Cyclobutane, octafluoro-

Other names:	CYCLOOCTAFLUOROBUTANE
	Cyclobutane, 1,1,2,2,3,3,4,4-octafluoro-
	FC-C 318
	FREON 318
	Freon C 318
	Halocarbon C-138
	Octafluorocyclobutane
	PERFLUOROCYCLOBUTANE
	Propellant C 318
	R C318
	RC-318
	UN 1976
	freon C-318
Inchi:	InChI=1S/C4F8/c5-1(6)2(7,8)4(11,12)3(1,9)10
InchiKey:	BCCOBQSFUDVTJQ-UHFFFAOYSA-N
Formula:	C4F8
SMILES:	FC1(F)C(F)(F)C(F)(F)C1(F)F
Mol. weight [g/mol]:	200.03
CAS:	115-25-3

Physical Properties

Property code	Value	Unit	Source
af	0.3560		KDB
ea	0.40 ± 0.30	eV	NIST Webbook
ea	0.63 ± 0.02	eV	NIST Webbook
ea	0.52 ± 0.05	eV	NIST Webbook
ea	1.05 ± 0.10	eV	NIST Webbook
ea	0.63 ± 0.05	eV	NIST Webbook
gf	-1572.12	kJ/mol	Joback Method
hf	-1628.19	kJ/mol	Joback Method
hfus	4.81	kJ/mol	Joback Method
hvap	12.52	kJ/mol	Joback Method
log10ws	-3.92		Aqueous Solubility Prediction Method
logp	2.541		Crippen Method
mcvol	70.520	ml/mol	McGowan Method
pc	2784.00	kPa	KDB

pc	2777.50 ± 8.10	kPa	NIST Webbook
pc	2785.00 ± 3.44	kPa	NIST Webbook
pc	2784.00 ± 5.00	kPa	NIST Webbook
rinpol	310.00		NIST Webbook
sl	291.10	J/mol×K	NIST Webbook
tb	267.30	K	NIST Webbook
tb	223.00 ± 10.00	K	NIST Webbook
tb	266.88 ± 0.20	K	NIST Webbook
tb	267.16	K	KDB
tc	388.46 ± 0.30	K	NIST Webbook
tc	388.37 ± 0.10	K	NIST Webbook
tc	388.44 ± 0.20	K	NIST Webbook
tc	388.46	K	KDB
tf	232.96	K	KDB
tf	233.05	K	Aqueous Solubility Prediction Method
tf	233.00 ± 5.00	K	NIST Webbook
tt	232.96 ± 0.20	K	NIST Webbook
tt	232.95	K	KDB
tt	232.96 ± 0.02	K	NIST Webbook
vc	0.325 ± 0.020	m3/kmol	NIST Webbook
vc	0.324	m3/kmol	KDB
zc	0.2792740		KDB

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	186.23	J/mol×K	419.47	Joback Method
cpg	178.82	J/mol×K	396.73	Joback Method
cpg	125.00	J/mol×K	283.04	Joback Method
cpg	138.29	J/mol×K	305.78	Joback Method
cpg	150.23	J/mol×K	328.52	Joback Method
cpg	160.91	J/mol×K	351.26	Joback Method
cpg	170.41	J/mol×K	373.99	Joback Method
cpl	222.40	J/mol×K	296.41	NIST Webbook
cpl	209.77	J/mol×K	268.52	NIST Webbook
hvapt	25.00	kJ/mol	251.50	NIST Webbook
hvapt	25.00	kJ/mol	310.50	NIST Webbook
hvapt	24.90	kJ/mol	253.50	NIST Webbook
hvapt	23.50	kJ/mol	318.50	NIST Webbook
hvapt	23.72	kJ/mol	261.25	NIST Webbook

hvapt	23.35	kJ/mol	267.20	KDB
hvapt	23.20	kJ/mol	365.50	NIST Webbook
pvap	180.00	kPa	282.90	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	99.00	kPa	267.92	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	110.00	kPa	269.89	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	122.00	kPa	272.90	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	148.00	kPa	277.87	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K

pvap	92.00	kPa	265.93	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	216.00	kPa	287.89	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	257.00	kPa	292.89	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	362.00	kPa	303.37	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	486.00	kPa	313.09	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K

pvap	635.00	kPa	322.53	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	889.00	kPa	335.34	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	1055.00	kPa	342.37	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	1329.00	kPa	352.36	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	85.40	kPa	263.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane

pvap	130.50	kPa	273.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane
pvap	81.00	kPa	263.00	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	266.10	kPa	293.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane
pvap	371.10	kPa	303.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane
pvap	51.00	kPa	253.38	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	40.00	kPa	248.30	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K

pvap	41.00	kPa	248.25	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	39.00	kPa	247.90	Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (248 to 283) K
pvap	190.20	kPa	283.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane
rhol	1654.00	kg/m3	253.00	KDB
srf	0.01	N/m	294.30	KDB
svapt	90.80	J/mol×K	261.25	NIST Webbook

