

91006

April 1991

Supersedes in part Item 76004
and in part Item 76006

Vapour pressures and critical points of liquids

Halogenated Ethylenes

ESDU Copyright material. For current status contact ESDU.

Endorsed by
The Institution of Chemical Engineers



ESDU DATA ITEM No.91006

ESDU DATA ITEMS

Data Items provide validated information for use in engineering design and analysis by, or under the supervision of, professionally qualified engineers. The data are founded on an evaluation of all the relevant information, both published and unpublished, and invariably supported by original work of ESDU staff engineers or consultants. The whole process is subject to independent review for which crucial support is provided by industrial companies, government research laboratories, universities and others from around the world through the participation of some of their leading experts on ESDU Technical Committees. This process ensures that the results of much valuable work (theoretical, experimental and operational), which may not be widely available or in a readily usable form, can be communicated concisely and accurately to the engineering community.

THE PREPARATION OF THIS DATA ITEM

The work on this particular Data Item was monitored and guided by the Physical Data and Reaction Kinetics Committee, which first met in 1966 and now has the following membership:

Chairman	
Dr D.T.Jamieson	— Independent
Vice-Chairman	
Mr C.F.Beaton	— Independent
Members	
Dr D.Ambrose†	— Independent
Dr E.Brunner*	— BASF AG, Ludwigshafen, West Germany
Dr M.W.Chase*	— National Institute of Standards and Technology, Gaithersburgh, USA
Dr J.R.Downey*	— Dow Chemical, Midland, USA
Dr G.Hobson	— Imperial Chemical Industries plc, Petrochemicals and Plastics Division
Dr A.E.Humphreys	— British Gas plc
Mr S.R.Knight	— Stone & Webster Engineering Ltd
Dr K.N.Marsh*	— Thermodynamics Research Center, USA
Dr M.Schoenberg*	— Hoechst AG, Frankfurt, West Germany
Mr J.T.R.Watson	— National Engineering Laboratory.

The technical work involved in the assessment of the available information and the construction and subsequent development of the Data Item was undertaken (under contract to ESDU) by

Mr J.Walton	— Independent
-------------	---------------

in consultation with Dr D.Ambrose.

The person with overall responsibility for the work in this subject area is Mr G.H.Walter, Head of Heat Transfer, Internal Flow and Physical Data.

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)

* Corresponding Member

† Emeritus Member

VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS
HALOGENATED ETHYLENES

CONTENTS

1.	INTRODUCTION	page 1
2.	NOTATION AND UNITS	page 2
3.	SOURCES OF DATA	page 2
4.	EVALUATION AND CORRELATION	page 2
5.	DISCUSSION OF UNCERTAINTIES	page 3
6.	ANTOINE EQUATION	page 4
7.	REFERENCES	page 4

TABLE 1 - COMPOUND NAME INDEX

COMPOUND TABLES in the following order

Formula	Name	Alternative Names	
MONOHALOETHYLENES			
C_2H_3F	Fluoroethylene	Vinyl fluoride	Refrigerant 1141
C_2H_3Cl	Chloroethylene	Vinyl chloride	Refrigerant 1140
C_2H_3Br	Bromoethylene	Vinyl bromide	Refrigerant 1140B1
DIHALOETHYLENES			
$C_2H_2F_2$	1,1-Difluoroethylene	Vinylidene fluoride	Refrigerant 1132a
$C_2H_2Cl_2$	1,1-Dichloroethylene	Vinylidene chloride	Refrigerant 1130a
	cis-1,2-Dichloroethylene	sym-Dichloroethylene	Refrigerant 1130(cis)
	trans-1,2-Dichloroethylene		Refrigerant 1130(trans)
$C_2H_2Br_2$	cis-1,2-Dibromoethylene	sym-Dibromoethylene	Refrigerant 1130B2(cis)
	trans-1,2-Dibromoethylene	asym-Dibromoethylene	Refrigerant 1130B2(trans)
$C_2H_2I_2$	cis-1,2-Diiodoethylene	sym-Diiodoethylene	
	trans-1,2-Diiodoethylene	asym-Diiodoethylene	
TRIALOETHYLENES			
C_2HClF_2	Chloro-1,1-difluoroethylene		Refrigerant 1122
C_2HCl_3	Trichloroethylene		Refrigerant 1120
TETRAHALOETHYLENES			
C_2F_4	Tetrafluoroethylene	Perfluoroethylene	Refrigerant 1114
C_2ClF_3	Chlorotrifluoroethylene		Refrigerant 1113
$C_2Cl_2F_2$	1,2-Dichlorodifluoroethylene		Refrigerant 1112
C_2Cl_4	Tetrachloroethylene	Perchloroethylene	Refrigerant 1110



VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS
HALOGENATED ETHYLENES

1. INTRODUCTION

This Data Item presents saturated vapour pressures of halogenated ethylenes arranged in the order shown on the Contents page. Table 1 is the Compound Name Index which lists alternative names of the compounds with, in bold, the first name used for each compound on the Contents page and at the head of each Table.

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 Table. Using the critical temperature and the critical pressure given, 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 normally rounded to the nearest kelvin and that values in other units are obtained by exact conversion. The Tables 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.

In certain circumstances the user may need to allow for uncertainties in the tabulated values and estimates of these are provided in the Tables. For simplicity the uncertainties are rounded to 1, 2 or 5 times a power of 10.

The short table giving data at specified vapour pressures contains an assessment of the data quality, indicated by the letters 'X', 'A', 'B' or 'C' at these pressures. The estimated uncertainties in temperature and pressure which are dependent upon the data quality are shown underneath. This subject is discussed at greater length in Section 5.

Tabulated values of vapour pressure are presented in three sets of units, namely, (i) pressures in kPa at temperatures in kelvins, (ii) pressures in mmHg or atm at temperatures in degrees C, (iii) pressures in psia at temperatures in degrees F. The Table providing pressures in kPa also gives the uncertainties in pressure and temperature. In general, pressures are given from just above the melting point to just below the critical point at intervals adjusted to make maximum use of the space available, a larger interval frequently being used at low temperatures. For polybromo and iodo compounds the tables are usually truncated at a convenient lower temperature.

Brackets enclose values above or below the range of supporting experimental data and values below 0.001 are given in exponent form. It is not feasible to assess uncertainties below 0.1 kPa.

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 Practical Temperature Scale (IPTS-68), the differences involved in changing to ITS-90 are less than the uncertainties in the data. On IPTS-68 kelvin temperatures are strictly called International Practical Kelvin Temperatures, similarly Celsius temperatures are strictly called International Practical Celsius Temperatures.

b_1, b_2, b_3, b_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:-

- (a) low pressure, below say 1 kPa (approximately 7.5 mmHg),
- (b) medium pressure, say 1 kPa to 200 kPa (approximately 2 atm),
- (c) high pressure, say 200 kPa to the critical point,
- (d) 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 low pressure range direct measurements of vapour pressure have relatively large uncertainties because of the difficulty of making such measurements. More reliable values may be estimated from calorimetric and volumetric data when these are available, as indicated in Section 4. In the high pressure range the uncertainties in measured values increase progressively with increasing temperature up to the critical point where the uncertainty in pressure may be several per cent.

For the majority of the compounds considered here the data are restricted to the medium, or in some cases, the high pressure range and values outside these ranges were obtained by estimation.

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 alkanols. 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 difference between the ideal gas heat capacity and the liquid heat capacity. 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 6. 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. As described in Item 90019 the fit of the Wagner equation to the data of the haloethanes with the most reliable data was adjusted until D_3/D_5 was the value given by the above straight line for the alkanes. The equations of these haloethanes were then used to produce a correlation which in turn was then used to derive the vapour pressure equations of the remaining haloethanes for which the data were less extensive or less reliable.

In this Item it was found there were insufficient compounds with data extensive and reliable enough to produce a corresponding correlation for haloethylenes. Therefore the vapour pressure equations of most of the compounds considered here were derived using the correlation for haloethanes.

5. DISCUSSION OF UNCERTAINTIES

For ease of interpolation, values are presented in the Tables according to a uniform pattern without regard to their estimated accuracy. The uncertainties in the values for each compound 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 giving data at specified vapour pressures the data quality at each pressure is denoted by one of the letters 'X', 'A', 'B' or 'C'. Brackets enclose the letters at those pressures which are outside the range of supporting experimental data. The uncertainties in temperature and pressure are not thought to be more than the values shown below each letter.

