Methane, trifluoro-

Other names:	Arcton
	Arcton 1
	CHF3
	FC 23
	FC 23 (fluorocarbon)
	Fluoryl
	Freon 23
	Freon F-23
	Genetron 23
	Genetron HFC23
	HFC 23
	Halocarbon 23
	Propellant 23
	R 23
	R 23 (halocarbon)
	R-23
	REFRIGERANT-23
	Refrigerant 23
	UN 1984
	carbon trifluoride
	fluoroform
	methyl trifluoride
	trifluoromethane
Inchi:	InChI=1S/CHF3/c2-1(3)4/h1H
InchiKey:	XPDWGBQVDMORPB-UHFFFAOYSA-N
Formula:	CHF3
SMILES:	FC(F)F
Mol. weight [g/mol]:	70.01
CAS:	75-46-7

Physical Properties

Property code	Value	Unit	Source
af	0.2600		KDB
affp	619.50	kJ/mol	NIST Webbook
basg	589.70	kJ/mol	NIST Webbook
chg	-71.55 ± 0.71	kJ/mol	NIST Webbook

chg	-516.30	kJ/mol	NIST Webbook
dm	1.60	debye	KDB
gf	-662.80	kJ/mol	KDB
hf	-695.40 ± 2.70	kJ/mol	NIST Webbook
hf	-690.80	kJ/mol	NIST Webbook
hf	-697.50	kJ/mol	KDB
hfus	4.06	kJ/mol	Joback Method
ie	14.80 ± 0.05	eV	NIST Webbook
ie	13.86	eV	NIST Webbook
ie	14.80	eV	NIST Webbook
ie	14.80	eV	NIST Webbook
ie	15.50	eV	NIST Webbook
ie	13.84	eV	NIST Webbook
ie	13.80	eV	NIST Webbook
ie	13.86	eV	NIST Webbook
ie	14.19 ± 0.02	eV	NIST Webbook
ie	13.90	eV	NIST Webbook
logp	1.179		Crippen Method
mcvol	30.260	ml/mol	McGowan Method
pc	4858.00	kPa	KDB
pc	5035.85 ± 10.13	kPa	NIST Webbook
pc	4816.20 ± 2.00	kPa	NIST Webbook
pc	4828.00 ± 25.00	kPa	NIST Webbook
pc	4836.12 ± 6.89	kPa	NIST Webbook
rinpol	202.00		NIST Webbook
rinpol	202.00		NIST Webbook
sl	151.04	J/mol×K	NIST Webbook
tb	189.00 ± 0.50	K	NIST Webbook
tb	191.00	K	KDB
tb	188.70	K	NIST Webbook
tb	191.00 ± 0.05	K	NIST Webbook
tb	189.00 ± 0.30	K	NIST Webbook
tc	299.30	K	KDB
tf	110.20 ± 0.20	K	NIST Webbook
tf	117.97 ± 0.05	K	NIST Webbook
tf	117.97	K	KDB
tf	113.00 ± 0.50	K	NIST Webbook
tt	118.02	K	Solid Liquid Equilibria for the CO2 + R23 and N2O + R23 Systems
tt	117.97 ± 0.02	K	NIST Webbook
vc	0.133	m3/kmol	KDB
zc	0.2596370		KDB

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	45.52	J/mol×K	219.65	Joback Method
cpg	56.14	J/mol×K	327.39	Joback Method
cpg	52.08	J/mol×K	284.29	Joback Method
cpg	49.96	J/mol×K	262.74	Joback Method
cpg	47.77	J/mol×K	241.20	Joback Method
cpg	54.14	J/mol×K	305.84	Joback Method
cpg	58.07	J/mol×K	348.93	Joback Method
cpl	86.44	J/mol×K	190.97	NIST Webbook
hfust	4.06	kJ/mol	118.00	NIST Webbook
hfust	4.06	kJ/mol	117.97	NIST Webbook
hfust	4.06	kJ/mol	118.00	NIST Webbook
hsubt	25.60	kJ/mol	103.50	NIST Webbook
hvapt	18.10	kJ/mol	164.00	NIST Webbook
hvapt	16.71	kJ/mol	190.97	NIST Webbook
hvapt	18.00	kJ/mol	169.00	NIST Webbook
hvapt	16.80	kJ/mol	248.00	NIST Webbook
pvap	62.29	kPa	183.20	Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) p (tetrafluoromethane (R14), trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23)
pvap	4605.00	kPa	297.07	Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3)

