG), the most important component of ADF. The component chemicals studied were PG, the corrosion inhibitor 4(5)-methylbenzotriazole (MeBT; common name: tolyltriazole), and proprietary mixes of corrosion inhibitors, buffers, and surfactants referred to as the additive package or AdPack. Relative to PG alone, the different additives increased the toxicity of ADF and decreased PG biodegradation rates. In enrichments of soil microorganisms acclimated to ADF, the MeBT component significantly decreased cell growth rates and yields, and inhibited PG biodegradation to a greater extent than the AdPack. Microtox tests indicated that MeBT is the ADF component most toxic to microorganisms. However, acute aquatic toxicity tests indicated that the AdPack components were more toxic than MeBT to Ceriodaphnia dubia and Pimephales promelas, although both components were more toxic than PG alone. /Aircraft deicing fluid/

Cornell JS et al; Environ Chem Toxicol 19 (6): 1465-72 (2000)

Hazardous Substances Data Bank (HSDB)

/AQUATIC SPECIES/ Streams receiving runoff from General Mitchell International Airport (GMIA), Milwaukee, Wisconsin, USA, were studied to assess toxic impacts of aircraft and runway deicers. Elevated levels of constituents related to deicing (propylene glycol, ethylene glycol, and ammonia) were observed in stream samples. The LC50s of type I deicer for Ceriodaphnia dubia, Pimephelas promelas, Hyalela azteca, and Chironimus tentans and the EC50 for Microtox were less than 5,000 mg/L of propylene glycol. Concentrations up to 39,000 mg/L were observed at airport outfall sites in samples collected during deicing events. The IC25s of type I deicer for C. dubia and P. promelas were less than 1,500 mg/L of propylene glycol. Concentrations up to 960 mg/L were observed in low-flow samples at an airport outfall site. Measured toxicity of stream water was greatest during winter storms when deicers were applied. Chronic toxicity was observed at airport outfall samples from low-flow periods in the winter and the summer, with the greater toxic impacts from the winter sample. All forms of toxicity in stream-water samples decreased as downstream flows increased. /Aircraft and runway deicers/

Corsi SR et al; Environ Toxicol Chem 20 (7): 1483-90 (2001)

Hazardous Substances Data Bank (HSDB)

/AQUATIC SPECIES/ ... Many of the /aircraft/ deicers are formulated mixtures of ethylene glycol (EG) or propylene glycol (PG) and a variety of additives. Because these deicers may be intentionally or accidentally released into aquatic ecosystems, the possibility exists for direct and indirect adverse effects on aquatic organisms. Laboratory studies evaluated the comparative toxicity of formulated glycol deicers and pure materials on the water flea, Ceriodaphnia dubia, and fathead minnow, Pimephales promelas. Acute (48 hr and 96 hr) and short-term chronic tests were performed according to USEPA

guidelines. The formulated mixtures were found to be substantially more toxic than either of the pure glycol materials. The 48 hr LC50s for C. dubia were 13,140 mg/L and 1,020 mg/L using formulated EG and PG, and 34,400 mg/L and 18,340 mg/L using pure EG and PG, respectively. The 96 hr LC50s for P. promelas were 8,050 mg/L and 710 mg/L using formulated EG and PG, and 72,860 mg/L and 55,770 mg/L using pure EG and PG, respectively. Chronic IC25s for C. dubia were 3,960 mg/L and 640 mg/L using formulated EG and PG, 12,310 mg/L and 13,470 mg/L using pure EG and PG. Chronic IC25s for P. promelas were 3,660 mg/L and 110 mg/L using formulated EG and PG, 22,520 mg/L and 6,940 mg/L using pure EG and PG. For airports that have stormwater discharge permits, numerical limits for EG and PG are generally listed, potential toxicity is assumed to be due to the glycol materials. However, other compounds in the mixtures may either contribute substantially to, or in some cases overshadow, the toxicity of the glycol materials.

Pillard DA; Environ Toxicol Chem 14 (2): 311-5 (1995)

Hazardous Substances Data Bank (HSDB)

14.1.17 National Toxicology Program Studies

Propylene glycol ... was tested for reproductive toxicity in Swiss CD-1 mice using the RACB protocol. It was part of a series of glycol ethers & congeners evaluated for structure-activity correlations using this design. Data collected on body weights, clinical signs, & food/**water** consumption during the dose-range-finding segment (Task 1) were used to set concns for the main study (Task 2) at 0.0, 1.0, 2.5, 5.0% PG in drinking **water**. These concns produced calculated consumption estimates of nearly =1.819, 4.796, & 10.118 g/kg bw/day. Although **water** consumption in the F0 generation was consistently higher for all groups (by 6 to 15%), these increases were not statistically different from controls. There was no effect on body weights during ... the continuous cohabitation portion of the study. All groups had > or =4.6 litters/pair, with > or =11.9 pups/litter. There was no treatment-related effect on pup weight adjusted for litter size (control value: 1.55 g). The viability & growth of the final litter was unaffected by PG consumption. Since there was no effect on fertility, a Task 3 crossover was not conducted. At the time this study was conducted, the protocol called for no necropsy of F0 animals in the absence of a fertility effect, so the F0 mice were killed & discarded without necropsy. For the second generation, just the control & 5% PG groups were evaluated. There was no treatment-related effect on mating, fertility, or on the number, weight, or viability of the F2 offspring. After delivery of the F2 pups, the F1 adults were killed & necropsied. There was no effect on body or organ weights in males or females, no change in sperm endpoints, & no change in estrous cycle parameters. Serum total **calcium** levels were measured in serum of the F1 mice, & was found unchanged by PG exposure from a control value of 9.2 mg/dL. In summary, propylene glycol, under the conditions of this experiment, has no effect on fertility & reproduction in either generation of Swiss mice at up to 10 g/kg/day.

