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Vapour pressures and critical points of liquids

C_1 to C_6 Alkanols

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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:

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(Continued on inside back cover)

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VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS

C₁ TO C₆ ALKANOLS

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VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS

C₁ TO C₆ ALKANOLS

1. INTRODUCTION

This Data Item presents saturated vapour pressures of the C₁ to C₆ alkanols listed, with alternative names if any, in Table 1 (page 4).

The values of vapour pressure given in the Tables have been obtained by evaluating, for each compound, a Wagner equation of the form

$$\ln p = \ln p_c + (T_c/T) (b_1 q + b_2 q^{3/2} + b_3 q^{5/2} + b_4 q^5), \quad (1)$$

where T is the temperature in kelvins ($T = 273.15 +$ the Celsius temperature) on the International Practical Temperature Scale of 1968 (IPTS-68), p is the vapour pressure in kPa, T_c , p_c are the critical temperature and critical pressure respectively and $q = 1 - T/T_c$.

Equation (1) was fitted to the experimental and calculated data that had been selected and weighted in accordance with a critical assessment of all the data. Note that estimated values of T_c are normally rounded to the nearest kelvin and that values in other units are obtained by exact conversion.

Table 2 is an index to Tables 5 onward. Table 3 gives T_c , p_c and the coefficients b_1 , b_2 , b_3 and b_4 for each compound to be used in Equation (1). Table 4 shows, for each compound, the normal boiling point in kelvins, degrees Celsius and degrees Fahrenheit, the value of dp/dT at the normal boiling point and the acentric factor.

Tables 5 to 9 present values of vapour pressure, in kPa, at 5 K intervals of temperature down to a temperature just above the melting point, T_m , or an arbitrary lower limit where the melting point is not known.

Tables 5(C) to 9(C) present the vapour pressures, in atm or mmHg, at intervals of 5 degrees C, the change from atm to mmHg being at approximately 2 atm. Tables 5(F) to 9(F) give the vapour pressures, in psia, at intervals of 10 degrees F.

The sources of experimental and calculated data for each compound, on which the tabulated values are based, are shown in Table A.1 and Table A.2. The uncertainties in the tabulated values of vapour pressure that the user should allow for are given in Table A.3.

The notation and units, conversion factors and additional References are given the introductory Data Item, Reference 1 (page 4).

2. 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 precise 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. Critical point data are usually of a lower degree of precision, with uncertainties in pressure of one to two per cent.

In the low pressure range direct measurements of vapour pressure have very large uncertainties because of the difficulty of making such measurements at low pressures. However, vapour pressures calculated from experimental low temperature thermal and volumetric data, have much lower uncertainties. Such calculated low range vapour pressures have been reported for a small number of key compounds which includes most of the normal alkanes up to hexadecane but only two alkanols, namely ethanol and propan-1-ol.

Table A.1 lists the sources of vapour pressure data considered for the compounds included in this Item. Table A.2 shows, for each compound, the sources that were selected as giving the most reliable data in each of the four pressure ranges. The more recent sources not used are indicated in the columns headed 'Other Sources'.

For most compounds the data are restricted to the medium pressure range and values outside this range were obtained by estimation. The critical temperatures and critical pressures were initially estimated by the methods of References 1 and 2, but the critical pressures, in particular, were reestimated from a correlation developed during the preparation of the Item.

The general procedure followed to obtain the final Wagner equation for each compound is outlined in Section 3.2 of the Introductory Data Item, see Reference 4 (page 3). This procedure was, of necessity, varied from compound to compound because of the varying quality and availability of data in each case. The consequent uncertainty in the derived values of vapour pressure, therefore, also vary considerably from one compound to another.

3. DISCUSSION OF UNCERTAINTIES

For ease of interpolation, values are presented in Table A.3 according to a uniform pattern without regard to their estimated accuracy. However, except in the low pressure range, values dependent on estimated data are much less certain than values dependent upon measured data.

In certain circumstances the user may need to allow for uncertainties in the tabulated values and an assessment of these is provided in Table A.3. For simplicity the uncertainties are given as 1, 2 or 5 times a power of 10.

In Table A.3 the letter 'X' indicates that the vapour pressures at the values at the top of the Table are derived from very high quality experimental data and that the uncertainty is considered less than the value shown. Similarly the letters 'A, B, C' indicate that the vapour pressures are based on progressively less certain data but that the uncertainties are thought to be less than the values shown. The letter 'D' indicates that the uncertainties cannot be estimated but are probably greater than the values shown. The letters 'A, B, C, D' are shown in brackets at those pressures which are above or below the range of supporting data.

