

Nitrous oxide

Other names:	DINITROGEN MONOXIDE Dinitrogen oxide Factitious air Hyponitrous acid anhydride LAUGHING GAS N2O Nitral Nitrogen monoxide Nitrogen oxide Nitrogen oxide (N2O) UN 1070 UN 2201
Inchi:	InChI=1S/N2O/c1-2-3
InchiKey:	GQPLMRYTRLFLPF-UHFFFAOYSA-N
Formula:	N2O
SMILES:	[N-]=[N+]=O
Mol. weight [g/mol]:	44.01
CAS:	10024-97-2

Physical Properties

Property code	Value	Unit	Source
af	0.1650		KDB
affp	575.20	kJ/mol	NIST Webbook
affp	549.80	kJ/mol	NIST Webbook
basg	523.30	kJ/mol	NIST Webbook
basg	548.70	kJ/mol	NIST Webbook
dm	0.20	debye	KDB
ea	0.27 ± 0.17	eV	NIST Webbook
ea	0.76 ± 0.10	eV	NIST Webbook
ea	0.22 ± 0.10	eV	NIST Webbook
ea	-0.15 ± 0.10	eV	NIST Webbook
gf	103.70	kJ/mol	KDB
hf	81.60	kJ/mol	KDB
ie	12.89 ± 0.01	eV	NIST Webbook
ie	12.89	eV	NIST Webbook
ie	12.89	eV	NIST Webbook
ie	12.89	eV	NIST Webbook

ie	12.89 ± 0.01	eV	NIST Webbook
ie	12.89 ± 0.01	eV	NIST Webbook
ie	12.80 ± 0.05	eV	NIST Webbook
ie	12.90	eV	NIST Webbook
ie	12.89 ± 0.01	eV	NIST Webbook
ie	12.88 ± 0.01	eV	NIST Webbook
ie	12.89 ± 0.00	eV	NIST Webbook
ie	12.91 ± 0.03	eV	NIST Webbook
ie	12.00 ± 1.00	eV	NIST Webbook
ie	12.89	eV	NIST Webbook
ie	12.88 ± 0.01	eV	NIST Webbook
ie	12.89 ± 0.00	eV	NIST Webbook
log10ws	1.67		Crippen Method
logp	-0.158		Crippen Method
mcvol	28.090	ml/mol	McGowan Method
pc	7255.00	kPa	KDB
pc	7234.60 ± 50.66	kPa	NIST Webbook
pc	7270.00 ± 50.00	kPa	NIST Webbook
pc	7238.00 ± 20.00	kPa	NIST Webbook
pt	87.85	kPa	KDB
pt	87.89 ± 0.01	kPa	NIST Webbook
pt	87.91 ± 0.01	kPa	NIST Webbook
rhoc	453.33 ± 2.20	kg/m3	NIST Webbook
rhoc	453.33 ± 4.40	kg/m3	NIST Webbook
rhoc	448.93	kg/m3	NIST Webbook
rinpol	182.00		NIST Webbook
rinpol	182.00		NIST Webbook
tb	184.67	K	KDB
tc	309.49	K	NIST Webbook
tc	309.55 ± 0.50	K	NIST Webbook
tc	309.56 ± 0.15	K	NIST Webbook
tc	309.65 ± 0.20	K	NIST Webbook
tc	309.57	K	KDB
tf	182.30	K	KDB
tt	182.32	K	KDB
tt	181.99	K	Solid Liquid Equilibria for the CO2 + R23 and N2O + R23 Systems
vc	0.097	m3/kmol	KDB
vc	0.096 ± 0.002	m3/kmol	NIST Webbook
zc	0.2734100		KDB
zra	0.28		KDB

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
hfust	6.50	kJ/mol	182.40	NIST Webbook
hsubt	25.10 ± 0.40	kJ/mol	74.00	NIST Webbook
hsubt	24.60	kJ/mol	165.00	NIST Webbook
hsubt	23.60	kJ/mol	113.00	NIST Webbook
hvapt	16.10	kJ/mol	209.00	NIST Webbook
hvapt	16.50	kJ/mol	184.70	NIST Webbook
pvap	3119.90	kPa	273.08	PVT Properties of Dinitrogen Monoxide
pvap	554.70	kPa	219.24	PVT Properties of Dinitrogen Monoxide
pvap	626.30	kPa	222.28	PVT Properties of Dinitrogen Monoxide
pvap	652.80	kPa	223.31	PVT Properties of Dinitrogen Monoxide
pvap	759.60	kPa	227.32	PVT Properties of Dinitrogen Monoxide
pvap	760.60	kPa	227.36	PVT Properties of Dinitrogen Monoxide
pvap	912.10	kPa	232.37	PVT Properties of Dinitrogen Monoxide
pvap	915.40	kPa	232.43	PVT Properties of Dinitrogen Monoxide
pvap	1092.90	kPa	237.49	PVT Properties of Dinitrogen Monoxide
pvap	1294.70	kPa	242.57	PVT Properties of Dinitrogen Monoxide
pvap	1521.90	kPa	247.65	PVT Properties of Dinitrogen Monoxide
pvap	1777.00	kPa	252.73	PVT Properties of Dinitrogen Monoxide
pvap	2061.80	kPa	257.80	PVT Properties of Dinitrogen Monoxide
pvap	2065.40	kPa	257.87	PVT Properties of Dinitrogen Monoxide

pvap	2379.00	kPa	262.90	PVT Properties of Dinitrogen Monoxide
pvap	2381.80	kPa	262.95	PVT Properties of Dinitrogen Monoxide
pvap	2730.60	kPa	267.98	PVT Properties of Dinitrogen Monoxide
pvap	2734.00	kPa	268.03	PVT Properties of Dinitrogen Monoxide
rho1	1226.00	kg/m3	184.00	KDB

