



Engineering Sciences Data

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Vapour pressures and critical points of liquids

Part 1 C: C₁₀ to C₂₄ alkanes

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The work on this Item was carried out in the Internal Flow and Physical Properties Group of the Engineering Sciences Data Unit. The member of staff who undertook the initial assessment of the available information and the construction and subsequent development of the Item was

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(Continued on inside back cover)

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VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS

PART IC: C₁₀ TO C₂₄ ALKANES

1. INTRODUCTION

This Data Item presents saturated vapour pressures of the C₁₀ to C₂₄ alkanes listed, with alternative names if any, in Table 1 (page 2). It complements Item Nos. 84022 and 84028 which deal with C₁ to C₇ and C₈ and C₉ alkanes respectively.

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

$$\ln p = \ln p_c + (T_c/T) [b_1q + b_2q^{3/2} + b_3q^3 + b_4q^6] \quad (1)$$

where $q = 1 - T/T_c$ and T_c and p_c are the critical temperature and critical pressure respectively. This equation has been fitted to the experimental and calculated data that have been selected and weighted in accordance with a critical assessment of all the data.

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 that, when used in Equation (1), give p in kPa for T in Kelvins. Table 4 shows for each compound, the normal boiling point in Kelvins, degrees Celsius (Centigrade) and degrees Fahrenheit, the value of dp/dT at the normal boiling point and the acentric factor.

Tables 5 to 10 represent values of vapour pressure, in kPa, at 5 K intervals of temperature down to a temperature just above the freezing point, T_f , or an arbitrary lower limit where the freezing point is not known.

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

The sources of experimental and calculated data for each compound, on which the tabulated values are based, are detailed in Appendix A. The suggested uncertainties in the tabulated values of vapour pressure that the user should allow for are discussed and tabulated in Appendix B.

A full explanation of the correlation procedure used to derive the tabulated values of vapour pressure together with notation and units, conversion factors and References is given in the Introductory Data Item, Reference 1.

2. REFERENCE

1. ESDU Vapour pressures and critical points of liquids. Introduction to Data Items issued after September 1984. Item No. 84021, Engineering Sciences Data Unit, 1984.

TABLE 1

 C_{10} to C_{24} ALKANES

No.	Name	Alternative Name
DECANES		
1	Decane	n-Decane
2	3,3,5-Trimethylheptane	
3	2,2,3,3-Tetramethylhexane	
4	2,2,5,5-Tetramethylhexane	
UNDECANES		
5	Undecane	n-Undecane
6	2-Methyldecane	
C_{12} TO C_{15} ALKANES		
7	Dodecane	n-Dodecane
8	Tridecane	n-Tridecane
9	Tetradecane	n-Tetradecane
10	Pentadecane	n-Pentadecane
HEXADECANES		
11	Hexadecane	n-Hexadecane
12	2-Methylpentadecane	
13	3-Methylpentadecane	
14	4-Methylpentadecane	
15	5-Methylpentadecane	
16	6-Methylpentadecane	
17	7-Methylpentadecane	
18	8-Methylpentadecane	
19	3-Ethyltetradecane	
20	4-Propyltridecane	
21	5-Butyldodecane	
22	6-Pentylundecane	
C_{17} TO C_{20} ALKANES		
23	Heptadecane	n-Heptadecane
24	Octadecane	n-Octadecane
25	Nonadecane	n-Nonadecane
26	Eicosane	n-Eicosane
C_{21} TO C_{24} ALKANES		
27	Heneicosane	n-Heneicosane
28	Docosane	n-Docosane
29	Tricosane	n-Tricosane
30	Tetracosane	n-Tetracosane

TABLE 2
INDEX TO MAIN TABLES

The locations of the Tables giving vapour pressures in various units are as follows:-

		kPa v K	atm or mmHg v deg.C		psia v deg.F		
No.	Name	Table	Pages	Table	Pages	Table	Pages
DECANES							
1	Decane	5	6, 7	5(C)	18,19	5(F)	30,31
2	3,3,5-Trimethylheptane	5	6, 7	5(C)	18,19	5(F)	30,31
3	2,2,3,3-Tetramethylhexane	5	6, 7	5(C)	18,19	5(F)	30,31
4	2,2,5,5-Tetramethylhexane	5	6, 7	5(C)	18,19	5(F)	30,31
UNDECANES							
5	Undecane	5	6, 7	5(C)	18,19	5(F)	30,31
6	2-Methyldecane	5	6, 7	5(C)	18,19	5(F)	30,31
C ₁₂ to C ₁₅ ALKANES							
7	Dodecane	6	8, 9	6(C)	20,21	6(F)	32,33
8	Tridecane	6	8, 9	6(C)	20,21	6(F)	32,33
9	Tetradecane	6	8, 9	6(C)	20,21	6(F)	32,33
10	Pentadecane	6	8, 9	6(C)	20,21	6(F)	32,33
HEXADECANES							
11	Hexadecane	7	10,11	7(C)	22,23	7(F)	34,35
12	2-Methylpentadecane	7	10,11	7(C)	22,23	7(F)	34,35
13	3-Methylpentadecane	7	10,11	7(C)	22,23	7(F)	34,35
14	4-Methylpentadecane	7	10,11	7(C)	22,23	7(F)	34,35
15	5-Methylpentadecane	7	10,11	7(C)	22,23	7(F)	34,35
16	6-Methylpentadecane	7	10,11	7(C)	22,23	7(F)	34,35
17	7-Methylpentadecane	7	10,11	7(C)	22,23	7(F)	34,35
18	8-Methylpentadecane	8	12,13	8(C)	24,25	8(F)	36,37
19	3-Ethyltetradecane	8	12,13	8(C)	24,25	8(F)	36,37
20	4-Propyltridecane	8	12,13	8(C)	24,25	8(F)	36,37
21	5-Butyldodecane	8	12,13	8(C)	24,25	8(F)	36,37
22	6-Pentylundecane	8	12,13	8(C)	24,25	8(F)	36,37
C ₁₇ to C ₂₀ ALKANES							
23	Heptadecane	9	14,15	9(C)	26,27	9(F)	38,39
24	Octadecane	9	14,15	9(C)	26,27	9(F)	38,39
25	Nonadecane	9	14,15	9(C)	26,27	9(F)	38,39
26	Eicosane	9	14,15	9(C)	26,27	9(F)	38,39
C ₂₁ to C ₂₄ ALKANES							
27	Heneicosane	10	16,17	10(C)	28,29	10(F)	40,41
28	Docosane	10	16,17	10(C)	28,29	10(F)	40,41
29	Tricosane	10	16,17	10(C)	28,29	10(F)	40,41
30	Tetracosane	10	16,17	10(C)	28,29	10(F)	40,41

