nitric acid

Other names: AZOTIC ACID
HYDROGEN NITRATE
Inchi: InChI=1S/HNO3/c2-1(3)4/h(H,2,3,4)
InchiKey: GRYLNZFGIOXLOG-UHFFFAOYSA-N
Formula: HNO3
SMILES: O=[N+]([O-])O
Mol. weight [g/mol]: 63.01
CAS: 7697-37-2

Physical Properties

Property code	Value	Unit	Source
affp	751.40	kJ/mol	NIST Webbook
affp	670.30	kJ/mol	NIST Webbook
basg	731.50	kJ/mol	NIST Webbook
ea	0.57 ± 0.15	eV	NIST Webbook
ea	0.56 ± 0.17	eV	NIST Webbook
gf	-152.15	kJ/mol	Joback Method
hf	-206.32	kJ/mol	Joback Method
hfus	11.21	kJ/mol	Joback Method
hvap	48.86	kJ/mol	Joback Method
ie	11.03 ± 0.01	eV	NIST Webbook
ie	12.20	eV	NIST Webbook
ie	11.96	eV	NIST Webbook
ie	11.95 ± 0.01	eV	NIST Webbook
log10ws	0.44		Crippen Method
logp	-0.348		Crippen Method
mcvol	34.150	ml/mol	McGowan Method
nfpah	%!d(float64=2)		KDB
nfpas	%!d(float64=1)		KDB
pc	8058.04	kPa	Joback Method
tb	443.42	K	Joback Method
tc	648.46	K	Joback Method
tf	294.19	K	Joback Method
vc	0.137	m3/kmol	Joback Method

Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	59.38	J/mol×K	443.42	Joback Method
cpg	61.79	J/mol×K	477.59	Joback Method
cpg	64.07	J/mol×K	511.77	Joback Method
cpg	66.21	J/mol×K	545.94	Joback Method
cpg	68.23	J/mol×K	580.12	Joback Method
cpg	70.12	J/mol×K	614.29	Joback Method
cpg	71.89	J/mol×K	648.46	Joback Method
hvapt	38.60	kJ/mol	314.50	NIST Webbook

Correlations

Information	Value
Property code	pvap
Equation	ln(Pvp) = A + B/(T + C)
Coeff. A	1.54030e+01
Coeff. B	-3.29672e+03
Coeff. C	-5.04600e+01
Temperature range (K), min.	231.55
Temperature range (K), max.	376.10

Sources

NIST Webbook:	http://webbook.nist.gov/cgi/cbook.cgi?ID=C7697372&Units=SI
Thermodynamic Properties of Ternary Solutions in the Water Nitric Acid Rare Earth Nitrate (Pr, Nd, Sm) Systems at 298.15 K:	https://www.doi.org/10.1021/acs.jced.6b00357
Liquid-Liquid Equilibria of Nitrobenzene-Inorganic Acid Systems at 298.15 K:	https://www.doi.org/10.1021/je800878b
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
Crippen Method:	http://pubs.acs.org/doi/abs/10.1021/ci990307l
Thermochemical Analysis on Rare Earth Complex of Gadolinium with Salicylic acid and 8-hydroxyquinoline:	https://www.doi.org/10.1016/j.tca.2012.08.027
KDB:	https://www.cheric.org/research/kdb/hcprop/showprop.php?cmpid=1911
Apparent molar volumes and apparent molar heat capacities of aqueous lead nitrate at temperatures from 278.15 K to 393.15 K and at the pressure 0.35 MPa:	https://www.doi.org/10.1016/j.jct.2003.09.013
Equilibrium Data for the N2O5-HNO3-N2O4 System at 258.2 K, 265.8 K, 273.2 K, and 281.2 K:	https://www.doi.org/10.1021/je800971f
Isobaric ternary vapor-liquid equilibrium: Nitric acid - water - anisole/4-methyl anisole:	https://www.doi.org/10.1016/j.fluid.2011.10.022

Densities and Excess Molar Volumes of the Ternary System N2O4 + H2O + HNO3 at 278.15 K, 283.15 K, 288.15 K, and 293.15 K:	https://www.doi.org/10.1021/je101357s
Effect of 1-ethyl-3-methylimidazolium tetrafluoroborate on the phase equilibria for systems containing 5-hydroxymethylfurfural, water, organic solvent in the absence and presence of sodium chloride:	https://www.doi.org/10.1016/j.jct.2019.01.001
Crippen Method:	https://www.chemeo.com/doc/models/crippen_log10ws
McGowan Method:	http://link.springer.com/article/10.1007/BF02311772
Distillation Separation of Hydrofluoric Acid and Nitric Acid From Acid Waste using the Salt Effect on Vapor-Liquid Equilibrium :	https://www.doi.org/10.1007/s10765-010-0904-8

Legend

affp:	Proton affinity
basg:	Gas basicity
cpg:	Ideal gas 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
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
nfpah:	NFPA Health Rating
nfpas:	NFPA Safety Rating
pc:	Critical Pressure
pvap:	Vapor pressure
tb:	Normal Boiling Point Temperature
tc:	Critical Temperature
tf:	Normal melting (fusion) point
vc:	Critical Volume