*Department of Health & Human Services/National Institute of Environmental Health Sciences, National Toxicology Program; Propylene Glycol (CAS No. 57-55-6): Reproduction and Fertility Assessment in CD-1 Mice When Administered in Drinking Water, NTP Study No. RACB84068 (September 1985) Available from, as of August 14, 2002: **https://ntp.niehs.nih.gov/index.cfm?objectid=0847F35A-0850-D1E7-B02ED4DDD150F990***

Hazardous Substances Data Bank (HSDB)

14.1.18 Populations at Special Risk

/Infant, premature/ The decreased size of premature infants and an increased serum half-life ... for propylene glycol in premature infants predispose them to a greater probability of toxic effects from over administration of propylene glycol. There is particular concern for very small infants and those receiving multiple IV medications containing propylene glycol. Absorption of propylene glycol from ointments applied to burns and injection of multivitamin products in infants has resulted in serum hyperosmolality, which was associated with cardiorespiratory arrest in one case.

*DHHS/NTP-CERHR; NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Propylene Glycol (March 2004) NIH Pub No. 04-4482 pp.II-45-46. Available from, as of January 11, 2010: **https://cerhr.niehs.nih.gov/evals/egpg/propylene/PG_Monograph.pdf***

Hazardous Substances Data Bank (HSDB)

/Infant; Infant, newborn; Infant, premature; Child, preschool/ Hyperosmolarity and lactic acidosis, both of which occur most frequently in patients with consumption of large quantities of propylene glycol or on administration to neonates, children under 4 years of age, pregnant women, and patients with hepatic or renal failure.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 593

Hazardous Substances Data Bank (HSDB)

/Children/ In children, seizures and respiratory depression have occurred after taking liquid medications containing propylene glycol.

*DHHS/NTP-CERHR; NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Propylene Glycol (March 2004) NIH Pub No. 04-4482 p.II-44 . Available from, as of January 11, 2010: **https://cerhr.niehs.nih.gov/evals/egpg/propylene/PG_Monograph.pdf***

Hazardous Substances Data Bank (HSDB)

Adverse effects /from propylene glycol/ may also occur in patients treated with **disulfiram** or **metronidazole**.

Rowe, R.C., Sheskey, P.J., Quinn, M.E.; (Eds.), Handbook of Pharmaceutical Excipients 6th edition Pharmaceutical Press, London, England 2009, p. 593

Hazardous Substances Data Bank (HSDB)

For more Populations at Special Risk (Complete) data for Propylene glycol (9 total), please visit the **HSDB record page**.

Hazardous Substances Data Bank (HSDB)

14.2 Ecological Information

14.2.1 EPA Ecotoxicity

Pesticide Ecotoxicity Data from EPA

EPA Pesticide Ecotoxicity Database

14.2.2 US EPA Regional Screening Levels for Chemical Contaminants

Resident Soil (mg/kg)	1.30e+05
Industrial Soil (mg/kg)	1.60e+06
Tapwater (ug/L)	4.00e+04
Risk-based SSL (mg/kg)	8.10e+00
Chronic Oral Reference Dose (mg/kg-day)	2.00e+01
Fraction of Contaminant Absorbed in Gastrointestinal Tract	1
Fraction of Contaminant Absorbed Dermally from Soil	0.1

EPA Regional Screening Levels for Chemical Contaminants at Superfund Sites

14.2.3 US EPA Regional Removal Management Levels for Chemical Contaminants

Resident Soil (mg/kg)	3.80e+06
Industrial Soil (mg/kg)	4.90e+07
Tapwater (ug/L)	1.20e+06
Chronic Oral Reference Dose (mg/kg-day)	2.00e+01
Fraction of Contaminant Absorbed in Gastrointestinal Tract	1
Fraction of Contaminant Absorbed Dermally from Soil	0.1

EPA Regional Screening Levels for Chemical Contaminants at Superfund Sites

14.2.4 Environmental Fate/Exposure Summary

Propylene glycol's production and use as an antifreeze in breweries and dairy establishments, substitute for **ethylene glycol** and **glycerol**, in the manufacture of synthetic resins, emulsifier in foods, solvent for food colors and flavors, and pharmaceutic aid (humectant, solvent) may result in its release to the environment through various waste streams. Its use to create artificial smoke and mist for theatrical use, as an airplane de-icing fluid and in aerosol mists that are commonly used in hospitals and public buildings for disinfection purposes will result in its direct release to the environment. If released to air, a vapor pressure of 0.13 mm Hg at 25 °C indicates propylene glycol will exist solely as a vapor in the ambient atmosphere. Vapor-phase propylene glycol will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 32 hours. Propylene glycol does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight. If released to soil, propylene glycol is expected to have very high mobility based upon an estimated Koc of 1. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 1.3X10-8 atm-cu m/mole. Propylene glycol is not expected to volatilize from dry soil surfaces based upon its vapor pressure. Propylene glycol was mineralized 73-78% in laboratory studies conducted using an agricultural soil over a 51 day incubation period, suggesting biodegradation will be an important environmental fate process in soil. If released into **water**, propylene glycol is not expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from **water** surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Numerous screening studies using wastewater or sewage inoculum as seed suggest that propylene glycol will be degraded readily in aqueous environments. An estimated BCF of 3 suggests the potential for bioconcentration in aquatic organisms is low. Propylene glycol is not expected to undergo hydrolysis since this compound lacks functional groups that hydrolyze under environmental conditions. Occupational exposure to propylene glycol may occur through inhalation and dermal contact with this compound at workplaces where propylene glycol is produced or used. Monitoring and use data indicate that the general population may be exposed to propylene glycol via inhalation and dermal contact with consumer products containing propylene glycol. (SRC)

Hazardous Substances Data Bank (HSDB)

14.2.5 Artificial Pollution Sources

Propylene glycol's production and use as an antifreeze in breweries and dairy establishments, substitute for **ethylene glycol** and **glycerol**, in the manufacture of synthetic resins, emulsifier in foods, solvent for food colors and flavors, and pharmaceutic aid (humectant, solvent)(1) may result in its release to the environment through various waste streams(SRC). Its use to create artificial smoke and mist for theatrical use, as an airplane de-icing fluid(1) and in aerosol mists that are commonly used in hospitals and public buildings for disinfection purposes(2) will result in its direct release to the environment(SRC).

