Difluorochloromethane

Other names:

Algeon 22
Algofrene 22
Algofrene 6
Algofrene Type 6
Arcton 22
Arcton 4
CFC 22
CHClF2
CHF2Cl
CHLORODIFLUOROMETHANE
Daiflon 22
Difluoromonochloromethane
Dymel 22
Electro-CF 22
Eskimon 22
F 22
F 22 (halocarbon)
FC 22
FKW 22
Flon 22
Flugene 22
Fluorocarbon-22
Forane 22
Freon 22
Frigen
Frigen 22
Genetron 22
HCFC 22
HFA-22
Haltron 22
Isceon 22
Isotron 22
Khaladon 22
Khladon 22
Methane, chlorodifluoro-
Methane, difluoro chloro
Monochlorodifluormethane
Monochlorodifluoromethane
Propellant 22
R 22

R-22
REFRIGERANT-22
Refrigerant 22
Refrigerant R 22
UN 1018
Ucon 22

Inchi: InChI=1S/CHClF2/c2-1(3)4/h1H
InchiKey: VOPWNXZWBYDODV-UHFFFAOYSA-N
Formula: CHClF2
SMILES: FC(F)Cl
Mol. weight [g/mol]: 86.47
CAS: 75-45-6

Physical Properties

Property code	Value	Unit	Source
af	0.2210		KDB
dm	1.40	debye	KDB
gf	-470.90	kJ/mol	KDB
hf	-502.00	kJ/mol	KDB
hf	-483.00 ± 3.00	kJ/mol	NIST Webbook
hfus	5.18	kJ/mol	Joback Method
hvap	20.18	kJ/mol	Joback Method
ie	12.28 ± 0.02	eV	NIST Webbook
ie	12.45 ± 0.05	eV	NIST Webbook
ie	12.60	eV	NIST Webbook
ie	12.56	eV	NIST Webbook
ie	12.10	eV	NIST Webbook
ie	12.28 ± 0.02	eV	NIST Webbook
log10ws	-1.20		Crippen Method
logp	1.448		Crippen Method
mcvol	40.730	ml/mol	McGowan Method
pc	4978.00	kPa	NIST Webbook
pc	4988.00 ± 4.98	kPa	NIST Webbook
pc	4990.00 ± 10.00	kPa	NIST Webbook
pc	4976.00 ± 15.00	kPa	NIST Webbook
pc	4975.00 ± 10.00	kPa	NIST Webbook
pc	4987.10 ± 5.00	kPa	NIST Webbook
pc	4980.00 ± 30.00	kPa	NIST Webbook
pc	4983.00 ± 8.00	kPa	NIST Webbook
pc	4912.24 ± 5.06	kPa	NIST Webbook

pc	4990.00	kPa	KDB
pc	5035.00 ± 12.00	kPa	NIST Webbook
rhoc	521.40 ± 4.32	kg/m3	NIST Webbook
rhoc	551.67 ± 1.73	kg/m3	NIST Webbook
rhoc	515.35 ± 6.05	kg/m3	NIST Webbook
rhoc	512.76 ± 5.12	kg/m3	NIST Webbook
rhoc	515.35 ± 5.14	kg/m3	NIST Webbook
rhoc	794.15 ± 12.11	kg/m3	NIST Webbook
rinpol	305.00		NIST Webbook
rinpol	301.00		NIST Webbook
rinpol	258.00		NIST Webbook
rinpol	309.00		NIST Webbook
sl	179.91	J/mol×K	NIST Webbook
tb	232.37	K	NIST Webbook
tb	313.30 ± 0.60	K	NIST Webbook
tb	232.40	K	KDB
tc	368.20 ± 0.50	K	NIST Webbook
tc	369.32 ± 0.03	K	NIST Webbook
tc	369.50 ± 0.50	K	NIST Webbook
tc	369.33 ± 0.10	K	NIST Webbook
tc	369.30 ± 0.03	K	NIST Webbook
tc	369.32 ± 0.05	K	NIST Webbook
tc	369.55 ± 0.10	K	NIST Webbook
tc	369.15	K	NIST Webbook
tc	369.15 ± 0.30	K	NIST Webbook
tc	369.30	K	KDB
tc	369.21 ± 0.20	K	NIST Webbook
tc	369.14 ± 0.50	K	NIST Webbook
tc	369.20 ± 1.00	K	NIST Webbook
tc	369.00 ± 0.15	K	NIST Webbook
tf	113.15	K	NIST Webbook
tf	114.00 ± 2.00	K	NIST Webbook
tf	115.73	K	KDB
tt	115.73 ± 0.02	K	NIST Webbook
tt	115.76 ± 0.01	K	NIST Webbook
vc	0.169	m3/kmol	KDB
vc	0.147 ± 0.005	m3/kmol	NIST Webbook
zc	0.2746450		KDB
zra	0.27		KDB

