

# 4,7-Methano-1H-indene, octahydro-

<b>Other names:</b>	2,3-Trimethylenenorbornane 4,7-Methanoindan, hexahydro- 4,7-methano-1H-indene, octahydro-, (3a.alpha.,4.alpha.,7.alpha.,7a.alpha.)- 4,7-methano-1H-indene, octahydro-, (3a.alpha.,4.beta.,7.beta.,7a.alpha.)- 4,7-methanoindan, hexahydro-, endo- 4,7-methanoindan, hexahydro-, exo- Bicyclo(2.2.1)heptane, 2,3-(1,3-propanediyl)- Hexadyro, 4,7-methaneindene Hexahydro-4,7-methanoindan JP-10 NSC 22464 Norbornane, 2,3-trimethylene- Octahydro-4,7-methano indene Octahydro-4,7-methano-1H-indene Tetrahydrocyclopentadiene dimer Tetrahydromethylcyclopentadiene Tricyclo(5.2.1.0(2,6))decane Tricyclo[5.1.0-2.6]decane Tricyclo[5.2.1.0(sup2,6)]decane Trimethylenenorbornane endo-tetrahydromethylcyclopentadiene endo-tricyclo[5.2.1.0(2,6)]decane exo-3,4,8,9-tetrahydromethylcyclopentadiene exo-5,6-trimethylenenorbornane exo-octahydro-4,7-methano-1H-indene exo-tetrahydromethylcyclopentadiene exo-tetrahydromethylcyclopentadiene exo-tricyclo[5.2.1.02,6]decane exo-trimethylenenorbornane jp10 tricyclo[5.2.1.02,6]decane
<b>Inchi:</b>	InChI=1S/C10H16/c1-2-9-7-4-5-8(6-7)10(9)3-1/h7-10H,1-6H2
<b>InchiKey:</b>	LPSXSORODABQKT-UHFFFAOYSA-N
<b>Formula:</b>	C10H16
<b>SMILES:</b>	C1CC2C3CCC(C3)C2C1
<b>Mol. weight [g/mol]:</b>	136.23
<b>CAS:</b>	6004-38-2

# Physical Properties

Property code	Value	Unit	Source
chs	-6084.40	kJ/mol	NIST Webbook
chs	-6109.00 ± 3.00	kJ/mol	NIST Webbook
gf	195.76	kJ/mol	Joback Method
hf	-60.20 ± 3.80	kJ/mol	NIST Webbook
hfs	-113.10 ± 2.50	kJ/mol	NIST Webbook
hfus	15.03	kJ/mol	Joback Method
hsub	52.90 ± 1.30	kJ/mol	NIST Webbook
hsub	52.90	kJ/mol	NIST Webbook
hsub	53.00 ± 1.00	kJ/mol	NIST Webbook
hvap	37.46	kJ/mol	Joback Method
ie	9.30	eV	NIST Webbook
log10ws	-2.73		Crippen Method
logp	2.833		Crippen Method
mcvol	119.180	ml/mol	McGowan Method
pc	3100.18	kPa	Joback Method
rinpol	1078.00		NIST Webbook
rinpol	1077.60		NIST Webbook
ripol	1243.40		NIST Webbook
ripol	1243.40		NIST Webbook
ripol	1243.00		NIST Webbook
tb	448.02	K	Joback Method
tc	661.62	K	Joback Method
tf	352.00 ± 1.00	K	NIST Webbook
vc	0.458	m3/kmol	Joback Method

# Temperature Dependent Properties

Property code	Value	Unit	Temperature [K]	Source
cpg	348.41	J/mol×K	590.42	Joback Method
cpg	293.60	J/mol×K	483.62	Joback Method
cpg	313.20	J/mol×K	519.22	Joback Method
cpg	331.44	J/mol×K	554.82	Joback Method
cpg	378.92	J/mol×K	661.62	Joback Method
cpg	364.21	J/mol×K	626.02	Joback Method
cpg	272.54	J/mol×K	448.02	Joback Method
cps	241.40	J/mol×K	329.00	NIST Webbook

