Formamide, N-methyl-

Other names:	EK 7011
	HCONHCH3
	METHYLFORMAMIDE
	Monomethylformamide
	N-Methylformamide
	N-Monomethylformamide
	N-methylformamide [NMF]
	N-methylmethanamide
	NSC 3051
	X 188
Inchi:	InChI=1S/C2H5NO/c1-3-2-4/h2H,1H3,(H,3,4)
InchiKey:	ATHHXGZTWNVVOU-UHFFFAOYSA-N
Formula:	C2H5NO
SMILES:	CNC=O
Mol. weight [g/mol]:	59.07
CAS:	123-39-7

Physical Properties

Property code	Value	Unit	Source
affp	851.30	kJ/mol	NIST Webbook
basg	820.30	kJ/mol	NIST Webbook
ea	0.02	eV	NIST Webbook
gf	-44.17	kJ/mol	Joback Method
hf	-116.72	kJ/mol	Joback Method
hfus	8.32	kJ/mol	Joback Method
hvap	56.20	kJ/mol	NIST Webbook
hvap	54.40 ± 1.30	kJ/mol	NIST Webbook
hvap	56.19	kJ/mol	NIST Webbook
ie	9.79	eV	NIST Webbook
ie	9.86	eV	NIST Webbook
ie	9.83 ± 0.04	eV	NIST Webbook
ie	10.00 ± 0.05	eV	NIST Webbook
log10ws	0.38		Crippen Method
logp	-0.638		Crippen Method
mcvol	50.590	ml/mol	McGowan Method
pc	5713.21	kPa	Joback Method
rinpol	793.00		NIST Webbook

rinpol	722.00		NIST Webbook
rinpol	793.00		NIST Webbook
ripol	1615.00		NIST Webbook
ripol	1615.00		NIST Webbook
tb	472.25	K	Separation of azeotrope (allyl alcohol + water): Isobaric vapour-liquid phase equilibrium measurements and extractive distillation
tb	455.70	K	NIST Webbook
tb	471.20	K	Separation of azeotropic mixture (2, 2, 3, 3-Tetrafluoro-1-propanol + water) by extractive distillation: Entrainers selection and vapour-liquid equilibrium measurements
tc	524.37	K	Joback Method
tf	206.96	K	Joback Method
vc	0.200	m3/kmol	Joback Method

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	86.11	J/mol×K	374.05	Joback Method
cpg	81.25	J/mol×K	343.99	Joback Method
cpg	90.79	J/mol×K	404.12	Joback Method
cpg	103.73	J/mol×K	494.31	Joback Method
cpg	95.28	J/mol×K	434.18	Joback Method
cpg	107.70	J/mol×K	524.37	Joback Method
cpg	99.59	J/mol×K	464.24	Joback Method
cpl	126.63	J/mol×K	308.00	NIST Webbook
cpl	126.10	J/mol×K	298.15	NIST Webbook
cpl	123.80	J/mol×K	298.15	NIST Webbook
cpl	122.00	J/mol×K	298.15	NIST Webbook
cpl	125.20	J/mol×K	298.15	NIST Webbook
hfust	10.44	kJ/mol	270.60	NIST Webbook
hvapt	54.50	kJ/mol	350.50	NIST Webbook
hvapt	53.80	kJ/mol	390.00	NIST Webbook
hvapt	53.40	kJ/mol	420.50	NIST Webbook

pvap	101.30	kPa	471.20	Separation of azeotropic mixture (2, 2, 3, 3-Tetrafluoro-1-propanol + water) by extractive distillation: Entrainers selection and vapour-liquid equilibrium measurements
pvap	1.15	kPa	353.15	Vapor liquid equilibria and density measurement for binary mixtures of o-xylene + NMF, m-xylene +NMF and p-xylene +NMF at 333.15 K, 343.15 K and 353.15 K from 0 kPa to 101.3 kPa
pvap	0.37	kPa	333.15	Vapor liquid equilibria and density measurement for binary mixtures of o-xylene + NMF, m-xylene +NMF and p-xylene +NMF at 333.15 K, 343.15 K and 353.15 K from 0 kPa to 101.3 kPa
pvap	0.67	kPa	343.15	Vapor liquid equilibria and density measurement for binary mixtures of o-xylene + NMF, m-xylene +NMF and p-xylene +NMF at 333.15 K, 343.15 K and 353.15 K from 0 kPa to 101.3 kPa
rhol	999.19	kg/m3	298.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium Bis(trifluoromethylsulfonyl)imide with N-Methylformamide and N,N-Dimethylformamide from (293.15 to 323.15) K