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	54.77	J/mol×K	257.81	Joback Method
cpg	67.53	J/mol×K	409.89	Joback Method
cpg	61.54	J/mol×K	333.85	Joback Method
cpg	59.37	J/mol×K	308.50	Joback Method
cpg	57.11	J/mol×K	283.16	Joback Method
cpg	63.62	J/mol×K	359.20	Joback Method
cpg	65.62	J/mol×K	384.54	Joback Method
cpl	93.01	J/mol×K	232.50	NIST Webbook
cpl	114.10	J/mol×K	298.15	NIST Webbook
hfust	4.12	kJ/mol	115.70	NIST Webbook
hfust	0.07	kJ/mol	59.00	NIST Webbook
hfust	4.12	kJ/mol	115.70	NIST Webbook
hvapt	20.10	kJ/mol	345.00	NIST Webbook
hvapt	20.00	kJ/mol	301.00	NIST Webbook
hvapt	20.40	kJ/mol	252.50	NIST Webbook
hvapt	20.22	kJ/mol	232.50	NIST Webbook
hvapt	20.19	kJ/mol	232.40	KDB
hvapt	21.80	kJ/mol	252.00	NIST Webbook
hvapt	21.00	kJ/mol	232.50	NIST Webbook
hvapt	20.20	kJ/mol	232.00	NIST Webbook
hvapt	21.30	kJ/mol	201.50	NIST Webbook
pvap	558.12	kPa	276.67	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	682.58	kPa	283.21	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	774.37	kPa	287.52	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K

pvap	932.29	kPa	294.06	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	485.71	kPa	272.37	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	1201.86	kPa	303.44	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	1316.37	kPa	306.98	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	405.65	kPa	267.03	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	528.00	kPa	275.00	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems
pvap	562.00	kPa	277.00	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems

pvap	718.00	kPa	285.10	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems	
pvap	761.00	kPa	286.90	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems	
pvap	807.00	kPa	289.00	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems	
pvap	677.00	kPa	283.00	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems	
pvap	637.00	kPa	281.00	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems	

pvap	599.00	kPa	279.00	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems
pvap	855.00	kPa	291.10	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems
pvap	955.00	kPa	295.10	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems
pvap	343.76	kPa	262.27	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	285.60	kPa	257.12	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	223.86	kPa	250.79	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	202.41	kPa	248.23	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K

pvap	125.48	kPa	237.03	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	3664.00	kPa	353.15	Phase equilibrium and critical point data for ethylene and chlorodifluoromethane binary mixtures using a new static-analytic apparatus
pvap	2426.00	kPa	333.15	Phase equilibrium and critical point data for ethylene and chlorodifluoromethane binary mixtures using a new static-analytic apparatus
pvap	1529.00	kPa	313.15	Phase equilibrium and critical point data for ethylene and chlorodifluoromethane binary mixtures using a new static-analytic apparatus
pvap	911.00	kPa	293.15	Phase equilibrium and critical point data for ethylene and chlorodifluoromethane binary mixtures using a new static-analytic apparatus
pvap	498.00	kPa	273.15	Phase equilibrium and critical point data for ethylene and chlorodifluoromethane binary mixtures using a new static-analytic apparatus
pvap	156.52	kPa	242.05	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K