dvisc	0.0027696	Paxs	298.15	Densities and Viscosities of exo-Tetrahydrodicyclopentadiene + n-Butanol and exo-Tetrahydrodicyclopentadiene + n-Pentanol at Temperatures of (293.15 to 313.15) K
dvisc	0.0025194	Paxs	303.15	Densities and Viscosities of exo-Tetrahydrodicyclopentadiene + n-Butanol and exo-Tetrahydrodicyclopentadiene + n-Pentanol at Temperatures of (293.15 to 313.15) K
dvisc	0.0020936	Paxs	313.15	Densities and Viscosities of exo-Tetrahydrodicyclopentadiene + n-Butanol and exo-Tetrahydrodicyclopentadiene + n-Pentanol at Temperatures of (293.15 to 313.15) K
dvisc	0.0021120	Paxs	313.15	Densities and Viscosities of Binary Mixtures of exo-Tetrahydrodicyclopentadiene with N-Undecane or N-Tetradecane at T = (293.15 to 313.15) K
dvisc	0.0025250	Paxs	303.15	Densities and Viscosities of Binary Mixtures of exo-Tetrahydrodicyclopentadiene with N-Undecane or N-Tetradecane at T = (293.15 to 313.15) K
dvisc	0.0027840	Paxs	298.15	Densities and Viscosities of Binary Mixtures of exo-Tetrahydrodicyclopentadiene with N-Undecane or N-Tetradecane at T = (293.15 to 313.15) K
dvisc	0.0030770	Paxs	293.15	Densities and Viscosities of Binary Mixtures of exo-Tetrahydrodicyclopentadiene with N-Undecane or N-Tetradecane at T = (293.15 to 313.15) K

dvisc	0.0030760	Paxs	293.15	Densities and Viscosities of Binary Mixtures of exo-Tetrahydrodicyclopentadiene with N-Undecane or N-Tetradecane at T = (293.15 to 313.15) K
dvisc	0.0030764	Paxs	293.15	Densities and Viscosities of exo-Tetrahydrodicyclopentadiene + n-Butanol and exo-Tetrahydrodicyclopentadiene + n-Pentanol at Temperatures of (293.15 to 313.15) K
hfust	3.07	kJ/mol	345.30	NIST Webbook
hfust	2.95	kJ/mol	352.00	NIST Webbook
hfust	2.95	kJ/mol	352.00	NIST Webbook
hfust	2.95	kJ/mol	352.00	NIST Webbook
hvapt	43.50	kJ/mol	411.50	NIST Webbook
hvapt	46.00	kJ/mol	425.50	NIST Webbook
pvap	85.00	kPa	456.82	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydrodicyclopentadiene and pure component vapor pressures
pvap	100.00	kPa	462.76	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydrodicyclopentadiene and pure component vapor pressures
pvap	101.60	kPa	463.60	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydrodicyclopentadiene and pure component vapor pressures

pvap	50.00	kPa	436.48	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	80.00	kPa	454.45	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	95.00	kPa	460.90	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	90.00	kPa	458.86	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	55.00	kPa	440.06	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	60.00	kPa	443.43	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures

pvap	65.00	kPa	446.40	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	2.00	kPa	344.02	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	75.00	kPa	451.93	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	5.00	kPa	367.23	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	10.00	kPa	384.68	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	15.00	kPa	396.77	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures

pvap	20.00	kPa	405.51	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	25.00	kPa	412.50	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	30.00	kPa	418.51	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	35.00	kPa	423.84	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	40.00	kPa	428.42	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
pvap	45.00	kPa	432.64	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures

pvap	3.50	kPa	358.17	Vapor liquid equilibrium, densities and viscosities for the binary system exo- and endo-tetrahydroncyclopentadiene and pure component vapor pressures
rhol	935.88	kg/m3	293.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydroncyclopentadiene + 1,3-Dimethyladamantane
rhol	932.00	kg/m3	298.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydroncyclopentadiene + 1,3-Dimethyladamantane
rhol	896.61	kg/m3	343.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydroncyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	900.56	kg/m3	338.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydroncyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	904.52	kg/m3	333.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydroncyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries

