

Thermal conductivity of liquids: Halogenated aliphatic hydrocarbons

Part 3. Halogenated higher hydrocarbons (C₃ to C₁₆)

Endorsed by
The Institution of Chemical Engineers
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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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THERMAL CONDUCTIVITY OF LIQUIDS: HALOGENATED ALIPHATIC HYDROCARBONS

Part 3. Halogenated higher hydrocarbons (C₃ to C₁₆)

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)	
HALOGENATED PROPANES			
1. CH ₃ [CH ₂] ₂ Cl	1-Chloropropane	Propyl chloride	7
2. (CH ₃) ₂ CHCl	2-Chloropropane	Isopropyl chloride 1-Methylethyl chloride	8
3. CH ₃ [CH ₂] ₂ Br	1-Bromopropane	Propyl bromide	9
4. (CH ₃) ₂ CHBr	2-Bromopropane	Isopropyl bromide 1-Methylethyl bromide	10
5. CH ₃ [CH ₂] ₂ I	1-Iodopropane	Propyl iodide	11
6. (CH ₃) ₂ CHI	2-Iodopropane	Isopropyl iodide 1-Methylethyl iodide	12
7. CH ₃ CH ₂ CHCl ₂	1,1-Dichloropropane	Propylidene chloride	13
8. CH ₃ CHClCH ₂ Cl	1,2-Dichloropropane	Propylene dichloride Propylene chloride	14

Formula	Name	Alternative Name(s)	
9. Cl[CH ₂] ₃ Cl	1,3-Dichloropropane	Trimethylene dichloride Trimethylene chloride	15
10. CH ₃ CH ₂ CHBr ₂	1,1-Dibromopropane	Propylidene bromide	16
11. CH ₃ CHBrCH ₂ Br	1,2-Dibromopropane	Propylene dibromide Propylene bromide	17
12. Br[CH ₂] ₃ Br	1,3-Dibromopropane	Trimethylene dibromide Trimethylene bromide	18
13. I[CH ₂] ₃ I	1,3-Diiodopropane	Trimethylene diiodide Trimethylene iodide	19
14. CH ₂ ClCHClCH ₂ Cl	1,2,3-Trichloropropane		20
15. CH ₂ BrCHBrCH ₂ Br	1,2,3-Tribromopropane		21
16. CCl ₃ CH ₂ CCl ₃	1,1,1,3,3,3-Hexachloropropane		22
17. CBr ₃ CH ₂ CBr ₃	1,1,1,3,3,3-Hexabromopropane		23
18. CF ₃ CF ₂ CF ₃	Octafluoropropane	Perfluoropropane Refrigerant 218	24
19. CCIF ₂ CCIFCF ₃	1,2-Dichlorohexafluoropropane	Refrigerant 216	25
20. CCl ₃ CF ₂ CF ₃	1,1,1-Trichloropentafluoropropane	Refrigerant 215	26
21. CCl ₃ CF ₂ CCIF ₂	1,1,1,3-Tetrachlorotetrafluoropropane	Refrigerant 214	27

HALOGENATED BUTANES

22. CH ₃ [CH ₂] ₃ Cl	1-Chlorobutane	Butyl chloride	28
23. CH ₃ CHClCH ₂ CH ₃	2-Chlorobutane	sec-Butyl chloride 1-Methylpropyl chloride	29
24. (CH ₃) ₂ CHCH ₂ Cl	1-Chloro-2-methylpropane	Isobutyl chloride 2-Methylpropyl chloride	30
25. (CH ₃) ₃ CCl	2-Chloro-2-methylpropane	tert-Butyl chloride 1,1-Dimethylethyl chloride	31
26. CH ₃ [CH ₂] ₃ Br	1-Bromobutane	Butyl bromide	32
27. CH ₃ CHBrCH ₂ CH ₃	2-Bromobutane	sec-Butyl bromide 1-Methylpropyl bromide	33
28. (CH ₃) ₂ CHCH ₂ Br	1-Bromo-2-methylpropane	Isobutyl bromide 2-Methylpropyl bromide	34
29. (CH ₃) ₃ CBr	2-Bromo-2-methylpropane	tert-Butyl bromide 1,1-Dimethylethyl bromide	35
30. CH ₃ [CH ₂] ₃ I	1-Iodobutane	Butyl iodide	36
31. CH ₃ CHICH ₂ CH ₃	2-Iodobutane	sec-Butyl iodide 1-Methylpropyl iodide	37
32. (CH ₃) ₂ CHCH ₂ I	1-Iodo-2-methylpropane	Isobutyl iodide 2-Methylpropyl iodide	38
33. (CH ₃) ₃ CI	2-Iodo-2-methylpropane	tert-Butyl iodide 1,1-Dimethylethyl iodide	39