(1) O'Neil MJ, ed; The Merck. 14th ed Whitehouse Station, NJ: Merck and Co., Inc., p. 1350 (2006) (2) Finis L et al; Patty's Toxicology 5th ed. Bingham E et al, eds., New York, NY: John Wiley & Sons 7: 26-31 (2001)

Hazardous Substances Data Bank (HSDB)

14.2.6 Environmental Fate

TERRESTRIAL FATE: Based on a classification scheme(1), an estimated Koc value of 1(SRC), determined from a log Kow of -0.92(2) and a regression-derived equation(3), indicates that propylene glycol is expected to have very high mobility in soil(SRC). Volatilization of propylene glycol from moist soil surfaces is not expected to be an important fate process(SRC) given an estimated Henry's Law constant of 1.3X10-8 atm-cu m/mole(SRC), derived from its vapor pressure, 0.13 mm Hg(4), and assigned value for **water** solubility of 1X10+6 mg/L (miscible)(5). Propylene glycol is not expected to volatilize from dry soil surfaces(SRC) based upon its vapor pressure(4). Laboratory experiments using agricultural soils from South Carolina conducted at 22 °C and a fortification of 1,000 ppm propylene glycol, yielded 73-78% mineralization during a 51 day incubation period(6), suggesting that biodegradation will be an important fate process in soils(SRC).

*(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) Hansch C et al; Exploring QSAR. Hydrophobic, Electronic, and Steric Constants. ACS Prof Ref Book. Heller SR, consult. ed., Washington, DC: Amer Chem Soc p. 7 (1995) (3) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from **https://www.epa.gov/oppt/exposure/pubs/episuitedl.htm** as of Feb 12, 2010. (4) Daubert TE, Danner RP; Physical and Thermodynamic Properties of Pure Chemicals Data Compilation Washington, DC: Taylor and Francis (1989) (5) Yalkowsky SH, Dannenfelser RM; The AQUASOL dATAbASE of Aqueous Solubility. Ver 5. Tucson, AZ: Univ AZ, College of Pharmacy (1992) (6) Shupack DP, Anderson TA; Water Air Soil Pollut 118: 53-58 (2000)*

Hazardous Substances Data Bank (HSDB)

AQUATIC FATE: Based on a classification scheme(1), an estimated Koc value of 1(SRC), determined from a log Kow of -0.92(2) and a regression-derived equation(3), indicates that propylene glycol is not expected to adsorb to suspended solids and sediment(SRC). Volatilization from **water** surfaces is not expected(3) based upon an estimated Henry's Law constant of 1.3X10-8 atm-cu m/mole(SRC), derived from its vapor pressure, 0.13 mm Hg(5), and assigned value for **water** solubility of 1X10+6 mg/L (miscible)(6). According to a classification scheme(7), an estimated BCF of 3(SRC), from its log Kow(2) and a

regression-derived equation(8), suggests the potential for bioconcentration in aquatic organisms is low(SRC). Numerous screening studies using wastewater or sewage inoculum as seed, suggests that propylene glycol will be degraded readily under aqueous environments(9-11).

*(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) Hansch C et al; Exploring QSAR. Hydrophobic, Electronic, and Steric Constants. ACS Prof Ref Book. Heller SR, consult. ed., Washington, DC: Amer Chem Soc p. 7 (1995) (3) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from **https://www.epa.gov/oppt/exposure/pubs/episuitedl.htm** as of Feb 12, 2010. (4) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990) (5) Daubert TE, Danner RP; Physical and Thermodynamic Properties of Pure Chemicals Data Compilation Washington, DC: Taylor and Francis (1989) (6) Yalkowsky SH, He Y; Handbook of Aqueous Solubility Data: An Extensive Compilation of Aqueous Solubility Data for Organic Compounds Extracted from the AQUASOL dATAbASE. Boca Raton, FL: CRC Press LLC, (2003) (7) Franke C et al; Chemosphere 29: 1501-14 (1994) (8) Meylan WM et al; Environ Toxicol Chem 18: 664-72 (1999) (9) Bridie AL et al; Water Res 13: 627-30 (1979) (10) Helfgott TB et al; An Index of Refractory Organics. USEPA-66/2-77-174 (1977) (11) Wagner R; Vom Wasser 47: 241-65 (1976)*

▸ Hazardous Substances Data Bank (HSDB)

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere(1), propylene glycol, which has a vapor pressure of 0.13 mm Hg at 25 °C(2), is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase propylene glycol is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals(SRC); the half-life for this reaction in air is estimated to be 32 hours(SRC), calculated from its rate constant of 1.2X10-11 cu cm/molecule-sec at 25 °C(3). Propylene glycol does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight(4).

