Ethane, 1,1,2,2-tetrafluoro-

Other names:	1,1,2,2-Tetrafluoroethane
	CHF2CHF2
	Freon 134
	R 134
	R-134
Inchi:	InChI=1S/C2H2F4/c3-1(4)2(5)6/h1-2H
InchiKey:	WXGNWUVNYMJENI-UHFFFAOYSA-N
Formula:	C2H2F4
SMILES:	FC(F)C(F)F
Mol. weight [g/mol]:	102.03
CAS:	359-35-3

Physical Properties

Property code	Value	Unit	Source
gf	-818.16	kJ/mol	Joback Method
hf	-879.61	kJ/mol	Joback Method
hfus	6.21	kJ/mol	Joback Method
hvap	16.00	kJ/mol	Joback Method
log10ws	-1.29		Crippen Method
logp	1.517		Crippen Method
mcvol	46.120	ml/mol	McGowan Method
pc	4036.37	kPa	Joback Method
rhoc	535.66 ± 3.06	kg/m3	NIST Webbook
rhoc	534.64 ± 8.16	kg/m3	NIST Webbook
rinpol	248.00		NIST Webbook
tb	250.15 ± 0.50	K	NIST Webbook
tb	250.00 ± 4.00	K	NIST Webbook
tb	250.00 ± 3.00	K	NIST Webbook
tb	250.00	K	NIST Webbook
tc	391.80 ± 0.50	K	NIST Webbook
tc	391.74 ± 0.05	K	NIST Webbook
vc	0.207	m3/kmol	Joback Method

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	95.82	J/mol×K	369.88	Joback Method
cpg	92.54	J/mol×K	348.46	Joback Method
cpg	89.14	J/mol×K	327.04	Joback Method
cpg	85.64	J/mol×K	305.62	Joback Method
cpg	82.02	J/mol×K	284.20	Joback Method
cpg	78.28	J/mol×K	262.78	Joback Method
cpg	74.42	J/mol×K	241.36	Joback Method
pvap	155.00	kPa	263.15	Vapor-Liquid Equilibria for 1,1,2,2-Tetrafluoroethane (R134) + Fluoroethane (R161) at Temperatures between (263.15 and 288.15) K
pvap	1065.90	kPa	323.15	Measurements of isothermal (vapour + liquid) equilibrium for the 1,1,2,2-1,1,2,2-tetrafluoroethane (R134) + cis-1,3,3,3-tetrafluoropropene (R1234ze(Z)) system at temperatures from (303.150 to 343.150) K
pvap	817.10	kPa	313.15	Measurements of isothermal (vapour + liquid) equilibrium for the 1,1,2,2-1,1,2,2-tetrafluoroethane (R134) + cis-1,3,3,3-tetrafluoropropene (R1234ze(Z)) system at temperatures from (303.150 to 343.150) K

pvap	613.80	kPa	303.15	Measurements of isothermal (vapour + liquid) equilibrium for the 1,1,2,2-1,1,2,2-tetrafluoroethane (R134) + cis-1,3,3,3-tetrafluoropropene (R1234ze(Z)) system at temperatures from (303.150 to 343.150) K
pvap	1368.50	kPa	333.15	Measurements of isothermal (vapour + liquid) equilibrium for the 1,1,2,2-1,1,2,2-tetrafluoroethane (R134) + cis-1,3,3,3-tetrafluoropropene (R1234ze(Z)) system at temperatures from (303.150 to 343.150) K
pvap	189.00	kPa	268.15	Vapor-Liquid Equilibria for 1,1,2,2-Tetrafluoroethane (R134) + Fluoroethane (R161) at Temperatures between (263.15 and 288.15) K
pvap	276.00	kPa	278.15	Vapor-Liquid Equilibria for 1,1,2,2-Tetrafluoroethane (R134) + Fluoroethane (R161) at Temperatures between (263.15 and 288.15) K
pvap	386.00	kPa	288.15	Vapor-Liquid Equilibria for 1,1,2,2-Tetrafluoroethane (R134) + Fluoroethane (R161) at Temperatures between (263.15 and 288.15) K