rhol	908.46	kg/m3	328.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydrodicyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	912.40	kg/m3	323.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydrodicyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	916.33	kg/m3	318.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydrodicyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	920.26	kg/m3	313.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydrodicyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	924.17	kg/m3	308.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydrodicyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	928.08	kg/m3	303.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydrodicyclopentadiene + 1,3-Dimethyladamantane

rhol	928.06	kg/m3	303.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydrodicyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	931.95	kg/m3	298.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydrodicyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	935.85	kg/m3	293.15	Densities and Viscosities for the Ternary Mixtures of exo-Tetrahydrodicyclopentadiene (1) + Isopropylcyclohexane (2) + Methyl Laurate (3) and Corresponding Binaries
rhol	904.50	kg/m3	333.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydrodicyclopentadiene + 1,3-Dimethyladamantane
rhol	908.44	kg/m3	328.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydrodicyclopentadiene + 1,3-Dimethyladamantane
rhol	912.38	kg/m3	323.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydrodicyclopentadiene + 1,3-Dimethyladamantane

rh <sub>ol</sub>	916.31	kg/m <sup>3</sup>	318.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydrodicyclopentadiene + 1,3-Dimethyladamantane
rh <sub>ol</sub>	920.24	kg/m <sup>3</sup>	313.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydrodicyclopentadiene + 1,3-Dimethyladamantane
rh <sub>ol</sub>	924.16	kg/m <sup>3</sup>	308.15	Density and Viscosity of Ternary Mixture of Cyclopentanol + exo-Tetrahydrodicyclopentadiene + 1,3-Dimethyladamantane
sf <sub>ust</sub>	8.40	J/mol×K	352.00	NIST Webbook
srf	0.03	N/m	293.15	Density, Refractive Index, Viscosity, and Surface Tension of Binary Mixtures of exo-Tetrahydrodicyclopentadiene with Some n-Alkanes from (293.15 to 313.15) K
srf	0.03	N/m	303.15	Density, Refractive Index, Viscosity, and Surface Tension of Binary Mixtures of exo-Tetrahydrodicyclopentadiene with Some n-Alkanes from (293.15 to 313.15) K

## Datasets

### Molar heat capacity at constant pressure, J/K/mol

Temperature, K - Liquid

Pressure, kPa - Liquid

Molar heat capacity at constant pressure, J/K/mol - Liquid

323.34	100.00	219.49
323.37	1030.00	219.39
323.37	2050.00	218.99
323.35	3070.00	218.80
323.34	4000.00	218.30
323.34	5020.00	218.14
323.35	6080.00	217.34
333.20	100.00	224.40
333.20	1070.00	224.39
333.21	2020.00	224.41
333.20	3000.00	223.84
333.16	3990.00	223.29
333.17	5040.00	223.42
333.17	5990.00	223.32
343.01	100.00	230.29
343.03	1090.00	230.02
343.06	2070.00	229.60
343.06	3060.00	229.00
343.09	4000.00	229.50
343.09	5030.00	228.72
343.09	6000.00	229.08
353.59	100.00	234.98
353.61	1080.00	234.61
353.61	2010.00	234.35
353.62	3070.00	234.12
353.59	4080.00	234.11
353.59	5070.00	234.17
353.60	6090.00	233.83
363.48	100.00	240.37
363.53	1070.00	240.28
363.53	2030.00	240.09
363.53	2990.00	239.97
363.54	4080.00	239.88
363.54	5000.00	239.76
363.55	6020.00	239.67
383.60	100.00	249.31
383.60	1000.00	248.82
383.61	2020.00	248.80
383.58	3060.00	248.68
383.58	4010.00	248.49
383.59	5070.00	248.39
383.60	5990.00	248.35
403.36	100.00	260.34
403.36	1020.00	259.74

