

93028

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Vapour pressures and critical points of liquids

Fused ring compounds

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THE PREPARATION OF THIS DATA ITEM

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in consultation with Dr D.Ambrose.

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KEEPING UP TO DATE

We are constantly striving to develop new work and review data already issued. Any comments arising out of your use of our data, or any suggestions for new topics or information that might lead to improvements, will help us to provide a better service.

(Continued on inside back cover)

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VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS
FUSED RING COMPOUNDS

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COMPOUND TABLES in the following order

Sheet	Formula	Name	Alternative Names
1.00	C ₉ H ₈	Indene	
1.01	C ₉ H ₁₀	Indane	2,3-Dihydroindene
1.02a	C ₉ H ₁₆	cis-Hexahydroindane	*cis-Octahydroindene
1.02b	C ₉ H ₁₆	trans-Hexahydroindane	*trans-Octahydroindene
1.20	C ₁₁ H ₁₄	1,1-Dimethylindane	1,1-Dimethyl-2,3-dihydroindene
2.00	C ₁₀ H ₈	Naphthalene	
2.01	C ₁₀ H ₁₂	1,2,3,4-Tetrahydronaphthalene	Tetralin
2.02	C ₁₀ H ₁₈	Decalin (cis + trans mixture)	*Decahydronaphthalene
2.02a	C ₁₀ H ₁₈	cis-Decahydronaphthalene	*cis-Decalin
2.02b	C ₁₀ H ₁₈	trans-Decahydronaphthalene	*trans-Decalin
2.10a	C ₁₁ H ₁₀	1-Methylnaphthalene	
2.10b	C ₁₁ H ₁₀	2-Methylnaphthalene	
2.11a	C ₁₁ H ₁₄	5-Methyl-1,2,3,4-tetrahydronaphthalene	5-Methyltetralin
2.11b	C ₁₁ H ₁₄	6-Methyl-1,2,3,4-tetrahydronaphthalene	6-Methyltetralin
2.20a	C ₁₂ H ₁₂	1-Ethylnaphthalene	
2.20b	C ₁₂ H ₁₂	2-Ethylnaphthalene	
2.20c	C ₁₂ H ₁₂	1,2-Dimethylnaphthalene	
2.20d	C ₁₂ H ₁₂	1,3-Dimethylnaphthalene	
2.20e	C ₁₂ H ₁₂	1,4-Dimethylnaphthalene	
2.20f	C ₁₂ H ₁₂	1,5-Dimethylnaphthalene	
2.20g	C ₁₂ H ₁₂	1,6-Dimethylnaphthalene	
2.20h	C ₁₂ H ₁₂	1,7-Dimethylnaphthalene	
2.20i	C ₁₂ H ₁₂	1,8-Dimethylnaphthalene	
2.20j	C ₁₂ H ₁₂	2,3-Dimethylnaphthalene	
2.20k	C ₁₂ H ₁₂	2,6-Dimethylnaphthalene	
2.20l	C ₁₂ H ₁₂	2,7-Dimethylnaphthalene	
2.30a	C ₁₃ H ₁₄	1-Propylnaphthalene	
2.30b	C ₁₃ H ₁₄	2-Propylnaphthalene	
2.30c	C ₁₃ H ₁₄	1-Isopropylnaphthalene	1-(1-Methylethyl)-naphthalene
2.30d	C ₁₃ H ₁₄	2-Isopropylnaphthalene	2-(1-Methylethyl)-naphthalene
3.00	C ₁₂ H ₁₀	Acenaphthene	
4.00	C ₁₃ H ₁₀	Fluorene	
5.00a	C ₁₄ H ₁₀	Anthracene	
5.00b	C ₁₄ H ₁₀	Phenanthrene	
6.00	C ₁₆ H ₁₀	Fluoranthene	
6.01	C ₁₆ H ₁₀	Pyrene	
✓8.00	C ₁₂ H ₉ N	Carbazole	

* For these compounds other alternative names are shown at the head of the relevant Sheets.
NB. To allow for the future issue of omitted compounds sheet numbers are not always consecutive.

VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS FUSED RING COMPOUNDS

1. INTRODUCTION

This Data Item presents saturated vapour pressures of the fused ring compounds shown in the order of arrangement on the Contents page. Space permits the listing of only one alternative name for each compound but for some compounds an additional alternative name is shown at the head of the relevant Sheet.

Table 1, page 5, gives the constants in the Wagner vapour pressure equation for all the compounds. On the following Sheets, the values of vapour pressure for each compound have been obtained by calculation from the Wagner vapour-pressure equation given at the top of each Sheet. Using the critical temperature and the critical pressure given, the numerical values of the coefficients were derived by fitting the equation to the data that had been selected and weighted in accordance with a critical assessment of all the data. Note that estimated values of critical temperature are rounded to the nearest kelvin and that values in other units are obtained by exact conversion.

The Sheets also give the acentric factor, the normal boiling point, the value of dT/dp at the normal boiling point and the approximate normal melting point. Brackets enclose data at those temperatures which are outside the range of supporting experimental data.

The table of Data at Specified Pressures for each compound gives, at each pressure, the temperature and the derivative of pressure with respect to temperature. In addition this table also gives an assessment of the data quality indicated, in decreasing order, by one of the letters 'A', 'B' or 'C'. Except at very low pressures, the estimated uncertainties in temperature and pressure which are dependent upon the data quality are shown below each letter rounded to 1, 2, or 5 times a power of 10. Uncertainties are discussed at greater length in Section 5.

Tabulated values of vapour pressure are presented in two sets of units, namely, (i) pressures in kPa at temperatures in kelvins, (ii) pressures in mmHg or atm at temperatures in degrees C. The table providing pressures in kPa also gives the uncertainties in pressure and temperature. Where justified, pressures are given at temperatures from just above the melting point to just below the critical point. To make maximum use of the space available, a larger temperature interval is frequently used at low temperatures. For compounds with very high estimated critical temperatures the tables are usually truncated at a convenient temperature somewhat less than the critical value. For compounds for which the available data are low in extent or quality the tabulated values are terminated at a few atmospheres pressure.

The sources of information which give vapour pressure and/or critical point data for the compound considered are listed on the reverse side of each sheet. Those sources that were used to derive the critical properties and the coefficients of the vapour pressure equation are shown in bold type together with the pressure ranges of their data. These arbitrary pressure ranges are described in Section 3.

2. NOTATION AND UNITS

All temperatures are based on the International Temperature Scale (ITS-90). On ITS-90 kelvin temperatures are strictly called International Kelvin Temperatures, similarly Celsius temperatures are strictly called International Celsius Temperatures.

N_1, N_2, N_3, N_4	non-dimensional coefficients of the Wagner vapour-pressure equation
p	vapour pressure
q	$(1-T/T_c)$
T	kelvin temperature
t	Celsius temperature ($T-273.15$) or Fahrenheit temperature ($9T/5-459.67$)

Note. The UNITS of temperature and vapour pressure are shown in each table.

Subscripts

b	denotes value at normal boiling point
c	denotes value at critical point
m	denotes value at normal melting point

3. SOURCES OF DATA

Experimental vapour pressure data are, according to the apparatus and technique applied, usually reported for different pressure regions which may loosely be defined as:-

- low pressure, below say 1 kPa (approximately 7.5 mmHg),
- medium pressure, say 1 kPa to 200 kPa (approximately 2 atm),
- high pressure, say 200 kPa to the critical point,
- the critical point.

The experimental data reported for the low and high pressure ranges are usually less accurate than, and not always compatible with, data for the medium pressure range, which may be of a very high degree of precision, possibly with an uncertainty in pressure less than 0.01 per cent near the normal boiling point. In the high pressure range the uncertainties increase progressively with temperature up to the critical point where the uncertainty in pressure is seldom lower than 0.1 per cent and frequently higher than 1 per cent.

Very reliable medium pressure range measurements have been made on nine of the compounds considered here and for three of these, indane, naphthalene and tetralin the critical temperature and the critical pressure have also been measured. The critical temperatures only of another five of these compounds have also been measured. Reliable low pressure data exist for eight of the compounds and the triple point of naphthalene has also been determined.

4. EVALUATION AND CORRELATION

In References 4 and 5 Ambrose has examined the differences, in the high pressure range, between the shapes of well-established vapour pressure curves for a variety of compounds. He has shown that for compounds in different classes of chemical substances these differences in shape are characterised by different ranges of numerical relationships between the coefficients of their Wagner equations. In Reference 6 Ambrose and Walton have demonstrated this phenomenon for the two homologous series of normal alkanes and alkan-1-ols. Thus, for certain classes of compounds

it is possible to establish criteria that should be met by vapour-pressure curves based on less extensive or less reliable data.

In Reference 3 Ambrose and Davies show how very low vapour pressures may be obtained from the differences between the ideal gas heat capacity and the liquid heat capacity at various temperatures. The procedure involves two integrations and, rigorous treatment also requires the liquid molar volume and the second virial coefficient of the vapour. Low range vapour pressures obtained in this way were included in the data used to derive the vapour-pressure equations of nearly all of the alkanes in Reference 6 but, in general, were not available for the alkanols.

