Perfluoropropane

Other names:	1,1,1,2,2,3,3,3-Octafluoropropane
	C3F8
	DMP 115
	Definity
	FC 218
	FC 218 (refrigerant)
	FREON 218
	Genetron 218
	HFC 218
	MRX 115
	OCTAFLUOROPROPANE
	PFC 218
	Perflutren
	Propane, 1,1,1,2,2,3,3,3-octafluoro-
	Propane, octafluoro-
	R 218
	R-218
	UN 2424
Inchi:	InChI=1S/C3F8/c4-1(5,2(6,7)8)3(9,10)11
InchiKey:	QYSGYZVSCZSLHT-UHFFFAOYSA-N
Formula:	C3F8
SMILES:	FC(F)(F)C(F)(F)C(F)(F)F
Mol. weight [g/mol]:	188.02
CAS:	76-19-7

Physical Properties

Property code	Value	Unit	Source
af	0.3250		KDB
gf	-1575.58	kJ/mol	Joback Method
hf	-1784.70 ± 8.80	kJ/mol	NIST Webbook
hfus	5.92	kJ/mol	Joback Method
hvap	11.85	kJ/mol	Joback Method
ie	13.38	eV	NIST Webbook
log10ws	-2.72		Crippen Method
logp	2.746		Crippen Method
mcvol	67.290	ml/mol	McGowan Method
pc	2675.00 ± 10.00	kPa	NIST Webbook

pc	2680.00	kPa	KDB
pc	2680.05 ± 20.26	kPa	NIST Webbook
pc	6183.90 ± 6.40	kPa	NIST Webbook
rhoc	603.54 ± 6.02	kg/m3	NIST Webbook
rhoc	627.98 ± 20.68	kg/m3	NIST Webbook
sl	287.23	J/mol×K	NIST Webbook
tb	237.20	K	NIST Webbook
tb	236.50 ± 0.50	K	NIST Webbook
tb	236.50	K	KDB
tb	234.00	K	NIST Webbook
tb	235.00 ± 2.00	K	NIST Webbook
tc	345.05 ± 0.30	K	NIST Webbook
tc	345.03 ± 0.20	K	NIST Webbook
tc	345.10 ± 0.50	K	NIST Webbook
tc	345.10	K	KDB
tf	125.46	K	KDB
tf	90.00 ± 2.00	K	NIST Webbook
tt	124.85 ± 0.30	K	NIST Webbook
tt	125.45 ± 0.02	K	NIST Webbook
vc	0.299	m3/kmol	KDB
zc	0.2792700		KDB

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	158.49	J/mol×K	352.80	Joback Method
cpg	122.00	J/mol×K	252.51	Joback Method
cpg	130.16	J/mol×K	272.57	Joback Method
cpg	137.88	J/mol×K	292.63	Joback Method
cpg	145.16	J/mol×K	312.68	Joback Method
cpg	152.03	J/mol×K	332.74	Joback Method
cpg	164.57	J/mol×K	372.86	Joback Method
cpl	181.38	J/mol×K	235.00	NIST Webbook
hfust	3.56	kJ/mol	99.40	NIST Webbook
hfust	0.48	kJ/mol	125.50	NIST Webbook
hfust	0.48	kJ/mol	125.50	NIST Webbook
hvapt	20.90	kJ/mol	236.00	NIST Webbook
hvapt	21.60	kJ/mol	215.00	NIST Webbook
hvapt	19.76	kJ/mol	236.42	NIST Webbook

pvap	1604.00	kPa	322.96	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	553.00	kPa	282.74	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	743.00	kPa	292.81	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	1124.00	kPa	308.04	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	1256.00	kPa	312.78	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K

pvap	483.00	kPa	278.05	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	298.00	kPa	264.05	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	995.00	kPa	303.04	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	304.80	kPa	263.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane
pvap	425.20	kPa	273.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane
pvap	580.10	kPa	283.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane

pvap	779.60	kPa	293.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane	
pvap	1026.30	kPa	303.15	Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and Hexafluoropropylene Oxide Containing Octafluorocyclobutane	
pvap	383.00	kPa	271.05	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K	
pvap	343.00	kPa	268.17	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K	
pvap	297.00	kPa	264.05	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K	
pvap	287.00	kPa	263.23	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K	

pvap	238.00	kPa	258.11	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	194.00	kPa	253.30	Isothermal Vapor Liquid Equilibrium Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K
pvap	408.18	kPa	272.76	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	53.10	kPa	223.21	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)
rhol	1350.00	kg/m3	293.00	KDB
sfust	3.81	J/mol×K	125.50	NIST Webbook

sfust	35.77	J/mol×K	99.40	NIST Webbook
svapt	83.58	J/mol×K	236.42	NIST Webbook

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/(T + C)
Coeff. A	1.49243e+01
Coeff. B	-2.26252e+03
Coeff. C	-1.46150e+01
Temperature range (K), min.	169.19
Temperature range (K), max.	345.02

