Maleic acid

Other names:	(Z)-2-Butenedioic acid
	(Z)-Butenedioic acid
	1,2-Ethylenedicarboxylic acid, (Z)
	1,2-Ethylenedicarboxylic acid, cis-
	2-Butenedioic acid (2Z)-
	2-Butenedioic acid (Z)-
	2-butenedioic acid (Z)
	Butenedioic acid,(Z)-
	CIS-1,2-ETHYLENEDICARBOXYL ACID
	CIS-BUTENEDIOIC ACID
	Kyselina maleinova
	Maleinic acid
	Malenic acid
	Toxilic acid
	cis-1,2-Ethylenedicarboxylic acid
	cis-1,4-butenedioic acid
	cis-2-butenedioic acid
Inchi:	InChI=1S/C4H4O4/c5-3(6)1-2-4(7)8/h1-2H,(H,5,6)(H,7,8)/b2-1-
InchiKey:	VZCYOOQTPOCHFL-UPHRSURJSA-N
Formula:	C4H4O4
SMILES:	O=C(O)C=CC(=O)O
Mol. weight [g/mol]:	116.07
CAS:	110-16-7

Physical Properties

Property code	Value	Unit	Source
chs	-1356.20	kJ/mol	NIST Webbook
chs	-1358.00	kJ/mol	NIST Webbook
chs	-1355.20 ± 0.67	kJ/mol	NIST Webbook
gf	-468.46	kJ/mol	Joback Method
hf	-538.29	kJ/mol	Joback Method
hfl	-787.30 ± 1.70	kJ/mol	NIST Webbook
hfs	-790.57 ± 0.71	kJ/mol	NIST Webbook
hfs	-787.76	kJ/mol	NIST Webbook
hfs	-789.52	kJ/mol	NIST Webbook

hfus	27.28	kJ/mol	Thermal analysis of phase change materials in the temperature range 120.150 .C
hvap	71.31	kJ/mol	Joback Method
log10ws	0.45		Crippen Method
logp	-0.288		Crippen Method
mcvol	77.800	ml/mol	McGowan Method
nfpaf	%!d(float64=1)		KDB
nfpah	%!d(float64=3)		KDB
nfpas	%!d(float64=1)		KDB
pc	6503.64	kPa	Joback Method
ss	159.40	J/mol×K	NIST Webbook
tb	587.18	K	Joback Method
tc	616.00 ± 50.00	K	NIST Webbook
tf	403.80 ± 0.50	K	NIST Webbook
tf	416.65 ± 0.50	K	NIST Webbook
tf	405.00 ± 2.00	K	NIST Webbook
tf	403.40 ± 0.60	K	NIST Webbook
tf	402.90 ± 0.60	K	NIST Webbook
vc	0.289	m3/kmol	Joback Method

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	168.01	J/mol×K	587.18	Joback Method
cpg	172.46	J/mol×K	617.62	Joback Method
cpg	176.64	J/mol×K	648.06	Joback Method
cpg	180.57	J/mol×K	678.50	Joback Method
cpg	184.27	J/mol×K	708.94	Joback Method
cpg	187.74	J/mol×K	739.38	Joback Method
cpg	191.01	J/mol×K	769.82	Joback Method
cps	135.60	J/mol×K	294.40	NIST Webbook
dvisc	0.0000492	Pa×s	587.18	Joback Method
dvisc	0.0025249	Pa×s	390.58	Joback Method
dvisc	0.0094225	Pa×s	351.26	Joback Method
dvisc	0.0003515	Pa×s	469.22	Joback Method
dvisc	0.0001649	Pa×s	508.54	Joback Method
dvisc	0.0000862	Pa×s	547.86	Joback Method
dvisc	0.0008609	Pa×s	429.90	Joback Method
hfust	26.90	kJ/mol	411.90	NIST Webbook
hsubt	105.40 ± 1.70	kJ/mol	368.50	NIST Webbook

hsubt	110.00 ± 2.50	kJ/mol	362.00	NIST Webbook
hsubt	110.00 ± 3.00	kJ/mol	363.00	NIST Webbook
hsubt	109.00 ± 4.20	kJ/mol	363.50	NIST Webbook

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/T + C*ln(T) + D*T^2
Coeff. A	1.80781e+02
Coeff. B	-1.91037e+04
Coeff. C	-2.28200e+01
Coeff. D	7.02669e-06
Temperature range (K), min.	403.45
Temperature range (K), max.	773.00

Sources

Crippen Method:	https://www.chemeo.com/doc/models/crippen_log10ws
Surface Tensions and Densities of Oxalic, Malonic, Succinic, Maleic, Malic, and cis-Fumaric Acids:	https://www.doi.org/10.1021/je050366x
McGowan Method:	http://link.springer.com/article/10.1007/BF02311772
Ultrasonic Velocity and Density Studies of Solutions of Maleic Acid and Tartaric Acid in Water at T = (298.15 and 308.15) K:	https://www.doi.org/10.1007/s10765-010-0736-6
Thermal analysis of phase change materials in the temperature range 120-150 °C:	https://www.doi.org/10.1016/j.tca.2010.11.011
Joback Method:	https://en.wikipedia.org/wiki/Joback_method
Solubility of Maleic Acid in Supercritical Carbon Dioxide:	https://www.doi.org/10.1021/je9008393
KDB Vapor Pressure Data:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=962
Crippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
KDB:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=962
Measurement and correlation of the solubility of maleic acid in acetone-ethyl acetate mixtures:	https://www.doi.org/10.1016/j.tca.2012.03.023
NIST Webbook:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C110167&Units=SI
The solubility of maleic acid in various inorganic salts and organic solvents:	https://www.doi.org/10.1016/j.fluid.2017.07.012
Thermodynamics model and parameters:	https://www.doi.org/10.1021/acs.jced.7b00562
Extraction of Citric Acid and Maleic Acid from Their Aqueous Solutions Using a Phosphorus-Bonded Extractant, Tri-n-octylphosphineoxide, and a Secondary Amine, Dioctylamine:	

Legend

chs:	Standard solid enthalpy of combustion
cpg:	Ideal gas heat capacity
cps:	Solid phase heat capacity
dvisc:	Dynamic viscosity
gf:	Standard Gibbs free energy of formation
hf:	Enthalpy of formation at standard conditions
hfl:	Liquid phase enthalpy of formation at standard conditions
hfs:	Solid phase enthalpy of formation at standard conditions
hfus:	Enthalpy of fusion at standard conditions
hfust:	Enthalpy of fusion at a given temperature
hsubt:	Enthalpy of sublimation at a given temperature
hvap:	Enthalpy of vaporization at standard conditions
log10ws:	Log10 of Water solubility in mol/l
logp:	Octanol/Water partition coefficient
mcvol:	McGowan's characteristic volume
nfpaf:	NFPA Fire Rating
nfpah:	NFPA Health Rating
nfpas:	NFPA Safety Rating
pc:	Critical Pressure
pvap:	Vapor pressure
ss:	Solid phase molar entropy at standard conditions
tb:	Normal Boiling Point Temperature
tc:	Critical Temperature
tf:	Normal melting (fusion) point
vc:	Critical Volume

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https://www.chemeo.com/cid/59-992-6/Maleic-acid.pdf

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