In Reference 7 Watson, reversing the procedure, derived the difference between the ideal gas and liquid heat capacities from the the second differential of the Wagner vapour-pressure equation. He plotted this difference against reduced temperature from the melting point to the normal boiling point for all the alkanes and alkanols in Reference 7. Although only valid up to reduced temperatures of about 0.5 these were shown to be a well ordered, uniformly varying set of curves for both series. Denoting the differences between the ideal gas and liquid heat capacities at reduced temperatures of 0.3 and 0.5 by, say, D_3 and D_5 respectively, it was noted that for the alkanes from propane to hexadecane, the variation of D_3/D_5 with D_5 could be represented by a straight line without significant error.

For the compounds considered here the unconstrained extrapolations of the vapour pressure curves of the compounds with the most extensive reliable data yielded values of D_3/D_5 which were not inconsistent with the line for the alkanes. The equations of these compounds were then used to derive a correlation which was similar in form to that derived for the alkanes, see Items 84022, 84028 and 85002. The vapour pressure equations of the fused-ring hydrocarbons with less extensive or less reliable data were the obtained by using this correlation to fit their data.

For most of the compounds considered here saturated liquid density data were available, see Item 93029, and for most compounds the critical temperature and pressure were adjusted until they were optimum values for the correlation of both properties.

5. DISCUSSION OF UNCERTAINTIES

At any temperature, the estimated uncertainties in the tabulated values of temperature and pressure are dependent upon the reliability of the experimental and estimated data on which they are based. Except in the low pressure range values dependent on estimated data are much less certain than values dependent upon measured data.

The reliability of the experimental or estimated data may vary considerably over the entire liquid range of a compound. The term 'data quality' is used here to express the assessed reliability of the fitted data and hence also the reliability of the tabulated values. In the table of Data at Specified Pressures the data quality at each pressure is denoted by one of the letters 'A', 'B' or 'C'.

The majority of reliable data are considered of quality 'A' with uncertainties of about 0.01 to 0.1 K at the normal boiling point or about 0.1 to 1 K at the critical point. Similarly the letters 'B' and 'C' indicate that the vapour pressures are based on progressively less reliable data, the uncertainties increasing tenfold with each successive letter.

The uncertainties in temperature and pressure are not thought to be more than the values shown below each letter. However when the data quality is 'C' it will be appreciated that the uncertainties are necessarily rather speculative and that for some compounds they may be underestimated. If the data quality is 'C' at the critical pressure the values of critical temperature and critical pressure given in the Tables should be regarded only as correlating parameters. Furthermore, since the acentric factor, ω , is dependent upon the value of critical pressure selected, the uncertainty in ω for these compounds is high, possibly greater than 0.05.

6. ANTOINE EQUATION

Some users may find it more convenient to use an Antoine equation for certain applications confined to limited ranges of temperature or pressure. The coefficients of the Antoine equation given at the end of each sheet have been obtained by fitting this equation to values obtained from the Wagner equation between pressures of 2 and 200 kPa. The RMS deviation of each fit is usually between 0.05 and 0.1 per cent.

WARNING. Although, for most compounds, the Antoine equation may be used up to about 500 kPa without undue additional error, use at pressures outside the range 2 to 500 kPa will give vapour pressures that get progressively lower than the values given by the Wagner equation.

7. REFERENCES

1. AMBROSE, D. Correlation and estimation of vapour-liquid critical properties: I. Critical temperatures of organic compounds. NPL Report Chem. 92, National Physical Laboratory, Teddington, Middlesex, UK, September 1978.
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4. AMBROSE, D. Vapour pressures and critical temperatures and critical pressures of some alkanolic acids: C1 to C10. J.Chem.Thermodynamics, Vol.19, pp.505-519, 1987.
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6. AMBROSE, D. Vapour pressures up to their critical temperatures of normal alkanes and alkan-1-ols. Pure & Appl.Chem., Vol.61, pp.1395-1403, 1989.
7. WATSON, J.T.R. Private Communication, 1990.

TABLE 1

Summary of Constants in the Wagner vapour pressure equation

$$\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c) \quad \text{where } q = 1 - T/T_c$$

Sheet	Name	T _c K	p _c kPa	N ₁	N ₂	N ₃	N ₄
1.00	Indene	695	4100	-7.53521	1.68035	-2.1936	-3.920
1.01	Indane	684.9	3950	-7.54029	1.61579	-2.0636	-4.098
1.02a	cis-Hexahydroindane	663	3350	-7.47396	1.72648	-2.1918	-3.954
1.02b	trans-Hexahydroindane	650	3200	-7.49536	1.81388	-2.3756	-3.603
1.20	1,1-Dimethylindane	679	2850	-7.94911	2.13831	-3.2802	-3.478
2.00	Naphthalene	749	4075	-7.55491	1.78374	-2.3774	-3.295
2.01	1,2,3,4-Tetrahydronaphthalene	720	3650	-7.71744	1.89327	-2.6918	-3.673
2.02	Decalin (cis + trans mixture)	695	3150	-7.56327	2.11771	-2.8967	-3.092
2.02a	cis-Decahydronaphthalene	702	3250	-7.52848	1.85201	-2.4648	-3.680
2.02b	trans-Decahydronaphthalene	687	3100	-7.51307	1.87827	-2.5215	-3.328
2.10a	1-Methylnaphthalene	772	3600	-7.82308	1.97924	-2.9005	-3.392
2.10b	2-Methylnaphthalene	765	3550	-7.82974	1.96527	-2.9257	-3.366
2.11a	5-Methyl-1,2,3,4-tetrahydronaphthalene	740	3200	-8.09014	2.10827	-3.3552	-3.794
2.11b	6-Methyl-1,2,3,4-tetrahydronaphthalene	732	3100	-8.02817	2.07158	-3.2445	-3.772
2.20a	1-Ethylnaphthalene	773	3150	-8.14217	2.21467	-3.5659	-3.632
2.20b	2-Ethylnaphthalene	772	3100	-8.12264	2.20124	-3.5247	-3.629
2.20c	1,2-Dimethylnaphthalene	784	3200	-8.17468	2.15891	-3.5064	-3.825
2.20d	1,3-Dimethylnaphthalene	782	3150	-8.15247	2.14554	-3.4667	-3.817
2.20e	1,4-Dimethylnaphthalene	789	3250	-8.09378	2.11044	-3.3617	-3.795
2.20f	1,5-Dimethylnaphthalene	787	3250	-8.05042	2.08471	-3.2842	-3.780
2.20g	1,6-Dimethylnaphthalene	788	3250	-7.97320	2.03934	-3.1465	-3.753
2.20h	1,7-Dimethylnaphthalene	786	3200	-7.95629	2.02949	-3.1163	-3.747
2.20i	1,8-Dimethylnaphthalene	803	3050	-8.01746	2.06528	-3.2254	-3.768
2.20j	2,3-Dimethylnaphthalene	790	3200	-8.09760	2.11271	-3.3685	-3.797
2.20k	2,6-Dimethylnaphthalene	781	3200	-8.06805	2.09515	-3.3157	-3.786
2.20l	2,7-Dimethylnaphthalene	783	3150	-8.02624	2.07044	-3.2411	-3.771
2.30a	1-Propylnaphthalene	780	2800	-8.32268	2.24918	-3.7718	-3.883
2.30b	2-Propylnaphthalene	783	2800	-8.25197	2.20580	-3.6449	-3.855
2.30c	1-Isopropylnaphthalene	769	2750	-8.42076	2.31013	-3.9482	-3.924
2.30d	2-Isopropylnaphthalene	774	2750	-8.25191	2.20576	-3.6448	-3.855
3.00	Acenaphthene	831	3900	-7.73450	1.91816	-2.7471	-3.679
4.00	Fluorene	850	3900	-7.97521	2.04052	-3.1501	-3.754
5.00a	Anthracene	923	3650	-7.69698	1.88186	-2.6556	-3.667
5.00b	Phenanthrene	912	3600	-7.82882	1.95609	-2.8895	-3.706
6.00	Fluoranthene	975	3500	-7.75140	1.91229	-2.7521	-3.683
6.01	Pyrene	989	3550	-7.93466	2.01692	-3.0778	-3.740
8.00	Carbazole	928	3900	-8.16698	2.15427	-3.4927	-3.822

C_9H_8 Indene

CAS Reg. No. 95-13-6

Mol. Wt. 116.160

Vapour Pressure $\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c)$

where T is the kelvin temperature on the International Temperature Scale of 1990 (ITS-90), p is the vapour pressure, T_c , p_c are the critical temperature and the critical pressure respectively and $q = 1 - T/T_c$.