(1) Bidleman TF; Environ Sci Technol 22: 361-367 (1988) (2) Daubert TE, Danner RP; Physical and Thermodynamic Properties of Pure Chemicals Data Compilation Washington, DC: Taylor and Francis (1989) (3) Atkinson R; J Phys Chem Ref Data Monograph 1 (1989) (4) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 8-12 (1990)

▸ Hazardous Substances Data Bank (HSDB)

14.2.7 Environmental Biodegradation

AEROBIC: Propylene glycol achieved 64% of its theoretical BOD using a sewage inoculum and a 5 day incubation period(1). A Warburg respirometer study employing a sewage seed showed that propylene glycol reached 78% of its theoretical BOD during a 40 day incubation period(2). Propylene glycol achieved 2.2, 56.7 and 80% of its theoretical BOD using a sewage inoculum and 5, 10, and 50 day incubation periods, respectively(3). Using raw wastewater and synthetic seawater as inoculum, propylene glycol achieved 55 and 83% of its theoretical BOD during 5 and 20 day incubation periods, respectively(4). Using wastewater from pretreated domestic sewage, propylene glycol reached 74.5% of its theoretical BOD in 5 days(5). Propylene glycol underwent 73-78% mineralization within 51 days when incubated with various agricultural soils from Clemson University, SC under laboratory conditions at 22 °C and 1,000 ppm propylene glycol in the soil; 40-79% mineralization was observed for propylene glycol incubated in the same soils for 64 days at 7 °C(6).

(1) Bridie AL et al; Water Res 13: 627-30 (1979) (2) Helfgott TB et al; An Index of Refractory Organics. USEPA-66/2-77-174 (1977) (3) Lamb CB, Jenkins GF; p. 326-9 in Proc 8th Industrial Waste Conf, Purdue Univ (1952) (4) Price KS et al; J Water Pollut Control Fed 46: 63-77 (1974) (5) Wagner R; Vom Wasser 47: 241-65 (1976) (6) Shupack DP, Anderson TA; Water Air Soil Pollut 118: 53-58 (2000)

▸ Hazardous Substances Data Bank (HSDB)

AEROBIC: Propylene glycol is mineralized to CO2 in soil microcosms incubated at temperatures ranging from -2 to 25 °C. No lag time period was observed. Degradation occurred with propylene glycol alone and in combination with **ethylene glycol** and **diethylene glycol** at glycol concentrations ranging from 392 to 5278 mg/kg suggesting that high levels of glycols in deicing fluids are unlikely to inhibit biodegradation. Complete disappearance of 0.045% propylene glycol occurred after 12 days at 8 °C and 57% of the theoretical **oxygen** demand was recovered after 34 days. With 0.45% propylene glycol, 76% degradation and 44% mineralization was obtained after 111 days(1). The rate of biodegradation ranged from 11.4 to 41.4 mg/kg soil per day at 8 °C with an average of 22.7 mg/kg per day. Rates at 25 °C were approximately 3.4 times faster than those at 8 °C, ranging from 78.9 to 88 mg/kg per day with a mean of 83.5 mg/kg per day. At -2 °C, biodegradation rates for propylene glycol ranged from 1.1 to 3.5 mg/kg per day with a mean of 2.3 mg/kg per day. After 111 days of incubation at -2 °C, 14% degradation to the parent compound was observed and the BOD was 8% of the theoretical **oxygen** demand(1).

(1) Klecka GM et al; Ecotox Environ Saf 25: 280-95 (1993)

▸ Hazardous Substances Data Bank (HSDB)

AEROBIC: Proylene glycol reached 90% of its theoretical BOD in 14 days in the Japanese MITI test(1). A mixture of propylene glycol, **diethylene glycol** and **potassium acetate** reached 32.9, 30.2%, and 24.1% of its theoretical BOD in 5 days, respectively at 8 °C, 4 °C and 1 °C(2). The measured surface biodegradation rates for deicing fluids, specifically propylene glycol, was 0.073 day-1(2). Aircraft deicing fluid, the major constituents being **ethylene glycol** and propylene glycol, reached concentrations ranging from 350-245,000 mg/L, with an average of 87,000 mg/L, of its theoretical BOD after 5 days(3).

(1) Sedykh A, Klopman G; SAR QSAR Environ Res 18(7-8): 693-709 (2007) (2) Revitt DM, Worrall P; Water Sci Technol 48: 103-111 (2003) (3) Zitomer DH, Tonuk GU; J Environ Eng 129: 123-129 (2003)

▸ Hazardous Substances Data Bank (HSDB)

ANAEROBIC: Using an activated sludge or digester sludge incubated under anaerobic conditions, propylene glycol was completely degraded within 5-9 days, while a sterile control showed no degradation(1). Rapid propylene glycol degradation is observed in topsoil materials high in organic matter at 20 °C; in subsoil materials, degradation of propylene glycol is very slow and incomplete(2).

(1) Kaplan DL et al; Environ Sci Technol 16: 723-5 (1982) (2) Jaesche P et al; J Contam Hydrol 85: 271-286 (2006)

▸ Hazardous Substances Data Bank (HSDB)

14.2.8 Environmental Abiotic Degradation

Under ordinary conditions propylene glycol is stable, but at high temps it tends to oxidize giving rise to products such as **propionaldehyde**, **lactic acid**, **pyruvic acid** and **acetic acid**.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1350

▸ Hazardous Substances Data Bank (HSDB)

The rate constant for the vapor-phase reaction of propylene glycol with photochemically-produced hydroxyl radicals has been measured as 1.2X10-11 cu cm/molecule-sec at 25 °C(1). This corresponds to an atmospheric half-life of about 32 hours at an atmospheric concentration of 5X10+5 hydroxyl radicals per cu cm(1). Propylene glycol is not expected to undergo hydrolysis in the environment due to the lack of hydrolyzable functional groups(2). Propylene glycol does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight(2). The rate constant for the reaction of propylene glycol with hydroxyl radicals in aqueous solution is approximately 0.94-1.68X10+9 L/mol-sec(3); if the hydroxyl radical concn of sunlit natural **water** is assumed to be 1X10-17 moles/L(4), the half-life would be approximately 1.3-2.3 years(SRC).