For those compounds for which the uncertainties at the critical pressure are denoted by 'D' the values of critical temperature and critical pressure given in the Tables should be regarded as correlating parameters and since the acentric factor, ω , is dependent upon the value of critical pressure selected, the uncertainty in ω for these compounds is greater than 0.05.

The user should allow for uncertainties of up to 10 per cent in the values below 1 kPa. At higher pressures the uncertainties for each compound are dependent upon the quality of the experimental data and the confidence in the experimental or estimated values of critical temperature and critical pressure.

4. 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.
PATEL, N. C. The correlation and estimation of vapour pressures. IV: Extrapolation of vapour pressures and estimation of critical pressures by the principle of corresponding states using two reference fluids with non-spherical molecules. J.Chem. Thermodynamics, Vol.16, pp.459-468, 1984.
4. ESDU Vapour pressures and critical points of liquids. Introduction to Data Items issued after September 1984. Item No. 84021, ESDU International, 1984.

TABLE 1

LIST of COMPOUNDS

The empirical formula, name and alternative names, if any, of each compound considered in this Item are as follows:

No.	Emp. Form.	Name	Alternative Names	
C ₁ and C ₂ ALKANOLS				
1	CH ₄ O	Methanol	Methyl Alcohol	
2	C ₂ H ₆ O	Ethanol	Ethyl Alcohol	
C ₃ ALKANOLS				
3	C ₃ H ₈ O	Propan-1-ol	Propyl Alcohol	
4		Propan-2-ol	Isopropyl Alcohol	
C ₄ ALKANOLS				
5	C ₄ H ₁₀ O	Butan-1-ol	Butyl Alcohol	
6		Butan-2-ol	sec-Butyl Alcohol	
7		2-Methylpropan-1-ol	Isobutyl Alcohol	
8		2-Methylpropan-2-ol	tert-Butyl Alcohol	
C ₅ ALKANOLS				
9	C ₅ H ₁₂ O	Pentan-1-ol	Pentyl Alcohol	n-Amyl Alcohol
10		Pentan-2-ol	sec-act-Pentyl Alcohol	sec-act-Amyl Alcohol
11		Pentan-3-ol	sec-Pentyl Alcohol	sec-Amyl Alcohol
12		2-Methylbutan-1-ol	pri-act-Pentyl Alcohol	pri-act-Amyl Alcohol
13		3-Methylbutan-1-ol	Isopentyl Alcohol	Isoamyl Alcohol
14		2-Methylbutan-2-ol	tert-Pentyl Alcohol	tert-Amyl Alcohol
15		3-Methylbutan-2-ol		
16		2,2-Dimethylpropan-1-ol	Neopentyl Alcohol	
C ₆ ALKANOLS				
17	C ₆ H ₁₄ O	Hexan-1-ol	Hexyl Alcohol	
18		Hexan-2-ol		
19		Hexan-3-ol		
20		2-Methylpentan-1-ol		
21		3-Methylpentan-1-ol		
22		4-Methylpentan-1-ol		
23		2-Methylpentan-2-ol		
24		3-Methylpentan-2-ol		
25		4-Methylpentan-2-ol		
26		2-Methylpentan-3-ol		
27		3-Methylpentan-3-ol		
28		2-Ethylbutan-1-ol		
29		2,2-Dimethylbutan-1-ol		
30		2,3-Dimethylbutan-1-ol		
31		3,3-Dimethylbutan-1-ol		
32		2,3-Dimethylbutan-2-ol		
33		3,3-Dimethylbutan-2-ol		

TABLE 2

LOCATION OF TABLES

The location of the Tables giving the vapour pressure of each compound in various units are as follows:-