Critical Temperature	T_c	695 K	($t_c = 421.85$ °C)
Critical Pressure	p_c	4100 kPa	($p_c = 40.46$ atm)
	N_1	-7.53521	
	N_2	1.68035	
	N_3	-2.1936	
	N_4	-3.920	
Acentric Factor		0.304	
Normal Boiling Point		455.717 K	($= 182.567$ °C)
dT/dp at N.B.P.		0.404 K/kPa	($= 0.054$ °C/mmHg)
Normal Melting Point		272 K	($= -1$ °C)

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	101.325	1000	4100
T/K			(291.452)	(328.540)	379.586	455.717	(578.421)	(695.000)
(dp/dT)/(kPa/K)			(0.007)	(0.054)	0.378	2.477	(14.360)	(44.452)
Data Quality				(C)	B	A	(B)	(B)
Uncert. in T (K)				(0.5)	0.1	0.02	(0.2)	(5)
Uncert. in p (kPa)				(0.02)	0.05	0.05	(5)	(200)
Uncert. in p (%)				(2)	0.5	0.05	(0.5)	(5)

Vapour Pressure of Indene

Units: kPa v. K

Uncertainty in				Uncertainty in				Uncertainty in			
T	p	T	p	T	p	T	p	T	p	T	p
K	kPa	K	%	K	kPa	K	%	K	kPa	K	%
				450	87.93	0.02	0.05	575	(951.8)	0.2	0.5
				455	99.56	0.02	0.05	580	(1023.)	0.5	0.5
				460	(112.4)	0.02	0.05	585	(1098.)	0.5	0.5
280	(0.042)			465	(126.5)	0.02	0.05	590	(1177.)	0.5	0.5
290	(0.090)			470	(141.9)	0.02	0.05	595	(1260.)	0.5	0.5
300	(0.181)			475	(158.8)	0.05	0.1	600	(1348.)	0.5	1
310	(0.344)			480	(177.2)	0.05	0.1	605	(1440.)	0.5	1
320	(0.623)			485	(197.2)	0.05	0.1	610	(1537.)	1	1
330	(1.081)	0.5	2	490	(218.9)	0.05	0.1	615	(1638.)	1	1
340	(1.804)	0.2	1	495	(242.4)	0.05	0.1	620	(1745.)	1	1
350	(2.908)	0.2	1	500	(267.9)	0.05	0.1	625	(1857.)	1	1
360	(4.538)	0.2	1	505	(295.3)	0.1	0.1	630	(1974.)	1	1
370	6.879	0.2	0.5	510	(324.9)	0.1	0.2	635	(2097.)	1	2
380	10.16	0.1	0.5	515	(356.6)	0.1	0.2	640	(2225.)	2	2
390	14.64	0.1	0.2	520	(390.7)	0.1	0.2	645	(2360.)	2	2
Interval change											
400	20.65	0.05	0.2	525	(427.3)	0.1	0.2	650	(2500.)	2	2
405	24.34	0.05	0.2	530	(466.3)	0.1	0.2	655	(2647.)	2	2
410	28.54	0.05	0.2	535	(508.1)	0.2	0.2	660	(2801.)	2	2
415	33.32	0.05	0.2	540	(552.5)	0.2	0.2	665	(2962.)	2	2
420	38.73	0.05	0.1	545	(599.9)	0.2	0.2	670	(3130.)	2	2
425	44.83	0.05	0.1	550	(650.3)	0.2	0.2	675	(3306.)	2	2
430	51.68	0.05	0.1	555	(703.8)	0.2	0.5	680	(3491.)	2	5
435	59.34	0.02	0.1	560	(760.6)	0.2	0.5	685	(3684.)	5	5
440	67.89	0.02	0.1	565	(820.8)	0.2	0.5	690	(3886.)	5	5
445	77.39	0.02	0.05	570	(884.5)	0.2	0.5	695	(4100.)	5	5

Vapour Pressure of Indene continued

Units: atm or mmHg v. °C

$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{mmHg}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{mmHg}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$
0	(0.182)	100	58.50	200	(1.504)	300	(9.143)	400	(31.98)
5	(0.274)	105	71.02	205	(1.679)	305	(9.831)	405	(33.77)
10	(0.405)	110	85.70	210	(1.871)	310	(10.56)	410	(35.64)
15	(0.590)	115	102.8	215	(2.079)	315	(11.32)	415	(37.60)
20	(0.846)	120	122.7	220	(2.305)	320	(12.13)	420	(39.67)
25	(1.197)	125	145.6	225	(2.549)	325	(12.98)		
30	(1.669)	130	171.9	230	(2.812)	330	(13.87)		
35	(2.298)	135	201.9	235	(3.096)	335	(14.81)		
40	(3.124)	140	236.1	240	(3.401)	340	(15.79)		
45	(4.200)	145	274.9	245	(3.729)	345	(16.83)		
50	(5.583)	150	318.7	250	(4.081)	350	(17.91)		
55	(7.345)	155	367.9	255	(4.457)	355	(19.05)		
60	(9.567)	160	423.1	260	(4.859)	360	(20.24)		
65	(12.34)	165	484.7	265	(5.287)	365	(21.49)		
70	(15.79)	170	553.3	270	(5.744)	370	(22.79)		
75	(20.02)	175	629.3	275	(6.231)	375	(24.16)		
80	(25.17)	180	713.5	280	(6.747)	380	(25.58)		
85	(31.42)	185	(806.3)	285	(7.296)	385	(27.08)		
90	(38.92)	190	(908.3)	290	(7.877)	390	(28.64)		
95	(47.87)	195	(1020.)	295	(8.492)	395	(30.27)		

The following Sources give vapour pressure and/or critical point data for this compound. Those Sources used to derive the critical properties and coefficients of the vapour pressure equation are shown in bold type together with the pressure range (low 'L', medium 'M', normal boiling point only 'N', high 'H' or critical 'C') of the data. An asterisk (*) indicates that the Source is not a primary source of experimental data for this compound.

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- 2 BRESTON, -, GAUGER, -, Am. Gas Assoc. Pr., Vol. 28, p. 492, 1946.
- 3 **STULL, D.R., SINKE, G.C., McDONALD, R.A., Pure Appl. Chem., Vol. 2, p. 315, 1961.** **M**
- 4 TRC Thermodynamic Tables, Texas A & M Univ., Loose leaf data sheets extant 1993.*

The following Sources were used to estimate critical point data for this compound.
 AMBROSE, D., NPL Report Chem 92, Nat. Phys. Lab., Teddington, Middlesex, UK, 1978.*
 AMBROSE, D., NPL Report Chem 98, Nat. Phys. Lab., Teddington, Middlesex, UK, 1979.*

Antoine equation: $\ln(p/\text{kPa}) = 14.12939 - 3698.541/(T/\text{K} - 66.850)$ for $2 < p/\text{kPa} < 200$.

C₉H₁₀ Indane (2,3-Dihydroindene)

CAS Reg. No. 496-11-7

Mol. Wt. 118.180

Vapour Pressure $\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c)$

where T is the kelvin temperature on the International Temperature Scale of 1990 (ITS-90), p is the vapour pressure, T_c, p_c are the critical temperature and the critical pressure respectively and q = 1 - T/T_c.

Critical Temperature	T _c = 684.9 K	(t _c = 411.75 °C)
Critical Pressure	p _c = 3950 kPa	(p _c = 38.98 atm)
	N ₁ = -7.54029	
	N ₂ = 1.61579	
	N ₃ = -2.0636	
	N ₄ = -4.098	
Acentric Factor	= 0.308	
Normal Boiling Point	= 451.010 K	(= 177.860 °C)
dT/dp at N.B.P.	= 0.401 K/kPa	(= 0.053 °C/mmHg)
Normal Melting Point	= 222 K	(= -51 °C)

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	101.325	1000	3950
T/K	(237.615)	(259.958)	(288.052)	(324.778)	375.399	451.010	572.893	684.900
(dp/dT)/(kPa/K)	(1.E-4)	(9.E-4)	(0.007)	(0.054)	0.381	2.493	14.470	43.487
Data Quality				(C)	B	B	A	A
Uncert. in T (K)				(0.2)	0.1	0.1	0.1	0.2
Uncert. in p (kPa)				(0.01)	0.02	0.2	2	10
Uncert. in p (%)				(1)	0.2	0.2	0.2	0.2

Vapour Pressure of Indane

Units: kPa v. K

		Uncertainty in				Uncertainty in				Uncertainty in	
T	p	T	p	T	p	T	p	T	p	T	p
K	kPa	K	%	K	kPa	K	%	K	kPa	K	%
Interval change											
230	(4.E-4)			450	98.83	0.1	0.2	575	1031.	0.1	0.2
				455	111.7	0.1	0.2	580	1107.	0.1	0.2
				460	125.8	0.1	0.2	585	1187.	0.1	0.2
				465	141.2	0.1	0.2	590	1272.	0.1	0.2
				470	158.2	0.1	0.2	595	1361.	0.1	0.2
240	(0.001)			475	176.6	0.1	0.2	600	1454.	0.1	0.2
250	(0.004)			480	196.7	0.1	0.2	605	1552.	0.2	0.2
260	(0.010)			485	218.6	0.1	0.2	610	1656.	0.2	0.2
270	(0.024)			490	242.2	0.1	0.2	615	1764.	0.2	0.2
280	(0.055)			495	267.8	0.1	0.2	620	1878.	0.2	0.2
290	(0.115)	0.2	1	500	295.4	0.1	0.2	625	1997.	0.2	0.2
300	(0.228)			505	325.2	0.1	0.2	630	2122.	0.2	0.2
310	(0.429)			510	357.2	0.1	0.2	635	2253.	0.2	0.2
320	(0.768)			515	391.6	0.1	0.2	640	2390.	0.2	0.2
330	(1.320)			520	428.4	0.1	0.2	645	2533.	0.2	0.2
340	(2.182)	0.1	0.5	525	467.8	0.1	0.2	650	2684.	0.2	0.2
350	(3.484)	0.1	0.5	530	509.9	0.1	0.2	655	2841.	0.2	0.2
360	5.392	0.1	0.5	535	554.9	0.1	0.2	660	3005.	0.2	0.2
370	8.110	0.1	0.2	540	602.7	0.1	0.2	665	3177.	0.2	0.2
380	11.89	0.1	0.2	545	653.7	0.1	0.2	670	3357.	0.2	0.2
390	17.02	0.1	0.2	550	707.8	0.1	0.2	675	3546.	0.2	0.2
400	23.84	0.1	0.2	555	765.2	0.1	0.2	680	3745.	0.2	0.2
410	32.75	0.1	0.2	560	826.1	0.1	0.2				
420	44.19	0.1	0.2	565	890.6	0.1	0.2				
430	58.65	0.1	0.2	570	958.8	0.1	0.2				
440	76.67	0.1	0.2								