pvap	1028.00	kPa	243.76	Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from (188.31 to 243.76) K
pvap	113.55	kPa	193.19	Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) p (tetrafluoromethane (R14), trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23)
pvap	707.03	kPa	233.16	Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) p (tetrafluoromethane (R14), trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23)

pvap	2502.79	kPa	273.25	Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) p (tetrafluoromethane (R14), trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23)
pvap	34.35	kPa	173.86	Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) p (tetrafluoromethane (R14), trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23)
pvap	41.46	kPa	177.11	Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) p (tetrafluoromethane (R14), trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23)

pvap	591.50	kPa	228.50	Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from (188.31 to 243.76) K
pvap	62.33	kPa	183.19	Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) p (tetrafluoromethane (R14), trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23)
pvap	600.35	kPa	228.83	Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) p (tetrafluoromethane (R14), trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23)
pvap	3246.00	kPa	283.15	(Vapour + liquid) equilibria of the {trifluoromethane (HFC-23) + propane} and {trifluoromethane (HFC-23) + n-butane} systems

pvap	3242.00	kPa	283.15	(Vapour + liquid) equilibria of the {trifluoromethane (HFC-23) + propane} and {trifluoromethane (HFC-23) + n-butane} systems
pvap	4158.00	kPa	293.15	(Vapour + liquid) equilibria of the {trifluoromethane (HFC-23) + propane} and {trifluoromethane (HFC-23) + n-butane} systems
pvap	4162.00	kPa	293.15	(Vapour + liquid) equilibria of the {trifluoromethane (HFC-23) + propane} and {trifluoromethane (HFC-23) + n-butane} systems
pvap	2176.00	kPa	267.81	Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3)
pvap	2497.00	kPa	272.86	Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3)
pvap	2881.00	kPa	277.90	Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3)
pvap	3269.00	kPa	282.96	Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3)
pvap	3707.00	kPa	287.99	Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3)

pvap	4084.00	kPa	292.02	Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3)
pvap	4180.00	kPa	293.04	Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3)
pvap	307.80	kPa	212.84	Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from (188.31 to 243.76) K
pvap	4171.70	kPa	293.18	Experimental determination of the critical loci for R-23 + (npropane or n-hexane) and R-116 + n-propane binary mixtures
pvap	4709.30	kPa	298.15	Experimental determination of the critical loci for R-23 + (npropane or n-hexane) and R-116 + n-propane binary mixtures
pvap	85.40	kPa	188.31	Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from (188.31 to 243.76) K
pvap	115.20	kPa	193.28	Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from (188.31 to 243.76) K
pvap	153.30	kPa	198.66	Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from (188.31 to 243.76) K
rhol	1246.00	kg/m3	239.00	KDB

sfust	34.40	J/mol×K	117.97	NIST Webbook
srf	0.01	N/m	200.20	KDB
svapt	87.50	J/mol×K	190.97	NIST Webbook

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/T + C*ln(T) + D*T^2
Coeff. A	7.39171e+01
Coeff. B	-3.58622e+03
Coeff. C	-9.81412e+00
Coeff. D	2.80359e-05
Temperature range (K), min.	117.97
Temperature range (K), max.	299.00