Name	kPa v K		atm or mmHg v deg.C		psia v deg.F	
	Table	Pages	Table	Pages	Table	Pages
C ₁ and C ₂ ALKANOLS						
Methanol	5	8, 9	5(C)	18,19	5(F)	28,29
Ethanol	5	8, 9	5(C)	18,19	5(F)	28,29
C ₃ ALKANOLS						
Propan-1-ol	5	8, 9	5(C)	18,19	5(F)	28,29
Propan-2-ol	5	8, 9	5(C)	18,19	5(F)	28,29
C ₄ ALKANOLS						
Butan-1-ol	5	8, 9	5(C)	18,19	5(F)	28,29
Butan-2-ol	5	8, 9	5(C)	18,19	5(F)	28,29
2-Methylpropan-1-ol	5	8, 9	5(C)	18,19	5(F)	28,29
2-Methylpropan-2-ol	5	8, 9	5(C)	18,19	5(F)	28,29
C ₅ ALKANOLS						
Pentan-1-ol	6	10,11	6(C)	20,21	6(F)	30,31
Pentan-2-ol	6	10,11	6(C)	20,21	6(F)	30,31
Pentan-3-ol	6	10,11	6(C)	20,21	6(F)	30,31
2-Methylbutan-1-ol	6	10,11	6(C)	20,21	6(F)	30,31
3-Methylbutan-1-ol	6	10,11	6(C)	20,21	6(F)	30,31
2-Methylbutan-2-ol	6	10,11	6(C)	20,21	6(F)	30,31
3-Methylbutan-2-ol	6	10,11	6(C)	20,21	6(F)	30,31
2,2-Dimethylpropan-1-ol	6	10,11	6(C)	20,21	6(F)	30,31
C ₆ ALKANOLS						
Hexan-1-ol	7	12,13	7(C)	22,23	7(F)	32,33
Hexan-2-ol	7	12,13	7(C)	22,23	7(F)	32,33
Hexan-3-ol	7	12,13	7(C)	22,23	7(F)	32,33
2-Methylpentan-1-ol	7	12,13	7(C)	22,23	7(F)	32,33
3-Methylpentan-1-ol	7	12,13	7(C)	22,23	7(F)	32,33
4-Methylpentan-1-ol	7	12,13	7(C)	22,23	7(F)	32,33
2-Methylpentan-2-ol	8	14,15	8(C)	24,25	8(F)	34,35
3-Methylpentan-2-ol	8	14,15	8(C)	24,25	8(F)	34,35
4-Methylpentan-2-ol	8	14,15	8(C)	24,25	8(F)	34,35
2-Methylpentan-3-ol	8	14,15	8(C)	24,25	8(F)	34,35
3-Methylpentan-3-ol	8	14,15	8(C)	24,25	8(F)	34,35
2-Ethylbutan-1-ol	9	16,17	9(C)	26,27	9(F)	36,37
2,2-Dimethylbutan-1-ol	9	16,17	9(C)	26,27	9(F)	36,37
2,3-Dimethylbutan-1-ol	9	16,17	9(C)	26,27	9(F)	36,37
3,3-Dimethylbutan-1-ol	9	16,17	9(C)	26,27	9(F)	36,37
2,3-Dimethylbutan-2-ol	9	16,17	9(C)	26,27	9(F)	36,37
3,3-Dimethylbutan-2-ol	9	16,17	9(C)	26,27	9(F)	36,37

TABLE 3
CONSTANTS in EQUATION (1)

This Table lists the constants for each compound that, when used in the equation

$$\ln p = \ln p_c + (T_c/T)(b_1q + b_2q^{3/2} + b_3q^{5/2} + b_4q^5),$$

where T is in kelvins and q = 1-T/T_c, give p in kilopascals when p_c is in kilopascals.