The data quality of vapour pressures derived from very high quality experimental data with uncertainties in temperature of about 0.001 K at the normal boiling point or about 0.01 K at the critical point is indicated by the letter 'X'. Such data are available for very few compounds.

The majority of reliable data are considered of quality 'A' with uncertainties up to 10 times those of quality 'X'. 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.

For those compounds for which the data quality at the critical pressure is denoted by 'C' the values of critical temperature and critical pressure given in the Tables should be regarded only as correlating parameters. 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.
2. AMBROSE, D. Correlation and estimation of vapour-liquid critical properties: II. Critical pressures and critical volumes of organic compounds. NPL Report Chem. 98, National Physical Laboratory, Teddington, Middlesex, UK, May 1979.
3. AMBROSE, D.
DAVIES, R.H. Correlation and estimation of vapour pressures III. Reference values for low pressure estimations. J.Chem.Thermodynamics, Vol.12, pp.871-879, 1980.
4. AMBROSE, D.
GHIASSEE, N.B. Vapour pressures and critical temperatures and critical pressures of some alkanolic acids: C1 to C10. J.Chem.Thermodynamics, Vol.19, pp.505-519, 1987.
5. AMBROSE, D.
GHIASSEE, N.B. Vapour pressures and critical temperatures and critical pressures of C5 and C6 cyclic alcohols and ketones. J.Chem.Thermodynamics, Vol.19, pp.903-909, 1987.
6. AMBROSE, D.
WALTON, J. 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
COMPOUND NAME INDEX

The first name given for each compound on the Contents page and at the head of each Table is in bold type

Name		Category
Bromoethylene		MONOHALOETHYLENES
Chloroethylene		MONOHALOETHYLENES
Chloro-1,1-difluoroethylene		TRIALOETHYLENES
Chlorotrifluoroethylene		TETRAHALOETHYLENES
cis-1,2-Dibromoethylene		DIHALOETHYLENES
trans-1,2-Dibromoethylene		DIHALOETHYLENES
1,2-Dichlorodifluoroethylene		TETRAHALOETHYLENES
1,1-Dichloroethylene		DIHALOETHYLENES
cis-1,2-Dichloroethylene		DIHALOETHYLENES
trans-1,2-Dichloroethylene		DIHALOETHYLENES
1,1-Difluoroethylene		DIHALOETHYLENES
cis-1,2-Diiodoethylene		DIHALOETHYLENES
trans-1,2-Diiodoethylene		DIHALOETHYLENES
Fluoroethylene		MONOHALOETHYLENES
Perchloroethylene	see Tetrachloroethylene	TETRAHALOETHYLENES
Perfluoroethylene	see Tetrafluoroethylene	TETRAHALOETHYLENES
Refrigerant 1110	see Tetrachloroethylene	TETRAHALOETHYLENES
Refrigerant 1112	see 1,2-Dichlorodifluoroethylene	TETRAHALOETHYLENES
Refrigerant 1113	see Chlorotrifluoroethylene	TETRAHALOETHYLENES
Refrigerant 1114	see Tetrafluoroethylene	TETRAHALOETHYLENES
Refrigerant 1120	see Trichloroethylene	TRIALOETHYLENES
Refrigerant 1122	see Chloro-1,1-difluoroethylene	TRIALOETHYLENES
Refrigerant 1130(cis)	see cis-1,2-Dichloroethylene	DIHALOETHYLENES
Refrigerant 1130(trans)	see trans-1,2-Dichloroethylene	DIHALOETHYLENES
Refrigerant 1130a	see 1,1-Dichloroethylene	DIHALOETHYLENES
Refrigerant 1130B2(cis)	see cis-1,2-Dibromoethylene	DIHALOETHYLENES
Refrigerant 1130B2(trans)	see trans-1,2-Dibromoethylene	DIHALOETHYLENES
Refrigerant 1132a	see 1,1-Difluoroethylene	DIHALOETHYLENES
Refrigerant 1140	see Chloroethylene	MONOHALOETHYLENES
Refrigerant 1140B1	see Bromoethylene	MONOHALOETHYLENES
Refrigerant 1141	see Fluoroethylene	MONOHALOETHYLENES
Tetrachloroethylene		TETRAHALOETHYLENES
Tetrafluoroethylene		TETRAHALOETHYLENES
Trichloroethylene		TRIALOETHYLENES
Vinyl bromide	see Bromoethylene	MONOHALOETHYLENES
Vinyl chloride	see Chloroethylene	MONOHALOETHYLENES
Vinyl fluoride	see Fluoroethylene	MONOHALOETHYLENES
Vinylidene chloride	see 1,1-Dichloroethylene	DIHALOETHYLENES
Vinylidene fluoride	see 1,1-Difluoroethylene	DIHALOETHYLENES