TABLE 3
CONSTANTS in EQUATION (1)

Name	T _C K	p _C kPa	b ₁	b ₂	b ₃	b ₄
DECANES						
Decane	617.65	2103	-8.40332	1.58272	-5.09331	-2.57663
3,3,5-Trimethylheptane	609.65	2317	-7.84809	1.43816	-3.99709	-2.47839
2,2,3,3-Tetramethylhexane	623.15	2510	-7.75530	1.41554	-3.81991	-2.44554
2,2,5,5-Tetramethylhexane	581.55	2186	-7.80887	1.43049	-3.92495	-2.45746
UNDECANES						
Undecane	638.85	1953	-8.63754	1.67290	-5.62137	-2.53715
2-Methyldecane	632.15	1969	-8.52923	1.61788	-5.34454	-2.62214
C₁₂ TO C₁₅ ALKANES						
Dodecane	658.65	1835	-8.85950	1.73919	-6.05885	-2.54440
Tridecane	676.15	1714	-9.07697	1.79233	-6.52813	-2.55194
Tetradecane	693.15	1622	-9.29951	1.89245	-6.98856	-2.51648
Pentadecane	708.15	1524	-9.52567	1.99901	-7.55727	-2.27145
HEXADECANES						
Hexadecane	722.15	1444	-9.74885	2.06084	-7.94243	-2.47035
2-Methylpentadecane	716.15	1461	-9.68578	2.04288	-7.83331	-2.41543
3-Methylpentadecane	719.15	1500	-9.65892	2.03532	-7.78669	-2.39154
4-Methylpentadecane	716.15	1488	-9.64599	2.03195	-7.76503	-2.37905
5-Methylpentadecane	715.15	1490	-9.63530	2.02638	-7.73953	-2.38307
6-Methylpentadecane	714.15	1482	-9.63641	2.02685	-7.74228	-2.38266
7-Methylpentadecane	714.15	1487	-9.63119	2.02698	-7.73655	-2.37078
8-Methylpentadecane	713.15	1472	-9.64305	2.02934	-7.75275	-2.38969
3-Ethyltetradecane	718.15	1511	-9.63510	2.02962	-7.74748	-2.36682
4-Propyltridecane	709.15	1483	-9.59518	2.00226	-7.62096	-2.47428
5-Butyldodecane	705.15	1483	-9.56017	2.00685	-7.61413	-2.30744
6-Pentylundecane	703.15	1474	-9.55706	2.00908	-7.61369	-2.29472
C₁₇ TO C₂₀ ALKANES						
Heptadecane	736.15	1358	-9.95701	2.18009	-8.43924	-2.29666
Octadecane	749.15	1290	-10.10338	2.24064	-8.78396	-2.21492
Nonadecane	761.15	1243	-10.23591	2.23390	-9.11738	-2.16323
Eicosane	771.15	1200	-10.61453	2.47944	-9.99742	-1.87708
C₂₁ TO C₂₄ ALKANES						
Heneicosane	781.15	1147	-10.84579	2.60235	-10.56392	-1.67746
Docosane	790.15	1101	-11.09303	2.74010	-11.17315	-1.45903
Tricosane	800.15	1059	-11.26730	2.83728	-11.60780	-1.29340
Tetracosane	809.15	1020	-11.46292	2.95180	-12.10315	-1.08968

