

Thermal conductivity of liquids: Aliphatic alcohols

ESDU Copyright material. For current status contact ESDU.

Endorsed by
The Institution of Chemical Engineers
The Institution of Mechanical Engineers

ESDU DATA ITEMS

Data Items provide validated information in engineering design and analysis for use 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 The data are founded on an evaluation of all the relevant information, both published and unpublished, and are invariably supported by original work of ESDU staff engineers or consultants.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.

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.

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, Germany
Dr M.W. Chase†	— National Institute of Standards & Technology, Gaithersburgh, USA
Dr J.R. Downey†	— Dow Chemical, Midland, USA
Dr B. Edmonds	— Infochem Computer Services Ltd, London, UK
Dr G. Hobson	— Imperial Chemical Industries plc, Petrochemicals & Plastics Division, Wilton, UK
Dr A.E. Humphreys	— British Gas plc, Loughborough, UK
Mr S.R. Knight	— Stone & Webster Engineering Ltd, Milton Keynes, UK
Dr K.N. Marsh†	— Thermodynamics Research Center, Texas A & M University System, USA
Mr J.T.R. Watson	— National Engineering Laboratory, East Kilbride, UK.

* Emeritus Member.

† Corresponding Member.

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

Dr D.T. Jamieson — Independent.

The person with overall responsibility for the work in this subject area is Mr S.J. Pugh, Head of Thermofluids Group.

THERMAL CONDUCTIVITY OF LIQUIDS: ALIPHATIC ALCOHOLS

CONTENTS

	Page
1. INTRODUCTION	1
2. NOTATION AND UNITS	1
3. CONVERSION FACTORS	2
4. THERMAL CONDUCTIVITY	2
4.1 Thermal Conductivity at Saturation Pressure	2
4.2 Effect of Pressure	3
5. EXPLANATION OF TABLES	3
6. REFERENCES	4
7. TABLES	5
TABLE 7.1 Constants for Equation (4.2)	5

Data sheets for each of the liquids are given in the following order:-

Formula	Name	Alternative Name(s)	
C₁ to C₃ ALKANOLS			
1. CH ₃ OH	Methanol	Methyl alcohol Carbinol Hydroxymethane	7
2. CH ₃ CH ₂ OH	Ethanol	Ethyl alcohol Methyl carbinol Hydroxyethane	11
3. CH ₃ [CH ₂] ₂ OH	Propan-1-ol	1-Propanol <i>n</i> -Propanol Propanol Propyl alcohol <i>n</i> -Propyl alcohol Ethyl carbinol 1-Hydroxypropane	15
4. (CH ₃) ₂ CHOH	Propan-2-ol	2-Propanol Isopropanol Isopropyl alcohol <i>sec</i> -Propyl alcohol 1-Methylethyl alcohol Dimethyl carbinol 2-Hydroxypropane	18

Formula	Name	Alternative Name(s)	
BUTANOLS			
5. $\text{CH}_3[\text{CH}_2]_3\text{OH}$	Butan-1-ol	1-Butanol <i>n</i> -Butanol Butanol Butyl alcohol <i>n</i> -Butyl alcohol Propyl carbinol 1-Hydroxybutane	20
6. $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$	Butan-2-ol	2-Butanol <i>sec</i> -Butyl alcohol 1-Methylpropyl alcohol Methyl ethyl carbinol 2-Hydroxybutane	23
7. $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$	2-Methylpropan-1-ol	2-Methyl-1-propanol Isobutanol Isobutyl alcohol 2-Methylpropyl alcohol Isopropyl carbinol 1-Methylethyl carbinol 2-Methyl-1-hydroxypropane	25
8. $(\text{CH}_3)_3\text{COH}$	2-Methylpropan-2-ol	2-Methyl-2-propanol <i>tert</i> -Butanol <i>tert</i> -Butyl alcohol 1,1-Dimethylethyl alcohol Trimethyl carbinol 2-Methyl-2-hydroxypropane	27
PENTANOLS			
9. $\text{CH}_3[\text{CH}_2]_4\text{OH}$	Pentan-1-ol	1-Pentanol <i>n</i> -Pentanol Pentanol Pentyl alcohol Amyl alcohol <i>n</i> -Pentyl alcohol <i>n</i> -Amyl alcohol Butyl carbinol 1-Hydroxypentane	28
10. $\text{CH}_3\text{CH}(\text{OH})[\text{CH}_2]_2\text{CH}_3$	Pentan-2-ol	2-Pentanol (<i>RS</i>)-Pentan-2-ol (<i>RS</i>)-2-Pentanol <i>dl</i> -Pentan-2-ol <i>dl</i> -2-Pentanol <i>sec-act</i> -Pentyl alcohol <i>sec-act</i> -Amyl alcohol 1-Methylbutyl alcohol Methyl propyl carbinol 2-Hydroxypentane	30

Formula	Name	Alternative Name(s)	
11. $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$	Pentan-3-ol	3-Pentanol <i>sec</i> -Pentyl alcohol <i>sec</i> -Amyl alcohol 1-Ethylpropyl alcohol Diethyl carbinol 3-Hydroxypentane	31
12. $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$	2-Methylbutan-1-ol	2-Methyl-1-butanol <i>pri-act</i> -Pentyl alcohol <i>pri-act</i> -Amyl alcohol 2-Methylbutyl alcohol <i>sec</i> -Butyl carbinol 1-Methylpropyl carbinol 2-Methyl-1-hydroxybutane	32
13. $(\text{CH}_3)_2\text{CH}[\text{CH}_2]_2\text{OH}$	3-Methylbutan-1-ol	3-Methyl-1-butanol Isopentyl alcohol Isoamyl alcohol 3-Methylbutyl alcohol Isobutyl carbinol 2-Methylpropyl carbinol 3-Methyl-1-hydroxybutane	33
14. $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}_2\text{CH}_3$	2-Methylbutan-2-ol	2-Methyl-2-butanol <i>tert</i> -Pentyl alcohol <i>tert</i> -Amyl alcohol 1,1-Dimethylpropyl alcohol Dimethyl ethyl carbinol 2-Methyl-2-hydroxybutane	35
15. $\text{CH}_3\text{CH}(\text{OH})\text{CH}(\text{CH}_3)_2$	3-Methylbutan-2-ol	3-Methyl-2-butanol 1,2-Dimethylpropyl alcohol Methyl isopropyl carbinol Methyl 1-methylethyl carbinol 3-Methyl-2-hydroxybutane	36
16. $(\text{CH}_3)_3\text{CCH}_2\text{OH}$	2,2-Dimethylpropan-1-ol	2,2-Dimethyl-1-propanol Neopentyl alcohol 2,2-Dimethylpropyl alcohol <i>tert</i> -Butyl carbinol 1,1-Dimethylethyl carbinol 2,2-Dimethyl-1-hydroxypropane	37
HEXANOLS			
17. $\text{CH}_3[\text{CH}_2]_5\text{OH}$	Hexan-1-ol	1-Hexanol <i>n</i> -Hexanol Hexanol Hexyl alcohol <i>n</i> -Hexyl alcohol Caproyl alcohol Pentyl carbinol Amyl carbinol 1-Hydroxyhexane	38