C₂H₃F Fluoroethylene (Vinyl fluoride, Refrigerant 1141)

Vapour Pressure $\ln p = \ln p_c + (T_c/T)(b_1q + b_2q^{1.5} + b_3q^{2.5} + b_4q^5)$

where T is the kelvin temperature on the International Practical Temperature Scale of 1968 (IPTS-68), p is the vapour pressure, T_c, p_c are the critical temperature and critical pressure respectively and q = 1 - T/T_c.

Critical Temperature	T _c = 328.2 K	(t _c = 55.05 °C	= 131.09 °F)
Critical Pressure	p _c = 5215 kPa	(= 51.47 atm	= 756.4 psia)
	b ₁ = -6.73895		
	b ₂ = 1.61757		
	b ₃ = -1.8074		
	b ₄ = -2.451		
Acentric Factor	= 0.148		
Normal Boiling Point	■ 200.950 K	(= -72.200 °C	= -97.960 °F)
dT/dp at N.B.P.	= 0.188 K/kPa	(■ 0.025 °C/mmHg	= 2.336 °F/psi)
Normal Melting Point	= 113 K	(= -160 °C	= -256 °F)

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	100	1000	5215
T/K			125.259	142.216	165.674	200.699	258.952	328.200
(dp/dT)/(kPa/K)			0.016	0.117	0.821	5.259	29.883	107.082
Data Quality			(C)	C	C	C	C	C
Uncertainty in T (K)			5	2	1	1	5	10
Uncertainty in p (%)			100	50	10	10	20	20

Vapour Pressure of Fluoroethylene

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	%
				200	96.38	1	10	300	2882.	5	20
				205	124.7	1	10	305	3219.	10	20
				210	159.1	1	10	310	3585.	10	20
115	(0.017)			215	200.4	1	10	315	3983.	10	20
120	(0.042)			220	249.4	2	10	320	4416.	10	20
125	(0.096)			225	307.1	2	10	325	4888.	10	20
130	(0.204)	2	50	230	374.3	2	10				
135	(0.407)	2	50	235	452.0	2	10				
140	(0.768)	2	50	240	541.1	2	10				
145	1.376	2	20	245	642.6	2	10				
150	2.357	2	20	250	757.6	2	20				
155	3.878	1	20	255	886.9	5	20				
160	6.156	1	20	260	1032.	5	20				
165	9.459	1	10	265	1193.	5	20				
170	14.11	1	10	270	1372.	5	20				
175	20.51	1	10	275	1569.	5	20				
180	29.09	1	10	280	1787.	5	20				
185	40.37	1	10	285	2026.	5	20				
190	54.92	1	10	290	2287.	5	20				
195	73.36	1	10	295	2571.	5	20				

Issued April 1991

Vapour Pressure of Fluoroethylene 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
		-125	14.56	-75	0.861	-25	7.041	25	27.28
		-120	24.30	-70	1.121	-20	8.263	30	30.50
		-115	39.07	-65	1.437	-15	9.635	35	34.01
-160	(0.088)	-110	60.74	-60	1.819	-10	11.16	40	37.82
-155	(0.227)	-105	91.59	-55	2.273	-5	12.86	45	41.96
-150	(0.535)	-100	134.4	-50	2.810	0	14.75	50	46.47
-145	(1.168)	-95	192.2	-45	3.437	5	16.82	55	51.42
-140	(2.383)	-90	268.9	-40	4.165	10	19.09		
-135	(4.582)	-85	368.4	-35	5.001	15	21.59		
-130	8.361	-80	495.3	-30	5.957	20	24.31		

Units: psia v. °F

t °F	p psia	t °F	p psia	t °F	p psia	t °F	p psia	t °F	p psia
-250	(0.003)	-150	2.391	-50	49.42	50	280.6		
-240	(0.009)	-140	3.576	-40	61.21	60	321.5		
-230	(0.021)	-130	5.199	-30	74.97	70	366.6		
-220	(0.046)	-120	7.368	-20	90.91	80	416.2		
-210	(0.095)	-110	10.21	-10	109.2	90	470.7		
-200	0.184	-100	13.84	0	130.1	100	530.4		
-190	0.335	-90	18.43	10	153.8	110	595.8		
-180	0.583	-80	24.11	20	180.4	120	667.6		
-170	0.969	-70	31.05	30	210.3	130	747.1		
-160	1.549	-60	39.43	40	243.6				

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.

