2,5,8,11-Tetraoxadodecane

Other names:	(CH3O(CH2)2OCH2)2
	1,2-Bis(2-methoxyethoxy)ethane
	1,2-Bis(methoxyethoxy)ethane
	Ansul Ether 161
	Dimethyl ether of triethylene glycol
	Ethane, 1,2-bis(2-methoxyethoxy)-
	Glyme 4
	Glyme-3
	NSC 66400
	Triethylene glycol dimethyl ether
	Triglyme
	methyltriglyme
	triethylene glycol, dimethyl ether
	triglyme (triethylene glycol dimethyl ether)
Inchi:	InChI=1S/C8H18O4/c1-9-3-5-11-7-8-12-6-4-10-2/h3-8H2,1-2H3
InchiKey:	YFNKIDBQEZZDLK-UHFFFAOYSA-N
Formula:	C8H18O4
SMILES:	COCCOCCOCCOC
Mol. weight [g/mol]:	178.23
CAS:	112-49-2

Physical Properties

Property code	Value	Unit	Source
affp	946.60	kJ/mol	NIST Webbook
basg	892.40	kJ/mol	NIST Webbook
gf	-403.52	kJ/mol	Joback Method
hf	-737.33	kJ/mol	Joback Method
hfus	21.23	kJ/mol	Joback Method
hvap	63.70 ± 3.30	kJ/mol	NIST Webbook
ie	9.80	eV	NIST Webbook
log10ws	0.48		Crippen Method
logp	0.312		Crippen Method
mcvol	147.060	ml/mol	McGowan Method
pc	2370.28	kPa	Joback Method
rinpol	1232.00		NIST Webbook
rinpol	1232.30		NIST Webbook
rinpol	208.42		NIST Webbook

rinpol	205.88		NIST Webbook
rinpol	1232.00		NIST Webbook
rinpol	205.88		NIST Webbook
rinpol	1232.30		NIST Webbook
sl	492.90	J/mol×K	NIST Webbook
tb	489.15	K	NIST Webbook
tb	489.20	K	NIST Webbook
tb	489.00 ± 2.00	K	NIST Webbook
tb	489.00	K	NIST Webbook
tc	636.37	K	Joback Method
tf	228.00	K	NIST Webbook
tf	228.15	K	NIST Webbook
tt	229.30 ± 0.20	K	NIST Webbook
vc	0.555	m3/kmol	Joback Method

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	367.85	J/mol×K	554.25	Joback Method
cpg	379.27	J/mol×K	581.62	Joback Method
cpg	356.14	J/mol×K	526.87	Joback Method
cpg	344.16	J/mol×K	499.50	Joback Method
cpg	331.93	J/mol×K	472.12	Joback Method
cpg	401.19	J/mol×K	636.37	Joback Method
cpg	390.39	J/mol×K	609.00	Joback Method
cpl	375.00	J/mol×K	338.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
cpl	379.00	J/mol×K	343.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K

cpl	373.00	J/mol×K	333.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
cpl	382.00	J/mol×K	353.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
cpl	367.78	J/mol×K	298.15	NIST Webbook
cpl	368.20	J/mol×K	298.15	NIST Webbook
cpl	359.00	J/mol×K	303.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
cpl	370.00	J/mol×K	323.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
cpl	368.00	J/mol×K	318.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K

cpl	366.00	J/mol×K	313.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
cpl	364.00	J/mol×K	308.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
cpl	381.00	J/mol×K	348.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
cpl	371.00	J/mol×K	328.15	Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K
dvisc	0.0027500	Pa×s	283.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0012500	Pa×s	323.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0017800	Pa×s	303.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0009360	Pa×s	343.15	Density, viscosity and solubility of carbon dioxide in glymes

dvisc	0.0008210	Pa×s	353.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0007260	Pa×s	363.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0017700	Pa×s	303.15	Densities, Viscosities and Derived Functions of Binary Mixtures: (Triethylene Glycol Dimethyl Ether + Water) and (N-acetylmorpholine+ Water) from 298.15 to 343.15 K
dvisc	0.0014800	Pa×s	313.15	Densities, Viscosities and Derived Functions of Binary Mixtures: (Triethylene Glycol Dimethyl Ether + Water) and (N-acetylmorpholine+ Water) from 298.15 to 343.15 K
dvisc	0.0012600	Pa×s	323.15	Densities, Viscosities and Derived Functions of Binary Mixtures: (Triethylene Glycol Dimethyl Ether + Water) and (N-acetylmorpholine+ Water) from 298.15 to 343.15 K
dvisc	0.0010800	Pa×s	333.15	Densities, Viscosities and Derived Functions of Binary Mixtures: (Triethylene Glycol Dimethyl Ether + Water) and (N-acetylmorpholine+ Water) from 298.15 to 343.15 K