Formula	Name	Alternative Name(s)	
18. $\text{CH}_3\text{CH}(\text{OH})[\text{CH}_2]_3\text{CH}_3$	Hexan-2-ol	2-Hexanol <i>sec</i> -Hexyl alcohol 1-Methylpentyl alcohol Methyl butyl carbinol Butyl methyl carbinol 2-Hydroxyhexane	40
19. $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})[\text{CH}_2]_2\text{CH}_3$	Hexan-3-ol	3-Hexanol 1-Ethylbutyl alcohol Ethyl propyl carbinol 3-Hydroxyhexane	41
20. $\text{CH}_3[\text{CH}_2]_2\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$	2-Methylpentan-1-ol	2-Methyl-1-pentanol 2-Methylpentyl alcohol 1-Methylbutyl carbinol 2-Methyl-1-hydroxypentane	42
21. $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)[\text{CH}_2]_2\text{OH}$	3-Methylpentan-1-ol	3-Methyl-1-pentanol 3-Methylpentyl alcohol 2-Methylbutyl carbinol 3-Methyl-1-hydroxypentane	43
22. $(\text{CH}_3)_2\text{CH}[\text{CH}_2]_3\text{OH}$	4-Methylpentan-1-ol	4-Methyl-1-pentanol 4-Methylpentyl alcohol 3-Methylbutyl carbinol 4-Methyl-1-hydroxypentane	44
23. $(\text{CH}_3)_2\text{C}(\text{OH})[\text{CH}_2]_2\text{CH}_3$	2-Methylpentan-2-ol	2-Methyl-2-pentanol 1,1-Dimethylbutyl alcohol Dimethyl propyl carbinol 2-Methyl-2-hydroxypentane	45
24. $\text{CH}_3\text{CH}(\text{OH})\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$	3-Methylpentan-2-ol	3-Methyl-2-pentanol 1,2-Dimethylbutyl alcohol Methyl <i>sec</i> -butyl carbinol Methyl 1-methylpropyl carbinol 3-Methyl-2-hydroxypentane	46
25. $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}(\text{CH}_3)_2$	4-Methylpentan-2-ol	4-Methyl-2-pentanol 1,3-Dimethylbutyl alcohol Methyl isobutyl carbinol Methyl 2-methylpropyl carbinol 4-Methyl-2-hydroxypentane	47
26. $(\text{CH}_3)_2\text{CHCH}(\text{OH})\text{CH}_2\text{CH}_3$	2-Methylpentan-3-ol	2-Methyl-3-pentanol 1-Ethyl-2-methylpropyl alcohol Ethyl isopropyl carbinol Ethyl 1-methylethyl carbinol 2-Methyl-3-hydroxypentane	48
27. $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)(\text{OH})\text{CH}_2\text{CH}_3$	3-Methylpentan-3-ol	3-Methyl-3-pentanol <i>tert</i> -Hexyl alcohol 1-Methyl-1-ethylpropyl alcohol Methyl diethyl carbinol 3-Methyl-3-hydroxypentane	49
28. $(\text{CH}_3\text{CH}_2)_2\text{CHCH}_2\text{OH}$	2-Ethylbutan-1-ol	2-Ethyl-1-butanol 2-Ethylbutyl alcohol 1-Ethylpropyl carbinol 2-Ethyl-1-hydroxybutane	50

Formula	Name	Alternative Name(s)	
29. $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{OH}$	2,2-Dimethylbutan-1-ol	2,2-Dimethyl-1-butanol 2,2-Dimethylbutyl alcohol 1,1-Dimethylpropyl carbinol 2,2-Dimethyl-1-hydroxybutane	51
30. $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{CH}_2\text{OH}$	2,3-Dimethylbutan-1-ol	2,3-Dimethyl-1-butanol 2,3-Dimethylbutyl alcohol 1,2-Dimethylpropyl carbinol 2,3-Dimethyl-1-hydroxybutane	52
31. $(\text{CH}_3)_3\text{C}[\text{CH}_2]_2\text{OH}$	3,3-Dimethylbutan-1-ol	3,3-Dimethyl-1-butanol 3,3-Dimethylbutyl alcohol 2,2-Dimethylpropyl carbinol 3,3-Dimethyl-1-hydroxybutane	53
32. $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}(\text{CH}_3)_2$	2,3-Dimethylbutan-2-ol	2,3-Dimethyl-2-butanol 1,1,2-Trimethylpropyl alcohol Dimethyl isopropyl carbinol Dimethyl 1-methylethyl carbinol 2,3-Dimethyl-2-hydroxybutane	54
33. $\text{CH}_3\text{CH}(\text{OH})\text{C}(\text{CH}_3)_3$	3,3-Dimethylbutan-2-ol	3,3-Dimethyl-2-butanol 1,2,2-Trimethylpropyl alcohol Methyl <i>tert</i> -butyl carbinol Methyl 1,1-dimethylethyl carbinol 3,3-Dimethyl-2-hydroxybutane	55
HEPTANOLS			
34. $\text{CH}_3[\text{CH}_2]_6\text{OH}$	Heptan-1-ol	1-Heptanol <i>n</i> -Heptanol Heptanol Heptyl alcohol <i>n</i> -Heptyl alcohol Oenanthic alcohol Enanthic alcohol Hexyl carbinol Caproyl carbinol 1-Hydroxyheptane	56
35. $\text{CH}_3\text{CH}(\text{OH})[\text{CH}_2]_4\text{CH}_3$	Heptan-2-ol	2-Heptanol <i>sec</i> -Heptyl alcohol 1-Methylhexyl alcohol Methyl pentyl carbinol 2-Hydroxyheptane	58
36. $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})[\text{CH}_2]_3\text{CH}_3$	Heptan-3-ol	3-Heptanol 1-Ethylpentyl alcohol Ethyl butyl carbinol 3-Hydroxyheptane	59
37. $\text{CH}_3[\text{CH}_2]_2\text{CH}(\text{OH})[\text{CH}_2]_2\text{CH}_3$	Heptan-4-ol	4-Heptanol 1-Propylbutyl alcohol Dipropyl carbinol 4-Hydroxyheptane	60
38. $(\text{CH}_3)_2\text{C}(\text{OH})[\text{CH}_2]_3\text{CH}_3$	2-Methylhexan-2-ol	2-Methyl-2-hexanol 1,1-Dimethylpentyl alcohol Dimethyl butyl carbinol 2-Methyl-2-hydroxyhexane	61

Formula	Name	Alternative Name(s)	
39. $(\text{CH}_3)_2\text{CHCH}(\text{OH})\text{CH}(\text{CH}_3)_2$	2,4-Dimethylpentan-3-ol	2,4-Dimethyl-3-pentanol 1-Isopropyl-2-methylpropyl alcohol 1-(1-Methylethyl)-2-methylpropyl alcohol Diisopropyl carbinol Bis(1-methylethyl) carbinol 2,4-Dimethyl-3-hydroxypentane	62

OCTANOLS

40. $\text{CH}_3[\text{CH}_2]_7\text{OH}$	Octan-1-ol	1-Octanol <i>n</i> -Octanol Octanol Octyl alcohol <i>n</i> -Octyl alcohol Caprylyl alcohol Caprylic alcohol Heptyl carbinol 1-Hydroxyoctane	63
41. $\text{CH}_3\text{CH}(\text{OH})[\text{CH}_2]_5\text{CH}_3$	Octan-2-ol	2-Octanol <i>sec</i> -Octyl alcohol 1-Methylheptyl alcohol Methyl hexyl carbinol 2-Hydroxyoctane	65
42. $\text{CH}_3[\text{CH}_2]_3\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}_2\text{OH}$	2-Ethylhexan-1-ol	2-Ethyl-1-hexanol 2-Ethylhexyl alcohol 1-Ethylpentyl carbinol 2-Ethyl-1-hydroxyhexane	66
43. $(\text{CH}_3)_2\text{CHCH}_2\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}_2\text{OH}$	4-Methyl-2-ethylpentan-1-ol	4-Methyl-2-ethyl-1-pentanol 2-Ethylisohexanol 2-Ethyl-4-methylpentan-1-ol 2-Ethyl-4-methyl-1-pentanol 2-Ethyl-4-methylpentyl alcohol 2-Ethylisohexyl alcohol 1-Ethylisopentyl carbinol 1-Ethyl-3-methylbutyl carbinol 2-Ethyl-4-methyl-1-hydroxypentane	67