CARPMAELS & RANSFORD, Patent Agents, London, Brit.Pat.469 421, 1937.
 STULL,D.R., Ind.Eng.Chem., Vol.39, p.517, 1947.*
 DOWNING,F.B., U.S.Pat. 2 480 560, 1950.
 BSAF, NSR Pat. 859 887, 1953. N
 HARMON,J., U.S.Pat. 2 599 631, 1953.
 BARTOCHA, et al., J.Inorg.Nucl.Chem., Vol.6, p.119, 1958.
 DU PONT, Tech.Bull.B-2, E.I.Du Pont de Nemours & Co., Wilmington, Del., 1966. C
 KRESTA,J., AMBROZ,L., Chem.Prumsyl., Vol.16, p.94, 1966. C
 AMBROSE,D., NPL Report Chem 107, Nat.Phys.Lab., Teddington, Middlesex, UK, 1980.*
 TRC Thermodynamic Tables, Texas A & M Univ., Loose leaf data sheets extant 1991.*

Antoine equation: $\ln(p/\text{kPa}) = 13.86424 - 1628.875/(T/\text{K} - 24.778)$ for $2 < p/\text{kPa} < 200$.

C₂H₃Cl Chloroethylene (Vinyl chloride, Refrigerant 1140)

Vapour Pressure $\ln p = \ln p_c + (T_c/T)(b_1q + b_2q^{1.5} + b_3q^{2.5} + b_4q^5)$

where T is the kelvin temperature on the International Practical Temperature Scale of 1968 (IPTS-68),
p is the vapour pressure, T_c, p_c are the critical temperature and critical pressure respectively
and $q = 1 - T/T_c$.

Critical Temperature	T _c = 424 K	(t _c = 150.85 °C	= 303.53 °F)
Critical Pressure	p _c = 5350 kPa	(= 52.80 atm	= 776.0 psia)
	b ₁ = -6.75952		
	b ₂ = 1.61858		
	b ₃ = -1.8234		
	b ₄ = -2.470		
Acentric Factor	= 0.153		
Normal Boiling Point	= 259.356 K	(= -13.794 °C	= 7.171 °F)
dT/dp at N.B.P.	= 0.242 K/kPa	(= 0.032 °C/mmHg	= 2.998 °F/psi)
Normal Melting Point	= 119 K	(= -154 °C	= -245 °F)

Data at Specified Pressures

p/kPa	0.001	0.01	0.1	1	10	100	1000	5350
T/K	132.119	145.342	162.014	183.858	214.041	259.034	333.691	424.000
(dp/dT)/(kPa/K)	2.E-4	0.002	0.012	0.091	0.638	4.098	23.344	85.293
Data Quality			(C)	(C)	8	8	C	(C)
Uncertainty in T (K)			5	2	0.1	0.1	1	10
Uncertainty in p (%)			50	20	1	0.5	5	20