dvisc	0.0009450	Pa×s	343.15	Densities, Viscosities and Derived Functions of Binary Mixtures: (Triethylene Glycol Dimethyl Ether + Water) and (N-acetylmorpholine+ Water) from 298.15 to 343.15 K
dvisc	0.0019600	Pa×s	298.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0021900	Pa×s	293.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0035600	Pa×s	273.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0024500	Pa×s	288.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0031000	Pa×s	278.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0014800	Pa×s	313.15	Density, viscosity and solubility of carbon dioxide in glymes
dvisc	0.0010800	Pa×s	333.15	Density, viscosity and solubility of carbon dioxide in glymes
hfust	23.71	kJ/mol	229.30	NIST Webbook
hfust	23.71	kJ/mol	229.30	NIST Webbook
hfust	23.71	kJ/mol	229.30	NIST Webbook
rfi	1.41250		318.15	Liquid Densities and Refractive Indices of Binary Mixtures for the Dimethyl Ether of a Glycol + Ethanol from T=288.15 K to 318.15 K

rfi	1.42090		298.15	Liquid Densities and Refractive Indices of Binary Mixtures for the Dimethyl Ether of a Glycol + Ethanol from T=288.15 K to 318.15 K
rfi	1.41670		308.15	Liquid Densities and Refractive Indices of Binary Mixtures for the Dimethyl Ether of a Glycol + Ethanol from T=288.15 K to 318.15 K
rfi	1.42500		288.15	Liquid Densities and Refractive Indices of Binary Mixtures for the Dimethyl Ether of a Glycol + Ethanol from T=288.15 K to 318.15 K
rhol	976.70	kg/m3	303.15	Thermophysical properties of glycols and glymes
rhol	971.90	kg/m3	308.15	Thermophysical properties of glycols and glymes
rhol	967.20	kg/m3	313.15	Thermophysical properties of glycols and glymes
rhol	962.40	kg/m3	318.15	Thermophysical properties of glycols and glymes
rhol	957.70	kg/m3	323.15	Thermophysical properties of glycols and glymes
rhol	952.90	kg/m3	328.15	Thermophysical properties of glycols and glymes
rhol	948.10	kg/m3	333.15	Thermophysical properties of glycols and glymes
rhol	943.30	kg/m3	338.15	Thermophysical properties of glycols and glymes

rhol	938.60	kg/m3	343.15	Thermophysical properties of glycols and glymes
rhol	933.80	kg/m3	348.15	Thermophysical properties of glycols and glymes
rhol	929.00	kg/m3	353.15	Thermophysical properties of glycols and glymes
rhol	924.20	kg/m3	358.15	Thermophysical properties of glycols and glymes
rhol	919.40	kg/m3	363.15	Thermophysical properties of glycols and glymes
rhol	914.50	kg/m3	368.15	Thermophysical properties of glycols and glymes
rhol	909.70	kg/m3	373.15	Thermophysical properties of glycols and glymes
rhol	994.10	kg/m3	283.15	Thermophysical properties of glycols and glymes
rhol	989.40	kg/m3	288.15	Thermophysical properties of glycols and glymes
rhol	984.60	kg/m3	293.15	Thermophysical properties of glycols and glymes
rhol	979.90	kg/m3	298.15	Thermophysical properties of glycols and glymes
rhol	986.00	kg/m3	293.15	Thermophysical properties of glycols and glymes
rhol	970.40	kg/m3	308.15	Thermophysical properties of glycols and glymes
rhol	965.60	kg/m3	313.15	Thermophysical properties of glycols and glymes
rhol	956.10	kg/m3	323.15	Thermophysical properties of glycols and glymes