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/(T + C)
Coeff. A	1.42253e+01
Coeff. B	-2.22800e+03
Coeff. C	-3.53850e+01
Temperature range (K), min.	195.24
Temperature range (K), max.	388.38

Information	Value
Property code	pvap

Equation	ln(Pvp) = A + B/T + C*ln(T) + D*T^2
Coeff. A	8.86963e+01
Coeff. B	-5.42536e+03
Coeff. C	-1.16250e+01
Coeff. D	1.66194e-05
Temperature range (K), min.	232.96
Temperature range (K), max.	388.37

Datasets

Kinematic viscosity, m2/s

Temperature, K - Gas	Pressure, kPa - Gas	Kinematic viscosity, m2/s - Gas
300.00	160.13	0.0000009
300.00	180.38	0.0000008
300.00	209.45	0.0000006
300.00	239.58	0.0000006
310.00	167.11	0.0000010
310.00	212.21	0.0000007
310.00	259.63	0.0000005
310.00	319.54	0.0000004
310.00	359.99	0.0000004
315.00	195.64	0.0000008
315.00	234.75	0.0000006
315.00	272.93	0.0000005
315.00	312.27	0.0000005
315.00	357.70	0.0000004
315.00	410.27	0.0000003
320.00	122.60	0.0000011
320.00	172.92	0.0000009
320.00	222.82	0.0000007
320.00	274.43	0.0000005
320.00	326.85	0.0000004
320.00	380.03	0.0000004
320.00	482.22	0.0000003
330.00	117.49	0.0000014
330.00	189.29	0.0000009
330.00	215.35	0.0000008
330.00	288.39	0.0000006

330.00	290.78	0.0000006
330.00	368.85	0.0000004
330.00	376.53	0.0000004
330.00	450.70	0.0000003
330.00	465.61	0.0000003
330.00	534.61	0.0000003
330.00	536.09	0.0000003
330.00	621.46	0.0000002
330.00	621.46	0.0000002
345.04	244.86	0.0000007
345.04	347.35	0.0000005
345.04	445.79	0.0000004
345.04	553.32	0.0000003
345.04	652.37	0.0000003
345.04	772.66	0.0000002
345.04	881.89	0.0000002
360.00	216.10	0.0000009
360.00	407.30	0.0000005
360.00	609.73	0.0000003
360.00	802.73	0.0000002
360.00	1012.20	0.0000002
360.00	1203.26	0.0000001
375.00	183.85	0.0000011
375.00	378.87	0.0000006
375.00	568.99	0.0000004
375.00	758.63	0.0000003
375.00	960.10	0.0000002
375.00	1188.17	0.0000002
375.00	1402.03	0.0000001
375.00	1620.38	0.0000001

Reference *https://www.doi.org/10.1016/j.jct.2007.07.002*

Sources

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Joback Method:	https://en.wikipedia.org/wiki/Joback_method
KDB Vapor Pressure Data:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1743
Kinematic viscosity and speed of sound in gaseous CO, CO2, SiF4, SF6, C4F8, and NH3 from 220 K to 375 K and pressures up to 3.4 MPa:	https://www.doi.org/10.1016/j.jct.2007.07.002

Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (249 to 293) K and Pressures up to 2.6 MPa:	https://www.doi.org/10.1021/je300217x
Isothermal Vapor Liquid Equilibrium Data for the 1,1,2,2-Tetrafluoroethene + 1,1,2,2,3,3,4,4-Octafluorocyclobutane Binary System: Measurement and Modeling from (249 to 293) K and Pressures up to 2.6 MPa:	https://www.doi.org/10.1021/je501047e
Measurement of Vapor Liquid Equilibria for the Binary Mixture of 1,1,2,2,3,4-Hexafluorocyclobutane (RC316) + Octafluorocyclobutane (RC318) from (263.15 to 293.15) K:	https://www.doi.org/10.1021/je401123k
Chemical Structure, Thermophysical Properties, and Environmental Data of Octafluorocyclobutane (C4F8, PFC-318, RC-318):	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1743
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Crippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
Aqueous Solubility Prediction Method:	http://onschallenge.wikispaces.com/file/view/AqueousDataset002.xlsx/351826032/AqueousDa

Legend

af:	Acentric Factor
cpg:	Ideal gas heat capacity
cpl:	Liquid phase heat capacity
ea:	Electron affinity
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
hvapt:	Enthalpy of vaporization at a given temperature
kvisc:	Kinematic viscosity
log10ws:	Log10 of Water solubility in mol/l
logp:	Octanol/Water partition coefficient
mcvol:	McGowan's characteristic volume
pc:	Critical Pressure
pvap:	Vapor pressure
rhol:	Liquid Density
rinpol:	Non-polar retention indices
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

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