Vapour Pressure of Indane continued

Units: atm or mmHg v. °C

t °C	p mmHg	t °C	p mmHg	t °C	p atm	t °C	p atm	t °C	p atm
-50	(0.001)	75	(24.03)	200	1.674	300	9.906	400	34.30
-45	(0.002)	80	(30.09)	205	1.866	305	10.64	405	36.22
-40	(0.004)	85	37.39	210	2.075	310	11.42	410	38.25
-35	(0.008)	90	46.13	215	2.302	315	12.24		
-30	(0.014)	95	56.52	220	2.547	320	13.10		
-25	(0.024)	100	68.80	225	2.812	325	14.00		
-20	(0.039)	105	83.22	230	3.098	330	14.96		
-15	(0.063)	110	100.1	235	3.406	335	15.96		
-10	(0.100)	115	119.6	240	3.736	340	17.01		
-5	(0.156)	120	142.3	245	4.091	345	18.11		
0	(0.237)	125	168.3	250	4.470	350	19.27		
5	(0.355)	130	198.0	255	4.876	355	20.48		
10	(0.522)	135	232.0	260	5.309	360	21.75		
15	(0.755)	140	270.5	265	5.770	365	23.08		
20	(1.077)	145	314.0	270	6.262	370	24.47		
25	(1.513)	150	363.0	275	6.784	375	25.93		
30	(2.097)	155	418.0	280	7.339	380	27.45		
35	(2.871)	160	479.4	285	7.927	385	29.05		
40	(3.882)	165	547.9	290	8.550	390	30.72		
45	(5.190)	170	623.9	295	9.209	395	32.47		
50	(6.864)	175	708.0						
55	(8.984)	180	800.9						
60	(11.64)	185	903.1						
65	(14.95)	190	1015.						
70	(19.03)	195	1138.						

The following Sources give vapour pressure and/or critical point data for this compound. Those Sources used to derive the critical properties and coefficients of the vapour pressure equation are shown in bold type together with the pressure range (low 'L', medium 'M', normal boiling point only 'N', high 'H' or critical 'C') of the data. An asterisk (*) indicates that the Source is not a primary source of experimental data for this compound.

- 1 PERKIN, H., J.Chem.Soc., Vol.69, p.1025, 1896.
- 2 KOHLRAUSH, K.W.F., SEKA, R., Chem.Ber., Vol.71, p.1551, 1938.
- 3 BOORD, C.E., et al., API Hydrocarbon Res.Proj., 6th An.Rep., Ohio St.Univ., 1944.
- 4 FENSKE, M.R., BRAUN, W.G., WIEGAND, R.V., et al., Anal.Chem., Vol.19, p.700, 1947.
- 5 GIL-AY, E., SHABTAI, J., MICHAELI, I., et al., J.Chem.Eng.Data, Vol.3, p.166, 1958.
- 6 STULL, D.R., SINKE, G.C., McDONALD, R.A., Pure Appl.Chem., Vol.2, p.315, 1961.
- 7 COOPER, A.R., CROWNE, C.W.P., et al., Trans.Faraday Soc., Vol.63, p.447, 1967.
- 8 AMBROSE, D., BRODERICK, B.E., et al., J.App.Chem.Biotechnol., Vol.24, p.359, 1974.
- 9 AMBROSE, D., ELLENDER, J.H., et al., J.Chem.Thermodynamics, Vol.8, p.601, 1976.
- 10 OSBORN, A.G., SCOTT, D.W., J.Chem.Thermodynamics, Vol.10, p.619, 1978.
- 11 TRC Thermodynamic Tables, Texas A & M Univ., Loose leaf data sheets extant 1993.*

C

M

M

Antoine equation: $\ln(p/\text{kPa}) = 14.09696 - 3650.552/(T/\text{K} - 65.874)$ for $2 < p/\text{kPa} < 200$.

C₉H₁₆ cis-Hexahydroindane (cis-Octahydroindene, cis-Hydrindan)

CAS Reg. No. 4551-51-3

Mol. Wt. 124.230

Vapour Pressure $\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c)$

where T is the kelvin temperature on the International Temperature Scale of 1990 (ITS-90), p is the vapour pressure, T_c , p_c are the critical temperature and the critical pressure respectively and $q = 1 - T/T_c$.

Critical Temperature $T_c = 663 \text{ K}$ ($t_c = 389.85 \text{ }^\circ\text{C}$)
 Critical Pressure $p_c = 3350 \text{ kPa}$ ($p_c = 33.06 \text{ atm}$)
 $N_1 = -7.47396$
 $N_2 = 1.72648$
 $N_3 = -2.1918$
 $N_4 = -3.954$

Acentric Factor $= 0.288$
 Normal Boiling Point $= 440.996 \text{ K}$ ($= 167.846 \text{ }^\circ\text{C}$)
 dT/dp at N.B.P. $= 0.404 \text{ K/kPa}$ ($= 0.054 \text{ }^\circ\text{C/mmHg}$)
 Normal Melting Point $= -$

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	101.325	1000	3350
T/K	(229.584)	(251.446)	(279.015)	(315.195)	365.361	440.996	(564.591)	(663.000)
(dp/dT)/(kPa/K)	(1.E-4)	(9.E-4)	(0.007)	(0.055)	0.383	2.478	(14.184)	(37.768)
Data Quality				(B)	A	A	(A)	(B)
Uncert. in T (K)				(0.05)	0.01	0.005	(0.1)	(5)
Uncert. in p (kPa)				(0.002)	0.005	0.01	(2)	(200)
Uncert. in p (%)				(0.2)	0.05	0.01	(0.2)	(5)

Vapour Pressure of cis-Hexahydroindane

Units: kPa v. K

		Uncertainty in				Uncertainty in				Uncertainty in	
T	p	T	p	T	p	T	p	T	p	T	p
K	kPa	K	%	K	kPa	K	%	K	kPa	K	%
250	(0.009)			450	(125.6)	0.005	0.01	575	(1156.)	0.2	0.2
260	(0.022)			455	(141.0)	0.005	0.02	580	(1237.)	0.2	0.2
270	(0.050)			460	(157.7)	0.01	0.02	585	(1322.)	0.2	0.5
280	(0.107)			465	(176.0)	0.01	0.02	590	(1412.)	0.5	0.5
290	(0.217)			470	(195.8)	0.01	0.02	595	(1506.)	0.5	0.5
300	(0.413)			475	(217.3)	0.01	0.02	600	(1605.)	0.5	0.5
310	(0.748)			480	(240.6)	0.02	0.02	605	(1709.)	0.5	1
320	(1.295)	0.02	0.2	485	(265.8)	0.02	0.05	610	(1818.)	1	1
330	(2.156)	0.02	0.1	490	(292.9)	0.02	0.05	615	(1932.)	1	1
340	(3.461)	0.02	0.1	495	(322.0)	0.02	0.05	620	(2052.)	1	1
350	(5.378)	0.02	0.05	500	(353.4)	0.02	0.05	625	(2177.)	1	2
360	8.112	0.01	0.05	505	(386.9)	0.02	0.05	630	(2308.)	2	2
370	11.91	0.01	0.05	510	(422.9)	0.05	0.05	635	(2445.)	2	2
380	17.08	0.01	0.02	515	(461.3)	0.05	0.05	640	(2589.)	2	2
390	23.94	0.01	0.02	520	(502.3)	0.05	0.1	645	(2740.)	2	2
Interval change											
400	32.89	0.005	0.02	525	(545.9)	0.05	0.1	650	(2899.)	2	2
405	38.28	0.005	0.02	530	(592.4)	0.05	0.1	655	(3065.)	2	5
410	44.36	0.005	0.02	535	(641.8)	0.05	0.1	660	(3240.)	5	5
415	51.19	0.005	0.02	540	(694.2)	0.1	0.1				
420	58.83	0.005	0.01	545	(749.7)	0.1	0.1				
425	67.34	0.005	0.01	550	(808.5)	0.1	0.2				
430	76.81	0.005	0.01	555	(870.7)	0.1	0.2				
435	87.30	0.005	0.01	560	(936.4)	0.1	0.2				
440	98.88	0.005	0.01	565	(1006.)	0.1	0.2				
445	(111.6)	0.005	0.01	570	(1079.)	0.2	0.2				