TABLE 4

NORMAL BOILING POINTS AND ACENTRIC FACTORS

Normal Boiling Point								Ac.
Name	p=101.325 kPa		p=760 mmHg		p=14.69595 psia		Fctr.	
	T	dT/dp	T	dT/dp	T	dT/dp		
	K	K per kPa	deg.C	deg.C per mmHg	deg.F	deg.F per psia		
DECANES								
Decane	447.30	0.3880	174.15	0.05174	345.48	4.816	0.489	
3,3,5-Trimethylheptane	428.83	0.3886	155.68	0.05180	312.22	4.822	0.382	
2,2,3,3-Tetramethylhexane	433.46	0.3927	160.31	0.05236	320.56	4.874	0.364	
2,2,5,5-Tetramethylhexane	410.61	0.3764	137.46	0.05018	279.42	4.671	0.374	
UNDECANES								
Undecane	469.08	0.4021	195.93	0.05361	384.68	4.990	0.532	
2-Methyldecane	462.37	0.3997	189.22	0.05329	372.59	4.960	0.513	
C ₁₂ TO C ₁₅ ALKANES								
Dodecane	489.48	0.4147	216.33	0.05528	421.39	5.146	0.574	
Tridecane	508.64	0.4260	235.49	0.05680	455.88	5.287	0.617	
Tetradecane	526.73	0.4368	253.58	0.05823	488.45	5.420	0.656	
Pentadecane	543.83	0.4464	270.68	0.05952	519.22	5.541	0.697	
HEXADECANES								
Hexadecane	559.98	0.4548	286.83	0.06064	548.29	5.645	0.739	
2-Methylpentadecane	553.99	0.4515	280.84	0.06019	537.52	5.603	0.727	
3-Methylpentadecane	554.76	0.4516	281.61	0.06021	538.89	5.605	0.722	
4-Methylpentadecane	552.64	0.4508	279.49	0.06010	535.09	5.594	0.719	
5-Methylpentadecane	551.68	0.4503	278.53	0.06003	533.36	5.588	0.718	
6-Methylpentadecane	551.17	0.4501	278.02	0.06001	532.44	5.586	0.718	
7-Methylpentadecane	550.94	0.4499	277.79	0.05999	532.02	5.584	0.717	
8-Methylpentadecane	550.79	0.4500	277.64	0.05999	531.75	5.584	0.719	
3-Ethyltetradecane	553.34	0.4509	280.19	0.06011	536.34	5.596	0.717	
4-Propyltridecane	546.80	0.4479	273.65	0.05971	524.57	5.558	0.711	
5-Butyldodecane	543.21	0.4462	270.06	0.05949	518.11	5.538	0.703	
6-Pentylundecane	541.89	0.4456	268.74	0.05941	515.73	5.530	0.703	
C ₁₇ TO C ₂₀ ALKANES								
Heptadecane	576.08	0.4648	302.93	0.06197	577.27	5.769	0.773	
Octadecane	590.48	0.4742	317.33	0.06322	603.19	5.885	0.800	
Nonadecane	603.68	0.4807	330.53	0.06409	626.96	5.966	0.831	
Eicosane	617.15	0.4825	344.00	0.06433	651.21	5.988	0.891	
C ₂₁ TO C ₂₄ ALKANES								
Heneicosane	629.80	0.4876	356.65	0.06501	673.97	6.052	0.931	
Docosane	641.56	0.4914	368.41	0.06552	695.14	6.099	0.973	
Tricosane	653.33	0.4973	380.18	0.06631	716.33	6.172	1.003	
Tetracosane	664.43	0.5020	391.28	0.06693	736.30	6.230	1.036	

TABLE 5

DECANES and UNDECANES (kPa v. K)

1	Decane	n-Decane				
2	3,3,5-Trimethylheptane					
3	2,2,3,3-Tetramethylhexane					
4	2,2,5,5-Tetramethylhexane					
5	Undecane	n-Undecane				
6	2-Methyldecane					
No.	1	2	3	4	5	6
T _C (K)	617.65	609.65	623.15	581.55	638.85	632.15
P _C (kPa)	2103	2317	2510	2186	1953	1969
T	p					
K	kPa					
635					1854.8	
630					1734.6	1913.1
625					1621.5	1789.5
620			2414.3		1514.9	1673.2
615	2029.1		2269.7		1414.3	1563.6
610	1896.8		2132.9		1319.3	1460.2
605	1772.4	2183.5	2003.3		1229.7	1362.6
600	1655.2	2048.2	1880.2		1145.1	1270.4
595	1544.6	1920.3	1763.4		1065.2	1183.3
590	1440.2	1799.2	1652.5		989.84	1101.1
585	1341.6	1684.5	1547.2		918.79	1023.6
580	1248.6	1575.9	1447.2	2141.3	851.83	950.41
575	1160.8	1472.9	1352.4	2003.4	788.77	881.44
570	1078.0	1375.3	1262.5	1873.7	729.42	816.46
565	999.91	1282.9	1177.3	1751.2	673.61	755.28
560	926.34	1195.4	1096.5	1635.5	621.17	697.73
555	857.06	1112.6	1020.1	1526.1	571.96	643.64
550	791.89	1034.3	947.74	1422.7	525.82	592.85
545	730.62	960.33	879.39	1325.0	482.61	545.22
540	673.08	890.46	814.84	1232.6	442.20	500.59
535	619.10	824.53	753.95	1145.3	404.44	458.83
530	568.51	762.38	696.57	1062.9	369.22	419.80
525	521.16	703.86	642.54	985.11	336.41	383.38
520	476.90	648.81	591.74	911.79	305.90	349.45
515	435.58	597.08	544.04	842.71	277.57	317.87
510	397.06	548.54	499.30	777.70	251.31	288.54
505	361.21	503.05	457.39	716.57	227.02	261.34
500	327.90	460.47	418.21	659.16	204.58	236.16
495	297.01	420.67	381.61	605.30	183.91	212.90
490	268.40	383.55	347.50	554.83	164.90	191.46
485	241.97	348.96	315.76	507.62	147.45	171.73
480	217.59	316.79	286.27	463.51	131.48	153.62
475	195.16	286.93	258.93	422.36	116.90	137.03
470	174.56	259.27	233.63	384.04	103.62	121.88
465	155.69	233.70	210.27	348.41	91.562	108.08
460	138.45	210.10	188.74	315.34	80.637	95.533
455	122.74	188.37	168.96	284.72	70.772	84.165
450	108.46	168.42	150.81	256.41	61.892	73.895
445	95.523	150.14	134.22	230.31	53.924	64.646
440	83.833	133.44	119.07	206.28	46.799	56.342
435	73.304	118.21	105.30	184.23	40.451	48.914
430	63.853	104.38	92.802	164.03	34.816	42.292
425	55.399	91.844	81.501	145.58	29.833	36.4

