# Fluoroform

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|---|---|
| **Other names:** | Arcton |
| | Arcton 1 |
| | CHF3 |
| | Carbon trifluoride |
| | FC 23 |
| | FC 23 (fluorocarbon) |
| | Fluoryl |
| | Freon 23 |
| | Freon F-23 |
| | Genetron 23 |
| | Genetron HFC23 |
| | HFC 23 |
| | Halocarbon 23 |
| | Methane, trifluoro- |
| | Methyl trifluoride |
| | Propellant 23 |
| | R 23 |
| | R 23 (halocarbon) |
| | R-23 |
| | REFRIGERANT-23 |
| | Refrigerant 23 |
| | Trifluoromethane |
| | UN 1984 |
| **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 |

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|---|---|---|---|
| chg | -516.30 | kJ/mol | NIST Webbook |
| dm | 1.60 | debye | KDB |
| gf | -662.80 | kJ/mol | KDB |
| hf | -697.50 | kJ/mol | KDB |
| hf | -695.40 ± 2.70 | kJ/mol | NIST Webbook |
| hf | -690.80 | kJ/mol | NIST Webbook |
| hfus | 4.06 | kJ/mol | Joback Method |
| hvap | 14.98 | kJ/mol | Joback Method |
| ie | 14.19 ± 0.02 | eV | NIST Webbook |
| ie | 13.80 | eV | NIST Webbook |
| ie | 13.90 | eV | NIST Webbook |
| ie | 15.50 | eV | NIST Webbook |
| ie | 14.80 | eV | NIST Webbook |
| ie | 14.80 ± 0.05 | eV | NIST Webbook |
| ie | 14.80 | eV | NIST Webbook |
| ie | 13.86 | eV | NIST Webbook |
| ie | 13.84 | eV | NIST Webbook |
| ie | 13.86 | eV | NIST Webbook |
| log10ws | -0.90 | | Crippen Method |
| logp | 1.179 | | Crippen Method |
| mcvol | 30.260 | ml/mol | McGowan Method |
| pc | 4828.00 ± 25.00 | kPa | NIST Webbook |
| pc | 4816.20 ± 2.00 | kPa | NIST Webbook |
| pc | 5035.85 ± 10.13 | kPa | NIST Webbook |
| pc | 4836.12 ± 6.89 | kPa | NIST Webbook |
| pc | 4858.00 | kPa | KDB |
| rhoc | 525.80 ± 2.80 | kg/m3 | NIST Webbook |
| rhoc | 516.00 | kg/m3 | NIST Webbook |
| rhoc | 527.20 ± 0.70 | kg/m3 | NIST Webbook |
| rhoc | 527.20 ± 2.80 | kg/m3 | NIST Webbook |
| rhoc | 527.90 ± 4.90 | kg/m3 | NIST Webbook |
| rhoc | 525.08 ± 3.22 | kg/m3 | NIST Webbook |
| rinpol | 202.00 | | 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 | 189.00 ± 0.30 | K | NIST Webbook |
| tb | 191.00 ± 0.05 | K | NIST Webbook |
| tb | 188.70 | K | NIST Webbook |
| tb | 191.00 | K | KDB |
| tc | 299.07 ± 0.16 | K | NIST Webbook |
| tc | 299.30 | K | KDB |
| tc | 299.06 ± 0.30 | K | NIST Webbook |

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|---|---|---|---|
| tc | 299.30 ± 0.20 | K | NIST Webbook |
| tc | 299.01 ± 0.02 | K | NIST Webbook |
| tc | 298.95 ± 0.10 | K | NIST Webbook |
| tc | 299.07 | K | NIST Webbook |
| tc | 299.45 ± 0.10 | K | NIST Webbook |
| tf | 117.97 ± 0.05 | K | NIST Webbook |
| tf | 117.97 | K | KDB |
| tf | 113.00 ± 0.50 | K | NIST Webbook |
| tf | 110.20 ± 0.20 | 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 | 47.77 | J/mol×K | 241.20 | Joback Method |
| cpg | 58.07 | J/mol×K | 348.93 | Joback Method |
| cpg | 56.14 | J/mol×K | 327.39 | Joback Method |
| cpg | 54.14 | J/mol×K | 305.84 | Joback Method |
| cpg | 52.08 | J/mol×K | 284.29 | Joback Method |
| cpg | 49.96 | J/mol×K | 262.74 | Joback Method |
| cpg | 45.52 | J/mol×K | 219.65 | 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 | 118.00 | NIST Webbook |
| hfust | 4.06 | kJ/mol | 117.97 | NIST Webbook |
| hsubt | 25.60 | kJ/mol | 103.50 | NIST Webbook |
| hvapt | 16.80 | kJ/mol | 248.00 | 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 |

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|---|---|---|---|---|
| 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 | 591.50 | kPa | 228.50 | 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) |

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|---|---|---|---|---|
| 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) |

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|---|---|---|---|---|
| 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 | 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 | 1028.00 | kPa | 243.76 | Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from (188.31 to 243.76) K |

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|---|---|---|---|---|
| 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) |