Formula	Name	Alternative Name(s)	
34. $\text{Cl}[\text{CH}_2]_4\text{Cl}$	1,4-Dichlorobutane	Tetramethylene dichloride Tetramethylene chloride	40
35. $\text{Br}[\text{CH}_2]_4\text{Br}$	1,4-Dibromobutane	Tetramethylene dibromide Tetramethylene bromide	41
36. $\text{I}[\text{CH}_2]_4\text{I}$	1,4-Diiodobutane	Tetramethylene diiodide Tetramethylene iodide	42
37. $\text{CH}_2\text{ClCHClCHClCH}_2\text{Cl}$	1,2,3,4-Tetrachlorobutane		43
38. $\text{CH}_2\text{BrCHBrCHBrCH}_2\text{Br}$	1,2,3,4-Tetrabromobutane		44
39. $\text{CF}_3(\text{CF}_2)_2\text{CF}_3$	Decafluorobutane	Perfluorobutane	45
40. $(\text{CF}_3)_3\text{CF}$	2-Trifluoromethylheptafluoropropane	Perfluoroisobutane Perfluoro-2-methylpropane	46

HALOGENATED PENTANES

41. $\text{CH}_3[\text{CH}_2]_4\text{Cl}$	1-Chloropentane	Pentyl chloride <i>n</i> -Amyl chloride	47
42. $\text{CH}_3\text{CHCl}[\text{CH}_2]_2\text{CH}_3$	2-Chloropentane	Pentan-2-yl chloride	48
43. $\text{CH}_3[\text{CH}_2]_4\text{Br}$	1-Bromopentane	Pentyl bromide <i>n</i> -Amyl bromide	49
44. $\text{CH}_3\text{CHBr}[\text{CH}_2]_2\text{CH}_3$	2-Bromopentane	Pentan-2-yl bromide	51
45. $\text{CH}_3[\text{CH}_2]_4\text{I}$	1-Iodopentane	Pentyl iodide <i>n</i> -Amyl iodide	52
46. $\text{CH}_3\text{CHI}[\text{CH}_2]_2\text{CH}_3$	2-Iodopentane	Pentan-2-yl iodide	53
47. $(\text{CH}_3)_2\text{CH}[\text{CH}_2]_2\text{I}$	1-Iodo-3-methylbutane	Isopentyl iodide Isoamyl iodide 3-Methylbutyl iodide	54
48. $\text{Cl}[\text{CH}_2]_5\text{Cl}$	1,5-Dichloropentane	Pentamethylene dichloride Pentamethylene chloride	55
49. $\text{Br}[\text{CH}_2]_5\text{Br}$	1,5-Dibromopentane	Pentamethylene dibromide Pentamethylene bromide	56
50. $\text{I}[\text{CH}_2]_5\text{I}$	1,5-Diiodopentane	Pentamethylene diiodide Pentamethylene iodide	57
51. $\text{CF}_3(\text{CF}_2)_3\text{CF}_3$	Dodecafluoropentane	Perfluoropentane	58
52. $(\text{CF}_3)_2\text{CFCF}_2\text{CF}_3$	2-Trifluoromethylnonafluorobutane	Perfluoro-2-methylbutane Perfluoroisopentane	59

HALOGENATED HEXANES

53. $\text{CH}_3[\text{CH}_2]_5\text{Cl}$	1-Chlorohexane	Hexyl chloride	60
54. $\text{CH}_3\text{CHCl}[\text{CH}_2]_3\text{CH}_3$	2-Chlorohexane	Hexan-2-yl chloride	61
55. $\text{CH}_3[\text{CH}_2]_5\text{Br}$	1-Bromohexane	Hexyl bromide	62
56. $\text{CH}_3\text{CHBr}[\text{CH}_2]_3\text{CH}_3$	2-Bromohexane	Hexan-2-yl bromide	63
57. $\text{CH}_3[\text{CH}_2]_5\text{I}$	1-Iodohexane	Hexyl iodide	64