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/T + C*ln(T) + D*T^2
Coeff. A	2.43031e+01
Coeff. B	-2.90039e+03
Coeff. C	-1.34471e+00
Coeff. D	-1.37204e-06
Temperature range (K), min.	125.46
Temperature range (K), max.	345.05

Datasets

Speed of sound, m/s

Temperature, K - Gas	Pressure, kPa - Gas	Speed of sound, m/s - Gas
248.20	10.00	107.9
248.20	20.00	107.6
248.20	30.00	107.25
248.20	50.00	106.56
248.20	70.00	105.77
248.20	100.00	104.62

248.20	150.00	102.76
259.80	20.00	110.0
259.80	30.00	109.59
259.80	50.00	108.88
259.80	70.00	108.23
259.80	100.00	107.27
259.80	150.00	105.51
259.80	200.00	103.72
259.80	250.00	101.83
270.20	10.00	112.31
270.20	20.00	111.99
270.20	30.00	111.77
270.20	50.00	111.27
270.20	70.00	110.9
272.60	100.00	110.29
272.60	150.00	108.59
272.60	200.00	106.9
272.60	250.00	105.22
272.60	300.00	103.59
272.60	350.00	101.9
272.60	400.00	100.27
283.20	20.00	114.63
283.20	30.00	114.12
283.20	50.00	113.84
283.20	70.00	113.1
283.20	100.00	112.46
283.20	150.00	111.28
283.20	200.00	109.88
283.20	250.00	108.56
283.20	300.00	107.1
283.20	350.00	105.61
283.20	400.00	103.99
296.10	50.00	116.81
296.10	70.00	116.31
296.10	100.00	115.55
296.10	150.00	114.42
296.10	200.00	113.23
296.10	250.00	111.94
296.10	300.00	110.7
296.10	350.00	109.43
296.10	400.00	108.12
303.90	10.00	119.13
303.90	20.00	118.98
303.90	30.00	118.79

303.90	50.00	118.42
303.90	70.00	118.04
303.90	100.00	117.43
303.90	150.00	116.26
303.90	200.00	115.36
303.90	250.00	114.31
303.90	300.00	113.14
303.90	350.00	112.0
303.90	400.00	110.63

Reference *https://www.doi.org/10.1016/j.fluid.2010.01.027*

Temperature, K	Pressure, kPa	Speed of sound, m/s
251.10	167.20	102.56
251.10	89.70	105.72
251.10	143.10	103.57
251.10	80.50	106.08
251.10	118.20	104.61
251.10	71.80	106.39
251.10	102.00	105.24
251.10	62.40	106.76
256.30	221.30	101.83
256.30	120.90	105.85
256.30	73.30	107.57
256.30	198.40	102.79
256.30	104.30	106.47
256.30	63.70	107.91
256.30	171.20	103.89
256.30	91.70	106.91
256.30	146.40	104.86
256.30	82.20	107.26
261.60	253.90	102.14
261.60	175.20	105.21
261.60	93.70	108.11
261.60	233.40	102.97
261.60	149.80	106.13
261.60	84.00	108.44
261.60	226.70	103.22
261.60	123.60	107.08
261.60	74.90	108.75
261.60	203.20	104.16
261.60	106.60	107.67
261.60	65.10	109.07

266.80	260.00	103.52
266.80	179.20	106.48
266.80	95.70	109.25
266.80	238.90	104.32
266.80	153.00	107.37
266.80	85.70	109.58
266.80	232.20	104.58
266.80	126.30	108.28
266.80	76.40	109.87
266.80	207.80	105.46
266.80	108.80	108.83
266.80	66.40	110.2
272.10	266.30	104.92
272.10	183.10	107.74
272.10	128.90	109.46
272.10	97.70	110.44
272.10	244.50	105.69
272.10	183.10	107.74
272.10	128.90	109.47
272.10	87.50	110.74
272.10	237.50	105.93
272.10	156.40	108.62
272.10	111.10	110.02
272.10	78.00	111.03
272.10	212.60	106.77
272.10	156.40	108.61
272.10	111.10	110.02
272.10	67.80	111.33
277.40	272.50	106.29
277.40	187.10	108.99
277.40	99.70	111.58
277.40	250.10	107.02
277.40	159.70	109.81
277.40	89.30	111.87
277.40	242.90	107.24
277.40	131.60	110.66
277.40	79.60	112.15
277.40	217.30	108.05
277.40	113.40	111.18
277.40	69.10	112.44
282.70	278.60	107.62
282.70	191.10	110.22
282.70	101.60	112.71
282.70	255.60	108.32