(1) Atkinson R; J Phys Chem Ref Data Monograph 1 (1989) (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990) (3) Anbar M, Neta P; Int J Appl Radiation Isotopes 18: 493-523 (1967) (4) Mill T et al; Science 207: 886-7 (1980)

▸ Hazardous Substances Data Bank (HSDB)

14.2.9 Environmental Bioconcentration

An estimated BCF of 3 was calculated for propylene glycol(SRC), using a log Kow of -0.92(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC).

(1) Hansch C et al; Exploring QSAR. Hydrophobic, Electronic, and Steric Constants. ACS Prof Ref Book. Heller SR, consult. ed., Washington, DC: Amer Chem Soc p. 7 (1995) (2) Meylan WM et al; Environ Toxicol Chem 18: 664-72 (1999) (3) Franke C et al; Chemosphere 29: 1501-14 (1994)

▸ Hazardous Substances Data Bank (HSDB)

14.2.10 Soil Adsorption/Mobility

Soil Adsorption Coefficient

2.29 L/kg

- EPA DSSTox

The Koc of propylene glycol is estimated as 1(SRC), using a log Kow of -0.92(1) and a regression-derived equation(2). According to a classification scheme(3), this estimated Koc value suggests that propylene glycol is expected to have very high mobility in soil(SRC).

(1) Hansch C et al; Exploring QSAR. Hydrophobic, Electronic, and Steric Constants. ACS Prof Ref Book. Heller SR, consult. ed., Washington, DC: Amer Chem Soc p. 7 (1995) (2) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from ***https://www.epa.gov/oppt/exposure/pubs/episuitedl.htm*** *as of Feb 12, 2010. (3) Swann RL et al; Res Rev 85: 17-28 (1983)*

- Hazardous Substances Data Bank (HSDB)

14.2.11 Volatilization from Water/Soil

The Henry's Law constant for propylene glycol is estimated as 1.3X10-8 atm-cu m/mole(SRC) derived from its vapor pressure, 0.13 mm Hg(1), and assigned value for **water** solubility of 1X10+6 mg/L (miscible)(2). This Henry's Law constant indicates that propylene glycol is expected to be essentially nonvolatile from **water** surfaces(3). Propylene glycol is not expected to volatilize from dry soil surfaces(SRC) based upon its vapor pressure(1).

(1) Daubert TE, Danner RP; Physical and Thermodynamic Properties of Pure Chemicals Data Compilation Washington, DC: Taylor and Francis (1989) (2) Yalkowsky SH, He Y; Handbook of Aqueous Solubility Data: An Extensive Compilation of Aqueous Solubility Data for Organic Compounds Extracted from the AQUASOL dATAbASE. Boca Raton, FL: CRC Press LLC, (2003) (3) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990)

- Hazardous Substances Data Bank (HSDB)

14.2.12 Environmental Water Concentrations

GROUNDWATER: Propylene glycol was detected at a concentration of 4 mg/L in samples from a perched **water** table at the Ottawa Airport, Ontario, Canada(1).

(1) ATSDR; Toxicological Profile for Propylene Glycol. Atlanta, GA: Agency for Toxic Substances and Disease Registry, US Public Health Service (2009). Available from, as of August 25, 2010: ***https://www.atsdr.cdc.gov/toxprofiles/index.asp***

- Hazardous Substances Data Bank (HSDB)

SURFACE **WATER**: Trigg Lake and Big Bear Creek, in the vicinity of the Dallas/Fort Worth International Airport, TX, were monitored for aircraft deicer/anti-icer fluid runoff from October 2002 to April 2004. Glycol concentrations at outfalls ranged from less than 81 to 23,800 mg/L; concentrations in Big Bear Creek ranged from less than 18 to 230 mg/L, with 10 and 35% of what was applied to aircraft was subsequently discharged into the creek. Glycol effluent released to Trigg Lake was initially diluted and degraded prior to reaching the lake outlet(1). Propylene glycol was detected in storm **water** runoff at the Salt Lake City airport Utah at concentrations up to 19,000 mg/L. The compound may also be released to surface **water** as a metabolite of the military propellant **propylene glycol dinitrate** which is found in waste **water** streams from munitions facilities(2).

(1) Corsi SR et al; Environ Toxicol Chem 25: 2890-900 (2006) (2) ATSDR; Toxicological Profile for Propylene Glycol. Atlanta, GA: Agency for Toxic Substances and Disease Registry, US Public Health Service (2009). Available from, as of August 25, 2010: ***https://www.atsdr.cdc.gov/toxprofiles/index.asp***

- Hazardous Substances Data Bank (HSDB)

14.2.13 Effluent Concentrations

Propylene glycol was identified, not quantified, in a wastewater effluent from a chemical plant in Memphis, TN in Aug 1974(1).

(1) Shackelford WM, Keith JL; Frequency of Organic Compounds Identified in Water. USEPA-600/4-76-062 p. 205 (1976)

- Hazardous Substances Data Bank (HSDB)

14.2.14 Atmospheric Concentrations

INDOOR AIR: Propylene glycol was detected in indoor air concentrations at the maximum concentration of 69.3 ug/cu m and the average concentration of 7.7 ug/cu m(1).

(1) Stolz P et al; in Indoor Air in Organic Indoor Air Pollutants. Occurrence, Measurement, Evaluation. Salthammer T, ed., New York, NY: Wiley-VCH, pp. 117-125 (1999)

- Hazardous Substances Data Bank (HSDB)

14.2.15 Other Environmental Concentrations

Propylene glycol was identified as a volatile component of latex-backed carpets(1). Propylene glycol was detected in newly manufactured and site houses at concentrations of 1.1-12.0 ppb and < 2.2-360 ppb in North America(2).