pvap	1047.70	kPa	298.34	Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K
pvap	495.00	kPa	273.00	Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems
rhol	1230.00	kg/m3	289.00	KDB
sfust	35.65	J/mol×K	115.70	NIST Webbook
sfust	1.13	J/mol×K	59.00	NIST Webbook
srf	0.02	N/m	233.20	KDB
svapt	86.95	J/mol×K	232.50	NIST Webbook

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/(T + C)
Coeff. A	1.42602e+01
Coeff. B	-1.95340e+03
Coeff. C	-2.97740e+01
Temperature range (K), min.	169.58
Temperature range (K), max.	369.30

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/T + C*ln(T) + D*T^2
Coeff. A	9.07815e+01
Coeff. B	-4.76845e+03
Coeff. C	-1.22837e+01
Coeff. D	2.40493e-05
Temperature range (K), min.	115.73
Temperature range (K), max.	369.30

Datasets

Specific volume, m3/kg

Pressure, kPa - Fluid (supercritical or subcritical phases)	Temperature, K - Fluid (supercritical or subcritical phases)	Specific volume, m3/kg - Fluid (supercritical or subcritical phases)
10000.00	298.20	0.0008
10000.00	323.20	0.0009
10000.00	348.20	0.0010
10000.00	373.20	0.0011
10000.00	423.20	0.0020
10000.00	473.20	0.0032
10000.00	523.20	0.0041
10000.00	573.20	0.0050
20000.00	298.20	0.0008
20000.00	323.20	0.0008
20000.00	348.20	0.0009
20000.00	373.20	0.0010
20000.00	423.20	0.0012
20000.00	473.20	0.0015
20000.00	523.20	0.0019
20000.00	573.20	0.0024
30000.00	298.20	0.0008
30000.00	323.20	0.0008
30000.00	348.20	0.0009
30000.00	373.20	0.0009
30000.00	423.20	0.0010
30000.00	473.20	0.0012
30000.00	523.20	0.0014
30000.00	573.20	0.0018
40000.00	298.20	0.0008
40000.00	323.20	0.0008
40000.00	348.20	0.0008
40000.00	373.20	0.0009
40000.00	423.20	0.0010
40000.00	473.20	0.0011
40000.00	523.20	0.0012
40000.00	573.20	0.0014

50000.00	298.20	0.0007
50000.00	323.20	0.0008
50000.00	348.20	0.0008
50000.00	373.20	0.0008
50000.00	423.20	0.0009
50000.00	473.20	0.0010
50000.00	523.20	0.0011
50000.00	573.20	0.0013
75000.00	298.20	0.0007
75000.00	323.20	0.0007
75000.00	348.20	0.0008
75000.00	373.20	0.0008
75000.00	423.20	0.0009
75000.00	473.20	0.0009
75000.00	523.20	0.0010
75000.00	573.20	0.0010
100000.00	298.20	0.0007
100000.00	323.20	0.0007
100000.00	348.20	0.0007
100000.00	373.20	0.0008
100000.00	423.20	0.0008
100000.00	473.20	0.0009
100000.00	523.20	0.0009
100000.00	573.20	0.0010
125000.00	298.20	0.0007
125000.00	323.20	0.0007
125000.00	348.20	0.0007
125000.00	373.20	0.0007
125000.00	423.20	0.0008
125000.00	473.20	0.0008
125000.00	523.20	0.0009
125000.00	573.20	0.0009
150000.00	298.20	0.0007
150000.00	323.20	0.0007
150000.00	348.20	0.0007
150000.00	373.20	0.0007
150000.00	423.20	0.0008
150000.00	473.20	0.0008
150000.00	523.20	0.0008
150000.00	573.20	0.0009
175000.00	298.20	0.0007
175000.00	323.20	0.0007
175000.00	348.20	0.0007
175000.00	373.20	0.0007