282.70	163.00	111.01
282.70	91.00	113.0
282.70	248.30	108.54
282.70	134.30	111.82
282.70	81.20	113.28
282.70	222.00	109.31
282.70	115.60	112.32
282.70	70.40	113.54
287.90	284.70	108.91
287.90	195.00	111.42
287.90	103.60	113.84
287.90	261.10	109.59
287.90	166.30	112.19
287.90	92.80	114.11
287.90	253.60	109.81
287.90	136.90	112.97
287.90	82.70	114.36
287.90	226.70	110.56
287.90	117.90	113.46
287.90	71.80	114.63
293.20	290.80	110.19
293.20	258.90	111.05
293.20	198.90	112.61
293.20	105.60	114.94
293.20	84.30	115.46
293.20	290.70	110.18
293.20	258.80	111.04
293.20	169.60	113.36
293.20	105.60	114.93
293.20	84.20	115.45
293.20	266.70	110.86
293.20	231.40	111.79
293.20	139.60	114.1
293.20	94.60	115.21
293.20	73.10	115.72
293.20	266.60	110.85
293.20	231.30	111.79
293.20	120.10	114.57
293.20	94.50	115.2
298.40	296.80	111.46
298.40	202.90	113.8
298.40	107.60	116.05
298.40	272.10	112.08
298.40	172.80	114.5

298.40	96.30	116.29
298.40	264.20	112.28
298.40	142.20	115.21
298.40	85.80	116.53
298.40	235.90	112.97
298.40	122.40	115.7
298.40	74.50	116.78
303.70	277.60	113.32
303.70	176.20	115.66
303.70	98.10	117.39
303.70	269.40	113.49
303.70	144.90	116.33
303.70	87.40	117.61
303.70	240.60	114.17
303.70	124.70	116.78
303.70	75.80	117.86
303.70	206.70	114.96
303.70	109.50	117.14
308.90	283.00	114.5
308.90	179.40	116.75
308.90	99.80	118.44
308.90	274.70	114.68
308.90	147.50	117.44
308.90	88.90	118.66
308.90	245.20	115.33
308.90	127.00	117.87
308.90	77.10	118.9
308.90	210.60	116.08
308.90	111.50	118.19
314.10	288.40	115.67
314.10	182.70	117.85
314.10	101.60	119.47
314.10	279.90	115.84
314.10	150.20	118.52
314.10	90.40	119.69
314.10	249.80	116.47
314.10	129.20	118.93
314.10	78.50	119.93
314.10	214.50	117.21
314.10	113.40	119.24
319.40	293.80	116.85
319.40	185.90	118.95
319.40	103.30	120.52
319.40	285.10	117.02

319.40	152.80	119.58
319.40	92.00	120.74
319.40	254.40	117.62
319.40	131.40	119.98
319.40	79.80	120.96
319.40	218.40	118.33
319.40	115.40	120.29
324.60	299.20	117.99
324.60	189.20	120.02
324.60	105.10	121.56
324.60	290.30	118.16
324.60	155.40	120.64
324.60	93.50	121.75
324.60	259.00	118.74
324.60	133.70	121.03
324.60	81.20	121.98
324.60	222.30	119.43
324.60	117.40	121.32

Reference *https://www.doi.org/10.1021/acs.jced.6b00536*

Mass density, kg/m3

Temperature, K - Liquid	Pressure, kPa - Liquid	Mass density, kg/m3 - Liquid
203.51	5337.70	1748.65
203.54	25066.00	1795.66
207.93	30528.00	1795.05
207.94	10279.00	1747.98
212.07	14905.00	1747.39
212.65	36376.00	1794.41
216.50	40978.00	1793.89
216.54	1000.80	1689.31
216.88	20281.00	1746.74
217.62	2018.30	1689.13
218.87	3201.20	1688.94
220.10	4356.80	1688.75
221.00	5191.70	1688.62
221.04	25052.00	1746.18
225.96	30368.00	1745.54
226.40	10304.00	1687.87
230.50	35314.00	1744.96