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|---|---|---|---|---|
| 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 | 307.80 | kPa | 212.84 | Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from (188.31 to 243.76) K |
| pvap | 4180.00 | kPa | 293.04 | Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3) |
| pvap | 4605.00 | kPa | 297.07 | Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3) |
| 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 |

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|---|---|---|---|---|
| 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 |
| pvap | 4084.00 | kPa | 292.02 | Isothermal (vapour + liquid) equilibrium data for binary systems of (n-hexane + CO2 or CHF3) |
| 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

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|---|---|
| **Isothermal vapour-liquid equilibrium data for the binary systems of (CHF3 or CH2F2) and n-heptane:** | https://www.doi.org/10.1016/j.jct.2016.06.031 |
| **Crippen Method:** | https://www.chemeo.com/doc/models/crippen_log10ws |
| **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 |
| **Sorption of trifluoromethane in zeolites and ionic liquid:** | https://www.doi.org/10.1016/j.jct.2013.04.018 |
| **Solubility of HFCs in lower alcohols:** | https://www.doi.org/10.1016/j.fluid.2011.01.003 |
| **Isothermal vapour-liquid equilibrium data for binary systems of (CHF3 or CH2F2) with (1-hexene or 3-methylpentane):** | https://www.doi.org/10.1016/j.jct.2017.12.002 |
| **KDB:** | https://www.cheric.org/files/research/kdb/mol/mol1521.mol |
| **(Vapour + liquid) equilibria of the {trifluoromethane (HFC-23) + propane} and {trifluoromethane (HFC-23) + butane} systems:** | https://www.doi.org/10.1016/j.jct.2009.06.009 |
| **Vapor-liquid and vapor-liquid-liquid equilibrium measurements and correlation for the trifluoromethane + 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) system:** | https://www.doi.org/10.1016/j.fluid.2017.07.002 |
| **Vapor-liquid equilibria for the trifluoromethane (HFC-23) + tetrafluoromethane (FC-14) system:** | https://www.doi.org/10.1021/je0602622 |
| **Experimental determination of the critical loci for R-23 + (propane or butane) binary mixtures:** | https://www.doi.org/10.1016/j.jct.2016.12.021 |
| **Solubility of hydrofluorocarbons in aromatic solvents and alcohols:** | https://www.doi.org/10.1016/j.fluid.2012.09.013 |
| **Experimental data and modeling with CPA EoS:** | https://www.doi.org/10.1016/j.fluid.2018.07.018 |
| **An isochoric vapor-liquid equilibrium data for the binary systems of CHF3 + n-heptane, n-decane, or 1-phenyloctane:** | https://www.doi.org/10.1016/j.fluid.2018.02.015 |
| **Isothermal Vapor-Liquid Equilibrium Data for Binary Systems of CHF3 or CH2F2 + n-Octane, 1-Octene, or Cyclohexane:** | https://www.doi.org/10.1021/acs.jced.8b00123 |
| **Virial Coefficients from Burnett Measurements for the R23 + N2O System:** | https://www.doi.org/10.1007/s10765-006-0082-x |
| **NIST Webbook:** | http://webbook.nist.gov/cgi/cbook.cgi?ID=C75467&Units=SI |
| **Experimental Determination and Modeling of Bubble and Dew Points in the System CO2 + CHF3:** | https://www.doi.org/10.1021/je800184c |
| **Fluid phase equilibria: the binary system trifluoromethane + 1-phenyloctane:** | https://www.doi.org/10.1016/j.fluid.2010.04.013 |
| **Crippen Method:** | http://pubs.acs.org/doi/abs/10.1021/ci990307l |
| **Solubility of Hydrofluorocarbons in Halobenzene Solvents:** | https://www.doi.org/10.1021/je500525q |
| **Vapor-Liquid Equilibrium Data for the Ethane + Trifluoromethane System at Temperatures from 203.76 to 243.76 K:** | https://www.doi.org/10.1021/je0601107 |
| **Solubilities of hydrofluorocarbons in ionic liquids: Experimental and modeling study:** | https://www.doi.org/10.1016/j.jct.2013.07.013 |
| **McGowan Method:** | http://link.springer.com/article/10.1007/BF02311772 |
| **KDB Pure (Korean Thermophysical Properties Databank):** | https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1521 |
| **Isothermal vapor-liquid equilibrium data for the trifluoromethane (R23) + 2,3,3,3-tetrafluoroprop-1-ene (R1234yf) system at temperatures from 283 to 348 K:** | https://www.doi.org/10.1016/j.fluid.2016.02.005 |
| **PVTx measurements for N2O + CHF3, N2O + CH2F2, and N2O + CHF3 + CH2F2 Systems:** | https://www.doi.org/10.1016/j.fluid.2004.11.021 |
| **Solid Liquid Equilibria for the CO2 + R23 and N2O + R23 Systems:** | https://www.doi.org/10.1007/s10765-008-0511-0 |
| **Solubility of hydrofluorocarbons in phosphonium-based ionic liquids: Experimental and modelling study:** | https://www.doi.org/10.1016/j.jct.2014.08.001 |
| **Joback Method:** | https://en.wikipedia.org/wiki/Joback_method |
| **KDB Vapor Pressure Data:** | https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1521 |

# 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 |
| **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 |
| **zc:** | Critical Compressibility |