Name	T _c K	P _c kPa	b ₁	b ₂	b ₃	b ₄
C ₁ and C ₂ ALKANOLS						
Methanol	512.64	8092	-8.63571	1.17982	-2.4790	-1.024
Ethanol	513.92	6132	-8.68587	1.17831	-4.8762	1.588
C ₃ ALKANOLS						
Propan-1-ol	536.78	5168	-8.53706	1.96214	-7.6918	2.945
Propan-2-ol	508.3	4763	-8.74110	2.16825	-8.6964	4.680
C ₄ ALKANOLS						
Butan-1-ol	563.05	4424	-8.40615	2.23010	-8.2486	-0.711
Butan-2-ol	536.01	4198	-8.36970	2.46355	-8.6714	-3.184
2-Methylpropan-1-ol	547.78	4304	-8.29580	2.04998	-8.2717	-1.544
2-Methylpropan-2-ol	506.2	3973	-8.44724	2.35844	-9.0348	-3.332
C ₅ ALKANOLS						
Pentan-1-ol	588.15	3909	-8.98005	3.91624	-9.9081	-2.191
Pentan-2-ol	560	3710	-8.26707	2.06241	-7.4247	-7.765
Pentan-3-ol	553	3660	-8.24094	2.20524	-8.5343	-1.835
2-Methylbutan-1-ol	577	3820	-8.27182	2.35150	-7.2191	-11.540
3-Methylbutan-1-ol	579	3830	-8.46283	2.33081	-6.8759	-9.466
2-Methylbutan-2-ol	534	3540	-8.18087	1.93935	-7.4277	-6.424
3-Methylbutan-2-ol	550	3640	-8.10903	2.12636	-8.0164	-5.482
2,2-Dimethylpropan-1-ol	554	3670	-8.08519	1.73253	-6.4970	-6.048
C ₆ ALKANOLS						
Hexan-1-ol	610.7	3470	-9.49034	5.13288	-10.5817	-5.154
Hexan-2-ol	586.2	3320	-8.82821	3.60449	-9.0473	-2.012
Hexan-3-ol	578	3280	-8.70183	2.48277	-6.3311	-4.386
2-Methylpentan-1-ol	600	3410	-8.87546	3.96653	-9.6387	-1.388
3-Methylpentan-1-ol	607	3450	-8.85230	3.78872	-9.0172	-4.409
4-Methylpentan-1-ol	603.5	3430	-9.06174	4.39213	-10.4972	-2.005
2-Methylpentan-2-ol	559.5	3170	-8.46576	2.55915	-6.9097	-2.494
3-Methylpentan-2-ol	581	3300	-8.54352	3.42241	-8.7956	-5.801
4-Methylpentan-2-ol	574.5	3260	-8.66723	3.10458	-8.0409	-1.482
2-Methylpentan-3-ol	567	3220	-8.49526	2.28519	-6.0329	-6.215
3-Methylpentan-3-ol	563	3200	-8.27599	2.23909	-6.0008	-1.744
2-Ethylbutan-1-ol	599	3400	-8.72410	3.62334	-8.8410	-2.276
2,2-Dimethylbutan-1-ol	588	3340	-8.32074	2.57859	-6.5496	-7.028
2,3-Dimethylbutan-1-ol	599	3400	-8.96569	3.79553	-9.3370	-3.202
3,3-Dimethylbutan-1-ol	595	3380	-8.71065	4.16165	-10.3209	-5.318
2,3-Dimethylbutan-2-ol	559	3180	-8.35617	2.90477	-7.9010	-2.558
3,3-Dimethylbutan-2-ol	562	3190	-8.51176	4.68688	-12.6546	-1.824

TABLE 4

NORMAL BOILING POINTS and ACENTRIC FACTORS

Name	Normal Boiling Point						Acentric
	p= 101.325 kPa		760 mmHg		14.69595 psia		Factor
	T K	dT/dp K/kPa	T deg.C	dT/dp deg.C per mmHg	T deg.F	dT/dp deg.F per psia	
C ₁ and C ₂ ALKANOLS							
Methanol	337.69	0.2508	64.54	0.03344	148.16	3.113	0.564
Ethanol	351.44	0.2498	78.29	0.03331	172.92	3.101	0.643
C ₃ ALKANOLS							
Propan-1-ol	370.30	0.2608	97.15	0.03477	206.87	3.236	0.620
Propan-2-ol	355.39	0.2469	82.24	0.03292	180.02	3.065	0.665
C ₄ ALKANOLS							
Butan-1-ol	390.88	0.2785	117.73	0.03713	243.92	3.457	0.591
Butan-2-ol	372.66	0.2658	99.51	0.03543	211.12	3.298	0.577
2-Methylpropan-1-ol	381.04	0.2708	107.89	0.03610	226.20	3.361	0.590
2-Methylpropan-2-ol	355.49	0.2509	82.34	0.03344	180.21	3.113	0.613
C ₅ ALKANOLS							
Pentan-1-ol	411.16	0.2986	138.01	0.03981	280.41	3.706	0.579
Pentan-2-ol	392.24	0.2861	119.09	0.03814	246.36	3.551	0.567
Pentan-3-ol	388.09	0.2823	114.94	0.03763	238.89	3.503	0.573
2-Methylbutan-1-ol	401.25	0.2937	128.10	0.03915	262.58	3.644	0.538
3-Methylbutan-1-ol	404.23	0.2973	131.08	0.03964	267.94	3.690	0.562
2-Methylbutan-2-ol	374.99	0.2758	101.84	0.03677	215.31	3.423	0.562
3-Methylbutan-2-ol	384.38	0.2815	111.23	0.03753	232.21	3.493	0.546
2,2-Dimethylpropan-1-ol	386.25	0.2887	113.10	0.03849	235.58	3.583	0.536
C ₆ ALKANOLS							
Hexan-1-ol	430.44	0.3199	157.29	0.04265	315.12	3.970	0.575
Hexan-2-ol	413.22	0.3117	140.07	0.04156	284.13	3.869	0.555
Hexan-3-ol	408.70	0.3143	135.55	0.04190	275.98	3.900	0.567
2-Methylpentan-1-ol	421.28	0.3170	148.13	0.04226	298.64	3.934	0.544
3-Methylpentan-1-ol	425.77	0.3201	152.62	0.04268	306.72	3.973	0.544
4-Methylpentan-1-ol	424.88	0.3152	151.73	0.04203	305.12	3.912	0.563
2-Methylpentan-2-ol	394.10	0.3064	120.95	0.04085	249.71	3.803	0.530
3-Methylpentan-2-ol	407.15	0.3079	134.00	0.04105	273.19	3.821	0.519
4-Methylpentan-2-ol	404.83	0.3099	131.68	0.04132	269.02	3.847	0.545
2-Methylpentan-3-ol	399.76	0.3096	126.61	0.04128	259.90	3.842	0.542
3-Methylpentan-3-ol	394.01	0.3129	120.86	0.04172	249.56	3.884	0.498
2-Ethylbutan-1-ol	419.48	0.3190	146.33	0.04252	295.40	3.958	0.528
2,2-Dimethylbutan-1-ol	410.01	0.3184	136.86	0.04245	278.35	3.951	0.497
2,3-Dimethylbutan-1-ol	422.68	0.3151	149.53	0.04201	301.15	3.911	0.572
3,3-Dimethylbutan-1-ol	416.32	0.3099	143.17	0.04131	289.70	3.846	0.521
2,3-Dimethylbutan-2-ol	391.86	0.3033	118.71	0.04044	245.68	3.764	0.505
3,3-Dimethylbutan-2-ol	393.28	0.2899	120.13	0.03865	248.23	3.598	0.496