Vapour Pressure of Chloroethylene

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	%
				225	19.35	0.1	1	350	(1437.)	2	5
				230	25.52	0.1	1	355	(1595.)	2	10
				235	33.21	0.1	1	360	(1765.)	2	10
				240	42.66	0.1	0.5	365	(1948.)	2	10
120	(7.E-5)			245	54.16	0.1	0.5	370	(2144.)	2	10
125	(2.E-4)			250	68.00	0.1	0.5	375	(2355.)	5	10
130	(7.E-4)			255	84.51	0.1	0.5	380	(2580.)	5	10
135	(0.002)			260	104.0	0.1	0.5	385	(2821.)	5	10
140	(0.004)			265	126.9	0.1	1	390	(3078.)	5	10
145	(0.009)			270	153.5	0.2	1	395	(3352.)	5	10
150	(0.020)			275	184.2	0.2	1	400	(3644.)	5	20
155	(0.041)			280	219.5	0.2	1	405	(3956.)	5	20
160	(0.078)			285	259.6	0.2	1	410	(4289.)	10	20
165	(0.143)	5	50	290	305.2	0.5	2	415	(4644.)	10	20
170	(0.251)	2	50	295	356.5	0.5	2	420	(5024.)	10	20
175	(0.426)	2	50	300	414.1	0.5	2				
180	(0.698)	2	20	305	478.3	0.5	2				
185	(1.109)	2	20	310	549.8	0.5	2				
190	(1.713)	1	10	315	628.8	1	2				
195	(2.578)	0.5	5	320	716.0	1	5				
200	(3.789)	0.5	5	325	811.7	1	5				
205	(5.450)	0.2	2	330	916.5	1	5				
210	7.681	0.1	1	335	1031.	1	5				
215	10.63	0.1	1	340	1155.	2	5				
220	14.45	0.1	1	345	(1290.)	2	5				

Issued April 1991

Vapour Pressure of Chloroethylene 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
-150	(0.001)	-50	130.5	25	3.869	75	(13.63)	125	(34.88)
-140	(0.009)	-40	226.3	30	4.478	80	(15.15)	130	(37.88)
-130	(0.053)	-30	372.4	35	5.156	85	(16.78)	135	(41.09)
-120	(0.237)	-20	585.6	40	5.908	90	(18.54)	140	(44.51)
-110	(0.861)	-10	885.2	45	6.738	95	(20.43)	145	(48.16)
Interval change									
-100	(2.638)	0	1293.	50	7.651	100	(22.45)	150	(52.10)
-90	(7.031)	5	1544.	55	8.652	105	(24.62)		
-80	(16.67)	10	1831.	60	9.745	110	(26.94)		
-70	(35.82)	15	2158.	65	10.94	115	(29.42)		
-60	70.84	20	2526.	70	(12.23)	120	(32.06)		

Units: psia v. °F

t °F	p psia	t °F	p psia	t °F	p psia	t °F	p psia	t °F	p psia
		-100	(0.542)	50	35.41	150	162.8	250	(480.1)
		-80	1.185	60	42.47	160	(184.2)	260	(527.0)
		-60	2.366	70	50.55	170	(207.6)	270	(577.3)
-240	(2.E-5)	-40	4.376	80	59.73	180	(233.0)	280	(631.3)
-220	(2.E-4)	-20	7.588	90	70.11	190	(260.7)	290	(689.5)
Interval change									
-200	(0.001)	0	12.45	100	81.78	200	(290.7)	300	(752.3)
-180	(0.006)	10	15.66	110	94.83	210	(323.2)		
-160	(0.025)	20	19.49	120	109.4	220	(358.2)		
-140	(0.080)	30	24.00	130	125.4	230	(395.9)		
-120	(0.223)	40	29.28	140	143.2	240	(436.5)		

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.

DANA, L.I., BURDICK, N., JENKINS, A.C., J. Am. Chem. Soc., Vol. 49, p. 2801, 1927.
 ROZLOVSKAYA, J.T., TEMKIN, M.I., J. Appl. Chem. (USSR), Vol. 19, p. 32, 1946.
 STULL, D.R., Ind. Eng. Chem., Vol. 39, p. 517, 1947.*
 DREISBACH, R.R., SHRADER, S.A., Ind. Eng. Chem., Vol. 41, p. 2879, 1949. **M**
 TIMMERMAN, J., Physico-Chemical Constants of Pure Org. Comp., Vol. 1, p. 277, 1950.*
 BANERJEE, DORAISWAMY, Brit. Chem. Eng., Vol. 3, p. 316, 1958.*
 McDONALD, R.A., SHRADER, S.A., et al., J. Chem. Eng. Data, Vol. 4, p. 311, 1959. **M**
 DANOV, GOLUBEV, Zh. Prikl. Khim., Vol. 41, p. 451, 1968.
 CARASSETI, Ann. Chim. (Rome), Vol. 67, p. 499, 1977.
 TRC Thermodynamic Tables, Texas A & M Univ., Loose leaf data sheets extant 1991.*

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

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

Antoine equation: $\ln(p/\text{kPa}) = 13.90927 - 2110.824/(T/K - 32.165)$ for $2 < p/\text{kPa} < 200$.