TABLE 5 continued

DECANES and UNDECANES (kPa v. K) continued

No.	1	2	3	4	5	6
continued						
T K	p kPa					
420	47.865	80.521	71.313	128.78	25.446	31.210
415	41.175	70.328	62.160	113.53	21.600	26.628
410	35.260	61.183	53.964	99.720	18.243	22.608
405	30.052	53.008	46.654	87.258	15.327	19.099
400	25.486	45.727	40.157	76.052	12.807	16.049
395	21.502	39.268	34.408	66.011	10.639	13.412
390	18.042	33.563	29.341	57.047	8.7860	11.144
385	15.054	28.546	24.896	49.077	7.2100	9.2032
380	12.485	24.153	21.013	42.020	5.8780	7.5526
375	10.291	20.326	17.640	35.799	4.7592	6.1572
370	8.4269	17.008	14.723	30.339	3.8257	4.9848
365	6.8535	14.148	12.215	25.572	3.0521	4.0064
360	5.5340	11.695	10.070	21.430	2.4158	3.1956
355	4.4350	9.6051	8.2475	17.851	1.8963	2.5285
350	3.5262	7.8342	6.7080	14.775	1.4756	1.9840
345	2.7805	6.3440	5.4163	12.148	1.1378	1.5430
340	2.1734	5.0984	4.3399	9.9186	8.689E-1	1.1890
335	1.6833	4.0648	3.4496	8.0387	6.569E-1	9.073E-1
330	1.2912	3.2137	2.7188	6.4647	4.914E-1	6.853E-1
325	9.804E-1	2.5185	2.1238	5.1565	3.635E-1	5.121E-1
320	7.365E-1	1.9554	1.6436	4.0778	2.657E-1	3.783E-1
315	5.471E-1	1.5033	1.2594	3.1955	1.919E-1	2.762E-1
310	4.016E-1	1.1439	9.550E-1	2.4802	1.367E-1	1.991E-1
305	2.911E-1	8.610E-1	7.163E-1	1.9057	9.611E-2	1.416E-1
300	2.082E-1	6.406E-1	5.310E-1	1.4486	6.658E-2	9.931E-2
295	1.468E-1	4.708E-1	3.888E-1	1.0888	4.541E-2	6.863E-2
290	1.020E-1	3.416E-1	2.811E-1	8.086E-1	3.048E-2	4.668E-2
285	6.980E-2	2.445E-1	2.004E-1	5.929E-1	2.011E-2	3.123E-2
280	4.696E-2	1.725E-1	1.408E-1	4.289E-1	1.302E-2	2.053E-2
275	3.104E-2	1.198E-1	9.742E-2	3.059E-1	8.276E-3	1.325E-2
270	2.014E-2	8.190E-2	6.631E-2	2.149E-1	5.151E-3	8.378E-3
265	1.281E-2	5.502E-2	4.435E-2	1.486E-1	3.137E-3	5.188E-3
260	7.975E-3	3.628E-2	2.912E-2		1.867E-3	3.142E-3
255	4.855E-3	2.346E-2	1.875E-2		1.084E-3	1.858E-3
250	2.885E-3	1.486E-2	1.182E-2		6.133E-4	1.071E-3
245	1.672E-3	9.204E-3	7.286E-3			6.012E-4
240		5.567E-3	4.385E-3			3.278E-4
235		3.282E-3	2.573E-3			1.733E-4
230		1.883E-3	1.469E-3			8.862E-5
225		1.049E-3	8.141E-4			4.375E-5
220		5.667E-4	4.373E-4			
215		2.959E-4				
210		1.490E-4				
205		7.216E-5				
200		3.350E-5				
T _f	243	—	219	260	247	224

TABLE 6

 C_{12} to C_{15} ALKANES (kPa v. K)

7	Dodecane	n-Dodecane
8	Tridecane	n-Tridecane
9	Tetradecane	n-Tetradecane
10	Pentadecane	n-Pentadecane

No.	7	8	9	10
T _C (K)	658.65	676.15	693.15	708.15
p _C (kPa)	1835	1714	1622	1524
T K	P kPa			
690			1555.5	1196.1
685			1455.6	1117.8
680			1361.8	1043.9
675		1687.9	1273.4	974.29
670		1579.4	1190.1	908.57
665		1477.7	1111.4	846.57
660		1381.8	1037.2	788.11
655	1747.9	1291.4	967.19	732.98
650	1635.2	1206.2	901.10	681.03
645	1529.3	1125.7	838.75	632.09
640	1429.4	1049.7	779.95	586.01
635	1335.2	977.95	724.52	542.66
630	1246.2	910.26	672.29	501.91
625	1162.3	846.42	623.12	463.62
620	1083.0	786.22	576.84	427.68
615	1008.2	729.48	533.34	393.98
610	937.56	676.05	492.46	362.41
605	870.97	625.76	454.09	332.86
600	808.21	578.47	418.12	305.24
595	749.07	534.03	384.41	279.45
590	693.41	492.32	352.88	255.41
585	641.04	453.19	323.40	233.02
580	591.82	416.54	295.89	212.20
575	545.59	382.24	270.24	192.87
570	502.23	350.18	246.37	174.95
565	461.60	320.25	224.17	158.37
560	423.56	292.35	203.57	143.05
555	388.00	266.39	184.49	128.92
550	354.80	242.25	166.84	115.92
545	323.84	219.85	150.54	103.98
540	295.02	199.11	135.52	93.038
535	268.23	179.92	121.71	83.030
530	243.37	162.21	109.03	73.899
525	220.33	145.90	97.422	65.587
520	199.03	130.90	86.815	58.041
515	179.36	117.15	77.148	51.209
510	161.25	104.56	68.358	45.039
505	144.60	93.061	60.387	39.483
500	129.32	82.590	53.179	34.496
495	115.35	73.077	46.679	30.033
490	102.59	64.459	40.835	26.052
485	90.969	56.672	35.597	22.513
480	80.418	49.658	30.918	19.378
475	70.861	43.360	26.752	16.611