rhol	994.65	kg/m3	303.15	Excess molar volumes and excess isentropic compressibilities of binary and ternary mixtures of o-chlorotoluene with cyclic ether and amides or cyclohexane at different temperatures
rhol	990.30	kg/m3	308.15	Excess molar volumes and excess isentropic compressibilities of binary and ternary mixtures of o-chlorotoluene with cyclic ether and amides or cyclohexane at different temperatures
rhol	999.12	kg/m3	298.15	Physico-chemical exploration of solution behaviour of some metal perchlorates prevailing in N-methyl formamide with the manifestation of ion solvent consequences
rhol	998.80	kg/m3	298.15	Excess Molar Volumes and Viscosity Deviations for the Ternary System N,N-Dimethylformamide + N-Methylformamide + Water and the Binary Subsystems at 298.15 K
rhol	1003.59	kg/m3	293.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium Bis(trifluoromethylsulfonyl)imide with N-Methylformamide and N,N-Dimethylformamide from (293.15 to 323.15) K

rhol	999.00	kg/m3	298.15	Excess molar volumes and excess isentropic compressibilities of binary and ternary mixtures of o-chlorotoluene with cyclic ether and amides or cyclohexane at different temperatures
rhol	994.75	kg/m3	303.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium Bis(trifluoromethylsulfonyl)imide with N-Methylformamide and N,N-Dimethylformamide from (293.15 to 323.15) K
rhol	990.33	kg/m3	308.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium Bis(trifluoromethylsulfonyl)imide with N-Methylformamide and N,N-Dimethylformamide from (293.15 to 323.15) K
rhol	990.63	kg/m3	308.15	Solution behavior of {(formamide/N-methylformamide/ N,N-dimethylformamide) + CsCl + water} ternary systems at multiple temperatures
rhol	981.23	kg/m3	318.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium Bis(trifluoromethylsulfonyl)imide with N-Methylformamide and N,N-Dimethylformamide from (293.15 to 323.15) K

rhol	976.57	kg/m3	323.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium Bis(trifluoromethylsulfonyl)imide with N-Methylformamide and N,N-Dimethylformamide from (293.15 to 323.15) K
rhol	1003.35	kg/m3	293.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-Methylpyrrolidinium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	998.91	kg/m3	298.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-Methylpyrrolidinium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	994.49	kg/m3	303.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-Methylpyrrolidinium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K

rhol	990.01	kg/m3	308.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-Methylpyrrolidinium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	985.47	kg/m3	313.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-Methylpyrrolidinium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	980.88	kg/m3	318.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-Methylpyrrolidinium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	976.24	kg/m3	323.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-Methylpyrrolidinium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K

rhol	1003.35	kg/m3	293.15	Volumetric Properties of Binary Mixtures of 1-Butyl-3-Methylimidazolium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	998.91	kg/m3	298.15	Volumetric Properties of Binary Mixtures of 1-Butyl-3-Methylimidazolium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	994.49	kg/m3	303.15	Volumetric Properties of Binary Mixtures of 1-Butyl-3-Methylimidazolium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	990.01	kg/m3	308.15	Volumetric Properties of Binary Mixtures of 1-Butyl-3-Methylimidazolium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K

rhol	999.25	kg/m3	298.15	Solution behavior of {(formamide/N-methylformamide/ N,N-dimethylformamide) + CsCl + water} ternary systems at multiple temperatures
rhol	980.88	kg/m3	318.15	Volumetric Properties of Binary Mixtures of 1-Butyl-3-Methylimidazolium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	1007.94	kg/m3	288.15	Solution behavior of {(formamide/N-methylformamide/ N,N-dimethylformamide) + CsCl + water} ternary systems at multiple temperatures
rhol	785.32	kg/m3	298.15	Binary Liquid-Liquid Equilibrium (LLE) for N-Methylformamide (NMF) + Hexadecane between (288.15 and 318.15) K and Ternary LLE for Systems of NMF + Heterocyclic Nitrogen Compounds + Hexadecane at 298.15 K
rhol	990.30	kg/m3	308.15	Topological and thermodynamic investigations of mixtures containing o-chlorotoluene and lower amides
rhol	994.65	kg/m3	303.15	Topological and thermodynamic investigations of mixtures containing o-chlorotoluene and lower amides