TABLE 5
VAPOUR PRESSURE of C₁ to C₄ ALKANOLS

Units: kPa v. K

	1	CH ₄ O	Methanol				Methyl Alcohol	
	2	C ₂ H ₆ O	Ethanol				Ethyl Alcohol	
	3	C ₃ H ₈ O	Propan-1-ol				Propyl Alcohol	
	4		Propan-2-ol				Isopropyl Alcohol	
	5	C ₄ H ₁₀ O	Butan-1-ol				Butyl Alcohol	
	6		Butan-2-ol				sec-Butyl Alcohol	
	7		2-Methylpropan-1-ol				Isobutyl Alcohol	
	8		2-Methylpropan-2-ol				tert-Butyl Alcohol	
No.	1	2	3	4	5	6	7	8
T _C /K	512.64	513.92	536.78	508.30	563.05	536.01	547.78	506.20
P _C /kPa	8092	6132	5168	4763	4424	4198	4304	3973
T	P							
K	kPa							
560					4229.7			
555					3930.6			
550					3650.8			
545					3388.2		4128.7	
540					3141.1		3831.8	
535			5025.1		2908.4	4133.0	3554.3	
530			4645.8		2689.2	3828.8	3293.7	
525			4292.6		2482.6	3546.5	3048.6	
520			3962.3		2288.1	3282.6	2817.8	
515			3652.8		2105.0	3035.3	2600.6	
510	7741.6	5740.4	3362.6		1932.9	2803.0	2396.0	
505	7116.0	5273.2	3090.5	4503.6	1771.2	2584.8	2203.4	3895.1
500	6533.9	4838.0	2835.3	4137.4	1619.5	2379.6	2022.4	3589.0
495	5991.6	4432.0	2596.2	3797.9	1477.5	2186.8	1852.3	3305.7
490	5486.4	4053.3	2372.4	3481.9	1344.6	2005.7	1692.8	3041.9
485	5015.7	3700.2	2163.1	3187.2	1220.6	1835.7	1543.4	2795.5
480	4577.6	3371.2	1967.7	2912.3	1105.0	1676.4	1403.6	2564.9
475	4170.3	3065.1	1785.5	2655.9	997.65	1527.3	1273.1	2349.1
470	3792.0	2780.6	1616.0	2416.8	898.05	1387.9	1151.6	2147.2
465	3441.1	2516.6	1458.6	2194.0	805.91	1257.8	1038.7	1958.3
460	3116.1	2272.1	1312.8	1986.8	720.90	1136.7	933.92	1781.8
455	2815.5	2046.1	1178.0	1794.4	642.69	1024.2	837.05	1617.1
450	2538.1	1837.6	1053.7	1615.9	570.95	919.95	747.71	1463.6
445	2282.5	1645.6	939.35	1450.8	505.36	823.54	665.56	1320.8
440	2047.5	1469.3	834.55	1298.4	445.58	734.66	590.25	1188.3
435	1831.8	1307.8	738.76	1158.1	391.29	652.97	521.44	1065.5
430	1634.4	1160.3	651.49	1029.3	342.18	578.14	458.79	952.12
425	1454.1	1026.0	572.27	911.42	297.93	509.81	401.97	847.68
420	1289.8	903.97	500.60	803.87	258.21	447.65	350.62	751.78
415	1140.5	793.53	436.03	706.10	222.72	391.32	304.42	664.02
410	1005.2	693.89	378.08	617.55	191.15	340.48	263.03	583.97
405	882.90	604.32	326.30	537.67	163.20	294.79	226.12	511.26
400	772.77	524.11	280.23	465.92	138.58	253.93	193.36	445.47
395	673.87	452.54	239.44	401.74	117.00	217.55	164.43	386.20
390	585.36	388.97	203.50	344.62	98.198	185.33	139.02	333.05
385	506.43	332.73	171.99	294.03	81.905	156.95	116.82	285.62
380	436.29	283.20	144.52	249.44	67.872	132.08	97.546	243.52
375	374.21	239.79	120.71	210.37	55.861	110.43	80.909	206.35