403.37	2060.00	259.23
403.38	3040.00	258.89
403.38	4010.00	257.41
403.39	5000.00	256.93
403.40	6070.00	256.62
423.21	100.00	271.95
423.20	1020.00	271.44
423.20	2050.00	270.28
423.20	3010.00	268.73
423.25	4020.00	267.73
423.26	4980.00	267.54
423.27	6000.00	266.96
443.15	240.00	284.80
443.14	1030.00	284.05
443.13	2050.00	283.43
443.11	3110.00	282.78
443.17	4060.00	282.05
443.19	5030.00	281.38
443.18	6050.00	280.75
463.17	230.00	301.77
463.18	1060.00	300.31
463.16	2040.00	298.88
463.20	3000.00	299.41
463.19	4070.00	297.53
463.21	5010.00	297.44
463.22	6020.00	296.56
483.42	470.00	321.27
483.39	1020.00	319.24
483.31	2050.00	316.76
483.32	3040.00	315.54
483.37	4030.00	315.19
483.38	5080.00	314.31
483.37	6060.00	314.11
503.30	480.00	338.70
503.28	1020.00	336.59
503.28	2040.00	334.35
503.28	3050.00	333.03
503.29	4090.00	330.60
503.29	5070.00	331.61
503.30	6000.00	331.50
523.47	500.00	355.43
523.45	1030.00	352.98
523.45	2060.00	350.70
523.44	3010.00	348.07

523.50	4000.00	346.42
523.49	5040.00	345.42
523.49	6180.00	344.08

Reference

<https://www.doi.org/10.1016/j.fluid.2016.11.031>

## Sources

### Joback Method:

[https://en.wikipedia.org/wiki/Joback\\_method](https://en.wikipedia.org/wiki/Joback_method)

### Density and Viscosity of Ternary Mixture of Cyclopentanol +

[McGowan Method:](https://www.doi.org/10.1021/acs.jced.9b00074)

### 1,3-Dimethyladamantane:

[Density, Refractive Index, Viscosity, and Surface Tension of Binary Mixtures](http://link.springer.com/article/10.1007/BF02311772)

### Crippen Method:

[Densities and Viscosities of](https://www.chemeo.com/doc/models/crippen_log10ws)

### exo-Tetrahydrocyclopentadiene +

[Isobaric heat capacities of](https://www.doi.org/10.1021/je9005129)

### exo-Tetrahydrocyclopentadiene at

[constant temperature 523\(293\)16](https://www.doi.org/10.1016/j.fluid.2016.11.031)

pressures up to 6 MPa:

[Crippen Method:](http://pubs.acs.org/doi/abs/10.1021/ci990307l)

### Vapor liquid equilibrium, densities and viscosities for the binary system exo-

[Densities and Viscosities for the](https://www.doi.org/10.1016/j.fluid.2006.09.024)

### Ternary Mixture vapor pressures:

[exo-Tetrahydrocyclopentadiene\(1\) +](https://www.doi.org/10.1021/acs.jced.9b00397)

[Mixtures of cyclohexane \(2\) + Methyl](https://www.doi.org/10.1021/je100313a)

[exo-Tetrahydrocyclopentadiene with](https://www.doi.org/10.1016/j.fluid.2016.11.031)

[N-Hexadecane or N-Tetradecane at T =](https://www.doi.org/10.1016/j.fluid.2016.11.031)

[\(293.15 to 313.15\) K:](https://www.doi.org/10.1016/j.fluid.2016.11.031)

## Legend

**chs:** Standard solid enthalpy of combustion

**cpg:** Ideal gas heat capacity

**cpl:** Liquid phase heat capacity

**cps:** Solid phase heat capacity

**dvisc:** Dynamic viscosity

**gf:** Standard Gibbs free energy of formation

**hf:** Enthalpy of formation at standard conditions

**hfs:** Solid phase enthalpy of formation at standard conditions

**hfus:** Enthalpy of fusion at standard conditions

**hfust:** Enthalpy of fusion at a given temperature

**hsub:** Enthalpy of sublimation 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

<b>logP:</b>	Octanol/Water partition coefficient
<b>mcvol:</b>	McGowan's characteristic volume
<b>pc:</b>	Critical Pressure
<b>pvap:</b>	Vapor pressure
<b>rhol:</b>	Liquid Density
<b>rinpol:</b>	Non-polar retention indices
<b>ripol:</b>	Polar retention indices
<b>sfust:</b>	Entropy of fusion at a given temperature
<b>srf:</b>	Surface Tension
<b>tb:</b>	Normal Boiling Point Temperature
<b>tc:</b>	Critical Temperature
<b>tf:</b>	Normal melting (fusion) point
<b>vc:</b>	Critical Volume

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