rhol	999.00	kg/m3	298.15	Topological and thermodynamic investigations of mixtures containing o-chlorotoluene and lower amides
rhol	999.36	kg/m3	298.15	PrhoT measurement and PC-SAFT modeling of N,N-dimethyl formamide, N -methyl formamide, N,N-dimethyl acetamide, and ethylenediamine from T = (293.15-423.15) K and pressures up to 35 MPa
rhol	976.24	kg/m3	323.15	Volumetric Properties of Binary Mixtures of 1-Butyl-3-Methylimidazolium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K
rhol	985.78	kg/m3	313.15	Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium Bis(trifluoromethylsulfonyl)imide with N-Methylformamide and N,N-Dimethylformamide from (293.15 to 323.15) K
rhol	985.47	kg/m3	313.15	Volumetric Properties of Binary Mixtures of 1-Butyl-3-Methylimidazolium Tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K

speedsl	1432.86	m/s	298.15	Topological investigations of molecular interactions of binary and ternary mixtures containing tetrahydropyran, o-toluidine and N-methyl formamide
speedsl	1431.91	m/s	298.15	Isentropic compressibilities of (amide + water) mixtures: A comparative study
speedsl	1402.55	m/s	308.15	Topological investigations of molecular interactions of binary and ternary mixtures containing tetrahydropyran, o-toluidine and N-methyl formamide
speedsl	1417.66	m/s	303.15	Topological investigations of molecular interactions of binary and ternary mixtures containing tetrahydropyran, o-toluidine and N-methyl formamide

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/(T + C)
Coeff. A	1.52412e+01
Coeff. B	-4.34038e+03
Coeff. C	-6.40690e+01
Temperature range (K), min.	354.33
Temperature range (K), max.	501.18

Information	Value

Property code	pvap
Equation	ln(Pvp) = A + B/T + C*ln(T) + D*T^2
Coeff. A	7.41690e+01
Coeff. B	-9.24638e+03
Coeff. C	-8.20817e+00
Coeff. D	2.46022e-06
Temperature range (K), min.	269.35
Temperature range (K), max.	721.00

Datasets

Mass density, kg/m3

Pressure, kPa - Liquid	Temperature, K - Liquid	Mass density, kg/m3 - Liquid
100.00	298.15	997.61

Reference *https://www.doi.org/10.1021/je400536f*

Sources

PrhoT measurement and PC-SAFT modeling of N,N-dimethyl formamide, N-methyl formamide, N,N-dimethyl acetamide, and ethylene glycol from T = (298.15 to 423.15) K and pressures up to 40 MPa:	https://www.doi.org/10.1016/j.fluid.2016.08.014
Separation of azeotropic mixture (2, 2, 3, 3-Tetrafluoro-1-propanol + water) by extractive distillation: Entrainer selection and vapour-liquid equilibrium measurements:	https://www.doi.org/10.1016/j.jct.2019.06.026
Liquid-Liquid Equilibrium for Ternary Systems of N-Methylformamide + Sulfolane + Alkanes at 298.15 K: Experiment and Correlation:	https://www.doi.org/10.1021/acs.jced.9b00202
Role of Anions (Tetrafluoroborate, Perchlorate) of Tetrabutylammonium Salts in Determining Solvation Effects Prevailing in Industrially Essential Solvents Probed by Conductance and FT-IR Spectra:	https://www.doi.org/10.1021/je400536f
Joback Method:	https://en.wikipedia.org/wiki/Joback_method
Volumetric Properties of Amino Acids in Aqueous N-Methylformamide Solutions at T = 298.15 K:	https://www.doi.org/10.1021/je1003466
Activity coefficients of NaCl in aqueous mixtures with epsilon-increasing co-solvent: N-methylformamide water mixtures at 298.15 K:	https://www.doi.org/10.1016/j.fluid.2011.08.018
KDB Vapor Pressure Data:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1376
Topological and thermodynamic investigations of mixtures containing o-chlorotoluene and lower amides:	https://www.doi.org/10.1016/j.jct.2013.12.006
Isothermal vapor-liquid equilibria for binary mixtures of benzene, toluene, m-xylene, and N-methylformamide at 333.15K and 353.15K:	https://www.doi.org/10.1016/j.fluid.2009.03.012
Vapor-Liquid Equilibria and Density Measurement for Binary Mixtures of Benzene + Nonane, Methylbenzene + 1,2-Dimethylbenzene, 1,3-Dimethylbenzene + 2,3,4,5-Tetrahydrothiophene-1,1-dioxide (Sulfolane), 1,2-Dimethylbenzene + Sulfolane, 1,2-Dimethylbenzene + N-Methylformamide (NMF), and 1,4-Dimethylbenzene + NMF from (333.15 to 353.15) K at Vacuum Conditions:	https://www.doi.org/10.1021/je100517z
Crippen Method:	https://www.chemeo.com/doc/models/crippen_log10ws
McGowan Method:	http://link.springer.com/article/10.1007/BF02311772
Physico-chemical exploration of solution behaviour of some metal perchlorates prevailing in N-methyl formamide with the manifestation of ion solvent consequences and ...:	https://www.doi.org/10.1016/j.tca.2015.03.023
Separation of azeotrope (allyl alcohol + water): isobaric vapour-liquid phase equilibrium measurements and extractive distillation:	https://www.doi.org/10.1016/j.jct.2017.11.009
Excess Molar Volumes and Viscosity of the Ternary System (N,N-Dimethylformamide + N-Methylformamide + Water and the Binary Subsystems at 298.15 K:	https://www.doi.org/10.1021/je050209y

Crippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
Solution behavior of {(formamide/N-methylformamide/N,N-dimethylformamide) + KCl + water} ternary systems at multiple temperatures:	https://www.doi.org/10.1016/j.jct.2014.05.013
The Yaws Handbook of Vapor Pressure:	https://www.sciencedirect.com/book/9780128029992/the-yaws-handbook-of-vapor-pressure
Excess Enthalpies of (N-Methylformamide or N-Methylacetamide) + Aromatic Compounds at 303.15 K:	https://www.doi.org/10.1021/je700414c
Activity coefficients of NaF in aqueous mixtures with ε-increasing co-solvent: N-methylformamide-water mixtures at 298.15 K:	https://www.doi.org/10.1016/j.fluid.2016.05.019
Binary Liquid-Liquid Equilibrium (LLE) for N-Methylformamide (NMF) + Hexadecane between (288.15 and 318.15) K and Ternary LLE for Systems of NMF + Heterocyclic Nitrogen Compounds + Hexadecane at 298.15 K:	https://www.doi.org/10.1021/je8006265
Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K:	https://www.doi.org/10.1021/je400803f
Vapor-Liquid Equilibria for Four Binary Systems at 363.15 K: N-Methylformamide + Hexane, + Benzene, + Chlorobenzene, and + Acetonitrile:	https://www.doi.org/10.1021/je020130i
KDB (Korean Thermophysical Properties Databank):	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1376
Vapor liquid equilibria and density measurement for binary mixtures of o-xylene + NMF, m-xylene + NMF and p-xylene + NMF at 333.15 K, 343.15 K and 353.15 K from 0 kPa to 101.3 kPa:	https://www.doi.org/10.1016/j.fluid.2009.12.002
Topological investigations of molecular interactions of binary and ternary mixtures containing tetrahydropyran, o-toluidine and N-methyl formamide:	https://www.doi.org/10.1016/j.tca.2011.06.020
NIST Webbook:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C123397&Units=SI
Excess molar volumes and excess isentropic compressibilities of binary and ternary mixtures of o-chlorotoluene with cyclic ether and amides or cyclohexane at different temperatures:	https://www.doi.org/10.1016/j.jct.2014.06.030
Volumetric Properties of Binary Mixtures of 1-Butyl-1-methylpyrrolidinium bis(trifluoromethylsulfonyl)imide with N-Methylformamide and N,N-Dimethylformamide from (293.15 to 323.15) K:	https://www.doi.org/10.1021/je300941v
Volumetric Properties of Binary Mixtures of 1-Butyl-3-methylimidazolium tris(pentafluoroethyl)trifluorophosphate with N-Methylformamide, N-Ethylformamide, N,N-Dimethylformamide, N,N-Dibutylformamide, and N,N-Dimethylacetamide from (293.15 to 323.15) K:	https://www.doi.org/10.1021/je5002945
Isentropic compressibilities of (amide + water) mixtures: A comparative study:	https://www.doi.org/10.1016/j.jct.2007.05.015
KDB:	https://www.cheric.org/files/research/kdb/mol/mol1376.mol

Legend

affp:	Proton affinity
basg:	Gas basicity
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
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
rhol:	Liquid Density
rinpol:	Non-polar retention indices
ripol:	Polar retention indices
speedsl:	Speed of sound in fluid

tb:	Normal Boiling Point Temperature
tc:	Critical Temperature
tf:	Normal melting (fusion) point
vc:	Critical Volume