TABLE 5 continued
 VAPOUR PRESSURE of C_1 to C_4 ALKANOLS continued

Units: kPa v. K

No.	1	2	3	4	5	6	7	8
continued								
T K	p kPa							
370	319.49	201.94	100.18	176.33	45.650	91.696	66.643	173.73
365	271.46	169.10	82.602	146.84	37.028	75.592	54.492	145.27
360	229.49	140.76	67.638	121.47	29.801	61.845	44.216	120.61
355	192.99	116.44	54.988	99.772	23.789	50.196	35.590	99.383
350	161.40	95.707	44.370	81.350	18.828	40.401	28.406	81.243
345	134.20	78.132	35.522	65.821	14.768	32.232	22.473	65.862
340	110.91	63.335	28.206	52.830	11.476	25.477	17.614	52.924
335	91.076	50.960	22.206	42.048	8.8293	19.942	13.672	42.135
330	74.293	40.687	17.327	33.174	6.7232	15.450	10.504	33.219
325	60.179	32.221	13.393	25.933	5.0641	11.841	7.9830	25.920
320	48.388	25.301	10.251	20.079	3.7710	8.9715	5.9987	20.006
315	38.608	19.691	7.7663	15.390	2.7745	6.7162	4.4542	15.264
310	30.554	15.181	5.8207	11.673	2.0157	4.9642	3.2660	11.506
305	23.973	11.590	4.3135	8.7566	1.4450	3.6203	2.3632	8.5623
300	18.641	8.7580	3.1589	6.4933	1.0215	2.6030	1.6862	6.2857
295	14.357	6.5464	2.2848	4.7569	7.12E-1	1.8437	1.1855	
290	10.947	4.8379	1.6311	3.4409	4.88E-1	1.2853	8.21E-1	
285	8.2584	3.5326	1.1485	2.4559	3.29E-1	8.81E-1	5.59E-1	
280	6.1608	2.5471	7.97E-1	1.7285	2.18E-1	5.93E-1	3.74E-1	
275	4.5417	1.8122	5.45E-1	1.1988	1.42E-1	3.92E-1	2.46E-1	
270	3.3063	1.2714	3.67E-1	8.19E-1	9.06E-2	2.54E-1	1.58E-1	
265	2.3751	8.79E-1	2.42E-1	5.50E-1	5.67E-2	1.61E-1	9.98E-2	
260	1.6822	5.98E-1	1.58E-1	3.63E-1	3.47E-2	9.97E-2	6.16E-2	
255	1.1737	4.00E-1	1.00E-1	2.36E-1	2.07E-2	6.03E-2	3.72E-2	
250	8.06E-1	2.63E-1	6.28E-2	1.50E-1	1.21E-2	3.56E-2	2.19E-2	
245	5.44E-1	1.70E-1	3.84E-2	9.34E-2	6.86E-3	2.04E-2	1.25E-2	
240	3.61E-1	1.08E-1	2.30E-2	5.70E-2	3.79E-3	1.14E-2	6.97E-3	
235	2.35E-1	6.67E-2	1.34E-2	3.40E-2	2.03E-3	6.14E-3	3.77E-3	
230	1.50E-1	4.04E-2	7.66E-3	1.98E-2	1.06E-3	3.20E-3	1.97E-3	
225	9.32E-2	2.39E-2	4.25E-3	1.13E-2		1.61E-3		
220	5.67E-2	1.38E-2	2.29E-3	6.22E-3				
215	3.37E-2	7.75E-3	1.20E-3	3.34E-3				
210	1.94E-2	4.23E-3		1.74E-3				
205	1.09E-2	2.24E-3						
200	5.93E-3	1.14E-3						
195	3.12E-3							
190	1.58E-3							
T_m /K	175	159	147	185	184	158	—	299