Vapour Pressure of cis-Hexahydroindane continued

Units: atm or mmHg v. °C

t °C	p mmHg	t °C	p mmHg	t °C	p atm	t °C	p atm	t °C	p atm
-25	(0.055)	75	(37.27)	175	(1.187)	275	(7.761)	375	(28.02)
-20	(0.088)	80	46.05	180	(1.334)	280	(8.362)	380	(29.63)
-15	(0.139)	85	56.51	185	(1.494)	285	(8.998)	385	(31.32)
-10	(0.214)	90	68.87	190	(1.668)	290	(9.669)		
-5	(0.324)	95	83.39	195	(1.858)	295	(10.38)		
0	(0.481)	100	100.3	200	(2.064)	300	(11.12)		
5	(0.704)	105	120.0	205	(2.287)	305	(11.91)		
10	(1.012)	110	142.8	210	(2.529)	310	(12.74)		
15	(1.433)	115	168.9	215	(2.789)	315	(13.60)		
20	(2.002)	120	198.9	220	(3.069)	320	(14.52)		
25	(2.758)	125	232.9	225	(3.370)	325	(15.48)		
30	(3.751)	130	271.6	230	(3.693)	330	(16.48)		
35	(5.041)	135	315.2	235	(4.039)	335	(17.54)		
40	(6.699)	140	364.3	240	(4.409)	340	(18.64)		
45	(8.805)	145	419.3	245	(4.804)	345	(19.80)		
50	(11.46)	150	480.7	250	(5.225)	350	(21.02)		
55	(14.76)	155	549.0	255	(5.674)	355	(22.29)		
60	(18.84)	160	624.8	260	(6.150)	360	(23.62)		
65	(23.85)	165	708.5	265	(6.656)	365	(25.02)		
70	(29.93)	170	(800.9)	270	(7.193)	370	(26.48)		

The following Sources give vapour pressure and/or critical point data for this compound. Those Sources used to derive the critical properties and coefficients of the vapour pressure equation are shown in bold type together with the pressure range (low 'L', medium 'M', normal boiling point only 'N', high 'H' or critical 'C') of the data. An asterisk (*) indicates that the Source is not a primary source of experimental data for this compound.

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- 2 FINKE, H.L., McCULLOUGH, J.P., et al., J.Chem.Thermodynamics, Vol.4, p.477, 1972.

The following Sources were used to estimate critical point data for this compound.
 AMBROSE, D., NPL Report Chem 92, Nat.Phys.Lab., Teddington, Middlesex, UK, 1978.*
 AMBROSE, D., NPL Report Chem 98, Nat.Phys.Lab., Teddington, Middlesex, UK, 1979.*

Antoine equation: $\ln(p/\text{kPa}) = 13.83178 - 3469.760/(T/\text{K} - 64.399)$ for $2 < p/\text{kPa} < 200$.

C₉H₁₆ trans-Hexahydroindane (trans-Octahydroindene, trans-Hydrindan)

CAS Reg. No. 3296-50-2

Mol. Wt. 124.230

Vapour Pressure $\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c)$ where *T* is the kelvin temperature on the International Temperature Scale of 1990 (ITS-90), *p* is the vapour pressure, *T_c*, *p_c* are the critical temperature and the critical pressure respectively and *q* = 1 - *T/T_c*.

Critical Temperature	<i>T_c</i> = 650 K	(<i>t_c</i> = 376.85 °C)
Critical Pressure	<i>p_c</i> = 3200 kPa	(<i>p_c</i> = 31.58 atm)
	<i>N₁</i> = -7.49536	
	<i>N₂</i> = 1.81388	
	<i>N₃</i> = -2.3756	
	<i>N₄</i> = -3.603	
Acentric Factor	□ 0.288	
Normal Boiling Point	= 434.234 K	(= 161.084 °C)
d <i>T</i> /d <i>p</i> at N.B.P.	□ 0.399 K/kPa	(□ 0.053 °C/mmHg)
Normal Melting Point	= -	-

Data at Specified Pressures

<i>p</i> /kPa	0.001	0.01	0.1	1	10	101.325	1000	3200
<i>T</i> /K	(225.210)	(246.829)	(274.091)	(309.864)	359.455	434.234	(556.684)	(650.000)
(d <i>p</i> /d <i>T</i>)/(kPa/K)	(1.E-4)	(1.E-3)	(0.007)	(0.055)	0.388	2.505	(14.296)	(36.903)
Data Quality				(B)	A	A	(A)	(B)
Uncert. in <i>T</i> (K)				(0.02)	0.005	0.002	(0.1)	(5)
Uncert. in <i>p</i> (kPa)				(0.001)	0.002	0.005	(2)	(200)
Uncert. in <i>p</i> (%)				(0.1)	0.02	0.005	(0.2)	(5)

Vapour Pressure of trans-Hexahydroindane

Units: kPa v. K

Uncertainty in				Uncertainty in				Uncertainty in			
<i>T</i> K	<i>p</i> kPa	<i>T</i> K	<i>p</i> %	<i>T</i> K	<i>p</i> kPa	<i>T</i> K	<i>p</i> %	<i>T</i> K	<i>p</i> kPa	<i>T</i> K	<i>p</i> %
250	(0.013)			450	(147.3)	0.005	0.01	575	(1289.)	0.2	0.5
260	(0.033)			455	(164.8)	0.005	0.01	580	(1377.)	0.5	0.5
270	(0.073)			460	(183.9)	0.005	0.01	585	(1471.)	0.5	0.5
280	(0.154)			465	(204.6)	0.005	0.02	590	(1569.)	0.5	0.5
290	(0.303)			470	(227.1)	0.01	0.02	595	(1671.)	0.5	1
300	(0.566)			475	(251.4)	0.01	0.02	600	(1779.)	1	1
310	(1.008)	0.02	0.1	480	(277.6)	0.01	0.02	605	(1893.)	1	1
320	(1.718)	0.01	0.05	485	(305.9)	0.02	0.02	610	(2011.)	1	1
330	(2.818)	0.01	0.05	490	(336.4)	0.02	0.02	615	(2136.)	1	2
340	(4.462)	0.01	0.05	495	(369.1)	0.02	0.05	620	(2266.)	2	2
350	6.848	0.005	0.02	500	(404.1)	0.02	0.05	625	(2403.)	2	2
360	10.21	0.005	0.02	505	(441.6)	0.02	0.05	630	(2547.)	2	2
370	14.84	0.005	0.02	510	(481.6)	0.05	0.05	635	(2698.)	2	2
380	21.07	0.005	0.01	515	(524.3)	0.05	0.05	640	(2856.)	2	5
390	29.27	0.002	0.01	520	(569.8)	0.05	0.1	645	(3023.)	5	5
Interval change											
400	39.88	0.002	0.01	525	(618.2)	0.05	0.1	650	(3200.)	5	5
405	46.24	0.002	0.01	530	(669.6)	0.05	0.1				
410	53.38	0.002	0.005	535	(724.1)	0.1	0.1				
415	61.37	0.002	0.005	540	(781.9)	0.1	0.1				
420	70.28	0.002	0.005	545	(843.1)	0.1	0.2				
425	80.18	0.002	0.005	550	(907.8)	0.1	0.2				
430	91.15	0.002	0.005	555	(976.1)	0.1	0.2				
435	(103.3)	0.002	0.005	560	(1048.)	0.2	0.2				
440	(116.6)	0.002	0.005	565	(1124.)	0.2	0.2				
445	(131.2)	0.002	0.01	570	(1204.)	0.2	0.2				

Vapour Pressure of trans-Hexahydroindane continued

Units: atm or mmHg v. °C

t °C	p mmHg	t °C	p mmHg	t °C	p atm	t °C	p atm	t °C	p atm
-25	(0.085)	75	47.56	175	(1.393)	275	(8.719)	375	(30.92)
-20	(0.135)	80	58.43	180	(1.561)	280	(9.380)		
-15	(0.209)	85	71.29	185	(1.743)	285	(10.08)		
-10	(0.319)	90	86.41	190	(1.941)	290	(10.81)		
-5	(0.476)	95	104.1	195	(2.157)	295	(11.59)		
0	(0.699)	100	124.6	200	(2.390)	300	(12.41)		
5	(1.010)	105	148.4	205	(2.642)	305	(13.26)		
10	(1.436)	110	175.7	210	(2.914)	310	(14.17)		
15	(2.012)	115	206.9	215	(3.206)	315	(15.12)		
20	(2.782)	120	242.5	220	(3.520)	320	(16.11)		
25	(3.796)	125	282.9	225	(3.857)	325	(17.16)		
30	(5.116)	130	328.5	230	(4.218)	330	(18.26)		
35	(6.816)	135	379.8	235	(4.604)	335	(19.41)		
40	(8.980)	140	437.3	240	(5.016)	340	(20.62)		
45	(11.71)	145	501.5	245	(5.454)	345	(21.88)		
50	(15.12)	150	573.0	250	(5.921)	350	(23.21)		
55	(19.34)	155	652.2	255	(6.417)	355	(24.60)		
60	(24.52)	160	739.8	260	(6.944)	360	(26.07)		
65	(30.82)	165	(836.4)	265	(7.502)	365	(27.60)		
70	(38.43)	170	(942.5)	270	(8.094)	370	(29.22)		

The following Sources give vapour pressure and/or critical point data for this compound. Those Sources used to derive the critical properties and coefficients of the vapour pressure equation are shown in bold type together with the pressure range (low 'L', medium 'M', normal boiling point only 'N', high 'H' or critical 'C') of the data. An asterisk (*) indicates that the Source is not a primary source of experimental data for this compound.