rhol	946.50	kg/m3	333.15	Thermophysical properties of glycols and glymes
rhol	936.90	kg/m3	343.15	Thermophysical properties of glycols and glymes
rhol	980.62	kg/m3	298.15	Thermodynamics of Mixtures Containing Ethers. Part III. Liquid-Liquid Equilibria for 2,5,8,11-Tetraoxadodecane or 2,5,8,11,14-Pentaoxapentadecane + Selected N-Alkanes
rhol	980.42	kg/m3	298.15	Liquid-Liquid Equilibrium of Ternary Mixtures Formed by Some Oligooxaethylenes with Ethanol and Hexadecane
rhol	981.50	kg/m3	298.15	Thermophysical properties of glycols and glymes
rhol	975.10	kg/m3	303.15	Thermophysical properties of glycols and glymes
rhol	990.80	kg/m3	288.15	Thermophysical properties of glycols and glymes
sfust	103.40	J/mol×K	229.30	NIST Webbook
srf	0.03	N/m	318.15	Volumetric and Surface Properties of Aqueous Mixtures of Polyethers at T = (298.15, 308.15, and 318.15) K
srf	0.03	N/m	308.15	Volumetric and Surface Properties of Aqueous Mixtures of Polyethers at T = (298.15, 308.15, and 318.15) K

srf	0.03	N/m	298.15	Volumetric and Surface Properties of Aqueous Mixtures of Polyethers at T = (298.15, 308.15, and 318.15) K
tcondl	0.13	W/m×K	362.39	Thermal Conductivity Measurement of Polyglycol Alkyl Ethers at Temperatures from (303.15 to 393.15) K
tcondl	0.14	W/m×K	302.75	Thermal Conductivity Measurement of Polyglycol Alkyl Ethers at Temperatures from (303.15 to 393.15) K
tcondl	0.12	W/m×K	392.16	Thermal Conductivity Measurement of Polyglycol Alkyl Ethers at Temperatures from (303.15 to 393.15) K
tcondl	0.14	W/m×K	332.54	Thermal Conductivity Measurement of Polyglycol Alkyl Ethers at Temperatures from (303.15 to 393.15) K

Pressure Dependent Properties

Property code	Value	Unit	Pressure [kPa]	Source
tbrp	376.70	K	1.30	NIST Webbook
tbrp	376.60	K	1.30	NIST Webbook

Correlations

Information	Value

Property code	pvap
Equation	ln(Pvp) = A + B/(T + C)
Coeff. A	1.57644e+01
Coeff. B	-4.62697e+03
Coeff. C	-7.40300e+01
Temperature range (K), min.	372.99
Temperature range (K), max.	516.68

Datasets

Speed of sound, m/s

Temperature, K - Liquid	Pressure, kPa - Liquid	Speed of sound, m/s - Liquid
293.15	100.00	1361.9
293.15	10000.00	1403.1
293.15	20000.00	1442.5
293.15	30000.00	1479.3
293.15	40000.00	1514.7
293.15	50000.00	1547.8
293.15	60000.00	1579.5
293.15	70000.00	1610.0
293.15	80000.00	1639.3
293.15	90000.00	1667.4
293.15	100000.00	1694.6
303.15	100.00	1323.2
303.15	10000.00	1366.5
303.15	20000.00	1407.2
303.15	30000.00	1445.2
303.15	40000.00	1481.6
303.15	50000.00	1515.7
303.15	60000.00	1548.2
303.15	70000.00	1579.4
303.15	80000.00	1609.3
303.15	90000.00	1638.2
303.15	100000.00	1665.9
313.15	100.00	1285.1
313.15	10000.00	1330.0
313.15	20000.00	1372.2
313.15	30000.00	1411.8