TABLE 6
VAPOUR PRESSURE of C₅ ALKANOLS

Units: kPa v. K

9	C ₅ H ₁₂ O	Pentan-1-ol		Pentyl Alcohol		n-Amyl Alcohol		
10		Pentan-2-ol		sec-act-Pentyl Alcohol		sec-act-Amyl Alcohol		
11		Pentan-3-ol		sec-Pentyl Alcohol		sec-Amyl Alcohol		
12		2-Methylbutan-1-ol		pri-act-Pentyl Alcohol		pri-act-Amyl Alcohol		
13		3-Methylbutan-1-ol		Isopentyl Alcohol		Isoamyl Alcohol		
14		2-Methylbutan-2-ol		tert-Pentyl Alcohol		tert-Amyl Alcohol		
15		3-Methylbutan-2-ol						
16		2,2-Dimethylpropan-1-ol		Neopentyl Alcohol				
No.	9	10	11	12	13	14	15	16
T _c /K	588.15	560	553	577	579	534	550	554
p _c /kPa	3909	3710	3660	3820	3830	3540	3640	3670
T	p							
K	kPa							
585	3730.2							
580	3467.2							
575	3223.8			3713.4	3615.8			
570	2996.8			3461.6	3365.6			
565	2784.3			3226.2	3131.5			
560	2585.0	2494.9		3005.0	2911.5			
555	2397.7	3449.6		2796.7	2704.5			
550	2221.6	3207.2	3502.2	2600.1	2509.5		2422.4	3464.0
545	2055.8	2979.9	3254.9	2414.6	2325.7		3385.1	3222.3
540	1899.8	2766.1	3023.7	2239.5	2152.6		3148.0	2995.3
535	1753.0	2564.6	2806.4	2074.1	1989.4		2925.5	2781.5
530	1615.0	2374.7	2601.8	1918.0	1835.7	3332.1	2716.1	2579.9
525	1485.1	2195.8	2409.0	1770.8	1691.1	3089.2	2518.7	2389.7
520	1363.2	2027.1	2227.3	1632.1	1555.2	2861.9	2332.4	2210.3
515	1248.7	1868.1	2055.9	1501.4	1427.5	2648.4	2156.7	2041.2
510	1141.5	1718.6	1894.4	1378.5	1307.6	2447.7	1991.0	1881.8
505	1041.1	1577.9	1742.2	1263.1	1195.4	2258.9	1834.7	1731.6
500	947.28	1445.7	1599.1	1154.8	1090.3	2081.3	1687.4	1590.4
495	859.77	1321.8	1464.5	1053.3	992.24	1914.2	1548.8	1457.7
490	778.29	1205.7	1338.3	958.48	900.77	1757.2	1418.5	1333.2
485	702.58	1097.1	1219.9	869.95	815.64	1609.7	1296.1	1216.6
480	632.39	995.76	1109.2	787.47	736.57	1471.4	1181.5	1107.5
475	567.48	901.35	1005.9	710.81	663.30	1341.8	1074.2	1005.7
470	507.60	813.59	909.58	639.72	595.55	1220.7	973.99	910.85
465	452.52	732.21	820.06	573.95	533.07	1107.6	880.64	822.65
460	402.01	656.91	737.05	513.26	475.60	1002.2	793.85	740.83
455	355.82	587.44	660.29	457.42	422.88	904.21	713.36	665.13
450	313.73	523.51	589.50	406.20	374.66	813.32	638.92	595.26
445	275.51	464.87	524.41	359.34	330.70	729.23	570.26	530.95
440	240.93	411.24	464.77	316.64	290.75	651.62	507.13	471.93
435	209.76	362.37	410.29	277.84	254.58	580.22	449.27	417.94
430	181.79	317.98	360.71	242.74	221.95	514.71	396.42	368.71
425	156.79	277.81	315.75	211.09	192.62	454.82	348.32	323.96
420	134.55	241.62	275.16	182.69	166.38	400.25	304.71	283.45
415	114.85	209.13	238.66	157.30	142.99	350.71	265.33	246.92
410	97.506	180.11	205.98	134.72	122.25	305.91	229.92	214.09
405	82.303	154.30	176.86	114.73	103.94	265.56	198.23	184.73
400	69.054	131.45	151.04	97.132	87.868	229.39	169.99	158.59