Formula	Name	Alternative Name(s)	
58. $\text{Cl}[\text{CH}_2]_6\text{Cl}$	1,6-Dichlorohexane	Hexamethylene dichloride Hexamethylene chloride	65
59. $\text{Br}[\text{CH}_2]_6\text{Br}$	1,6-Dibromohexane	Hexamethylene dibromide Hexamethylene bromide	66
60. $\text{I}[\text{CH}_2]_6\text{I}$	1,6-Diiodohexane	Hexamethylene diiodide Hexamethylene iodide	67
61. $\text{CF}_3(\text{CF}_2)_4\text{CF}_3$	Tetradecafluorohexane	Perfluorohexane	68
62. $(\text{CF}_3)_2\text{CF}(\text{CF}_2)_2\text{CF}_3$	2-Trifluoromethylundecafluoropentane	Perfluoro-2-methylpentane	69
63. $\text{CF}_3\text{CF}_2\text{CF}(\text{CF}_3)\text{CF}_2\text{CF}_3$	3-Trifluoromethylundecafluoropentane	Perfluoro-3-methylpentane	70
64. $(\text{CF}_3)_2(\text{CF})_2(\text{CF}_3)_2$	2,3-Bis(trifluoromethyl)octafluorobutane	Perfluoro-2,3-dimethylbutane	71

HALOGENATED HEPTANES

65. $\text{CH}_3[\text{CH}_2]_6\text{Cl}$	1-Chloroheptane	Heptyl chloride	72
66. $\text{CH}_3[\text{CH}_2]_6\text{Br}$	1-Bromoheptane	Heptyl bromide	73
67. $\text{CH}_3[\text{CH}_2]_6\text{I}$	1-Iodoheptane	Heptyl iodide	74
68. $\text{CF}_3(\text{CF}_2)_5\text{CF}_3$	Hexadecafluoroheptane	Perfluoroheptane	75

HALOGENATED OCTANES

69. $\text{CH}_3[\text{CH}_2]_7\text{Cl}$	1-Chlorooctane	Octyl chloride	76
70. $\text{CH}_3\text{CHCl}[\text{CH}_2]_5\text{CH}_3$	2-Chlorooctane	Octan-2-yl chloride	77
71. $\text{CH}_3[\text{CH}_2]_7\text{Br}$	1-Bromooctane	Octyl bromide	78
72. $\text{CH}_3\text{CHBr}[\text{CH}_2]_5\text{CH}_3$	2-Bromooctane	Octan-2-yl bromide	79
73. $\text{CH}_3[\text{CH}_2]_7\text{I}$	1-Iodooctane	Octyl iodide	80
74. $\text{Cl}[\text{CH}_2]_8\text{Cl}$	1,8-Dichlorooctane	Octamethylene dichloride Octamethylene chloride	81
75. $\text{Br}[\text{CH}_2]_8\text{Br}$	1,8-Dibromooctane	Octamethylene dibromide Octamethylene bromide	82
76. $\text{I}[\text{CH}_2]_8\text{I}$	1,8-Diiodooctane	Octamethylene diiodide Octamethylene iodide	83
77. $\text{CF}_3(\text{CF}_2)_6\text{CF}_3$	Octadecafluorooctane	Perfluorooctane	84

HALOGENATED NONANES

78. $\text{CH}_3[\text{CH}_2]_8\text{Cl}$	1-Chlorononane	Nonyl chloride	85
79. $\text{CH}_3[\text{CH}_2]_8\text{Br}$	1-Bromononane	Nonyl bromide	86
80. $\text{CH}_3[\text{CH}_2]_8\text{I}$	1-Iodononane	Nonyl iodide	87
81. $\text{CF}_3(\text{CF}_2)_7\text{CF}_3$	Eicosafluorononane	Perfluorononane	88

Formula	Name	Alternative Name(s)
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HALOGENATED DECANES

82. $\text{CH}_3[\text{CH}_2]_9\text{Cl}$	1-Chlorodecane	Decyl chloride	89
83. $\text{CH}_3[\text{CH}_2]_9\text{Br}$	1-Bromodecane	Decyl bromide	90
84. $\text{CH}_3[\text{CH}_2]_9\text{I}$	1-Iododecane	Decyl iodide	91
85. $\text{Cl}[\text{CH}_2]_{10}\text{Cl}$	1,10-Dichlorodecane	Decamethylene dichloride Decamethylene chloride	92
86. $\text{Br}[\text{CH}_2]_{10}\text{Br}$	1,10-Dibromodecane	Decamethylene dibromide Decamethylene bromide	93
87. $\text{I}[\text{CH}_2]_{10}\text{I}$	1,10-Diiododecane	Decamethylene diiodide Decamethylene iodide	94
88. $\text{CF}_3(\text{CF}_2)_8\text{CF}_3$	Docosafluorodecane	Perfluorodecane	95