175000.00	423.20	0.0007
175000.00	473.20	0.0008
175000.00	523.20	0.0008
175000.00	573.20	0.0008
200000.00	298.20	0.0006
200000.00	323.20	0.0007
200000.00	348.20	0.0007
200000.00	373.20	0.0007
200000.00	423.20	0.0007
200000.00	473.20	0.0008
200000.00	523.20	0.0008
200000.00	573.20	0.0008
225000.00	298.20	0.0006
225000.00	323.20	0.0007
225000.00	348.20	0.0007
225000.00	373.20	0.0007
225000.00	423.20	0.0007
225000.00	473.20	0.0007
225000.00	523.20	0.0008
225000.00	573.20	0.0008
250000.00	298.20	0.0006
250000.00	323.20	0.0006
250000.00	348.20	0.0007
250000.00	373.20	0.0007
250000.00	423.20	0.0007
250000.00	473.20	0.0007
250000.00	523.20	0.0007
250000.00	573.20	0.0008
275000.00	298.20	0.0006
275000.00	323.20	0.0006
275000.00	348.20	0.0006
275000.00	373.20	0.0007
275000.00	423.20	0.0007
275000.00	473.20	0.0007
275000.00	523.20	0.0007
275000.00	573.20	0.0007
300000.00	298.20	0.0006
300000.00	323.20	0.0006
300000.00	348.20	0.0006
300000.00	373.20	0.0006
300000.00	423.20	0.0007
300000.00	473.20	0.0007
300000.00	523.20	0.0007
300000.00	573.20	0.0007

325000.00	298.20	0.0006
325000.00	323.20	0.0006
325000.00	348.20	0.0006
325000.00	373.20	0.0006
325000.00	423.20	0.0007
325000.00	473.20	0.0007
325000.00	523.20	0.0007
325000.00	573.20	0.0007
350000.00	298.20	0.0006
350000.00	323.20	0.0006
350000.00	348.20	0.0006
350000.00	373.20	0.0006
350000.00	423.20	0.0007
350000.00	473.20	0.0007
350000.00	523.20	0.0007
350000.00	573.20	0.0007
375000.00	298.20	0.0006
375000.00	323.20	0.0006
375000.00	348.20	0.0006
375000.00	373.20	0.0006
375000.00	423.20	0.0006
375000.00	473.20	0.0007
375000.00	523.20	0.0007
375000.00	573.20	0.0007
400000.00	298.20	0.0006
400000.00	323.20	0.0006
400000.00	348.20	0.0006
400000.00	373.20	0.0006
400000.00	423.20	0.0006
400000.00	473.20	0.0007
400000.00	523.20	0.0007
400000.00	573.20	0.0007
425000.00	298.20	0.0006
425000.00	323.20	0.0006
425000.00	348.20	0.0006
425000.00	373.20	0.0006
425000.00	423.20	0.0006
425000.00	473.20	0.0006
425000.00	523.20	0.0007
425000.00	573.20	0.0007
450000.00	298.20	0.0006
450000.00	323.20	0.0006
450000.00	348.20	0.0006
450000.00	373.20	0.0006

450000.00	423.20	0.0006
450000.00	473.20	0.0006
450000.00	523.20	0.0006
450000.00	573.20	0.0007
475000.00	298.20	0.0006
475000.00	323.20	0.0006
475000.00	348.20	0.0006
475000.00	373.20	0.0006
475000.00	423.20	0.0006
475000.00	473.20	0.0006
475000.00	523.20	0.0006
475000.00	573.20	0.0007
500000.00	298.20	0.0006
500000.00	323.20	0.0006
500000.00	348.20	0.0006
500000.00	373.20	0.0006
500000.00	423.20	0.0006
500000.00	473.20	0.0006
500000.00	523.20	0.0006
500000.00	573.20	0.0006