TABLE 6 continued

VAPOUR PRESSURE of C₅ ALKANOLS continued

Units: kPa v. K

No.	9	10	11	12	13	14	15	16
continued								
T K	p kPa							
395	57.573	111.34	128.27	81.721	73.828	197.10	144.96	135.42
390	47.686	93.733	108.28	68.304	61.635	168.43	122.90	114.99
385	39.225	78.403	90.846	56.695	51.110	143.09	103.55	97.068
380	32.033	65.138	75.725	46.717	42.083	120.83	86.680	81.433
375	25.963	53.734	62.694	38.200	34.393	101.37	72.068	67.875
370	20.876	43.996	51.538	30.983	27.888	84.476	59.492	56.189
365	16.648	35.740	42.052	24.915	22.426	69.898	48.742	46.182
360	13.160	28.793	34.044	19.854	17.878	57.404	39.620	37.671
355	10.309	22.995	27.337	15.671	14.121	46.772	31.937	30.486
350	7.9984	18.196	21.762	12.245	11.046	37.794	25.520	24.465
345	6.1436	14.259	17.169	9.4655	8.5518	30.272	20.205	19.461
340	4.6693	11.060	13.418	7.2349	6.5496	24.024	15.841	15.337
335	3.5097	8.4857	10.382	5.4641	4.9590	18.880	12.294	11.969
330	2.6074	6.4368	7.9491	4.0747	3.7094	14.685	9.4377	9.2447
325	1.9135	4.8238	6.0198	2.9980	2.7394	11.299	7.1629	
320	1.3863	3.5691	4.5062	2.1746	1.9957	8.5933	5.3712	
315	9.91E-1	2.6052	3.3323	1.5537	1.4332	6.4565	3.9767	
310	6.98E-1	1.8745	2.4327	1.0924	1.0136	4.7888	2.9049	
305	4.84E-1	1.3284	1.7521	7.55E-1	7.05E-1	3.5036	2.0919	
300	3.31E-1	9.26E-1	1.2440	5.13E-1	4.83E-1	2.5264	1.4838	
295	2.22E-1	6.35E-1	8.70E-1	3.41E-1	3.24E-1	1.7940	1.0359	
290	1.47E-1	4.28E-1	5.99E-1	2.23E-1	2.14E-1	1.2533	7.11E-1	
285	9.49E-2	2.82E-1	4.05E-1	1.42E-1	1.38E-1	8.60E-1	4.79E-1	
280	6.03E-2	1.83E-1	2.69E-1	8.86E-2	8.70E-2	5.80E-1	3.17E-1	
275	3.75E-2	1.16E-1	1.76E-1	5.39E-2	5.37E-2	3.83E-1	2.05E-1	
270	2.28E-2	7.15E-2	1.12E-1	3.19E-2	3.23E-2	2.48E-1	1.30E-1	
265	1.35E-2	4.31E-2	7.04E-2	1.84E-2	1.89E-2	1.57E-1	8.08E-2	
260	7.83E-3	2.53E-2	4.31E-2	1.03E-2	1.08E-2		4.89E-2	
255	4.41E-3	1.45E-2	2.57E-2	5.56E-3	5.96E-3		2.88E-2	
250	2.42E-3	8.02E-3	1.50E-2	2.90E-3	3.19E-3		1.65E-2	
245	1.29E-3	4.30E-3	8.50E-3	1.46E-3	1.65E-3		9.18E-3	
240		2.23E-3	4.68E-3				4.95E-3	
235		1.11E-3	2.50E-3				2.58E-3	
230			1.29E-3				1.29E-3	
225								
T _m /K	195	—	204	—	—	264	—	327