313.15	40000.00	1448.8
313.15	50000.00	1484.1
313.15	60000.00	1517.5
313.15	70000.00	1549.7
313.15	80000.00	1580.3
313.15	90000.00	1609.9
313.15	100000.00	1638.1
323.15	100.00	1247.7
323.15	10000.00	1294.6
323.15	20000.00	1338.5
323.15	30000.00	1379.1
323.15	40000.00	1417.3
323.15	50000.00	1453.6
323.15	60000.00	1487.9
323.15	70000.00	1520.7
323.15	80000.00	1552.0
323.15	90000.00	1581.9
323.15	100000.00	1610.8
333.15	100.00	1210.9
333.15	10000.00	1259.5
333.15	20000.00	1304.8
333.15	30000.00	1346.9
333.15	40000.00	1386.3
333.15	50000.00	1423.4
333.15	60000.00	1458.8
333.15	70000.00	1492.1
333.15	80000.00	1524.3
333.15	90000.00	1554.8
333.15	100000.00	1584.3
343.15	100.00	1174.6
343.15	10000.00	1225.1
343.15	20000.00	1272.0
343.15	30000.00	1315.6
343.15	40000.00	1356.2
343.15	50000.00	1394.1
343.15	60000.00	1430.3
343.15	70000.00	1464.6
343.15	80000.00	1497.2
343.15	90000.00	1528.4
343.15	100000.00	1558.5
353.15	100.00	1138.7
353.15	10000.00	1191.5
353.15	20000.00	1240.0
353.15	30000.00	1284.6

353.15	40000.00	1326.2
353.15	50000.00	1365.6
353.15	60000.00	1402.4
353.15	70000.00	1437.6
353.15	80000.00	1470.9
353.15	90000.00	1502.6
353.15	100000.00	1533.4

Reference *https://www.doi.org/10.1021/je034036t*

Viscosity, Pa*s

Temperature, K - Liquid	Pressure, kPa - Liquid	Viscosity, Pa*s - Liquid
293.15	100.00	0.0021350
293.15	20000.00	0.0025360
293.15	40000.00	0.0029700
293.15	60000.00	0.0034340
293.15	80000.00	0.0039260
293.15	100000.00	0.0044380
313.15	100.00	0.0014890
313.15	20000.00	0.0017550
313.15	40000.00	0.0020440
313.15	60000.00	0.0023550
313.15	80000.00	0.0026870
313.15	100000.00	0.0030400
333.15	100.00	0.0011200
333.15	20000.00	0.0013080
333.15	40000.00	0.0015010
333.15	60000.00	0.0016950
333.15	80000.00	0.0018890
333.15	100000.00	0.0020820
353.15	100.00	0.0008470
353.15	20000.00	0.0009880
353.15	40000.00	0.0011380
353.15	60000.00	0.0012960
353.15	80000.00	0.0014630
353.15	100000.00	0.0016390