HALOGENATED UNDECANES to HALOGENATED HEXADECANES

89. $\text{CH}_3[\text{CH}_2]_{10}\text{Cl}$	1-Chloroundecane	Undecyl chloride	96
90. $\text{CH}_3[\text{CH}_2]_{11}\text{Cl}$	1-Chlorododecane	Dodecyl chloride	97
91. $\text{CH}_3[\text{CH}_2]_{12}\text{Cl}$	1-Chlorotridecane	Tridecyl chloride	98
92. $\text{CH}_3[\text{CH}_2]_{13}\text{Cl}$	1-Chlorotetradecane	Tetradecyl chloride	99
93. $\text{CH}_3[\text{CH}_2]_{14}\text{Cl}$	1-Chloropentadecane	Pentadecyl chloride	100
94. $\text{CH}_3[\text{CH}_2]_{15}\text{Cl}$	1-Chlorohexadecane	Hexadecyl chloride	101

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THERMAL CONDUCTIVITY OF LIQUIDS: HALOGENATED ALIPHATIC HYDROCARBONS

Part 3. Halogenated higher hydrocarbons (C_3 to C_{16})

1. INTRODUCTION

This Item presents values of thermal conductivity at saturation pressure, in tabular form, for straight and branched chain liquid halogenated higher hydrocarbons (C_3 to C_{16}).

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 either been taken from ESDU 89006 (Reference 8) or estimated from correlations of ESDU values with chemical structure. 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 halogenated alkanes in this Item, it was found that C and D are directly related to B^* , as was observed for other non-hydrogen-bonded compounds such as the alkanes. 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 $\geq 573 \text{ K}$.

* $C = 1 - 3B$ and $D = 3B$.

6. REFERENCES

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

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7. TABLES

TABLE 7.1 Constants for Equation (4.2)