(1) USCPSC; Status Report for Chemical Emissions from New Carpets. US Consumer Product Safety Commission (1993) (2) Hodgson At et al; Indoor Air 10: 178-9 (2000)

- Hazardous Substances Data Bank (HSDB)

Propylene glycol was detected in snowbanks within the General Mitchell International Airport in Wisconsin, a medium-sized airport. The compound was identified as the main constituent, with the concentration ranging from 144 to 8,210 kg from February 2000-March 2003. Glycol content in snowbanks ranged from 0.17- 11.4%(1)

(1) Corsi SR et al; Environ Sci Technol 40: 3195-3202 (2006)

- Hazardous Substances Data Bank (HSDB)

Propylene glycol was present in the following consumer product categories: paint primers and varnishes, all purpose cleaners, room deodorants and disinfectants, personal deodorants, and metal cleaners and polishes(1). The weight percentage of propylene glycol in the products ranged from 16.15% to 42.47%(1). Propylene glycol was also detected in oven spray cleaner at unknown concentrations(2).

(1) USEPA; Compilation and speciation of National Emissions Factor for consumer/commercial solvent use. Information compiled to support urban air toxics assessment studies. USEPA-450/2-89-008 (1989) (2) Salthammer T; in Organic Indoor Air Pollutants. Occurrence, Measurement, Evaluation. Salthammer T, ed., New York, NY: Wiley-VCH, pp. 219-232 (1999)

- Hazardous Substances Data Bank (HSDB)

14.2.16 Probable Routes of Human Exposure

According to the 2006 TSCA Inventory Update Report, the number of persons reasonably likely to be exposed in the industrial manufacturing, processing, and use for propylene glycol is 1000 or greater; the data may be greatly underestimated(1).

*(1) US EPA; Inventory Update Reporting (IUR). Non-confidential 2006 IUR Records by Chemical, including Manufacturing, Processing and Use Information. Washington, DC: U.S. Environmental Protection Agency. Available from, as of March 2, 2010: **https://cfpub.epa.gov/iursearch/index.cfm***

▸ Hazardous Substances Data Bank (HSDB)

NIOSH (NOES Survey 1981-1983) has statistically estimated that 2,238,429 workers (936,584 of these are female) are potentially exposed to propylene glycol in the US(1). Occupational exposure to propylene glycol may occur through inhalation and dermal contact with this compound at workplaces where propylene glycol is produced or used(SRC). Monitoring and use data indicate that the general population may be exposed to propylene glycol via inhalation and dermal contact with consumer products containing propylene glycol(SRC).

*(1) NIOSH; NOES. National Occupational Exposure Survey conducted from 1981-1983. Estimated numbers of employees potentially exposed to specific agents by 2-digit standard industrial classification (SIC). Available from, as of Feb 12, 2010: **https://www.cdc.gov/noes/***

▸ Hazardous Substances Data Bank (HSDB)

15 Associated Disorders and Diseases

- Comparative Toxicogenomics Database (CTD)

Associated Occupational Diseases with Exposure to the Compound

Contact dermatitis, allergic [Category: Skin Disease]

Encephalopathy, chronic solvent [Category: Chronic Poisoning]

Solvents, acute toxic effect [Category: Acute Poisoning]

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

16 Literature

16.1 NLM Curated PubMed Citations

PubChem

16.2 Springer Nature References

Springer Nature

16.3 Thieme References

Thieme Chemistry

16.4 Wiley References

Wiley

16.5 Depositor Provided PubMed Citations

PubChem

16.6 Synthesis References

Rudolf Huettinger, Ulrich Holtschmidt, "Polyoxyalkylene ethers of **glycerin** or 1,2-propanediol, esterified with fatty acid and/or **isostearic acid**, their synthesis and use as thickening or solubilizing agents." U.S. Patent US4614622, issued June, 1968.

DrugBank

16.7 Chemical Co-Occurrences in Literature

PubChem

16.8 Chemical-Gene Co-Occurrences in Literature

PubChem

16.9 Chemical-Disease Co-Occurrences in Literature

PubChem

17 Patents

17.1 Depositor-Supplied Patent Identifiers

PubChem

Link to all deposited patent identifiers

PubChem

17.2 WIPO PATENTSCOPE

Patents are available for this chemical structure:

https://patentscope.wipo.int/search/en/result.jsf?inchikey=DNIAPMSPPWPWGF-UHFFFAOYSA-N

PATENTSCOPE (WIPO)

18 Biomolecular Interactions and Pathways

18.1 Protein Bound 3D Structures

View 1 protein in NCBI Structure

PubChem

18.2 Chemical-Gene Interactions

18.2.1 CTD Chemical-Gene Interactions

Comparative Toxicogenomics Database (CTD)

18.3 Drug-Drug Interactions

DrugBank

18.4 Pathways

PubChem

19 Biological Test Results

19.1 BioAssay Results

PubChem

20 Taxonomy

Escherichia coli (strain K12, MG1655)

- E. coli Metabolome Database (ECMDB)

The LOTUS Initiative for Open Natural Products Research: frozen dataset union wikidata (with metadata) | **DOI:10.5281/zenodo.5794106**

- LOTUS - the natural products occurrence database

21 Classification

21.1 Ontologies

21.1.1 MeSH Tree

- Medical Subject Headings (MeSH)

21.1.2 NCI Thesaurus Tree

- NCI Thesaurus (NCIt)

21.1.3 ChEBI Ontology

- ChEBI

21.1.4 KEGG: Drug

KEGG

21.1.5 KEGG: JP15

KEGG

21.1.6 KEGG: Animal Drugs

KEGG

21.1.7 EPA Safer Choice

EPA Safer Choice

21.1.8 ChemIDplus

ChemIDplus

21.1.9 CAMEO Chemicals

CAMEO Chemicals

21.1.10 ChEMBL Target Tree

ChEMBL

21.1.11 EPA CPDat Classification

EPA Chemical and Products Database (CPDat)