NONANOLS

44. $\text{CH}_3[\text{CH}_2]_8\text{OH}$	Nonan-1-ol	1-Nonanol <i>n</i> -Nonanol Nonanol Nonyl alcohol <i>n</i> -Nonyl alcohol Octyl carbinol Caprylyl carbinol 1-Hydroxynonane	68
---	------------	---	----

Formula	Name	Alternative Name(s)	
45. $(\text{CH}_3)_2\text{CHCH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}(\text{CH}_3)_2$	2,6-Dimethylheptan-4-ol	2,6-Dimethyl-4-heptanol 1-Isobutyl-3-methylbutyl alcohol 1-(2-Methylpropyl)-3-methylbutyl alcohol Diisobutyl carbinol Bis(2-methylpropyl) carbinol 2,6-Dimethyl-4-hydroxyheptane	70
C₁₀ to C₁₄ ALKANOLS			
46. $\text{CH}_3[\text{CH}_2]_9\text{OH}$	Decan-1-ol	1-Decanol <i>n</i> -Decanol Decanol Decyl alcohol <i>n</i> -Decyl alcohol Capryl alcohol Capric alcohol Nonyl carbinol 1-Hydroxydecane	71
47. $\text{CH}_3[\text{CH}_2]_{10}\text{OH}$	Undecan-1-ol	1-Undecanol <i>n</i> -Undecanol Undecanol Undecyl alcohol <i>n</i> -Undecyl alcohol Hendecyl alcohol Decyl carbinol Capryl carbinol 1-Hydroxyundecane	73
48. $\text{CH}_3[\text{CH}_2]_{11}\text{OH}$	Dodecan-1-ol	1-Dodecanol <i>n</i> -Dodecanol Dodecanol Dodecyl alcohol <i>n</i> -Dodecyl alcohol Lauryl alcohol Undecyl carbinol Hendecyl carbinol 1-Hydroxydodecane	74
49. $\text{CH}_3[\text{CH}_2]_{12}\text{OH}$	Tridecan-1-ol	1-Tridecanol <i>n</i> -Tridecanol Tridecanol Tridecyl alcohol <i>n</i> -Tridecyl alcohol Dodecyl carbinol Lauryl carbinol 1-Hydroxytridecane	75
50. $\text{CH}_3[\text{CH}_2]_{13}\text{OH}$	Tetradecan-1-ol	1-Tetradecanol <i>n</i> -Tetradecanol Tetradecanol Tetradecyl alcohol <i>n</i> -Tetradecyl alcohol Myristyl alcohol Myristic alcohol Tridecyl carbinol 1-Hydroxytetradecane	76

Formula	Name	Alternative Name(s)	
C₁₅ to C₂₀ ALKANOLS			
51. CH ₃ [CH ₂] ₁₄ OH	Pentadecan-1-ol	1-Pentadecanol <i>n</i> -Pentadecanol Pentadecanol Pentadecyl alcohol <i>n</i> -Pentadecyl alcohol Tetradecyl carbinol Myristyl carbinol 1-Hydroxypentadecane	77
52. CH ₃ [CH ₂] ₁₅ OH	Hexadecan-1-ol	1-Hexadecanol <i>n</i> -Hexadecanol Hexadecanol Hexadecyl alcohol <i>n</i> -Hexadecyl alcohol Cetyl alcohol <i>n</i> -Cetyl alcohol Pentadecyl carbinol 1-Hydroxyhexadecane	78
53. CH ₃ [CH ₂] ₁₆ OH	Heptadecan-1-ol	1-Heptadecanol <i>n</i> -Heptadecanol Heptadecanol Heptadecyl alcohol <i>n</i> -Heptadecyl alcohol Hexadecyl carbinol Cetyl carbinol 1-Hydroxyheptadecane	79
54. CH ₃ [CH ₂] ₁₇ OH	Octadecan-1-ol	1-Octadecanol <i>n</i> -Octadecanol Octadecanol Octadecyl alcohol <i>n</i> -Octadecyl alcohol Stearyl alcohol Heptadecyl carbinol 1-Hydroxyoctadecane	80
55. CH ₃ [CH ₂] ₁₈ OH	Nonadecan-1-ol	1-Nonadecanol <i>n</i> -Nonadecanol Nonadecanol Nonadecyl alcohol <i>n</i> -Nonadecyl alcohol Octadecyl carbinol Stearyl carbinol 1-Hydroxynonadecane	81

Formula	Name	Alternative Name(s)	
56. $\text{CH}_3[\text{CH}_2]_{19}\text{OH}$	Eicosan-1-ol	1-Eicosanol <i>n</i> -Eicosanol Eicosanol Icosan-1-ol 1-Icosanol <i>n</i> -Icosanol Eicosyl alcohol <i>n</i> -Eicosyl alcohol Icosyl alcohol <i>n</i> -Icosyl alcohol Arachidyl alcohol Arachidic alcohol Arachic alcohol Nonadecyl carbinol 1-Hydroxyeicosane 1-Hydroxyicosane	82

ESDU Copyright material. For current status contact ESDU.

This page is intentionally blank

THERMAL CONDUCTIVITY OF LIQUIDS: ALIPHATIC ALCOHOLS

1. INTRODUCTION

This Item presents values of thermal conductivity at saturation pressure, in tabular form, for straight and branched chain liquid aliphatic alcohols.

The data on which these recommended values of thermal conductivity are based are the most reliable available and the temperature range covered is from the melting temperature to approximately 0.9 of the critical temperature. Quantities are expressed in SI units and conversion factors to other units are provided in Section 3.

Section 4 describes the procedure used to obtain the values of thermal conductivity presented and indicates the effect of pressure. Section 5 gives an explanation of the Tables and indicates the uncertainties in the values presented in them.

References to sources of supplementary information are given in Section 6. The data sources for each particular compound are listed on the appropriate data sheet.

2. NOTATION AND UNITS

The SI unit of thermal conductivity is the watt per metre kelvin (W/m K). A convenient submultiple SI unit for the range of thermal conductivity in this Item is the milliwatt per metre kelvin (mW/m K); hence that is the unit adopted here.

A	constant for each liquid in Equation (4.2)	mW/m K
A'	constant for each liquid in Equation (4.1)	mW/m K
B'	non-dimensional constant for each liquid in Equation (4.1)	—
B, C, D	non-dimensional constants for each liquid in Equation (4.2)	—
p	pressure	N/m ² (Pa)
T	kelvin temperature	K
t	Celsius temperature, $T - 273.15$	°C
λ	thermal conductivity	mW/m K

Subscripts

c	denotes value at the critical point
p	denotes value at pressure p
r	denotes reduced quantity, <i>e.g.</i> $T_r = T/T_c$.

3. CONVERSION FACTORS

$$\begin{aligned}
 1 \text{ mW/m K} &= 0.8598 \times 10^{-3} \text{ kcal/m h } ^\circ\text{C}^* \\
 &= 2.3885 \times 10^{-6} \text{ cal/cm s } ^\circ\text{C}^* \\
 &= 0.5778 \times 10^{-3} \text{ Chu/ft h } ^\circ\text{C}^* \\
 &= 0.5778 \times 10^{-3} \text{ Btu/ft h } ^\circ\text{F}^* \\
 &= 6.9335 \times 10^{-3} \text{ Btu in/ft}^2 \text{ h } ^\circ\text{F}^*
 \end{aligned}$$

$$\begin{aligned}
 10^5 \text{ N/m}^2 &= 1 \text{ bar} \\
 &= 14.5038 \text{ lbf/in}^2 \\
 &= 1.0197 \text{ kgf/cm}^2 \\
 &= 0.9869 \text{ atm} \\
 &= 750.062 \text{ mmHg.}
 \end{aligned}$$

* The values used for the calorie and British Thermal Unit are International Table values.