Reference *https://www.doi.org/10.1016/j.fluid.2006.06.015*

Sources

Thermophysical properties of glycols and glymes:	https://www.doi.org/10.1021/acs.jced.5b00662
Thermodynamics of Mixtures Containing Ethers. Part III. Liquid-Liquid Equilibria for 2,5,8,11-Tetraoxadodecane or 2,5,8,11,14-Pentaoxapentadecane + Selected N-Alkanes:	https://www.doi.org/10.1021/je049903o
Isothermal Vapor-Liquid Equilibrium of the Absorption Working Pairs (HFC-32 + DMETrEG, HFC-32 + NMP) at Temperatures from 293.15 to 343.15 K:	https://www.doi.org/10.1021/acs.jced.9b00117
Crippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
The Yaws Handbook of Vapor Pressure:	https://www.sciencedirect.com/book/9780128029992/the-yaws-handbook-of-vapor-pressure
NIST Webbook:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C112492&Units=SI
Measurement and Correlation of Isothermal Vapor Liquid Equilibrium of Fluoroethane + Dimethyl Ether Triethylene Glycol, 1,1-Difluoroethane + Dimethyl Ether Triethylene Glycol, and 1,1-Difluoroethane + N-Methyl-2-pyrrolidone Systems:	https://www.doi.org/10.1021/acs.jced.5b00782
Thermal Conductivity Measurement of Polyglycol Alkyl Ethers at Temperatures from (303.15 to 393.15) K:	https://www.doi.org/10.1021/je900641w
P-rho-T-x Measurements for (1,1,1,2-Tetrafluoroethane + Triethylene Glycol Dimethyl Ether) at High Haloalkane Content:	https://www.doi.org/10.1021/je050503q
Isothermal Vapor-Liquid Equilibrium of HFC-161 + DMETrEG within the Temperature Range of 293.15-353.15 K and Comparison for HFC-161 Combined with Different Absorbents:	https://www.doi.org/10.1021/acs.jced.5b00951
Volumetric and Surface Properties of Aqueous Mixtures of Polyethers at T = (298.15, 308.15, and 318.15) K:	https://www.doi.org/10.1021/je100757w
Liquid-Liquid Equilibrium of Ternary Mixtures Formed by Some Oligooxaethylenes with Ethanol and Hexadecane:	https://www.doi.org/10.1021/je800503d
Solubility Study of Methane and Ethane in Promising Physical Solvents for Natural Gas Sweetening Operations:	https://www.doi.org/10.1021/je050172h
Molar Heat Capacity of Aqueous Sulfolane, 4-Formylmorpholine, 1-Methyl-2-pyrrolidinone, and Triethylene Glycol Dimethyl Ether Solutions from (303.15 to 353.15) K:	https://www.doi.org/10.1021/je800999s
Densities, Viscosities, and Derived Functions of Binary Mixtures: (Triethylene Glycol Dimethyl Ether + Water) and (N-acetylmorpholine+ Water) from 298.15 to 343.15 K:	https://www.doi.org/10.1021/je050021e
Crippen Method:	https://www.chemeo.com/doc/models/crippen_log10ws
Solubilities of Nonpolar Gases in Triethylene Glycol Dimethyl Ether, Tetraethylene Glycol Dimethyl Ether, Dimethyl Carbonate, and Diethyl Carbonate at 298.15 K and 101.33 kPa Partial Pressure of Gas:	https://www.doi.org/10.1021/je020199q
Liquid Densities and Refractive Indices of Binary Mixtures for the Dimethyl Ether + Glycol Ethers from (283.15 to 318.15) K:	https://www.doi.org/10.1021/je0302304
p-T-x Measurements for Some Working Fluids for an Absorption Heat Transformer: 1,1,1,2-Tetrafluoroethane (R134a) + Dimethylether Diethylene Glycol (DMEDEG) and Dimethylether Triethylene Glycol (DMETrEG):	https://www.doi.org/10.1021/je9009915
Density, viscosity, and solubility of carbon dioxide in glymes:	https://www.doi.org/10.1016/j.fluid.2010.08.014
Isothermal Vapor-Liquid Equilibria of the Absorption Working Pairs (R1234yf + NMP, R1234yf + DMETrEG) at Temperatures from 283.15 K to 353.15 K:	https://www.doi.org/10.1021/acs.jced.7b00821
High-pressure viscosity behavior of x 1,1,1,2-tetrafluoroethane (HFC-134a) + (1 - x) triethylene glycol dimethylether (TriEGDME) mixtures: Measurements and modeling:	https://www.doi.org/10.1016/j.fluid.2006.06.015
Bubble pressure measurements for the (1,1,1,2-tetrafluoroethane + triethylene glycol dimethyl ether) system:	https://www.doi.org/10.1016/j.jct.2006.03.004
Thermophysical properties of two PAG-derivative lubricants from high pressure acoustic measurements:	https://www.doi.org/10.1021/je034036t
McGowan Method:	http://link.springer.com/article/10.1007/BF02311772
Joback Method:	https://en.wikipedia.org/wiki/Joback_method

Legend

affp:	Proton affinity
basg:	Gas basicity
cpg:	Ideal gas heat capacity
cpl:	Liquid phase heat capacity
dvisc:	Dynamic viscosity
gf:	Standard Gibbs free energy of formation
hf:	Enthalpy of formation at standard conditions
hfus:	Enthalpy of fusion at standard conditions

hfust:	Enthalpy of fusion at a given temperature
hvap:	Enthalpy of vaporization at standard conditions
ie:	Ionization energy
log10ws:	Log10 of Water solubility in mol/l
logp:	Octanol/Water partition coefficient
mcvol:	McGowan's characteristic volume
pc:	Critical Pressure
pvap:	Vapor pressure
rfi:	Refractive Index
rhol:	Liquid Density
rinpol:	Non-polar retention indices
sfust:	Entropy of fusion at a given temperature
sl:	Liquid phase molar entropy at standard conditions
speedsl:	Speed of sound in fluid
srf:	Surface Tension
tb:	Normal Boiling Point Temperature
tbrp:	Boiling point at reduced pressure
tc:	Critical Temperature
tcondl:	Liquid thermal conductivity
tf:	Normal melting (fusion) point
tt:	Triple Point Temperature
vc:	Critical Volume