21.1.12 NORMAN Suspect List Exchange Classification

NORMAN Suspect List Exchange

21.1.13 EPA DSSTox Classification

EPA DSSTox

21.1.14 Consumer Product Information Database Classification

Consumer Product Information Database (CPID)

21.1.15 LOTUS Tree

- LOTUS - the natural products occurrence database

21.1.16 FDA Drug Type and Pharmacologic Classification

- National Drug Code (NDC) Directory

21.1.17 Haz-Map Classification

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

22 Information Sources

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   PROPYLENE GLYCOL
   https://cameochemicals.noaa.gov/chemical/9030

   CAMEO Chemical Reactivity Classification
   https://cameochemicals.noaa.gov/browse/react

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   (±)-Propylene glycol
   https://commonchemistry.cas.org/detail?cas_rn=57-55-6

3. **ChemIDplus**

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   Propylene glycol [USP:JAN]
   https://chem.nlm.nih.gov/chemidplus/sid/0000057556

   ChemIDplus Chemical Information Classification
   https://chem.nlm.nih.gov/chemidplus/

4. **DrugBank**

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   https://www.drugbank.ca/legal/terms_of_use

   Propylene glycol
   https://www.drugbank.ca/drugs/DB01839

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   https://www.cancer.gov/policies/copyright-reuse

   propylene glycol
   https://dtp.cancer.gov/dtpstandard/servlet/dwindex?searchtype=NSC&outputformat=html&searchlist=69860

   Glycol, polypropylene (P750)
   https://dtp.cancer.gov/dtpstandard/servlet/dwindex?searchtype=NSC&outputformat=html&searchlist=35749

   Glycol, polypropylene (P1200)
   https://dtp.cancer.gov/dtpstandard/servlet/dwindex?searchtype=NSC&outputformat=html&searchlist=35748

   Glycol, polypropylene (P400)
   https://dtp.cancer.gov/dtpstandard/servlet/dwindex?searchtype=NSC&outputformat=html&searchlist=35747

6. **EPA Chemicals under the TSCA**

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   https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

   1,2-Propanediol
   https://www.epa.gov/chemicals-under-tsca

7. **EPA DSSTox**

   LICENSE

   https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

   1,2-Propylene glycol
   https://comptox.epa.gov/dashboard/DTXSID0021206

   CompTox Chemicals Dashboard Chemical Lists
   https://comptox.epa.gov/dashboard/chemical-lists/

8. **European Chemicals Agency (ECHA)**

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   https://echa.europa.eu/web/guest/legal-notice

   Propane-1,2-diol
   https://echa.europa.eu/substance-information/-/substanceinfo/100.000.307

   1,2-Propanediol
   https://echa.europa.eu/information-on-chemicals

   Propane-1,2-diol
   https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/44442

9. **Hazardous Substances Data Bank (HSDB)**

   Propylene glycol
   https://pubchem.ncbi.nlm.nih.gov/source/hsdb/174

10. **ILO International Chemical Safety Cards (ICSC)**

    LICENSE

PROPYLENE GLYCOL
https://www.ilo.org/dyn/icsc/showcard.display?p_version=2&p_card_id=0321

11. Occupational Safety and Health Administration (OSHA)

PROPYLENE GLYCOL
https://www.osha.gov/chemicaldata/882

12. The National Institute for Occupational Safety and Health (NIOSH)

1,2-Propanediol
https://www.cdc.gov/niosh-rtecs/TY1E8480.html

13. EU Food Improvement Agents

PROPANE-1,2-DIOL
https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32012R0231

14. Wikipedia

propylene glycol
https://en.wikipedia.org/wiki/Propylene_glycol

15. Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

Propylene glycol
https://haz-map.com/Agents/685

Haz-Map Classification
https://haz-map.com/

16. CDC-ATSDR Toxic Substances Portal

Propylene Glycol
https://wwwn.cdc.gov/TSP/substances/ToxSubstance.aspx?toxid=240

17. ChEBI

Propane-1,2-diol
http://www.ebi.ac.uk/chebi/searchId.do?chebiId=CHEBI:16997

ChEBI Ontology
http://www.ebi.ac.uk/chebi/userManualForward.do#ChEBI%20Ontology

18. E. coli Metabolome Database (ECMDB)

https://ecmdb.ca/compounds/M2MDB000426

19. LOTUS - the natural products occurrence database

LOTUS Tree
https://lotus.naturalproducts.net/

20. ClinicalTrials.gov

https://clinicaltrials.gov/

21. Comparative Toxicogenomics Database (CTD)

https://ctdbase.org/detail.go?type=chem&acc=D019946

22. Consumer Product Information Database (CPID)

Propylene glycol
https://www.whatsinproducts.com/chemicals/view/1/47/000057-55-6

Consumer Products Category Classification
https://www.whatsinproducts.com/

23. EPA Chemical and Products Database (CPDat)

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

https://comptox.epa.gov/dashboard/DTXSID0021206#exposure

EPA CPDat Classification
https://www.epa.gov/chemical-research/chemical-and-products-database-cpdat

24. EPA Pesticide Ecotoxicity Database

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

https://ecotox.ipmcenters.org/

25. EPA Regional Screening Levels for Chemical Contaminants at Superfund Sites

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

Propylene Glycol
https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

Propylene Glycol
https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search?tool=rml

26. EPA Safer Choice

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

1,2-Propanediol
https://www.epa.gov/saferchoice/safer-ingredients

EPA Safer Chemical Ingredients Classification
https://www.epa.gov/saferchoice

27. Joint FAO/WHO Expert Committee on Food Additives (JECFA)

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1,2-DIHYDROXYPROPANE
https://apps.who.int/food-additives-contaminants-jecfa-database/Home/Chemical/786