4. THERMAL CONDUCTIVITY

4.1 Thermal Conductivity at Saturation Pressure

In Reference 2 Riedel showed that the experimental data for the thermal conductivity of normal (that is unassociated) liquids along the saturation line could be represented by the equation:

$$\lambda = A'[1 + (20/3)(1 - T_r)^{2/3}].$$

For the liquids considered in this Item a better representation of the data is obtained, over a wide temperature range, from the modified equation which was used in some earlier ESDU Items:

$$\lambda = A'[1 + B'(1 - T_r)^{2/3}]. \quad (4.1)$$

The range of applicability of Equation (4.1) is limited for most compounds; recent data from several sources show that there may be marked deviations in the regions of the triple point and the critical point from extrapolations of Equation (4.1) fitted in the intermediate region.

For the liquids considered in this Item a good representation of the data* between the melting temperature and $T_r = 0.9$ is obtained from the equation:

$$\lambda = A[1 + B(1 - T_r)^{1/3} + C(1 - T_r)^{2/3} + D(1 - T_r)]. \quad (4.2)$$

Measurements of thermal conductivity have been made for relatively few liquids at $T_r > 0.9$ and so, because of the uncertain variation of thermal conductivity in the critical region, data are presented only for temperatures up to $T_r = 0.9$. The equation extrapolates in a physically realistic manner to within a few kelvin of the critical point.

The critical temperatures for these compounds have been taken from ESDU 88005, 88012 (References 8 and 9). In this Item, the critical temperatures should be regarded as correlating parameters only and should not be taken as a source of accurate values.

* Experimental data at temperatures below the normal boiling temperature, t_b are often at 1 atm pressure. As indicated in Section 4.2 the difference between values of λ at 1 atm pressure and at saturation pressure below t_b is not significant.

The derived values of A , B , C and D given in Table 7.1 are a correlated set of values giving the best fit to the experimental data, not only as individual compounds but also as members of their chemical series. This method of correlating data for a series of compounds has been described in References 5 and 6. For the alkanols in this Item, it was found that B , C and D could be held constant*. Correlated values of the constants A , B , C and D were used to estimate constants for liquids for which no experimental data exist. Using these values with the values of T_c given in Table 7.1, values of λ in mW/m K have been calculated for each compound from Equation (4.2) and are presented in the data sheets.

4.2 Effect of Pressure

At temperatures up to the normal boiling point, the effect of pressure from the saturation pressure to $50 \times 10^5 \text{ N/m}^2$ (up to 50 atm) is to increase the thermal conductivity by approximately 1 per cent and, for most practical purposes, values at saturation pressure may be taken as equal to those at atmospheric pressure.

Reference 1 gives measurements of thermal conductivity for a number of liquids up to $12\,000 \times 10^5 \text{ N/m}^2$ ($\approx 12\,000 \text{ atm}$) at 30°C and 75°C . A generalised correlation of these results is given in Reference 3, but a knowledge of the critical pressure of the substance is required for its use.

For pressures up to $500 \times 10^5 \text{ N/m}^2$ ($\approx 500 \text{ atm}$) between the melting temperature and the normal boiling point a very approximate relationship:

$$\lambda_p/\lambda \approx 1 + 0.2p \times 10^{-8}, \quad (4.3)$$

may be used where λ_p is the thermal conductivity at pressure p and λ is the thermal conductivity at a pressure of 10^5 N/m^2 ($\approx 1 \text{ atm}$), both at the same temperature.

5. EXPLANATION OF TABLES

The constants of Equation (4.2) are given in Table 7.1 and on the data sheets. Values of the thermal conductivity are given in the data sheets at 10 kelvin intervals in K and $^\circ\text{C}$, from within 10 kelvin of the melting temperature, or an appropriate starting temperature where the melting temperature is unknown, to a temperature corresponding with $T_r \approx 0.9$.

The sources are given in the data sheets and extrapolated values are indicated in parentheses.

For uniformity and ease of interpolation the data are presented and can be read to more significant digits than is warranted by their estimated accuracy.

The experimental data from the most reliable individual sources have a repeatability of about ± 1 per cent although differences in technique used by different workers (and possibly also in the purity of samples) can increase the uncertainty in the absolute values to about ± 2 per cent. However, such reliable data are not available for all the compounds considered, nor over the whole temperature range covered. Although it is considered that the correlation procedures adopted keep the errors in the values presented to a minimum, the user should in general allow for an uncertainty of ± 5 per cent unless the value in the data sheet is truncated to a whole number. Where whole numbers are given the uncertainty increases to ± 10 per cent.

Some fluids have poor thermal stability coupled with a high critical temperature. Values have been tabulated for all fluids up to $T_r \approx 0.9$ but many of these fluids will decompose at elevated temperatures. As most compounds will decompose rapidly at temperatures above about 300°C , uncertainties of greater than ± 10 per cent may occur for temperatures $\geq 573 \text{ K}$.

* $B = 3.0$, $C = -6.5$, $D = 5.4$.

6. REFERENCES

The references given are recommended sources of information supplementary to that in this Item.

1. BRIDGMAN, P.W. The thermal conductivity of liquids under pressure. *Proc. Am. Acad. Arts Sci.*, Vol. 59, No. 7, pp. 141-169, 1923.
2. RIEDEL, L. New measurements of the thermal conductivity of organic liquids. (In German). *Chem. Ing. Tech.*, Vol. 23, No. 13, pp. 321-324, 1951.
3. LENOIR, J.M. Effect of pressure on the thermal conductivity of liquids. *Petrol. Refiner*, Vol. 36, No. 8, pp. 162-164, 1957.
4. JAMIESON, D.T.
IRVING, J.B.
TUDHOPE, J.S. *The thermal conductivity of liquids: a data survey to 1973*. HMSO, Edinburgh, UK, 1975.
5. JAMIESON, D.T. Thermal conductivity of liquids. *J. Chem. Eng. Data*, Vol. 24, No. 3, pp. 244-246, 1979.
6. JAMIESON, D.T.
CARTWRIGHT, G. Thermal conductivity of associated fluids. *J. Chem. Eng. Data*, Vol. 25, No. 3, pp. 199-201, 1980.
7. BSI *Recommendations for names for chemicals used in industry*. British Standards Institution, BS 2474, 1983.
8. ESDU Vapour pressures and critical points of liquids: C₁ to C₆ alkanols. Data Item 88005, ESDU International plc, London, UK, 1988.
9. ESDU Vapour pressures and critical points of liquids: C₇ to C₂₀ alkanols. Data Item 88012, ESDU International plc, London, UK, 1988.
10. HMSO *A guide to the tariff classification of chemicals in the combined nomenclature*. HMSO, London, UK, 1991.

7. TABLES

TABLE 7.1 Constants for Equation (4.2)