TABLE 6 continued

 C_{12} to C_{15} ALKANES (kPa v. K) continued

No.	7	8	9	10
continued				
T K	p kPa			
470	62.232	37.722	23.056	14.179
465	54.464	32.692	19.789	12.050
460	47.492	28.222	16.912	10.193
455	41.257	24.262	14.389	8.5809
450	35.699	20.769	12.186	7.1879
445	30.764	17.699	10.271	5.9899
440	26.398	15.013	8.6133	4.9647
435	22.551	12.673	7.1855	4.0919
430	19.175	10.644	5.9617	3.3528
425	16.226	8.8928	4.9183	2.7305
420	13.661	7.3889	4.0336	2.2096
415	11.441	6.1043	3.2877	1.7762
410	9.5295	5.0129	2.6625	1.4181
405	7.8917	4.0911	2.1417	1.1240
400	6.4963	3.3170	1.7108	8.842E-1
395	5.3142	2.6712	1.3565	6.901E-1
390	4.3187	2.1359	1.0675	5.343E-1
385	3.4858	1.6952	8.333E-1	4.101E-1
380	2.7934	1.3350	6.451E-1	3.119E-1
375	2.2218	1.0428	4.950E-1	2.351E-1
370	1.7533	8.076E-1	3.764E-1	1.754E-1
365	1.3723	6.200E-1	2.835E-1	1.296E-1
360	1.0648	4.715E-1	2.114E-1	9.469E-2
355	8.188E-1	3.550E-1	1.560E-1	6.843E-2
350	6.237E-1	2.646E-1	1.138E-1	4.887E-2
345	4.704E-1	1.951E-1	8.209E-2	3.447E-2
340	3.510E-1	1.423E-1	5.850E-2	2.400E-2
335	2.591E-1	1.025E-1	4.116E-2	1.649E-2
330	1.891E-1	7.293E-2	2.858E-2	1.117E-2
325	1.363E-1	5.122E-2	1.956E-2	7.448E-3
320	9.700E-2	3.547E-2	1.319E-2	4.891E-3
315	6.811E-2	2.421E-2	8.762E-3	3.159E-3
310	4.715E-2	1.628E-2	5.723E-3	2.005E-3
305	3.215E-2	1.076E-2	3.674E-3	1.249E-3
300	2.158E-2	6.999E-3	2.316E-3	7.633E-4
295	1.425E-2	4.470E-3	1.432E-3	4.570E-4
290	9.243E-3	2.801E-3	8.679E-4	2.677E-4
285	5.884E-3	1.720E-3	5.146E-4	1.533E-4
280	3.673E-3	1.034E-3	2.983E-4	
275	2.245E-3	6.076E-4		
270	1.342E-3	3.487E-4		
265	7.836E-4			
T_f	263	268	279	283

TABLE 7
HEXADECANES -I (kPa v. K)

11	Hexadecane						
12	2-Methylpentadecane						
13	3-Methylpentadecane						
14	4-Methylpentadecane						
15	5-Methylpentadecane						
16	6-Methylpentadecane						
17	7-Methylpentadecane						
n-Hexadecane							
No.	11	12	13	14	15	16	17
T _C (K)	722.15	716.15	719.15	716.15	715.15	714.15	714.15
P _C (kPa)	1444	1461	1500	1488	1490	1482	1487
T K	P kPa						
670	703.62	775.26	765.88	791.62	803.89	810.30	813.32
665	653.87	721.11	712.37	736.54	748.07	754.09	756.93
660	607.01	670.09	661.94	684.64	695.46	701.11	703.78
655	562.91	622.05	614.43	635.74	645.90	651.19	653.70
650	521.42	576.83	569.72	589.71	599.23	604.19	606.55
645	482.42	534.29	527.65	546.39	555.31	559.96	562.17
640	445.79	494.30	488.10	505.65	514.00	518.36	520.43
635	411.40	456.73	450.95	467.38	475.19	479.27	481.20
630	379.16	421.48	416.08	431.44	438.74	442.56	444.37
625	348.96	388.42	383.38	397.73	404.54	408.11	409.80
620	320.69	357.44	352.74	366.14	372.49	375.82	377.40
615	294.26	328.45	324.07	336.57	342.48	345.59	347.05
610	269.58	301.35	297.28	308.91	314.41	317.30	318.67
605	246.57	276.05	272.25	283.07	288.18	290.88	292.14
600	225.13	252.45	248.92	258.97	263.71	266.22	267.39
595	205.19	230.46	227.19	236.51	240.90	243.23	244.32
590	186.67	210.02	206.98	215.61	219.68	221.83	222.84
585	169.50	191.03	188.22	196.20	199.95	201.95	202.87
580	153.60	173.42	170.82	178.19	181.65	183.49	184.35
575	138.90	157.12	154.72	161.50	164.69	166.39	167.18
570	125.34	142.05	139.83	146.08	149.01	150.58	151.29
565	112.85	128.15	126.11	131.84	134.53	135.97	136.63
560	101.37	115.34	113.47	118.73	121.18	122.51	123.11
555	90.836	103.58	101.86	106.66	108.91	110.12	110.67
550	81.195	92.785	91.216	95.597	97.642	98.751	99.249
545	72.389	82.907	81.475	85.463	87.323	88.334	88.786
540	64.365	73.887	72.583	76.204	77.891	78.811	79.221
535	57.070	65.669	64.485	67.765	69.292	70.126	70.496
530	50.456	58.200	57.127	60.091	61.469	62.224	62.558
525	44.474	51.430	50.461	53.131	54.372	55.053	55.353
520	39.079	45.309	44.436	46.835	47.949	48.563	48.831
515	34.227	39.791	39.007	41.155	42.153	42.703	42.943
510	29.877	34.830	34.128	36.047	36.937	37.430	37.643
505	25.989	30.384	29.757	31.465	32.257	32.697	32.886
500	22.525	26.411	25.854	27.370	28.072	28.463	28.630
495	19.450	22.874	22.381	23.720	24.341	24.687	24.835
490	16.728	19.735	19.300	20.480	21.026	21.332	21.462
485	14.329	16.960	16.577	17.612	18.092	18.360	18.474
480	12.223	14.514	14.179	15.084	15.503	15.739	15.838
475	10.380	12.369	12.076	12.864	13.229	13.434	13.520