1. CAMIN, D.L., ROSSINI, F.D., J. Phys. Chem., Vol. 59, p.1173, 1955. M
2. FINKE, H.L., McCULLOUGH, J.P., et al., J. Chem. Thermodynamics, Vol. 4, p.477, 1972.

The following Sources were used to estimate critical point data for this compound.

AMBROSE, D., NPL Report Chem 92, Nat. Phys. Lab., Teddington, Middlesex, UK, 1978.*
 AMBROSE, D., NPL Report Chem 98, Nat. Phys. Lab., Teddington, Middlesex, UK, 1979.*

Antoine equation: $\ln(p/\text{kPa}) = 13.82102 - 3423.442/(T/\text{K} - 62.229)$ for $2 < p/\text{kPa} < 200$.

C₁₁H₁₄ 1,1-Dimethylindane

CAS Reg. No. 4912-92-9

Mol. Wt. 146.230

Vapour Pressure $\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c)$

where T is the kelvin temperature on the International Temperature Scale of 1990 (ITS-90), p is the vapour pressure, T_c, p_c are the critical temperature and the critical pressure respectively and q = 1 - T/T_c.

Critical Temperature	T _c = 679 K	(t _c = 405.85 °C)
Critical Pressure	p _c = 2850 kPa	(p _c = 28.13 atm)
	N ₁ = -7.94911	
	N ₂ = 2.13831	
	N ₃ = -3.2802	
	N ₄ = -3.478	
Acentric Factor	= 0.367	
Normal Boiling Point	= 467.178 K	(= 194.028 °C)
dT/dp at N.B.P.	= 0.416 K/kPa	(= 0.055 °C/mmHg)
Normal Melting Point	= -	-

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	101.325	1000	2850
T/K	(246.684)	(269.818)	(298.869)	336.790	389.017	467.178	(594.204)	(679.000)
(dp/dT)/(kPa/K)	(1.E-4)	(9.E-4)	(0.007)	0.053	0.369	2.405	(13.849)	(33.368)
Data Quality				B	A	A	(B)	(B)
Uncert. in T (K)				0.02	0.01	0.005	(0.5)	(5)
Uncert. in p (kPa)				0.001	0.005	0.01	(5)	(200)
Uncert. in p (%)				0.1	0.05	0.01	(0.5)	(5)

Vapour Pressure of 1,1-Dimethylindane

Units: kPa v. K

		Uncertainty in				Uncertainty in				Uncertainty in	
T	p	T	p	T	p	T	p	T	p	T	p
K	kPa	K	%	K	kPa	K	%	K	kPa	K	%
250	(0.001)			450	66.15	0.005	0.01	575	(759.6)	0.2	0.2
260	(0.004)			455	75.19	0.005	0.01	580	(817.4)	0.2	0.5
270	(0.010)			460	85.18	0.005	0.01	585	(878.5)	0.2	0.5
280	(0.024)			465	96.19	0.005	0.01	590	(943.0)	0.2	0.5
290	(0.052)			470	(108.3)	0.005	0.01	595	(1011.)	0.5	0.5
300	(0.108)			475	(121.6)	0.005	0.01	600	(1083.)	0.5	0.5
310	(0.211)	0.05	0.2	480	(136.1)	0.005	0.02	605	(1158.)	0.5	0.5
320	0.391	0.02	0.2	485	(151.9)	0.01	0.02	610	(1238.)	0.5	1
330	0.694	0.02	0.1	490	(169.1)	0.01	0.02	615	(1321.)	0.5	1
340	1.181	0.02	0.1	495	(187.7)	0.01	0.02	620	(1409.)	1	1
350	1.938	0.02	0.1	500	(208.0)	0.02	0.02	625	(1501.)	1	1
360	3.077	0.02	0.05	505	(229.8)	0.02	0.05	630	(1598.)	1	1
370	4.738	0.02	0.05	510	(253.4)	0.02	0.05	635	(1700.)	1	2
380	7.098	0.01	0.05	515	(278.8)	0.02	0.05	640	(1807.)	2	2
390	10.37	0.01	0.05	520	(306.1)	0.05	0.05	645	(1919.)	2	2
Interval change											
400	14.80	0.01	0.05	525	(335.4)	0.05	0.1	650	(2036.)	2	2
405	17.55	0.01	0.02	530	(366.8)	0.05	0.1	655	(2160.)	2	2
410	20.69	0.01	0.02	535	(400.4)	0.05	0.1	660	(2290.)	2	2
415	24.29	0.01	0.02	540	(436.2)	0.05	0.1	665	(2426.)	2	5
420	28.38	0.01	0.02	545	(474.5)	0.1	0.1	670	(2570.)	5	5
425	33.01	0.005	0.02	550	(515.2)	0.1	0.2	675	(2721.)	5	5
430	38.23	0.005	0.02	555	(558.4)	0.1	0.2				
435	44.10	0.005	0.02	560	(604.4)	0.1	0.2				
440	50.67	0.005	0.02	565	(653.2)	0.2	0.2				
445	58.00	0.005	0.01	570	(704.9)	0.2	0.2				

Vapour Pressure of 1,1-Dimethylindane continued

Units: atm or mmHg v. °C

$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{mmHg}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{mmHg}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$
-25	(0.009)	100	40.48	200	(1.150)	300	(7.293)	400	(26.29)
-20	(0.015)	105	49.50	205	(1.288)	305	(7.853)	405	(27.85)
-15	(0.025)	110	60.15	210	(1.439)	310	(8.444)		
-10	(0.041)	115	72.64	215	(1.604)	315	(9.068)		
-5	(0.065)	120	87.21	220	(1.783)	320	(9.726)		
0	(0.101)	125	104.1	225	(1.977)	325	(10.42)		
5	(0.154)	130	123.7	230	(2.186)	330	(11.15)		
10	(0.231)	135	146.1	235	(2.413)	335	(11.92)		
15	(0.342)	140	171.8	240	(2.657)	340	(12.73)		
20	(0.498)	145	201.0	245	(2.919)	345	(13.58)		
25	(0.713)	150	234.2	250	(3.201)	350	(14.47)		
30	(1.007)	155	271.7	255	(3.503)	355	(15.41)		
35	(1.404)	160	313.9	260	(3.826)	360	(16.40)		
40	1.933	165	361.2	265	(4.172)	365	(17.43)		
45	2.628	170	414.0	270	(4.540)	370	(18.52)		
50	3.532	175	472.8	275	(4.933)	375	(19.66)		
55	4.696	180	538.1	280	(5.350)	380	(20.86)		
60	6.180	185	610.3	285	(5.794)	385	(22.11)		
65	8.053	190	690.0	290	(6.265)	390	(23.44)		
70	10.40	195	(777.7)	295	(6.764)	395	(24.83)		
75	13.30								
80	16.88								
85	21.24								
90	26.52								
95	32.88								

The following Sources give vapour pressure and/or critical point data for this compound. Those Sources used to derive the critical properties and coefficients of the vapour pressure equation are shown in bold type together with the pressure range (low 'L', medium 'M', normal boiling point only 'N', high 'H' or critical 'C') of the data. An asterisk (*) indicates that the Source is not a primary source of experimental data for this compound.

1 OSBORN, A.G., SCOTT, D.W., J.Chem. Thermodynamics, Vol.10, p.619, 1978. M

The following Sources were used to estimate critical point data for this compound.

AMBROSE, D., NPL Report Chem 92, Nat.Phys.Lab., Teddington, Middlesex, UK, 1978.*

AMBROSE, D., NPL Report Chem 98, Nat.Phys.Lab., Teddington, Middlesex, UK, 1979.*

Antoine equation: $\ln(p/\text{kPa}) = 14.01067 - 3712.565/(T/\text{K} - 71.902)$ for $2 < p/\text{kPa} < 200$.

$C_{10}H_8$ Naphthalene

CAS Reg. No. 91-20-3

Mol. Wt. 128.170

Vapour Pressure $\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c)$

where T is the kelvin temperature on the International Temperature Scale of 1990 (ITS-90), p is the vapour pressure, T_c , p_c are the critical temperature and the critical pressure respectively and $q = 1 - T/T_c$.

