

## Piperazine, 1,4-dimethyl-

<b>Other names:</b>	1,4-Dimethylpiperazine Lupetazine N,N'-Dimethylpiperazine N,N'-Dimethylpiperazine Texacat DMP piperazine, N,N'-dimethyl-
<b>Inchi:</b>	InChI=1S/C6H14N2/c1-7-3-5-8(2)6-4-7/h3-6H2,1-2H3
<b>InchiKey:</b>	RXYPXQSKLGGKOL-UHFFFAOYSA-N
<b>Formula:</b>	C6H14N2
<b>SMILES:</b>	CN1CCN(C)CC1
<b>Mol. weight [g/mol]:</b>	114.19
<b>CAS:</b>	106-58-1

## Physical Properties

Property code	Value	Unit	Source
hvap	41.20 ± 0.40	kJ/mol	NIST Webbook
hvap	43.80 ± 0.30	kJ/mol	NIST Webbook
ie	8.77	eV	NIST Webbook
log10ws	0.63		Crippen Method
logp	-0.136		Crippen Method
mcvol	104.500	ml/mol	McGowan Method
tb	404.15 ± 0.30	K	NIST Webbook
tb	403.65 ± 1.50	K	NIST Webbook
tc	606.00	K	Critical temperatures and pressures of caprolactam, dimethyl sulfoxide, 1,4-dimethylpiperazine, and 2,6-dimethylpiperazine
tf	272.15 ± 0.20	K	NIST Webbook

## Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
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cpl	235.90	J/mol×K	353.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	221.70	J/mol×K	303.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	222.10	J/mol×K	308.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	231.70	J/mol×K	348.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	229.60	J/mol×K	343.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	228.50	J/mol×K	338.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	227.50	J/mol×K	333.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	225.70	J/mol×K	328.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	225.30	J/mol×K	323.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	224.60	J/mol×K	318.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K

cpl	223.40	J/molxK	313.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
cpl	216.50	J/molxK	298.15	Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 353.15) K
hvapt	41.60	kJ/mol	297.50	NIST Webbook
hvapt	44.30 ± 0.30	kJ/mol	289.50	NIST Webbook
hvapt	41.20	kJ/mol	298.15	Vapour pressure and enthalpy of vaporization of aliphatic poly-amines
pvap	3.60	kPa	313.79	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	4.75	kPa	319.53	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	2.70	kPa	308.08	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols

pvap	2.24	kPa	304.32	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	2.18	kPa	303.82	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	2.02	kPa	302.54	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	1.79	kPa	300.21	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	1.60	kPa	298.16	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols

pvap	1.23	kPa	293.52	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	1.13	kPa	292.03	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	0.79	kPa	286.01	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	0.58	kPa	281.23	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
pvap	0.42	kPa	276.29	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols

pvap	3.06	kPa	310.37	Vapor Pressure and Its Temperature Dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols
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## Pressure Dependent Properties

Property code	Value	Unit	Pressure [kPa]	Source
tbrp	404.70	K	100.00	NIST Webbook

## Correlations

Information	Value
Property code	pvap
Equation	$\ln(P_{vp}) = A + B/(T + C)$
Coeff. A	1.55296e+01
Coeff. B	-3.82598e+03
Coeff. C	-5.35040e+01
Temperature range (K), min.	272.56
Temperature range (K), max.	427.94

## Sources

NIST Webbook:	<a href="http://webbook.nist.gov/cgi/cbook.cgi?ID=C106581&amp;Units=SI">http://webbook.nist.gov/cgi/cbook.cgi?ID=C106581&amp;Units=SI</a>
McGowan Method:	<a href="http://link.springer.com/article/10.1007/BF02311772">http://link.springer.com/article/10.1007/BF02311772</a>
Molar Heat Capacity (Cp) of Aqueous Cyclic Amine Solutions from (298.15 to 350.0) K:	<a href="https://www.doi.org/10.1021/je400178k">https://www.doi.org/10.1021/je400178k</a>
Vapor pressure and enthalpy of vaporization of aliphatic poly-amines:	<a href="https://www.doi.org/10.1016/j.jct.2009.09.003">https://www.doi.org/10.1016/j.jct.2009.09.003</a>
Critical temperatures and pressures of caprolactam, dimethyl sulfoxide, and dimethyl sulfoxide:	<a href="https://www.doi.org/10.1016/j.fluid.2018.05.029">https://www.doi.org/10.1016/j.fluid.2018.05.029</a>
Vapor pressure and its temperature dependence of 28 Organic Compounds: Cyclic Amines, Cyclic Ethers, and Cyclic and Open Chain Secondary Alcohols.	<a href="https://www.doi.org/10.1021/acs.jced.6b00576">https://www.doi.org/10.1021/acs.jced.6b00576</a>
The Yaws Handbook of Vapor Pressure:	<a href="https://www.chemeo.com/doc/models/crippen_log10ws">https://www.chemeo.com/doc/models/crippen_log10ws</a>
	<a href="https://www.sciencedirect.com/book/9780128029992/the-yaws-handbook-of-vapor-pressure">https://www.sciencedirect.com/book/9780128029992/the-yaws-handbook-of-vapor-pressure</a>

Crippen Method:

<http://pubs.acs.org/doi/abs/10.1021/ci990307l>

Molar excess enthalpy (Hm E) for  
systems of aqueous piperazine  
derivatives:

<https://www.doi.org/10.1016/j.jct.2015.06.006>

## Legend

<b>cpl:</b>	Liquid phase heat capacity
<b>hvap:</b>	Enthalpy of vaporization at standard conditions
<b>hvapt:</b>	Enthalpy of vaporization at a given temperature
<b>ie:</b>	Ionization energy
<b>log10ws:</b>	Log10 of Water solubility in mol/l
<b>logp:</b>	Octanol/Water partition coefficient
<b>mcvol:</b>	McGowan's characteristic volume
<b>pvap:</b>	Vapor pressure
<b>tb:</b>	Normal Boiling Point Temperature
<b>tbrp:</b>	Boiling point at reduced pressure
<b>tc:</b>	Critical Temperature
<b>tf:</b>	Normal melting (fusion) point

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