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TABLE 7 continued

HEXADECANES -I (kPa v. K) continued

No.	11	12	13	14	15	16	17
continued							
T K	p kPa						
470	8.7755	10.493	10.239	10.923	11.239	11.417	11.492
465	7.3837	8.8611	8.6419	9.2315	9.5043	9.6585	9.7226
460	6.1821	7.4469	7.2584	7.7649	7.9993	8.1320	8.1869
455	5.1496	6.2272	6.0659	6.4989	6.6993	6.8130	6.8599
450	4.2667	5.1802	5.0429	5.4112	5.5818	5.6786	5.7184
445	3.5157	4.2859	4.1698	4.4814	4.6257	4.7079	4.7415
440	2.8802	3.5261	3.4284	3.6906	3.8121	3.8814	3.9097
435	2.3454	2.8840	2.8022	3.0216	3.1234	3.1815	3.2051
430	1.8981	2.3444	2.2765	2.4590	2.5437	2.5921	2.6117
425	1.5260	1.8937	1.8376	1.9885	2.0585	2.0986	2.1149
420	1.2186	1.5196	1.4735	1.5974	1.6550	1.6880	1.7013
415	9.663E-1	1.2109	1.1734	1.2745	1.3215	1.3485	1.3594
410	7.606E-1	9.580E-1	9.276E-1	1.0095	1.0477	1.0696	1.0784
405	5.941E-1	7.523E-1	7.279E-1	7.937E-1	8.245E-1	8.421E-1	8.492E-1
400	4.603E-1	5.861E-1	5.666E-1	6.192E-1	6.438E-1	6.579E-1	6.635E-1
395	3.537E-1	4.529E-1	4.375E-1	4.792E-1	4.986E-1	5.098E-1	5.143E-1
390	2.694E-1	3.470E-1	3.350E-1	3.676E-1	3.829E-1	3.917E-1	3.953E-1
385	2.033E-1	2.635E-1	2.541E-1	2.796E-1	2.915E-1	2.984E-1	3.011E-1
380	1.520E-1	1.982E-1	1.910E-1	2.106E-1	2.199E-1	2.252E-1	2.273E-1
375	1.125E-1	1.476E-1	1.422E-1	1.572E-1	1.642E-1	1.683E-1	1.699E-1
370	8.241E-2	1.089E-1	1.048E-1	1.161E-1	1.214E-1	1.245E-1	1.258E-1
365	5.971E-2	7.943E-2	7.637E-2	8.485E-2	8.886E-2	9.117E-2	9.209E-2
360	4.277E-2	5.730E-2	5.505E-2	6.133E-2	6.430E-2	6.601E-2	6.670E-2
355	3.027E-2	4.086E-2	3.922E-2	4.381E-2	4.599E-2	4.725E-2	4.775E-2
350	2.116E-2	2.878E-2	2.760E-2	3.092E-2	3.250E-2	3.341E-2	3.378E-2
345	1.459E-2	2.001E-2	1.917E-2	2.154E-2	2.267E-2	2.333E-2	2.359E-2
340	9.928E-3	1.373E-2	1.314E-2	1.481E-2	1.561E-2	1.607E-2	1.626E-2
335	6.658E-3	9.284E-3	8.878E-3	1.004E-2	1.060E-2	1.092E-2	1.105E-2
330	4.397E-3	6.186E-3	5.911E-3	6.706E-3	7.088E-3	7.308E-3	7.397E-3
325	2.858E-3	4.058E-3	3.874E-3	4.410E-3	4.668E-3	4.817E-3	4.877E-3
320	1.827E-3	2.619E-3	2.497E-3	2.853E-3	3.025E-3	3.124E-3	3.164E-3
315	1.147E-3	1.661E-3	1.582E-3	1.814E-3	1.927E-3	1.992E-3	2.018E-3
310	7.069E-4	1.034E-3	9.843E-4	1.133E-3	1.205E-3	1.247E-3	1.264E-3
305	4.272E-4	6.319E-4	6.007E-4	6.943E-4	7.398E-4	7.661E-4	7.769E-4
300	2.529E-4	3.783E-4	3.593E-4	4.169E-4	4.451E-4	4.613E-4	4.680E-4
295	1.465E-4	2.217E-4	2.103E-4	2.451E-4	2.622E-4	2.720E-4	2.761E-4
290		1.270E-4	1.204E-4	1.409E-4	1.510E-4	1.568E-4	1.593E-4
285		7.106E-5	6.728E-5	7.912E-5	8.497E-5	8.833E-5	8.975E-5
280		3.876E-5	3.666E-5	4.332E-5	4.662E-5	4.852E-5	4.933E-5
275		2.059E-5	1.945E-5	2.310E-5	2.492E-5	2.596E-5	2.641E-5
270		1.063E-5	1.003E-5	1.198E-5	1.295E-5	1.351E-5	1.375E-5
265		5.327E-6	5.022E-6	6.028E-6	6.533E-6	6.823E-6	6.948E-6
260			2.435E-6	2.939E-6	3.193E-6	3.339E-6	3.403E-6
255				1.386E-6	1.510E-6	1.581E-6	1.612E-6
250					6.888E-7	7.222E-7	7.370E-7
245					3.025E-7	3.177E-7	3.244E-7
T _f	291	264	256	253	244	242	244

TABLE 8

HEXADECANES-II (kPa v. K)