Compound	T_c K	A mW/m K	B	C	D	Range of Applicability °C
1. Methanol	512.64	106.9	3.0	-6.5	5.4	-100 to 200
2. Ethanol	513.92	87.4	3.0	-6.5	5.4	-120 to 200
3. Propan-1-ol	536.78	79.8	3.0	-6.5	5.4	-130 to 220
4. Propan-2-ol	508.3	72.5	3.0	-6.5	5.4	-90 to 190
5. Butan-1-ol	563.05	76.8	3.0	-6.5	5.4	-90 to 240
6. Butan-2-ol	536.01	71.0	3.0	-6.5	5.4	-120 to 220
7. 2-Methylpropan-1-ol	547.78	69.5	3.0	-6.5	5.4	-80 to 230
8. 2-Methylpropan-2-ol	506.2	60.8	3.0	-6.5	5.4	20 to 190
9. Pentan-1-ol	588.15	75.1	3.0	-6.5	5.4	-80 to 260
10. Pentan-2-ol	560.	69.8	3.0	-6.5	5.4	-70 to 240
11. Pentan-3-ol	553.	69.8	3.0	-6.5	5.4	-70 to 230
12. 2-Methylbutan-1-ol	577.	67.9	3.0	-6.5	5.4	-50 to 250
13. 3-Methylbutan-1-ol	579.	67.9	3.0	-6.5	5.4	-50 to 260
14. 2-Methylbutan-2-ol	534.	60.5	3.0	-6.5	5.4	-10 to 220
15. 3-Methylbutan-2-ol	550.	61.9	3.0	-6.5	5.4	-50 to 230
16. 2,2-Dimethylpropan-1-ol	554.	62.4	3.0	-6.5	5.4	50 to 230
17. Hexan-1-ol	610.7	74.3	3.0	-6.5	5.4	-50 to 280
18. Hexan-2-ol	586.2	68.7	3.0	-6.5	5.4	-30 to 260
19. Hexan-3-ol	578.	68.7	3.0	-6.5	5.4	-30 to 260
20. 2-Methylpentan-1-ol	600.	67.1	3.0	-6.5	5.4	-30 to 270
21. 3-Methylpentan-1-ol	607.	67.1	3.0	-6.5	5.4	-30 to 280
22. 4-Methylpentan-1-ol	603.5	67.1	3.0	-6.5	5.4	-30 to 280
23. 2-Methylpentan-2-ol	559.5	60.0	3.0	-6.5	5.4	-100 to 240
24. 3-Methylpentan-2-ol	581.	61.4	3.0	-6.5	5.4	-30 to 260
25. 4-Methylpentan-2-ol	574.5	62.7	3.0	-6.5	5.4	-30 to 250
26. 2-Methylpentan-3-ol	567.	61.4	3.0	-6.5	5.4	-30 to 250
27. 3-Methylpentan-3-ol	563.	60.5	3.0	-6.5	5.4	-30 to 240
28. 2-Ethylbutan-1-ol	599.	67.1	3.0	-6.5	5.4	-120 to 270
29. 2,2-Dimethylbutan-1-ol	588.	61.6	3.0	-6.5	5.4	-20 to 260
30. 2,3-Dimethylbutan-1-ol	599.	61.6	3.0	-6.5	5.4	-30 to 270
31. 3,3-Dimethylbutan-1-ol	595.	61.6	3.0	-6.5	5.4	-30 to 270
32. 2,3-Dimethylbutan-2-ol	559.	59.7	3.0	-6.5	5.4	-10 to 240
33. 3,3-Dimethylbutan-2-ol	562.	56.5	3.0	-6.5	5.4	0 to 240

TABLE 7.1 Constants for Equation (4.2)

Compound	T_c K	A mW/m K	B	C	D	Range of Applicability °C
34. Heptan-1-ol	632.5	74.0	3.0	-6.5	5.4	-40 to 300
35. Heptan-2-ol	607.	68.4	3.0	-6.5	5.4	-30 to 280
36. Heptan-3-ol	604.	68.4	3.0	-6.5	5.4	-70 to 280
37. Heptan-4-ol	602.	68.4	3.0	-6.5	5.4	-40 to 280
38. 2-Methylhexan-2-ol	584.	59.5	3.0	-6.5	5.4	-30 to 260
39. 2,4-Dimethylpentan-3-ol	583.	60.5	3.0	-6.5	5.4	-10 to 260
40. Octan-1-ol	652.5	74.2	3.0	-6.5	5.4	-20 to 320
41. Octan-2-ol	638.	68.4	3.0	-6.5	5.4	-30 to 310
42. 2-Ethylhexan-1-ol	641.	66.8	3.0	-6.5	5.4	-70 to 310
43. 4-Methyl-2-ethylpentan-1-ol	633.	61.4	3.0	-6.5	5.4	-30 to 300
44. Nonan-1-ol	671.5	74.5	3.0	-6.5	5.4	-10 to 340
45. 2,6-Dimethylheptan-4-ol	630.	61.1	3.0	-6.5	5.4	-30 to 300
46. Decan-1-ol	689.	75.3	3.0	-6.5	5.4	10 to 360
47. Undecan-1-ol	705.	76.3	3.0	-6.5	5.4	10 to 370
48. Dodecan-1-ol	720.	77.4	3.0	-6.5	5.4	20 to 380
49. Tridecan-1-ol	734.	78.5	3.0	-6.5	5.4	30 to 400
50. Tetradecan-1-ol	747.	79.5	3.0	-6.5	5.4	40 to 410
51. Pentadecan-1-ol	759.	80.4	3.0	-6.5	5.4	40 to 420
52. Hexadecan-1-ol	770.	81.3	3.0	-6.5	5.4	50 to 430
53. Heptadecan-1-ol	780.	82.1	3.0	-6.5	5.4	50 to 440
54. Octadecan-1-ol	790.	82.8	3.0	-6.5	5.4	60 to 450
55. Nonadecan-1-ol	799.	83.6	3.0	-6.5	5.4	60 to 450
56. Eicosan-1-ol	809.	84.4	3.0	-6.5	5.4	60 to 460

CH₃OH METHANOL (METHYL ALCOHOL, CARBINOL, HYDROXYMETHANE)

$$\lambda = A[1 + B(1 - T_r)^{1/3} + C(1 - T_r)^{2/3} + D(1 - T_r)]$$

where

λ = thermal conductivity at saturation pressure (mW/m K)

$$T_r = T/T_c \quad T = \text{temperature (K)}$$

$$T_c = 512.64 \text{ K}$$

$$A = 106.9, \quad B = 3.0, \quad C = -6.5, \quad D = 5.4$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
170	(242.)	330	190.7	-100	(241.)	60	189.9
180	(238.3)	340	188.1	-90	(237.2)	70	187.3
190	(234.7)	350	185.5	-80	233.6	80	184.8
200	231.2	360	183.1	-70	230.1	90	182.3
210	227.7	370	180.7	-60	226.6	100	180.0
220	224.3	380	178.5	-50	223.2	110	177.8
230	220.9	390	176.3	-40	219.9	120	175.6
240	217.6	400	174.2	-30	216.6	130	173.6
250	214.4	410	172.3	-20	213.4	140	171.7
260	211.2	420	170.4	-10	210.2	150	169.9
270	208.0	430	169.	0	207.1	160	168.
280	205.0	440	167.	10	204.0	170	167.
290	202.0	450	165.	20	201.0	180	165.
300	199.0	460	164.	30	198.1	190	164.
310	196.2	470	163.	40	195.3	200	162.
320	193.4			50	192.6		

WEBER, H.F.

Rep. Phys., Vol. 22, pp. 116-122, 1886.

DE HEEN, P.

Bull. Acad. Belges, Cl. Sci., Vol. 18, pp. 192-208, 1889.

LEES, C.H.

Phil. Trans. R. Soc. London, Ser. A, Vol. 191, pp. 339-440, 1898.

GOLDSCHMIDT, R.

Phys. Z., Vol. 12, pp. 417-424, 1911.

SHIBA, H.

Sci. Papers, Inst. Phys. Chem. Res. (Tokyo), Vol. 16, pp. 205-241, 1931.