28. NORMAN Suspect List Exchange

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NORMAN Suspect List Exchange Classification
https://www.norman-network.com/nds/SLE/

29. USGS Columbia Environmental Research Center

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https://www.usgs.gov/foia

PROPYLENE GLYCOL
https://www.cerc.usgs.gov/data/acute/qrychemdesc.asp?Chemical=P0520

30. EU Clinical Trials Register
https://www.clinicaltrialsregister.eu/

31. FDA Center for Food Safety and Applied Nutrition (CFSAN)

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https://www.fda.gov/about-fda/about-website/website-policies#linking

Propylene glycol
https://www.fda.gov/food/food-additives-petitions/food-additive-status-list

PROPYLENE GLYCOL
https://www.cfsanappsexternal.fda.gov/scripts/fdcc/index.cfm?set=IndirectAdditives&id=PROPYLENEGLYCOL

PROPYLENE GLYCOL
https://www.cfsanappsexternal.fda.gov/scripts/fdcc/index.cfm?set=FoodSubstances&id=PROPYLENEGLYCOL

32. Flavor and Extract Manufacturers Association (FEMA)

PROPYLENE GLYCOL
https://www.femaflavor.org/flavor-library/propylene-glycol

33. MassBank Europe

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https://github.com/MassBank/MassBank-web/blob/master/LICENSE

1,2-PROPANEDIOL
https://massbank.eu/MassBank/Result.jsp?inchikey=DNIAPMSPPWPWGF-UHFFFAOYSA-N

34. MassBank of North America (MoNA)

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https://mona.fiehnlab.ucdavis.edu/documentation/license

1,2-PROPANEDIOL
https://mona.fiehnlab.ucdavis.edu/spectra/browse?query=compound.metaData%3Dq%3D%27name%3D%3D%22InChIKey%22%20and%20value%3D%3D%22DNIAPMSPPWPWGF-UHFFFAOYSA-N%22%27

35. NIST Mass Spectrometry Data Center

LICENSE
https://www.nist.gov/srd/public-law

Propylene Glycol

http://www.nist.gov/srd/nist1a.cfm

36. **SpectraBase**

1,2-PROPANEDIOL
https://spectrabase.com/spectrum/65kx7QCjpGO

1,2-PROPANEDIOL
https://spectrabase.com/spectrum/ueSEz4Ob8A

1,2-Propanediol
https://spectrabase.com/spectrum/79iiYJ06ezM

1,2-Propanediol
https://spectrabase.com/spectrum/3rtAC6kIDfC

1,2-Propanediol
https://spectrabase.com/spectrum/4P0jceTzv0r

1,2-Propanediol
https://spectrabase.com/spectrum/8qEvT3T9y71

1,2-Propanediol
https://spectrabase.com/spectrum/ELiPLks3bkq

1,2-Propanediol; Propylene glycol
https://spectrabase.com/spectrum/5ch5mgYQgLf

1,2-Propanediol
https://spectrabase.com/spectrum/sSQByNqTqy

1,2-Propanediol
https://spectrabase.com/spectrum/4rcoamafpRV

1,2-Propanediol
https://spectrabase.com/spectrum/EMXvXmRigWU

1,2-Propanediol
https://spectrabase.com/spectrum/BAE3SnLC0GX

1,2-Propanediol
https://spectrabase.com/spectrum/8R9uBOhRXJv

1,2-Propanediol
https://spectrabase.com/spectrum/B5ll9c02qhh

1,2-Propanediol
https://spectrabase.com/spectrum/3EdE8fgq1E8

Poly(propylene glycol), average mn ca. 425
https://spectrabase.com/spectrum/DFibwx0teMb

37. **National Drug Code (NDC) Directory**

CENTELLA ASIATICA
https://www.fda.gov/drugs/drug-approvals-and-databases/national-drug-code-directory

38. **NIOSH Manual of Analytical Methods**

57-55-6
https://www.cdc.gov/niosh/docs/2003-154/pdfs/5523.pdf

39. **NIPH Clinical Trials Search of Japan**
https://rctportal.niph.go.jp/en/

40. **Rhea - Annotated Reactions Database**

https://www.rhea-db.org/rhea?query=CHEBI:16997

41. **Springer Nature**

42. **Thieme Chemistry**

43. **Wikidata**

Propylene_glycol
https://www.wikidata.org/wiki/Q161495

44. **Wiley**
https://pubchem.ncbi.nlm.nih.gov/substance/?source=wiley&sourceid=136706

45. **Medical Subject Headings (MeSH)**

Propylene Glycol
https://www.ncbi.nlm.nih.gov/mesh/68019946

MeSH Tree
http://www.nlm.nih.gov/mesh/meshhome.html

Solvents
https://www.ncbi.nlm.nih.gov/mesh/68012997

Pharmaceutical Vehicles

https://www.ncbi.nlm.nih.gov/mesh/68014677

46. **PubChem**
https://pubchem.ncbi.nlm.nih.gov

47. **KEGG**

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https://www.kegg.jp/kegg/legal.html

Therapeutic category of drugs in Japan
http://www.genome.jp/kegg-bin/get_htext?br08301.keg

Drugs listed in the Japanese Pharmacopoeia
http://www.genome.jp/kegg-bin/get_htext?br08311.keg

Animal drugs in Japan
http://www.genome.jp/kegg-bin/get_htext?br08331.keg

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http://www.ebi.ac.uk/Information/termsofuse.html

ChEMBL Protein Target Tree
https://www.ebi.ac.uk/chembl/g/#browse/targets

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https://ncit.nci.nih.gov

50. **PATENTSCOPE (WIPO)**

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https://pubchem.ncbi.nlm.nih.gov/substance/403029368

51. **NCBI**
https://www.ncbi.nlm.nih.gov/projects/linkout