Sources

Isothermal vapour-liquid equilibrium data for binary systems of (CHF3 or C2H6) with (1-hexene or n-heptane):	https://www.doi.org/10.1016/j.jct.2017.12.002
Sorption of trifluoromethane in zeolites and ionic liquid:	https://www.doi.org/10.1016/j.jct.2013.04.018
Solubility of hydrofluorocarbons in aromatic solvents and alcohols:	https://www.doi.org/10.1016/j.fluid.2012.09.013
Experimental Determination and Modeling of Bubble and Dew Points in the System CO2 + CHF3:	https://www.doi.org/10.1021/je800184c
Solid Liquid Equilibria for the CO2 + R23 and N2O + R23 Systems:	https://www.doi.org/10.1007/s10765-008-0511-0
Isothermal vapour-liquid equilibrium data for the binary systems of (CHF3 or C2H6) and n-heptane:	https://www.doi.org/10.1016/j.jct.2016.06.031
Experimental determination of the critical loci for R-23 + (npropane or n-hexane) and R-116 + n-propane binary mixtures:	https://www.doi.org/10.1016/j.jct.2016.12.021
Joback Method:	https://en.wikipedia.org/wiki/Joback_method
McGowan Method:	http://link.springer.com/article/10.1007/BF02311772
Solubility of Hydrofluorocarbons in Halobenzene Solvents:	https://www.doi.org/10.1021/je500525q
KDB Vapor Pressure Data:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1521
KDB:	https://www.cheric.org/files/research/kdb/mol/mol1521.mol
Phase equilibria of the binary systems of fenofibrate and dense gases (carbon dioxide, propane, trifluoromethane):	https://www.doi.org/10.1016/j.fluid.2018.07.018
Grippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
(Vapour + liquid) equilibria of the {trifluoromethane (HFC-23) + propane} and trifluoromethane (HFC-23) + n-butane} systems:	https://www.doi.org/10.1016/j.jct.2009.06.009
Solubility of hydrofluorocarbons in phosphonium based ionic liquids: Experimental and modelling study:	https://www.doi.org/10.1016/j.jct.2014.08.001
Isothermal vapour-liquid equilibrium data for binary systems of (n-hexane + CO2 or CHF3):	https://www.doi.org/10.1016/j.jct.2015.10.009
Chemeo Relay (1.0):	
Solubilities of hydrofluorocarbons in ionic liquids: Experimental and modelling study:	https://www.doi.org/10.1016/j.jct.2013.07.013

Virial Coefficients from Burnett Measurements for the R23 + N2O System:	https://www.doi.org/10.1007/s10765-006-0082-x
Crippen Method:	https://www.chemeo.com/doc/models/crippen_log10ws
Isothermal Vapor-Liquid Equilibrium Data for Binary Systems of CHF3 or C2F6 with Methylcyclohexane or Toluene:	https://www.doi.org/10.1021/acs.jced.8b00123
NIST Webbook:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C75467&Units=SI
PVTx measurements for N2O+CH3F, N2O+CH2F2, and N2O+ CHF3 binary systems:	https://www.doi.org/10.1016/j.fluid.2004.11.021
Solubility of HFCs in lower alcohols:	https://www.doi.org/10.1016/j.fluid.2011.01.003
An Isothermal vapour-liquid equilibrium data for the binary systems of CHF 3 with n- nonane, n-decane, n-undecane and C2F6 with n- nonane and n-decane:	https://www.doi.org/10.1016/j.fluid.2018.02.015
Isothermal vapor-liquid equilibrium data for the trifluoromethane (R23) + 1,1,1,2-tetrafluoroethane (R134a) system at temperatures from 254 to 348 K:	https://www.doi.org/10.1016/j.fluid.2016.02.005
Vapor-Liquid Equilibrium for the trifluoromethane + 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) system:	https://www.doi.org/10.1021/je0602622
Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation of the binary mixtures 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) + trifluoromethane (R23), 1,1,1,2-tetrafluoroethane (R134a) + trifluoromethane (R23), octafluoropropane (R218), nitrogen (R728) and argon (R740)) and ethane (R170) p trifluoromethane (R23):	https://www.doi.org/10.1016/j.fluid.2017.07.002
Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures Ranging from 233.15 to 243.15 K:	https://www.doi.org/10.1021/je0601107
Liquid phase equilibrium in the binary system trifluoromethane + 1-phenyloctane:	https://www.doi.org/10.1016/j.fluid.2010.04.013

Legend

af:	Acentric Factor
affp:	Proton affinity
basg:	Gas basicity
chg:	Standard gas enthalpy of combustion
cpg:	Ideal gas heat capacity
cpl:	Liquid phase heat capacity
dm:	Dipole Moment
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
hsubt:	Enthalpy of sublimation at a given temperature
hvapt:	Enthalpy of vaporization at a given temperature
ie:	Ionization energy
logp:	Octanol/Water partition coefficient
mcvol:	McGowan's characteristic volume
pc:	Critical Pressure
pvap:	Vapor pressure
rhol:	Liquid Density
rinpol:	Non-polar retention indices
sfust:	Entropy of fusion at a given temperature
sl:	Liquid phase molar entropy at standard conditions
srf:	Surface Tension
svapt:	Entropy of vaporization at a given temperature
tb:	Normal Boiling Point Temperature
tc:	Critical Temperature

tf:	Normal melting (fusion) point
tt:	Triple Point Temperature
vc:	Critical Volume
zc:	Critical Compressibility