Critical Temperature $T_c = 749$ K ($t_c = 475.85$ °C)
 Critical Pressure $p_c = 4075$ kPa ($p_c = 40.22$ atm)
 $N_1 = -7.55491$
 $N_2 = 1.78374$
 $N_3 = -2.3774$
 $N_4 = -3.295$

Acentric Factor $= 0.302$
 Normal Boiling Point $= 491.103$ K ($= 217.953$ °C)
 dT/dp at N.B.P. $= 0.436$ K/kPa ($= 0.058$ °C/mmHg)
 Normal Melting Point $= 353$ K ($= 80$ °C)

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	101.325	1000	4075
T/K				353.438	408.772	491.103	623.664	749.000
(dp/dT)/(kPa/K)				0.049	0.349	2.293	13.284	41.103
Data Quality				B	A	A	A	A
Uncert. in T (K)				0.05	0.01	0.02	0.1	0.5
Uncert. in p (kPa)				0.002	0.005	0.05	1	20
Uncert. in p (%)				0.2	0.05	0.05	0.1	0.5

Vapour Pressure of Naphthalene

Units: kPa v. K

Uncertainty in				Uncertainty in				Uncertainty in			
T	p	T	p	T	p	T	p	T	p	T	p
K	kPa	K	%	K	kPa	K	%	K	kPa	K	%
360	1.374	0.05	0.2	500	123.4	0.02	0.05	625	1018.	0.1	0.1
370	2.172	0.02	0.1	505	137.4	0.02	0.05	630	1087.	0.1	0.1
380	3.338	0.02	0.1	510	152.6	0.02	0.05	635	1159.	0.1	0.1
390	4.996	0.02	0.1	515	169.0	0.02	0.05	640	1235.	0.1	0.1
				520	186.8	0.02	0.05	645	1315.	0.1	0.1
Interval change											
400	7.301	0.02	0.05	525	206.1	0.02	0.05	650	1399.	0.1	0.1
405	8.752	0.02	0.05	530	226.8	0.02	0.05	655	1486.	0.1	0.2
410	10.44	0.01	0.05	535	249.1	0.05	0.05	660	1577.	0.1	0.2
415	12.38	0.01	0.05	540	273.1	0.05	0.05	665	1673.	0.2	0.2
420	14.62	0.02	0.05	545	298.8	0.05	0.05	670	1773.	0.2	0.2
425	17.18	0.02	0.05	550	326.4	0.05	0.05	675	1878.	0.2	0.2
430	20.10	0.02	0.05	555	355.8	0.05	0.05	680	1987.	0.2	0.2
435	23.42	0.02	0.05	560	387.2	0.05	0.1	685	2100.	0.2	0.2
440	27.17	0.02	0.05	565	420.7	0.05	0.1	690	2219.	0.2	0.2
445	31.40	0.02	0.05	570	456.4	0.05	0.1	695	2343.	0.2	0.2
450	36.15	0.02	0.05	575	494.3	0.05	0.1	700	2472.	0.2	0.2
455	41.46	0.02	0.05	580	534.6	0.05	0.1	705	2607.	0.2	0.2
460	47.39	0.02	0.05	585	577.2	0.05	0.1	710	2747.	0.2	0.2
465	53.98	0.02	0.05	590	622.4	0.05	0.1	715	2894.	0.2	0.2
470	61.29	0.02	0.05	595	670.3	0.05	0.1	720	3046.	0.2	0.2
475	69.37	0.02	0.05	600	720.8	0.05	0.1	725	3206.	0.5	0.5
480	78.28	0.02	0.05	605	774.2	0.05	0.1	730	3372.	0.5	0.5
485	88.08	0.02	0.05	610	830.5	0.05	0.1	735	3545.	0.5	0.5
490	98.82	0.02	0.05	615	889.8	0.05	0.1	740	3726.	0.5	0.5
495	110.6	0.02	0.05	620	952.2	0.05	0.1	745	3916.	0.5	0.5

Vapour Pressure of Naphthalene continued

Units: atm or mmHg v. °C

t °C	p mmHg	t °C	p mmHg	t °C	p atm	t °C	p atm	t °C	p atm
80	7.394	175	257.5	225	1.170	325	6.926	425	23.92
85	9.435	180	295.7	230	1.303	330	7.442	430	25.23
90	11.94	185	338.4	235	1.449	335	7.987	435	26.60
95	15.00	190	386.0	240	1.606	340	8.561	440	28.02
		195	438.8	245	1.777	345	9.166	445	29.50
100	18.71	200	497.2	250	1.962	350	9.802	450	31.05
105	23.17	205	561.7	255	2.161	355	10.47	455	32.66
110	28.51	210	632.6	260	2.375	360	11.17	460	34.34
115	34.85	215	710.5	265	2.606	365	11.91	465	36.10
120	42.34	220	795.8	270	2.853	370	12.68	470	37.94
125	51.14			275	3.118	375	13.49	475	39.88
130	61.43			280	3.402	380	14.34		
135	73.39			285	3.705	385	15.23		
140	87.24			290	4.028	390	16.16		
145	103.2			295	4.372	395	17.13		
150	121.5			300	4.737	400	18.14		
155	142.3			305	5.126	405	19.20		
160	166.1			310	5.538	410	20.31		
165	193.0			315	5.975	415	21.46		
170	223.3			320	6.437	420	22.67		

The following Sources give vapour pressure and/or critical point data for this compound. Those Sources used to derive the critical properties and coefficients of the vapour pressure equation are shown in bold type together with the pressure range (low 'L', medium 'M', normal boiling point only 'N', high 'H' or critical 'C') of the data. An asterisk (*) indicates that the Source is not a primary source of experimental data for this compound.

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Antoine equation: $\ln(p/\text{kPa}) = 14.18707 - 4043.826/(T/\text{K} - 68.495)$ for $2 < p/\text{kPa} < 200$.

C₁₀H₁₂ 1,2,3,4-Tetrahydronaphthalene (Tetralin)

CAS Reg. No. 119-64-2

Mol. Wt. 132.210

Vapour Pressure $\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c)$

where T is the kelvin temperature on the International Temperature Scale of 1990 (ITS-90), p is the vapour pressure, T_c , p_c are the critical temperature and the critical pressure respectively and $q = 1 - T/T_c$.

Critical Temperature	$T_c = 720 \text{ K}$	($t_c = 446.85 \text{ }^\circ\text{C}$)
Critical Pressure	$p_c = 3650 \text{ kPa}$	($p_c = 36.02 \text{ atm}$)
	$N_1 = -7.71744$	
	$N_2 = 1.89327$	
	$N_3 = -2.6918$	
	$N_4 = -3.673$	
Acentric Factor	$\omega = 0.331$	
Normal Boiling Point	$T_b = 480.418 \text{ K}$	($= 207.268 \text{ }^\circ\text{C}$)
dT/dp at N.B.P.	$\omega = 0.424 \text{ K/kPa}$	($= 0.057 \text{ }^\circ\text{C/mmHg}$)
Normal Melting Point	$T_m = 237 \text{ K}$	($= -36 \text{ }^\circ\text{C}$)

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	101.325	1000	3650
T/K	(254.075)	(277.908)	(307.823)	346.838	400.472	480.418	609.475	(720.000)
$(dp/dT)/(\text{kPa/K})$	($1.E-4$)	($9.E-4$)	(0.007)	0.051	0.360	2.358	13.642	(39.128)
Data Quality				C	B	B	B	(B)
Uncert. in T (K)				0.2	0.1	0.1	0.5	(5)
Uncert. in p (kPa)				0.01	0.05	0.2	5	(200)
Uncert. in p (%)				1	0.5	0.2	0.5	(5)

Vapour Pressure of 1,2,3,4-Tetrahydronaphthalene

Units: kPa v. K

		Uncertainty in				Uncertainty in				Uncertainty in	
$\frac{T}{K}$	$\frac{p}{kPa}$	T K	p %	$\frac{T}{K}$	$\frac{p}{kPa}$	T K	p %	$\frac{T}{K}$	$\frac{p}{kPa}$	T K	p %
240	(2.E-4)			450	47.14	0.1	0.2	600	876.9	0.2	0.5
				460	61.44	0.1	0.2	605	940.3	0.5	0.5
				470	79.01	0.1	0.2	610	1007.	0.5	0.5
				480	100.3	0.1	0.2	615	(1078.)	0.5	0.5
				490	126.0	0.1	0.2	620	(1152.)	0.5	0.5
Interval change											
250	(6.E-4)			500	156.5	0.1	0.2	625	(1229.)	0.5	0.5
260	(0.002)			505	173.8	0.1	0.2	630	(1311.)	0.5	1
270	(0.005)			510	192.5	0.1	0.2	635	(1397.)	0.5	1
280	(0.012)			515	212.8	0.1	0.2	640	(1486.)	1	1
290	(0.027)			520	234.6	0.1	0.2	645	(1581.)	1	1
300	(0.058)			525	258.2	0.2	0.2	650	(1679.)	1	1
310	(0.116)			530	283.5	0.2	0.2	655	(1783.)	1	1
320	(0.221)			535	310.7	0.2	0.2	660	(1891.)	1	1
330	(0.401)			540	339.9	0.2	0.2	665	(2004.)	1	2
340	0.699			545	371.1	0.2	0.2	670	(2122.)	2	2
350	1.173	0.2	1	550	404.4	0.2	0.5	675	(2246.)	2	2
360	1.901	0.2	1	555	440.0	0.2	0.5	680	(2375.)	2	2
370	2.986	0.2	0.5	560	477.9	0.2	0.5	685	(2510.)	2	2
380	4.556	0.2	0.5	565	518.2	0.2	0.5	690	(2651.)	2	2
390	6.773	0.1	0.5	570	561.0	0.2	0.5	695	(2799.)	2	2
400	9.831	0.1	0.5	575	606.5	0.2	0.5	700	(2953.)	2	2
410	13.96	0.1	0.5	580	654.7	0.2	0.5	705	(3115.)	2	5
420	19.43	0.1	0.5	585	705.7	0.2	0.5	710	(3284.)	5	5
430	26.54	0.1	0.2	590	759.7	0.2	0.5	715	(3462.)	5	5
440	35.65	0.1	0.2	595	816.7	0.2	0.5	720	(3650.)	5	5