18	8-Methylpentadecane				
19	3-Ethyltetradecane				
20	4-Propyltridecane				
21	5-Butyldodecane				
22	6-Pentylundecane				
No.	18	19	20	21	22
T _C (K)	713.15	718.15	709.15	705.15	703.15
p _C (kPa)	1472	1511	1483	1483	1474
T	p				
K	kPa				
670	815.38	783.18	868.95	918.54	937.88
665	758.83	728.64	809.16	855.80	873.95
660	705.54	677.24	752.80	796.66	813.68
655	655.34	628.81	699.69	740.91	756.88
650	608.06	583.22	649.67	688.38	703.36
645	563.58	540.31	602.57	638.92	652.96
640	521.74	499.97	558.26	592.35	605.51
635	482.42	462.06	516.59	548.55	560.87
630	445.50	426.47	477.44	507.38	518.91
625	410.85	393.08	440.69	468.70	479.48
620	378.38	361.80	406.21	432.40	442.47
615	347.97	332.51	373.91	398.37	407.76
610	319.52	305.13	343.67	366.48	375.24
605	292.93	279.55	315.38	336.64	344.80
600	268.12	255.69	288.97	308.74	316.34
595	245.00	233.47	264.33	282.70	289.76
590	223.47	212.79	241.37	258.41	264.96
585	203.46	193.58	220.00	235.80	241.87
580	184.89	175.76	200.16	214.77	220.38
575	167.68	159.27	181.75	195.24	200.43
570	151.76	144.02	164.70	177.14	181.92
565	137.06	129.94	148.94	160.38	164.78
560	123.51	116.98	134.39	144.90	148.94
555	111.04	105.06	120.99	130.62	134.33
550	99.586	94.133	108.67	117.47	120.87
545	89.094	84.126	97.367	105.40	108.50
540	79.503	74.987	87.018	94.330	97.159
535	70.754	66.659	77.565	84.205	86.777
530	62.792	59.089	68.950	74.965	77.298
525	55.565	52.225	61.118	66.553	68.663
520	49.023	46.019	54.016	58.913	60.817
515	43.117	40.422	47.594	51.994	53.706
510	37.799	35.390	41.802	45.743	47.280
505	33.026	30.879	36.594	40.114	41.488
500	28.756	26.849	31.926	35.059	36.284
495	24.946	23.258	27.753	30.533	31.622
490	21.561	20.072	24.037	26.495	27.459
485	18.561	17.253	20.739	22.904	23.755
480	15.915	14.770	17.822	19.722	20.470
475	13.588	12.590	15.252	16.912	17.567
470	11.550	10.684	12.996	14.442	15.013
465	9.7736	9.0251	11.024	12.277	12.773
460	8.2311	7.5873	9.3083	10.389	10.818
455	6.8978	6.3467	7.8212	8.7500	9.1191
450	5.7509	5.2815	6.5386	7.3326	7.5487

TABLE 8 continued

HEXADECANES-II (kPa v. K) continued

No.	18	19	20	21	22
	continued				
T K	p kPa				
445	4.7691	4.3715	5.4377	6.1130	6.3824
440	3.9330	3.5979	4.4975	5.0688	5.2973
435	3.2247	2.9440	3.6987	4.1795	4.3721
430	2.6281	2.3943	3.0237	3.4261	3.5876
425	2.1284	1.9349	2.4567	2.7914	2.9260
420	1.7125	1.5534	1.9832	2.2599	2.3714
415	1.3685	1.2385	1.5903	1.8175	1.9093
410	1.0858	9.804E-1	1.2663	1.4516	1.5267
405	8.552E-1	7.703E-1	1.0010	1.1511	1.2120
400	6.683E-1	6.005E-1	7.852E-1	9.060E-1	9.550E-1
395	5.181E-1	4.643E-1	6.111E-1	7.075E-1	7.467E-1
390	3.982E-1	3.560E-1	4.716E-1	5.479E-1	5.791E-1
385	3.034E-1	2.705E-1	3.609E-1	4.208E-1	4.452E-1
380	2.291E-1	2.036E-1	2.736E-1	3.202E-1	3.393E-1
375	1.713E-1	1.518E-1	2.055E-1	2.414E-1	2.562E-1
370	1.268E-1	1.121E-1	1.528E-1	1.803E-1	1.916E-1
365	9.286E-2	8.182E-2	1.125E-1	1.332E-1	1.418E-1
360	6.727E-2	5.909E-2	8.186E-2	9.740E-2	1.038E-1
355	4.817E-2	4.217E-2	5.892E-2	7.041E-2	7.517E-2
350	3.408E-2	2.974E-2	4.190E-2	5.031E-2	5.380E-2
345	2.380E-2	2.070E-2	2.943E-2	3.550E-2	3.803E-2
340	1.640E-2	1.422E-2	2.040E-2	2.473E-2	2.654E-2
335	1.115E-2	9.627E-3	1.394E-2	1.700E-2	1.827E-2
330	7.467E-3	6.424E-3	9.396E-3	1.152E-2	1.240E-2
325	4.924E-3	4.220E-3	6.235E-3	7.685E-3	8.294E-3
320	3.195E-3	2.727E-3	4.072E-3	5.049E-3	5.459E-3
315	2.038E-3	1.732E-3	2.615E-3	3.262E-3	3.535E-3
310	1.277E-3	1.081E-3	1.650E-3	2.071E-3	2.249E-3
305	7.848E-4	6.614E-4	1.021E-3	1.291E-3	1.405E-3
300	4.729E-4	3.967E-4	6.200E-4	7.892E-4	8.609E-4
295	2.790E-4	2.329E-4	3.686E-4	4.727E-4	5.169E-4
290	1.609E-4	1.337E-4	2.144E-4	2.770E-4	3.037E-4
285	9.070E-5	7.499E-5	1.218E-4	1.587E-4	1.744E-4
280	4.985E-5	4.101E-5	6.755E-5	8.872E-5	9.779E-5
275	2.669E-5	2.184E-5	3.649E-5	4.835E-5	5.344E-5
270	1.390E-5	1.131E-5	1.918E-5	2.565E-5	2.843E-5
265	7.023E-6	5.682E-6	9.788E-6	1.322E-5	1.469E-5
260	3.440E-6	2.766E-6	4.843E-6	6.606E-6	7.368E-6
255	1.630E-6	1.302E-6	2.318E-6	3.196E-6	3.577E-6
250	7.450E-7	5.916E-7	1.072E-6	1.494E-6	1.678E-6
245		2.587E-7	4.772E-7	6.731E-7	7.587E-7
240			2.042E-7	2.916E-7	3.299E-7
235				1.212E-7	1.376E-7
230				4.814E-8	
T _f	247	242	239	226	231