- BATES, O.K.
HAZZARD, G.
PALMER, G.
Ind. Eng. Chem. Anal., Vol. 10, No. 6, pp. 314-318, 1938.
- DITTMAN, F.W.
WINDING, C.C.
Ind. Eng. Chem., Vol. 41, No. 3, pp. 543-550, 1949.
- VAN DER HELD, E.F.M.
VAN DRUNEN, F.G.
Physica, Vol. 15, No. 10, pp. 865-881, 1949.
- VARGAFTIK, N.B.
Izv. Vses. Teplotekhn. Inst., Vol. 18, No. 8, 1949.
- RIEDEL, L.
Chem. Ing. Tech., Vol. 23, No. 19, pp. 465-469, 1951.
- VARGAFTIK, N.B.
Izv. Vses. Teplotekhn. Inst., Vol. 20, 1951.
- ABAS-ZADE, A.K.
Dokl. Akad. Nauk. SSSR., Vol. 99, pp. 227-230, 1954.
- FILIPPOV, L.P.
Vestn. Mosk. Gos. Univ., Ser. Fiz.-Mat. Est. Nauk., Vol. 9, No. 12, pp. 45-48, 1954.
- MASON, H.L.
Trans. Am. Soc. Mech. Eng., Vol. 76, No. 5, pp. 817-821, 1954.
- SAKIADIS, B.C.
COATES, J.
AIChEJ., Vol. 1, No. 3, pp. 275-288, 1955.
- CECIL, O.B.
MUNCH, R.H.
Ind. Eng. Chem., Vol. 48, No. 3, pp. 437-440, 1956.
- GERTS, I.G.
FILIPPOV, L.P.
Zh. Fiz. Khim., Vol. 30, No. 11, pp. 2424-2427, 1956.
- ABAS-ZADE, A.K.
AMIRASLANOV, A.M.
Zh. Fiz. Khim., Vol. 31, No. 7, pp. 1459-1467, 1957.
- HILDENBRAND, D.L.
HAPPE, J.A.
J. Phys. Chem., Vol. 61, No. 10, pp. 1415-1417, 1957.
- VARGAFTIK, N.B.
Proceedings of the Conference on the Thermodynamic and Transport Properties of Fluids, London, UK, 1957.
- EL'DAROV, F.G.
Zh. Fiz. Khim., Vol. 34, No. 8, pp. 1205-1211, 1960.
- FILIPPOV, L.P.
Vestn. Mosk. Gos. Univ. Ser. 3, Fiz. Astron., Vol. 15, No. 3, pp. 61-68, 1960.
- SCHEFFY, W.J.
JOHNSON, E.F.
J. Chem. Eng. Data, Vol. 6, No. 2, pp. 245-249, 1961.
- FRITZ, W.
POLTZ, H.
Int. J. Heat Mass Trans., Vol. 5, No. 2, pp. 307-316, 1962.
- JAMIESON, D.T.
TUDHOPE, J.S.
NEL Report No. 81, National Engineering Laboratory, East Kilbride, UK, 1963.
- JOBST, W.
Int. J. Heat Mass Trans., Vol. 7, No. 7, pp. 725-732, 1964.
- POLTZ, H.
Int. J. Heat Mass Trans., Vol. 8, No. 4, pp. 609-622, 1965.

- GELLER, Z.I.
RASTORGUEV, Yu.L.
GANIEV, Yu.A.
- SALE, P.
- TUFEU, R.
LeNEINDRE, B.
JOHANNIN, P.
- YAMAMOTO, A.
AKIYAMA, J.
- ABAS-ZADE, A.K.
DZHAMALOV, R.
- POLTZ, H.
JUGEL, R.
- VENART, J.E.S.
KRISHNAMURTHY, C.
- GANIEV, Yu.A.
- RASTORGUEV, Yu.L.
GANIEV, Yu.A.
- GOLUBEV, I.F.
VASIL'KOVSKAYA, T.N.
- PERRY, M.G.
JANGDA, H.A.S.
- SCHUHMANN, H.
MARKEFSKI, M.
LAABS, R.
- MUKHAMEDZYANOV, I.Kh.
MUKHAMEDZYANOV, G.Kh.
USMANOV, A.G.
- PAPADOPOULOS, C.
- JAMIESON, D.T.
IRVING, J.B.
TUDHOPE, J.S.
- MALLAN, G.M.
MICHAELIAN, M.S.
LOCKHART, F.J.
- MUKHAMEDZYANOV, I.Kh.
MUKHAMEDZYANOV, G.Kh.
USMANOV, A.G.
- Izv. Vyssh. Ucheb. Zaved., Neft. Gaz.*, Vol. 9, No. 2, pp. 88-90, 1966.
- Bull. Int. Inst. Refrig., Annexe, Commission 2*, pp. 65-77, 1966.
- C.R. Acad. Sci. Paris, Ser. B*, Vol. 262, No. 4, pp. 229-231, 1966.
- Kogyo Kwagaku Zasshi*, Vol. 69, No. 9, pp. 1659-1663, 1966.
- Dokl. Akad. Nauk., Azerb. SSR., Ser. Fiz.-Tekhn. Mat. Nauk.*, Vol. 67, No. 6, pp. 22-26, 1967.
- Int. J. Heat Mass Trans.*, Vol. 10, No. 8, pp. 1075-1088, 1967.
- Proceedings of the 7th Conference on Thermal Conductivity*, Gaithersburgh, Maryland, USA, 1967.
- Teplofiz. Svoistva Zhidk., Mater. Vses. Teplofiz. Konf. 3rd, Svoistvam Veshch. Vys. Temp.*, pp. 95-98, 1968.
- Inzh. Fiz. Zh.*, Vol. 14, No. 4, pp. 689-697, 1968.
- Teploenergetika*, Vol. 16, No. 5, pp. 77-82, 1969.
- Proceedings of the Symposium on Physical Properties of Liquids and Gases for Plant and Process Design*, National Engineering Laboratory, East Kilbride, UK, 1968. Published by: HMSO, Edinburgh, UK, 1970.
- Wiss. Z. Tech. Hochschule, Magdeburg*, Vol. 14, No. 8, pp. 869-871, 1970.
- Trudy Kazan Khim. Tekhnol. In.-ta*, Vol. 44, pp. 57-67, 1971.
- Chem. Ind.*, No. 33, pp. 932-934, 1971.
- Unpublished data, National Engineering Laboratory, East Kilbride, UK, 1972.
- J. Chem. Eng. Data*, Vol. 17, No. 4, pp. 412-414, 1972.
- Teplo-Massoperenos, Dokl. Vses. Soveshch. 4th*, Vol. 7, pp. 468-472, 1972.

- POWELL, R.W.
GROOT, H. *Int. J. Heat Mass Trans.*, Vol. 15, pp. 360-366, 1972.
- DUL'NEV, G.N.
ZARICHNYAK, Yu.P.
MURATOVA, B.L. *Izv. Vyssh. Ucheb. Zaved., Neft. Gaz.*, Vol. 18, pp. 110-112, 1975.
- TRUMP, W.N.
LUEBKE, H.W.
FOWLER, L.
EMERY, E.M. *Rev. Sci. Instrum.*, Vol. 48, No. 1, pp. 47-51, 1977.
- TAKIZAWA, S.
MURATA, H.
NAGASHIMA, A. *Bull. Japan. Soc. Mech. Eng.*, Vol. 21, No. 152, pp. 273-278, 1978.
- NASHIMA, T.
YOSHIDA, K. *Proc. 1st Japan. Symp. Thermophys. Props.*, p. 63, 1980.
- RAAL, J.D.
RIJSDIJK, R.L. Council for Scientific and Industrial Research (CSIR) Report, CSIR-CENG M-334, South Africa, 1980.
- ASSAEL, M.J.
CHARITIDOU, E.
NIETO de CASTRO, C.A. *Int. J. Thermophys.*, Vol. 9, No. 5, pp. 813-823, 1988.

CH₃CH₂OH ETHANOL (ETHYL ALCOHOL, METHYL CARBINOL, HYDROXYETHANE)

$$\lambda = A[1 + B(1 - T_r)^{1/3} + C(1 - T_r)^{2/3} + D(1 - T_r)]$$

where

λ = thermal conductivity at saturation pressure (mW/m K)

$$T_r = T/T_c \quad T = \text{temperature (K)}$$

$$T_c = 513.92 \text{ K}$$

$$A = 87.4, \quad B = 3.0, \quad C = -6.5, \quad D = 5.4$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
150	(204.)	320	158.3	-120	(203.)	50	157.6
160	(200.9)	330	156.1	-110	(200.0)	60	155.4
170	(197.9)	340	154.0	-100	197.0	70	153.3
180	195.0	350	151.9	-90	194.1	80	151.2
190	192.1	360	149.9	-80	191.1	90	149.3
200	189.2	370	147.9	-70	188.3	100	147.4
210	186.3	380	146.1	-60	185.5	110	145.5
220	183.5	390	144.3	-50	182.7	120	143.8
230	180.8	400	142.6	-40	179.9	130	142.1
240	178.1	410	141.0	-30	177.2	140	140.5
250	175.4	420	139.5	-20	174.6	150	139.0
260	172.8	430	138.	-10	172.0	160	138.
270	170.3	440	137.	0	169.5	170	136.
280	167.8	450	135.	10	167.0	180	135.
290	165.3	460	134.	20	164.5	190	134.
300	162.9	470	133.	30	162.2	200	133.
310	160.6			40	159.9		

WEBER, H.F.