Vapour Pressure of 1,2,3,4-Tetrahydronaphthalene continued

Units: atm or mmHg v. °C

t °C	p mmHg	t °C	p mmHg	t °C	p atm	t °C	p atm	t °C	p atm
		100	25.66	225	1.485	325	8.431	425	(28.57)
		105	31.67	230	1.650	330	9.045	430	(30.14)
		110	38.83	235	1.830	335	9.692	435	(31.78)
-35	(0.001)	115	47.30	240	2.024	340	(10.37)	440	(33.51)
-30	(0.002)	120	57.27	245	2.234	345	(11.09)	445	(35.32)
-25	(0.004)	125	68.95	250	2.460	350	(11.84)		
-20	(0.007)	130	82.54	255	2.704	355	(12.64)		
-15	(0.012)	135	98.29	260	2.965	360	(13.47)		
-10	(0.019)	140	116.4	265	3.246	365	(14.34)		
-5	(0.031)	145	137.3	270	3.546	370	(15.25)		
0	(0.049)	150	161.1	275	3.867	375	(16.21)		
5	(0.077)	155	188.2	280	4.210	380	(17.21)		
10	(0.117)	160	218.9	285	4.575	385	(18.26)		
15	(0.176)	165	253.5	290	4.964	390	(19.36)		
20	(0.260)	170	292.5	295	5.378	395	(20.50)		
25	(0.378)	175	336.2	300	5.817	400	(21.70)		
30	(0.542)	180	384.9	305	6.282	405	(22.96)		
35	(0.767)	185	439.2	310	6.775	410	(24.27)		
40	(1.070)	190	499.5	315	7.297	415	(25.64)		
45	(1.475)	195	566.2	320	7.849	420	(27.08)		
50	(2.008)	200	639.8						
55	(2.703)	205	720.7						
60	3.600	210	809.6						
65	4.747	215	906.8						
70	6.198	220	1013.						
75	8.018								
80	10.28								
85	13.07								
90	16.49								
95	20.65								

The following Sources give vapour pressure and/or critical point data for this compound. Those Sources used to derive the critical properties and coefficients of the vapour pressure equation are shown in bold type together with the pressure range (low 'L', medium 'M', normal boiling point only 'N', high 'H' or critical 'C') of the data. An asterisk (*) indicates that the Source is not a primary source of experimental data for this compound.

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Antoine equation: $\ln(p/\text{kPa}) = 14.11685 - 3881.643/(T/\text{K} - 71.853)$ for $2 < p/\text{kPa} < 200$.

C₁₀H₁₈ Decalin (cis + trans mixture) (Decahydronaphthalene, Bicyclo[4.4.0]decane)

CAS Reg. No. 91-17-8

Mol. Wt. 138.250

Vapour Pressure $\ln p = \ln p_c + (N_1q + N_2q^{1.5} + N_3q^{2.5} + N_4q^5)/(T/T_c)$

where T is the kelvin temperature on the International Temperature Scale of 1990 (ITS-90), p is the vapour pressure, T_c, p_c are the critical temperature and the critical pressure respectively and q = 1 - T/T_c.

Critical Temperature T = 695 K (t_c = 421.85 °C)
 Critical Pressure p_c = 3150 kPa (p_c = 31.09 atm)
 N₁ = -7.56327
 N₂ = 2.11771
 N₃ = -2.8967
 N₄ = -3.092

Acentric Factor = 0.285
 Normal Boiling Point = 464.683 K (= 191.533 °C)
 dT/dp at N.B.P. = 0.427 K/kPa (= 0.057 °C/mmHg)
 Normal Melting Point = 148 K (= -125 °C)

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	101.325	1000	3150
T/K	(241.021)	(264.233)	(293.468)	(331.770)	384.776	464.683	596.168	(695.000)
(dp/dT)/(kPa/K)	(1.E-4)	(9.E-4)	(0.007)	(0.052)	0.363	2.342	13.264	(34.280)
Data Quality				(C)	C	C	C	(C)
Uncert. in T (K)				(1)	1	2	5	(10)
Uncert. in p (kPa)				(0.05)	0.5	5	50	(200)
Uncert. in p (%)				(5)	5	5	5	(10)

Vapour Pressure of Decalin (cis + trans mixture)

Units: kPa v. K

		Uncertainty in				Uncertainty in				Uncertainty in	
T	p	T	p	T	p	T	p	T	p	T	p
K	kPa	K	%	K	kPa	K	%	K	kPa	K	%
250	(0.003)			475	127.8	2	5	600	1052.	5	5
260	(0.007)			480	142.5	2	5	605	1122.	5	5
270	(0.017)			485	158.4	2	5	610	1196.	5	5
280	(0.037)			490	175.6	2	5	615	1274.	5	10
290	(0.078)			495	194.2	2	5	620	1356.	5	10
300	(0.156)			500	214.3	2	5	625	1441.	5	10
310	(0.294)			505	236.0	2	5	630	1530.	5	10
320	(0.529)			510	259.3	2	5	635	1624.	5	10
330	(0.912)			515	284.3	2	5	640	1721.	5	10
340	(1.514)	1	5	520	311.1	2	5	645	(1824.)	5	10
350	(2.428)	1	5	525	339.7	2	5	650	(1931.)	10	10
360	(3.773)	1	5	530	370.3	5	5	655	(2042.)	10	10
370	(5.699)	1	5	535	403.0	5	5	660	(2159.)	10	10
380	8.386	1	5	540	437.7	5	5	665	(2282.)	10	10
390	12.05	1	5	545	474.6	5	5	670	(2410.)	10	10
400	16.94	2	5	550	513.8	5	5	675	(2543.)	10	10
410	23.36	2	5	555	555.4	5	5	680	(2684.)	10	10
420	31.61	2	5	560	599.5	5	5	685	(2831.)	10	10
430	42.07	2	5	565	646.1	5	5	690	(2986.)	10	10
440	55.13	2	5	570	695.3	5	5	695	(3150.)	10	10
Interval change											
450	71.23	2	5	575	747.3	5	5				
455	80.55	2	5	580	802.1	5	5				
460	90.81	2	5	585	859.9	5	5				
465	102.1	2	5	590	920.7	5	5				
470	114.4	2	5	595	984.6	5	5				

Vapour Pressure of Decalin (cis + trans mixture) continued

Units: atm or mmHg v. °C

$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{mmHg}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{mmHg}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$	$\frac{t}{^{\circ}\text{C}}$	$\frac{p}{\text{atm}}$
-25	(0.016)	100	48.41	200	1.211	300	7.182	400	(24.61)
-20	(0.027)	105	58.67	205	1.351	305	7.713	405	(25.97)
-15	(0.043)	110	70.69	210	1.503	310	8.272	410	(27.39)
-10	(0.068)	115	84.67	215	1.668	315	8.861	415	(28.89)
-5	(0.106)	120	100.9	220	1.847	320	9.480	420	(30.48)
0	(0.161)	125	119.5	225	2.040	325	10.13		
5	(0.241)	130	140.9	230	2.248	330	10.82		
10	(0.355)	135	165.3	235	2.472	335	11.53		
15	(0.514)	140	193.1	240	2.713	340	12.29		
20	(0.734)	145	224.5	245	2.970	345	13.08		
25	(1.032)	150	259.9	250	3.246	350	13.90		
30	(1.434)	155	299.7	255	3.541	355	14.77		
35	(1.966)	160	344.2	260	3.855	360	15.68		
40	(2.663)	165	393.8	265	4.190	365	16.63		
45	(3.568)	170	448.9	270	4.547	370	(17.62)		
50	(4.728)	175	510.0	275	4.925	375	(18.66)		
55	(6.201)	180	577.5	280	5.327	380	(19.74)		
60	(8.055)	185	651.8	285	5.752	385	(20.88)		
65	(10.37)	190	733.4	290	6.203	390	(22.06)		
70	(13.22)	195	822.8	295	6.679	395	(23.31)		
75	(16.73)								
80	(20.99)								
85	(26.14)								
90	(32.32)								
95	(39.69)								

The following Sources give vapour pressure and/or critical point data for this compound. Those Sources used to derive the critical properties and coefficients of the vapour pressure equation are shown in bold type together with the pressure range (low 'L', medium 'M', normal boiling point only 'N', high 'H' or critical 'C') of the data. An asterisk (*) indicates that the Source is not a primary source of experimental data for this compound.

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Antoine equation: $\ln(p/\text{kPa}) = 13.78622 - 3633.802/(T/\text{K} - 68.321)$ for $2 < p/\text{kPa} < 200$.