Reference *https://www.doi.org/10.1021/je060371g*

Molar heat capacity at constant pressure, J/K/mol

Temperature, K - Liquid	Pressure, kPa - Liquid	Molar heat capacity at constant pressure, J/K/mol - Liquid
305.15	2060.00	110.07
305.15	2560.00	110.16
305.15	3040.00	109.56
305.15	3680.00	109.30
305.15	4110.00	108.86
305.15	4570.00	108.26
305.15	5120.00	107.74
310.15	2060.00	112.84
310.15	2560.00	112.06
310.15	3040.00	111.54
310.15	3680.00	110.51
310.15	4110.00	110.25
310.15	4570.00	109.38
310.15	5120.00	109.04
315.15	2060.00	115.52

315.15	2560.00	114.31
315.15	3040.00	113.79
315.15	3680.00	112.41
315.15	4110.00	112.15
315.15	4570.00	111.37
315.15	5120.00	110.77
320.15	2560.00	117.08
320.15	3040.00	116.39
320.15	3680.00	114.74
320.15	4110.00	114.14
320.15	4570.00	113.45
320.15	5120.00	112.58
325.15	2560.00	120.45
325.15	3040.00	119.59
325.15	3680.00	117.60
325.15	4110.00	116.73
325.15	4570.00	115.95
325.15	5120.00	114.83
330.15	3040.00	123.74
330.15	3680.00	121.23
330.15	4110.00	120.10
330.15	4570.00	119.07
330.15	5120.00	117.60
335.15	4110.00	124.43
335.15	4570.00	122.96
335.15	5120.00	121.14
340.15	4570.00	127.89
340.15	5120.00	125.64
345.15	5120.00	131.43

Reference *https://www.doi.org/10.1016/j.fluid.2014.05.029*

Sources

Crippen Method:	https://www.chemeo.com/doc/models/crippen_log10ws
Solubility of Refrigerant 1,1,1,2-Tetrafluoroethane in the N,N-Dimethyl Formamide in the Temperature Range from (263.15 to 363.15) K :	https://www.doi.org/10.1021/je100975b
KDB:	https://www.cheric.org/files/research/kdb/mol/mol1515.mol
KDB Vapor Pressure Data:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1515
Phase Equilibrium and Liquid Viscosity of CO2 + n-Dodecane Mixtures between 283 and 353 K:	https://www.doi.org/10.1021/acs.jced.9b00187
McGowan Method:	http://link.springer.com/article/10.1007/BF02311772
Viscosity of Gaseous Mixtures of HCFC-22 + HCFC-142b at Pressures to 6.3 MPa:	https://www.doi.org/10.1007/s10765-009-0579-1

Density Data for the Refrigerant Ethyl Fluoride (HFC-161) over a Temperature Range from (230 to 344) K:	https://www.doi.org/10.1021/je2000827
Experimental Measurements and Thermodynamic Modeling of the Dissociation Conditions of Clathrate Hydrates for (Refrigerant + NaCl + Water) Systems:	https://www.doi.org/10.1021/je400919u
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
NIST Webbook:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C75456&Units=SI
Vapor liquid equilibria for R22 +N,N-dimethylformamide system at temperatures from 283.15 to 368.15K:	https://www.doi.org/10.1016/j.fluid.2008.01.028
Phase equilibrium and critical point data for ethylene and chlorodifluoromethane binary mixtures using a new static-analytic apparatus:	https://www.doi.org/10.1016/j.fluid.2017.08.005
Crippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
Measurements of the isobaric heat capacity of R1234yf in liquid phase at temperatures from 305 K to 355 K and pressures up to 1 MPa:	https://www.doi.org/10.1016/j.fluid.2014.05.029
Specific Volumes of Chlorodifluoromethane in the Temperature Range from (250 to 375) K and Pressures up to 500 MPa:	https://www.doi.org/10.1021/je060371g
KDB Pure (Korean Thermophysical Properties Databank):	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1515

Legend

af:	Acentric Factor
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
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
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
vols:	Specific Volume
zc:	Critical Compressibility
zra:	Rackett Parameter