pvap	1730.20	kPa	343.15	Measurements of isothermal (vapour + liquid) equilibrium for the 1,1,2,2-1,1,2,2-tetrafluoroethane (R134) + cis-1,3,3,3-tetrafluoropropene (R1234ze(Z)) system at temperatures from (303.150 to 343.150) K
pvap	382.90	kPa	288.15	Measurements of isothermal (vapour + liquid) equilibria data for {1,1,2,2-Tetrafluoroethane (R134) + trans-1,3,3,3-tetrafluoropropene (R1234ze (E))} at T = (258.150 to 288.150) K
pvap	271.30	kPa	278.15	Measurements of isothermal (vapour + liquid) equilibria data for {1,1,2,2-Tetrafluoroethane (R134) + trans-1,3,3,3-tetrafluoropropene (R1234ze (E))} at T = (258.150 to 288.150) K
pvap	323.40	kPa	283.15	Phase equilibrium for the binary azeotropic mixture of trifluoroiodomethane (R13I1) + 1,1,2,2-tetrafluoroethane (R134) at temperatures from 258.150 to 283.150 K
pvap	225.90	kPa	273.15	Phase equilibrium for the binary azeotropic mixture of trifluoroiodomethane (R13I1) + 1,1,2,2-tetrafluoroethane (R134) at temperatures from 258.150 to 283.150 K

pvap	153.00	kPa	263.15	Phase equilibrium for the binary azeotropic mixture of trifluoroiodomethane (R13I1) + 1,1,2,2-tetrafluoroethane (R134) at temperatures from 258.150 to 283.150 K
pvap	124.30	kPa	258.15	Phase equilibrium for the binary azeotropic mixture of trifluoroiodomethane (R13I1) + 1,1,2,2-tetrafluoroethane (R134) at temperatures from 258.150 to 283.150 K

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/(T + C)
Coeff. A	1.47295e+01
Coeff. B	-2.34888e+03
Coeff. C	-1.76940e+01
Temperature range (K), min.	180.34
Temperature range (K), max.	391.80

Sources

Crippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
Crippen Method:	https://www.chemeo.com/doc/models/crippen_log10ws
The investigation on the vapor + liquid equilibrium for the ternary mixture Isobutane (R600a) + 1,1-difluoroethane (R152a) + 1,1,2,2-tetrafluoroethane (R134) at temperatures from 253.150 to 273.150 K:	https://www.doi.org/10.1016/j.fluid.2015.08.020
Phase equilibrium for the binary azeotropic mixture of trifluoroiodomethane (R13I1) + 1,1,2,2-tetrafluoroethane (R134) at temperatures from 258.150 to 283.150 K:	https://www.doi.org/10.1016/j.fluid.2011.11.013
Joback Method:	https://en.wikipedia.org/wiki/Joback_method
Vapour + liquid equilibrium data for the azeotropic {1,1-difluoroethane (R152a) + 1,1,2,2-tetrafluoroethane (R134)} system at various temperatures from (258.150 to 288.150) K:	https://www.doi.org/10.1016/j.jct.2012.03.022
The Yaws Handbook of Vapor Pressure:	https://www.sciencedirect.com/book/9780128029992/the-yaws-handbook-of-vapor-pressure
Solubility Differences of Halocarbon Isomers in Ionic Liquid [emim][Tf2N]:	https://www.doi.org/10.1021/je700295e

Isothermal (vapour + liquid) equilibrium for the binary {1,1,2,2-tetrafluoroethane (R134) + propane (R290)} and {1,1,2,2-tetrafluoroethane (R134) + isobutane (R600a)} systems:	https://www.doi.org/10.1016/j.jct.2010.04.016
(Vapor + liquid) equilibrium measurements and correlation for {1,1,2,2-tetrafluoroethane (R134) + isobutane (R600a)} system:	https://www.doi.org/10.1016/j.jct.2014.06.010
NIST Webbook:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C359353&Units=SI
Measurements of isothermal (vapour + liquid) equilibria data for {1,1,2,2-Tetrafluoroethane (R134) + trans-1,3,3,3-tetrafluoropropene (R1234ze(E))} at T = (258.150 to 288.150) K:	https://www.doi.org/10.1016/j.jct.2012.12.026
Measurements of isothermal (vapour + liquid) equilibrium for the {1,1,2,2-tetrafluoroethane (R134) + cis-1,3,3,3-tetrafluoropropene (R1234ze(Z))} system at temperatures from (303.150 to 343.150) K:	https://www.doi.org/10.1016/j.jct.2017.03.010
Vapor-Liquid Equilibria for 1,1,2,2-Tetrafluoroethane (R134) + Fluoroethane (R161) at Temperatures between (263.15 and 288.15) K:	https://www.doi.org/10.1021/je100143k
McGowan Method:	http://link.springer.com/article/10.1007/BF02311772

Legend

cpg:	Ideal gas heat capacity
gf:	Standard Gibbs free energy of formation
hf:	Enthalpy of formation at standard conditions
hfus:	Enthalpy of fusion at standard conditions
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
pc:	Critical Pressure
pvap:	Vapor pressure
rhoc:	Critical density
rinpol:	Non-polar retention indices
tb:	Normal Boiling Point Temperature
tc:	Critical Temperature
vc:	Critical Volume