Rep. Phys., Vol. 22, pp. 116-122, 1886.

DE HEEN, P.

Bull. Acad. Belges, Cl. Sci., Vol. 18, pp. 192-208, 1889.

HENNEBERG, H.

Ann. Phys., Vol. 36, No. 3, pp. 146-164, 1889.

LEES, C.H.

Phil. Trans. R. Soc. London, Ser. A, Vol. 191, pp. 339-440, 1898.

GOLDSCHMIDT, R.

Phys. Z., Vol. 12, pp. 417-424, 1911.

BRIDGMAN, P.W.

Proc. Am. Acad. Arts Sci., Vol. 59, No. 7, pp. 141-169, 1923.

- SHIBA, H. *Sci. Papers, Inst. Phys. Chem. Res. (Tokyo)*, Vol. 16, pp. 205-241, 1931.
- BATES, O.K.
HAZZARD, G.
PALMER, G. *Ind. Eng. Chem. Anal.*, Vol. 10, No. 6, pp. 314-318, 1938.
- READ, J.H.
LLOYD, D.M.G. *Trans. Faraday Soc.*, Vol. 44, No. 309, pp. 721-729, 1948.
- DITTMAN, F.W.
WINDING, C.C. *Ind. Eng. Chem.*, Vol. 41, No. 3, pp. 543-550, 1949.
- VARGAFTIK, N.B. *Izv. Vses. Teplotekhn. Inst.*, Vol. 18, No. 8, 1949.
- KERZHENTSEV, V.V. *Candidate Phys. Mat. Sci.*, Thesis, Moscow Aviation Institute, Moscow, USSR, 1951.
- RIEDEL, L. *Chem. Ing. Tech.*, Vol. 23, No. 19, pp. 465-469, 1951.
- VARGAFTIK, N.B. *Izv. Vses. Teplotekhn. Inst.*, Vol. 20, 1951.
- BAXTER, S.
VODDEN, H.A.
DAVIES, S. *J. Appl. Chem.*, Vol. 3, No. 10, pp. 477-480, 1953.
- ABAS-ZADE, A.K. *Dokl. Akad. Nauk. SSSR.*, Vol. 99, pp. 227-230, 1954.
- FILIPPOV, L.P. *Vestn. Mosk. Gos. Univ., Ser. Fiz.-Mat. Est. Nauk.*, Vol. 9, No. 12, pp. 45-48, 1954.
- MASON, H.L. *Trans. Am. Soc. Mech. Eng.*, Vol. 76, No. 5, pp. 817-821, 1954.
- KERZHENTSEV, V.V. *Trudy Mosk. Aviats. Inst.*, 1955.
- SAKIADIS, B.C.
COATES, J. *AIChEJ.*, Vol. 1, No. 3, pp. 275-288, 1955.
- CHALLONER, A.R.
POWELL, R.W. *Proc. R. Soc. London, Ser. A*, Vol. 238, No. 1212, pp. 90-106, 1956.
- TSEDERBERG, N.V. *Teploenergetika*, Vol. 3, No. 9, pp. 42-48, 1956.
- ABAS-ZADE, A.K.
AMIRASLANOV, A.M. *Zh. Fiz. Khim.*, Vol. 31, No. 7, pp. 1459-1467, 1957.
- HILDENBRAND, D.L.
HAPPE, J.A. *J. Phys. Chem.*, Vol. 61, No. 10, pp. 1415-1417, 1957.
- VARGAFTIK, N.B. *Proceedings of the Conference on the Thermodynamic and Transport Properties of Fluids*, London, UK, 1957.
- FRONTASEV, V.P.
GUSAKOV, M.Y. *Zh. Tekhn. Fiz.*, Vol. 29, No. 10, pp. 1277-1284, 1959.
- MAUCH, R. Measurement of the thermal conductivity of liquids. (In German). Thesis, Federal Institute of Technology (ETH), Zürich, Switzerland, 1959.
- EL'DAROV, F.G. *Zh. Fiz. Khim.*, Vol. 34, No. 8, pp. 1205-1211, 1960.

- FILIPPOV, L.P. *Vestn. Mosk. Gos. Univ. Ser. 3, Fiz. Astron.*, Vol. 15, No. 3, pp. 61-68, 1960.
- SCHEFFY, W.J.
JOHNSON, E.F. *J. Chem. Eng. Data*, Vol. 6, No. 2, pp. 245-249, 1961.
- GRASSMANN, P.
STRAUMANN, W.
WIDMER, F.
JOBST, W. *Progress in International Research on Thermodynamic and Transport Properties*, American Society of Mechanical Engineers, Academic Press, New York and London, pp. 447-453, 1962.
- RODRIGUEZ, H.V. Molecular field relationships to liquid viscosity, compressibility and prediction of thermal conductivity of binary liquid mixtures. Ph.D. Thesis, Louisiana State University, Louisiana, USA, 1962.
- JOBST, W. Measurement of the conductivity of organic aliphatic liquids and gases by a dynamic, absolute method. (In German). Ph.D. Thesis, Technische Hochschule, Zürich, Switzerland, 1964.
- VENART, J.E.S. *J. Sci. Instrum.*, Vol. 41, No. 12, pp. 727-731, 1964.
- SALE, P. *Bull. Int. Inst. Refrig., Annexe, Commission 2*, pp. 65-77, 1966.
- TUFEU, R.
LeNEINDRE, B.
JOHANNIN, P. *C.R. Acad. Sci. Paris, Ser. B*, Vol. 262, No. 4, pp. 229-231, 1966.
- POLTZ, H.
JUGEL, R. *Int. J. Heat Mass Trans.*, Vol. 10, No. 8, pp. 1075-1088, 1967.
- VENART, J.E.S.
KRISHNAMURTHY, C. *Proceedings of the 7th Conference on Thermal Conductivity*, Gaithersburgh, Maryland, USA, 1967.
- GOLUBEV, I.F.
VASIL'KOVSKAYA, T.N. *Teploenergetika*, Vol. 16, No. 5, pp. 77-82, 1969.
- SCHUHMANN, H.
MARKEFSKI, M.
LAABS, R. *Wiss. Z. Tech. Hochschule, Magdeburg*, Vol. 14, No. 8, pp. 869-871, 1970.
- MUKHAMEDZYANOV, I.Kh.
MUKHAMEDZYANOV, G.Kh.
USMANOV, A.G. *Trudy Kazan Khim. Tekhnol. In.-ta*, Vol. 44, pp. 57-67, 1971.
- POPOV, V.N.
MALOV, B.A. *Teploenergetika*, Vol. 18, pp. 88-90, 1971.
- TABOREK, J. Unpublished data, Private communication to D.T. Jamieson, 1971.
- MALLAN, G.M.
MICHAELIAN, M.S.
LOCKHART, F.J. *J. Chem. Eng. Data*, Vol. 17, No. 4, pp. 412-414, 1972.
- MUKHAMEDZYANOV, I.Kh.
MUKHAMEDZYANOV, G.Kh.
USMANOV, A.G. *Teplo-Massoperenos, Dokl. Vses. Soveshch. 4th*, Vol. 7, pp. 468-472, 1972.

TAKIZAWA, S.
MURATA, H.
NAGASHIMA, A.