231.73	15327.00	1687.19
234.92	39898.00	1744.41
235.64	915.80	1615.88
236.89	20178.00	1686.54
237.72	1980.70	1615.62
239.20	3133.70	1615.41
240.32	3992.90	1615.26
241.96	25015.00	1685.92
241.97	5288.20	1615.05
247.06	29611.00	1685.32
248.40	10248.00	1614.25
253.05	1037.70	1548.82
253.35	35422.00	1684.57
254.58	2042.70	1548.62
254.84	15219.00	1613.5
256.20	3092.60	1548.41
257.67	4032.30	1548.23
257.99	39644.00	1684.03
259.38	5163.90	1548.03
260.60	5918.90	1547.89
261.38	20247.00	1612.75
262.20	6953.30	1547.71
264.92	1305.50	1498.9
266.69	2167.60	1498.5
267.42	10407.00	1547.12
267.61	24742.00	1612.07
268.40	3123.50	1498.5
270.01	4060.30	1498.31
272.10	5218.80	1498.08
273.85	29781.00	1611.39
274.19	14632.00	1546.4
278.85	1048.70	1431.66
280.31	34598.00	1610.69
280.62	9990.20	1497.18
280.96	2016.50	1431.43
282.61	20193.00	1545.52
283.12	3037.60	1431.2
285.20	4021.60	1430.98
287.19	39685.00	1609.96
287.23	4975.50	1430.78
289.39	15154.00	1496.29
290.43	25199.00	1544.72
294.19	1027.20	1348.77
296.89	2032.00	1348.25

298.14	10127.00	1429.72
298.14	10227.00	1432.13
298.15	20139.00	1495.43
298.17	30128.00	1543.94
299.56	3026.30	1348.25
302.24	4025.20	1348.0
305.19	5144.50	1347.73
305.57	34457.00	1543.21
306.47	24759.00	1494.63
308.23	15310.00	1431.18
313.20	39261.00	1542.45
316.93	30165.00	1493.65
318.20	20116.00	1430.27
318.20	1978.90	1206.47
318.20	10061.00	1346.6
318.20	19323.00	1427.89
318.20	2006.90	1206.47
318.21	9971.70	1346.6
322.10	2987.30	1206.16
325.72	35057.00	1492.81
326.06	3974.10	1205.86
328.08	24771.00	1429.38
329.83	4928.60	1205.58
330.81	14738.00	1345.54
332.72	39008.00	1492.14
339.50	7422.80	1204.86
341.20	30200.00	1425.83
344.83	20114.00	1344.37
353.16	23269.00	1343.69
353.16	35743.00	1424.77
353.17	10953.00	1203.86

Reference *https://www.doi.org/10.1021/je300148f*

Sources

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):	https://www.doi.org/10.1016/j.fluid.2017.07.002
KDB Vapor Pressure Data:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1581
Crippen Method:	https://www.chemeo.com/doc/models/crippen_log10ws
KDB:	https://www.cheric.org/files/research/kdb/mol/mol1581.mol
NIST Webbook:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C76197&Units=SI

Speed of Sound Data in Pure Refrigerants R-116 and R-218 and Their Mixtures. Experiment and Modeling:	https://www.doi.org/10.1021/acs.jced.6b00536
Joback Method:	https://en.wikipedia.org/wiki/Joback_method
The Yaws Handbook of Vapor Pressure:	https://www.sciencedirect.com/book/9780128029992/the-yaws-handbook-of-vapor-pressure
Velocity of sound in perfluoropropane (C3F8), perfluoroethane (C2F6) and their mixtures:	https://www.doi.org/10.1016/j.fluid.2012.10.002
Measurement of Vapor Liquid Equilibria for the Binary Mixture of Octafluoropropane and	https://www.doi.org/10.1021/je401123k
Properties of saturated fluorocarbons:	https://www.doi.org/10.1016/j.fluid.2010.01.027
Experimental data and modeling using isothermal Vapor Liquid Equilibrium	https://www.doi.org/10.1021/je4000857
Data and Modeling for the Ethane (R170) + Perfluoropropane (R218) System at Temperatures from (264 to 308) K:	http://link.springer.com/article/10.1007/BF02311772
Experimental Study of p-.rho.-T Relationship of Compressed Liquid Phase for Octafluoropropane and Two near Azeotropic Ternary HFC/HC Mixtures:	https://www.doi.org/10.1021/je300148f
Crippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l

Legend

af:	Acentric Factor
cpg:	Ideal gas heat capacity
cpl:	Liquid phase heat capacity
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
hvapt:	Enthalpy of vaporization at a given temperature
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
rhoc:	Critical density
rhol:	Liquid Density
sfust:	Entropy of fusion at a given temperature
sl:	Liquid phase molar entropy at standard conditions
speedsl:	Speed of sound in fluid
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