TABLE 9

C₁₇ to C₂₀ ALKANES (kPa v. K)

23	Heptadecane	n-Heptadecane
24	Octadecane	n-Octadecane
25	Nonadecane	n-Nonadecane
26	Eicosane	n-Eicosane

No.	23	24	25	26
T _C (K)	736.15	749.15	761.15	771.15
p _C (kPa)	1358	1290	1243	1200

T	P			
K	kPa			
745		1220.5	1002.6	839.77
740		1142.0	937.46	783.33
735	1337.2	1068.2	876.08	730.21
730	1250.8	998.85	818.22	680.22
725	1170.0	933.51	763.68	633.17
720	1094.0	871.93	712.25	588.89
715	1022.5	813.88	663.77	547.24
710	955.07	759.16	618.08	508.06
705	891.56	707.57	575.02	471.23
700	831.69	658.94	534.47	436.63
695	775.25	613.12	496.29	404.13
690	722.05	569.96	460.36	373.64
685	671.91	529.32	426.57	345.04
680	624.68	491.07	394.82	318.24
675	580.21	455.09	365.00	293.14
670	538.34	421.28	337.01	269.67
665	498.96	389.51	310.77	247.73
660	461.93	359.70	286.19	227.24
655	427.15	331.74	263.19	208.14
650	394.49	305.55	241.69	190.35
645	363.86	281.03	221.61	173.79
640	335.16	258.10	202.88	158.40
635	308.29	236.68	185.43	144.13
630	283.15	216.70	169.19	130.90
625	259.67	198.08	154.11	118.67
620	237.76	180.75	140.12	107.36
615	217.34	164.65	127.15	96.937
610	198.33	149.71	115.17	87.341
605	180.66	135.87	104.10	78.524
600	164.27	123.06	93.892	70.437
595	149.07	111.23	84.504	63.035
590	135.01	100.33	75.884	56.274
585	122.02	90.293	67.983	50.112
580	110.05	81.077	60.758	44.508
575	99.029	72.629	54.164	39.424
570	88.906	64.902	48.160	34.824
565	79.627	57.850	42.706	30.671
560	71.139	51.428	37.764	26.932
555	63.393	45.594	33.297	23.576
550	56.338	40.307	29.271	20.571
545	49.930	35.529	25.652	17.890
540	44.123	31.222	22.407	15.504
535	38.875	27.350	19.508	13.388
530	34.146	23.881	16.925	11.518
525	29.895	20.780	14.632	9.8716

TABLE 9 continued

C₁₇ to C₂₀ ALKANES (kPa v. K) continued

No.	23	24	25	26
continued				
T K	p kPa			
520	26.087	18.019	12.602	8.4266
515	22.685	15.567	10.812	7.1633
510	19.656	13.399	9.2398	6.0634
505	16.968	11.487	7.8631	5.1096
500	14.591	9.8075	6.6629	4.2860
495	12.497	8.3384	5.6207	3.5780
490	10.658	7.0583	4.7197	2.9722
485	9.0514	5.9475	3.9441	2.4563
480	7.6522	4.9879	3.2796	2.0191
475	6.4391	4.1626	2.7129	1.6506
470	5.3922	3.4562	2.2322	1.3415
465	4.4927	2.8544	1.8264	1.0839
460	3.7237	2.3445	1.4857	8.703E-1
455	3.0696	1.9147	1.2014	6.943E-1
450	2.5161	1.5544	9.654E-1	5.502E-1
445	2.0503	1.2541	7.707E-1	4.330E-1
440	1.6605	1.0053	6.111E-1	3.383E-1
435	1.3363	8.005E-1	4.812E-1	2.623E-1
430	1.0683	6.330E-1	3.761E-1	2.018E-1
425	8.481E-1	4.969E-1	2.918E-1	1.540E-1
420	6.685E-1	3.872E-1	2.245E-1	1.165E-1
415	5.230E-1	2.993E-1	1.714E-1	8.742E-2
410	4.059E-1	2.295E-1	1.297E-1	6.497E-2
405	3.126E-1	1.744E-1	9.727E-2	4.782E-2
400	2.386E-1	1.314E-1	7.227E-2	3.485E-2
395	1.805E-1	9.810E-2	5.317E-2	2.514E-2
390	1.354E-1	7.252E-2	3.873E-2	1.793E-2
385	1.005E-1	5.307E-2	2.791E-2	1.265E-2
380	7.387E-2	3.843E-2	1.989E-2	8.820E-3
375	5.372E-2	2.752E-2	1.401E-2	6.073E-3
370	3.864E-2	1.948E-2	9.753E-3	4.128E-3
365	2.748E-2	1.362E-2	6.703E-3	2.769E-3
360	1.930E-2	9.409E-3	4.546E-3	1.831E-3
355	1.339E-2	6.412E-3	3.041E-3	1.193E-3
350	9.166E-3	4.310E-3	2.005E-3	7.654E-4
345	6.188E-3	2.855E-3	1.302E-3	4.832E-4
340	4.117E-3	1.863E-3	8.318E-4	2.999E-4
335	2.698E-3	1.196E-3	5.228E-4	1.829E-4
330	1.740E-3	7.552E-4	3.228E-4	1.094E-4
325	1.103E-3	4.685E-4	1.957E-4	6.423E-5
320	6.871E-4	2.853E-4	1.164E-4	3.693E-5
315	4.201E-4	1.704E-4	6.782E-5	2.078E-5
310	2.518E-4	9.973E-5	3.868E-5	1.143E-5
305	1.479E-4	5.711E-5		
300	8.499E-5			
T _f	295	301	305	309