Correlations

Information	Value
Property code	pvap
Equation	$\ln(P_{vp}) = A + B/(T + C)$
Coeff. A	1.36769e+01
Coeff. B	-1.26781e+03
Coeff. C	-4.47100e+01
Temperature range (K), min.	182.30
Temperature range (K), max.	309.57

Sources

Isochoric PVTx measurements for the C2H6 + N2O binary system: Crippen Method:	https://www.doi.org/10.1021/je0503148
	https://www.chemeo.com/doc/models/crippen_log10ws
Solid Liquid Equilibria for the CO2 + R23 and N2O + R23 Systems: Vapour pressure and excess Gibbs free energy of the ternary system {x1CH3F N2O + x2R134a + x3R23} at temperature of 182.33 K:	https://www.doi.org/10.1007/s10765-008-0511-0
Physical Solubility and Diffusivity of N2O and CO2 into Aqueous Solutions	https://www.doi.org/10.1016/j.jct.2006.04.010
Solubility of N2O and CO2 in 1-Propanol + pentan-3-ol systems	http://webbook.nist.gov/cgi/cbook.cgi?ID=C10024972&Units=SI
Physical Solubility and Diffusivity of N2O and CO2 into Aqueous Solutions	https://www.doi.org/10.1021/je0301951
Solubility of N2O and CO2 in 1-Propanol + pentan-3-ol systems	https://www.doi.org/10.1016/j.jct.2019.05.017
Physical Solubility and Diffusivity of N2O and CO2 into Aqueous Solutions	https://www.doi.org/10.1021/acs.jced.8b00735
Solubility of N2O and CO2 in 1-Propanol + pentan-3-ol systems	https://www.doi.org/10.1021/je0503913
Physical Solubility and Diffusivity of N2O and CO2 into Aqueous Solutions	https://www.doi.org/10.1007/s10765-011-1150-4
Solubility of N2O and CO2 in 1-Propanol + pentan-3-ol systems	https://www.doi.org/10.1021/acs.jced.7b00112
Physical Solubility and Diffusivity of N2O and CO2 into Aqueous Solutions	https://www.doi.org/10.1021/acs.jced.6b00504
Solubility of N2O and CO2 in 1-Propanol + pentan-3-ol systems	https://www.doi.org/10.1021/je9007926
Physical Solubility and Diffusivity of N2O and CO2 into Aqueous Solutions	http://pubs.acs.org/doi/abs/10.1021/ci9903071

Vapour pressure and excess Gibbs free energy of binary mixtures of hydrogen measurements and correlations, and solubility of N₂O and CO₂ in V33 K: Viscosity of partially CO₂ loaded water and N₂O + R125 Systems: solubility of carbon dioxide in aqueous solutions of

Solubility of N₂O in Density, and Viscosity of Aqueous Solutions of Binary Measurements and Virial Coefficients for the R23+N₂O System: Measurement and Modeling study of physical N₂O solubility in Mequiamine and Correlation of the Physicochemical Properties of Novel Solubility of (2-aminopropylamine and 2,2,2-trifluoroethylamine) diethanolamine for CO₂ capture

Solubility of carbon dioxide, nitrous oxide and methane in ionic liquids at subcritical conditions for the CO₂ + R125 and N₂O + R125 Systems: A New Approach Properties of Dinitrogen Monoxide: Binary Diffusion Coefficient Data of Various Gas Systems Determined Using a Loschmidt Cell and Holographic Interferometry: Physicochemical Properties of Aqueous Solutions of

Solubility of N₂O in Density, and Viscosity of Aqueous Solutions of Binary Measurements and Virial Coefficients for the R23+N₂O System: Measurement and Modeling study of physical N₂O solubility in Mequiamine and Correlation of the Physicochemical Properties of Novel Solubility of (2-aminopropylamine and 2,2,2-trifluoroethylamine) diethanolamine for CO₂ capture

Solubility of carbon dioxide, nitrous oxide, ethane, and nitrogen in MeGowan Method: Automated apparatus for gas solubility measurements: (Vapour + liquid) equilibria of {xCH₃Cl + (1-x)HCl} at temperatures (159.01 and 182.39) K: PVTx Measurements for the N₂O + R125 Binary System: PVTx measurements for N₂O+CH₃F, N₂O+CH₂F₂, and N₂O+ CHF₃ binary systems: Diffusion Coefficients of N₂O in Aqueous Piperazine Solutions Using the Physicochemical Properties of Aqueous Piperazine Salts of Basic Organic Acids as Measurements for CO₂ and N₂O binary system: Virial Coefficients from Burnett Measurements for the R23 + N₂O System:

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Legend

af:	Acentric Factor
affp:	Proton affinity
basg:	Gas basicity
dm:	Dipole Moment
ea:	Electron affinity
gf:	Standard Gibbs free energy of formation
hf:	Enthalpy of formation at standard conditions
hfust:	Enthalpy of fusion at a given temperature
hsubt:	Enthalpy of sublimation at a given temperature
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
pt:	Triple Point Pressure
pvap:	Vapor pressure
rhoc:	Critical density
rhof:	Liquid Density
rinpol:	Non-polar retention indices
tb:	Normal Boiling Point Temperature
tc:	Critical Temperature
tf:	Normal melting (fusion) point
tt:	Triple Point Temperature
vc:	Critical Volume
zc:	Critical Compressibility
zra:	Rackett Parameter

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