Bull. Japan. Soc. Mech. Eng., Vol. 21, No. 152, pp. 273-278, 1978.

RAAL, J.D.
RIJSDIJK, R.L.

Council for Scientific and Industrial Research (CSIR) Report, CSIR-CENG M-334, South Africa, 1980.

KNIBBE, P.G.

Council for Scientific and Industrial Research (CSIR) Report, CSIR-CENG-415, South Africa, 1982. Microfiche No. PB82-239864.

OGIWARA, K.
ARAI, Y.
SAITO, S.

Japan. J. Chem. Eng., Vol. 15, No. 5, pp. 335-342, 1982.

ASSAEL, M.J.
CHARITIDOU, E.
NIETO de CASTRO, C.A.

Int. J. Thermophys., Vol. 9, No. 5, pp. 813-823, 1988.

CH₃[CH₂]₂OH PROPAN-1-OL (1-PROPANOL, *n*-PROPANOL, PROPANOL, PROPYL ALCOHOL, *n*-PROPYL ALCOHOL, ETHYL CARBINOL, 1-HYDROXYPROPANE)

$$\lambda = A[1 + B(1 - T_r)^{1/3} + C(1 - T_r)^{2/3} + D(1 - T_r)]$$

where

λ = thermal conductivity at saturation pressure (mW/m K)

$$T_r = T/T_c, \quad T = \text{temperature (K)}$$

$$T_c = 536.78 \text{ K}$$

$$A = 79.8, \quad B = 3.0, \quad C = -6.5, \quad D = 5.4$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
140	(191.)	320	147.4	-130	(190.)	50	146.7
150	(188.0)	330	145.4	-120	(187.2)	60	144.8
160	(185.4)	340	143.4	-110	(184.5)	70	142.8
170	(182.7)	350	141.5	-100	181.9	80	140.9
180	180.1	360	139.7	-90	179.3	90	139.1
190	177.5	370	137.9	-80	176.7	100	137.3
200	175.0	380	136.2	-70	174.2	110	135.6
210	172.5	390	134.5	-60	171.7	120	134.0
220	170.0	400	132.9	-50	169.2	130	132.4
230	167.5	410	131.4	-40	166.8	140	130.9
240	165.1	420	129.9	-30	164.4	150	129.5
250	162.8	430	129.	-20	162.0	160	128.
260	160.4	440	127.	-10	159.7	170	127.
270	158.1	450	126.	0	157.4	180	126.
280	155.9	460	125.	10	155.2	190	124.
290	153.7	470	124.	20	153.0	200	123.
300	151.6	480	123.	30	150.9	210	122.
310	149.4	490	122.	40	148.8	220	121.

WEBER, H.F.

Rep. Phys., Vol. 22, pp. 116-122, 1886.

GOLDSCHMIDT, R.

Phys. Z., Vol. 12, pp. 417-424, 1911.

SHIBA, H.

Sci. Papers, Inst. Phys. Chem. Res. (Tokyo), Vol. 16, pp. 205-241, 1931.

DANILOFF, M.

J. Am. Chem. Soc., Vol. 54, pp. 1328-1332, 1932.

- BATES, O.K.
HAZZARD, G.
Ind. Eng. Chem., Vol. 37, No. 2, pp. 193-195, 1945.
- VARGAFTIK, N.B.
Izv. Vses. Teplotekhn. Inst., Vol. 18, No. 8, 1949.
- RIEDEL, L.
Chem. Ing. Tech., Vol. 23, No. 19, pp. 465-469, 1951.
- BAXTER, S.
VODDEN, H.A.
DAVIES, S.
J. Appl. Chem., Vol. 3, No. 10, pp. 477-480, 1953.
- FILIPPOV, L.P.
Vestn. Mosk. Gos. Univ., Ser. Fiz.-Mat. Est. Nauk., Vol. 9, No. 12, pp. 45-48, 1954.
- SAKIADIS, B.C.
COATES, J.
AIChEJ., Vol. 1, No. 3, pp. 275-288, 1955.
- ABAS-ZADE, A.K.
AMIRASLANOV, A.M.
Zh. Fiz. Khim., Vol. 31, No. 7, pp. 1459-1467, 1957.
- AMIRASLANOV, A.M.
Dokl. Akad. Nauk., Azerb. SSR., Vol. 13, pp. 1049-1052, 1957.
- VARGAFTIK, N.B.
Proceedings of the Conference on the Thermodynamic and Transport Properties of Fluids, London, UK, 1957.
- FILIPPOV, L.P.
Vestn. Mosk. Gos. Univ. Ser. 3, Fiz. Astron., Vol. 15, No. 3, pp. 61-68, 1960.
- JOBST, W.
Measurement of the conductivity of organic aliphatic liquids and gases by a dynamic, absolute method. (In German). Ph.D. Thesis, Technische Hochschule, Zürich, Switzerland, 1964.
- SALE, P.
Bull. Int. Inst. Refrig., Annexe, Commission 2, pp. 65-77, 1966.
- TUFEU, R.
LeNEINDRE, B.
JOHANNIN, P.
C.R. Acad. Sci. Paris, Ser. B, Vol. 262, No. 4, pp. 229-231, 1966.
- ABAS-ZADE, A.K.
DZHAMALOV, R.
Dokl. Akad. Nauk., Azerb. SSR., Ser. Fiz.-Tekhn. Mat. Nauk., Vol. 67, No. 6, pp. 22-26, 1967.
- POLTZ, H.
JUGEL, R.
Int. J. Heat Mass Trans., Vol. 10, No. 8, pp. 1075-1088, 1967.
- RASTORGUEV, Yu.L.
GANIEV, Yu.A.
Zh. Fiz. Khim., Vol. 41, No. 6, pp. 1352-1356, 1967.
- VENART, J.E.S.
KRISHNAMURTHY, C.
Proceedings of the 7th Conference on Thermal Conductivity, Gaithersburg, Maryland, USA, 1967.
- GANIEV, Yu.A.
Teplofiz. Svoistva Zhidk., Mater. Vses. Teplofiz. Konf. 3rd, Svoistvam Veshch. Vys. Temp., pp. 95-98, 1968.
- VASIL'KOVSKAYA, T.N.
GOLUBEV, I.F.
Teploenergetika, Vol. 16, No. 6, pp. 84-87, 1969.
- PERRY, M.G.
JANGDA, H.A.S.
Proceedings of the Symposium on Physical Properties of Liquids and Gases for Plant and Process Design, National Engineering Laboratory, East Kilbride, UK, 1968. Published by: HMSO, Edinburgh, UK, 1970.

SCHUHMANN, H.
MARKEFSKI, M.
LAABS, R.

Wiss. Z. Tech. Hochschule, Magdeburg, Vol. 14, No. 8, pp. 869-871, 1970.

GURENKOVA, T.V.
NORDEN, P.A.
USMANOV, A.G.

Fluid Mech., Sov. Res., Vol. 3, No. 4, pp. 114-118, 1974.

USMANOV, I.U.
SALIKHOV, A.S.

Izv. Vyssh. Ucheb. Zaved., Neft. Gaz., Vol. 18, No. 9, pp. 61-64, 1975.

BAGDASARYAN, S.S.
ARUTYUNYAN, G.S.

Izv. Vyssh. Ucheb. Zaved., Neft. Gaz., Vol. 23, No. 12, pp. 40 and 83, 1980.

RAAL, J.D.
RIJSDIJK, R.L.

J. Chem. Eng. Data, Vol. 26, No. 4, pp. 351-359, 1981.

OGIWARA, K.
ARAI, Y.
SAITO, S.

Japan. J. Chem. Eng., Vol. 15, No. 5, pp. 335-342, 1982.

ASSAEL, M.J.
CHARITIDOU, E.
NIETO de CASTRO, C.A.

Int. J. Thermophys., Vol. 9, No. 5, pp. 813-823, 1988.