Compound	T_c	A	B	C	D	Range of Applicability °C	
	K	mW/m K					
1. 1-Chloropropane	503.2	59.7	1.30	-2.90	3.90	-120	to 190
2. 2-Chloropropane	488.	57.8	1.30	-2.90	3.90	-120	to 170
3. 1-Bromopropane	540.	48.9	1.30	-2.90	3.90	-110	to 220
4. 2-Bromopropane	525.	46.6	1.30	-2.90	3.90	-90	to 210
5. 1-Iodopropane	589.15	36.6	1.90	-4.70	5.70	-100	to 270
6. 2-Iodopropane	572.15	35.2	1.90	-4.70	5.70	-90	to 250
7. 1,1-Dichloropropane	561.65	51.4	1.50	-3.50	4.50	-100	to 240
8. 1,2-Dichloropropane	574.	53.9	1.50	-3.50	4.50	-100	to 250
9. 1,3-Dichloropropane	605.15	53.9	1.50	-3.50	4.50	-100	to 280
10. 1,1-Dibromopropane	630.15	40.4	1.50	-3.50	4.50	-70	to 300
11. 1,2-Dibromopropane	650.	42.4	1.50	-3.50	4.50	-60	to 320
12. 1,3-Dibromopropane	670.15	42.4	1.50	-3.50	4.50	-40	to 340
13. 1,3-Diiodopropane	776.15	32.4	2.10	-5.30	6.30	-10	to 430
14. 1,2,3-Trichloropropane	648.15	48.0	1.75	-4.25	5.25	-20	to 320
15. 1,2,3-Tribromopropane	753.	36.5	1.75	-4.25	5.25	10	to 410
16. 1,1,1,3,3,3-Hexachloropropane	738.15	37.6	2.50	-6.50	7.50	0	to 400
17. 1,1,1,3,3,3-Hexabromopropane	870.15	37.6	2.50	-6.50	7.50	30	to 520
18. Octafluoropropane	345.04	29.5	3.30	-8.90	9.90	-170	to 50
19. 1,2-Dichlorohexafluoropropane	450.15	31.5	2.00	-5.00	6.00	-80	to 140
20. 1,1,1-Trichloropentafluoropropane	490.15	32.4	2.00	-5.00	6.00	-80	to 180
21. 1,1,1,3-Tetrachlorotetrafluoropropane	550.15	34.9	1.50	-3.50	4.50	-90	to 230
22. 1-Chlorobutane	538.	57.2	1.35	-3.05	4.05	-120	to 220
23. 2-Chlorobutane	529.	55.6	1.35	-3.05	4.05	-140	to 210
24. 1-Chloro-2-methylpropane	525.	55.1	1.35	-3.05	4.05	-130	to 210
25. 2-Chloro-2-methylpropane	507.	53.6	1.35	-3.05	4.05	-30	to 190
26. 1-Bromobutane	571.	48.5	1.35	-3.05	4.05	-110	to 250
27. 2-Bromobutane	561.15	46.5	1.35	-3.05	4.05	-110	to 240
28. 1-Bromo-2-methylpropane	569.15	44.4	1.35	-3.05	4.05	-120	to 250
29. 2-Bromo-2-methylpropane	542.	43.4	1.35	-3.05	4.05	-20	to 220
30. 1-Iodobutane	617.15	35.9	1.95	-4.85	5.85	-100	to 290
31. 2-Iodobutane	600.15	34.5	1.95	-4.85	5.85	-110	to 280
32. 1-Iodo-2-methylpropane	598.15	34.3	1.95	-4.85	5.85	-90	to 270
33. 2-Iodo-2-methylpropane	583.15	33.6	1.95	-4.85	5.85	-40	to 260
34. 1,4-Dichlorobutane	641.15	50.9	1.50	-3.50	4.50	-40	to 310
35. 1,4-Dibromobutane	707.15	41.9	1.50	-3.50	4.50	-20	to 370
36. 1,4-Diiodobutane	789.15	32.4	2.00	-5.00	6.00	0	to 450
37. 1,2,3,4-Tetrachlorobutane	723.15	43.1	2.00	-5.00	6.00	0	to 390
38. 1,2,3,4-Tetrabromobutane	875.15	34.3	2.00	-5.00	6.00	40	to 520
39. Decafluorobutane	386.4	38.4	1.00	-2.00	3.00	-160	to 80
40. 2-Trifluoromethylheptafluoropropane	395.	36.2	1.00	-2.00	3.00	-160	to 90
41. 1-Chloropentane	569.	56.6	1.30	-2.90	3.90	-100	to 250
42. 2-Chloropentane	554.15	55.1	1.30	-2.90	3.90	-140	to 230
43. 1-Bromopentane	606.15	48.9	1.30	-2.90	3.90	-90	to 280
44. 2-Bromopentane	590.15	47.3	1.30	-2.90	3.90	-100	to 270
45. 1-Iodopentane	642.15	36.4	1.85	-4.55	5.55	-90	to 310
46. 2-Iodopentane	638.15	35.0	1.85	-4.55	5.55	-50	to 310

TABLE 7.1 Constants for Equation (4.2) (Concluded)

Compound	T_c	A	B	C	D	Range of Applicability		
	K	mW/m K				°C		
47. 1-Iodo-3-methylbutane	638.15	35.0	1.85	-4.55	5.55	-50	to	310
48. 1,5-Dichloropentane	664.15	48.1	1.40	-3.20	4.20	-70	to	330
49. 1,5-Dibromopentane	728.15	43.6	1.40	-3.20	4.20	-40	to	390
50. 1,5-Diiodopentane	801.15	36.5	1.75	-4.25	5.25	-10	to	460
51. Dodecafluoropentane	420.	42.8	0.30	0.10	0.90	-140	to	110
52. 2-Trifluoromethylnonafluorobutane	421.	39.7	0.30	0.10	0.90	-140	to	110
53. 1-Chlorohexane	595.	57.0	1.20	-2.60	3.60	-100	to	270
54. 2-Chlorohexane	580.15	55.4	1.20	-2.60	3.60	-110	to	260
55. 1-Bromohexane	629.15	49.1	1.20	-2.60	3.60	-90	to	300
56. 2-Bromohexane	613.15	47.6	1.20	-2.60	3.60	-90	to	290
57. 1-Iodohexane	664.	37.9	1.75	-4.25	5.25	-80	to	330
58. 1,6-Dichlorohexane	687.	48.9	1.30	-2.90	3.90	-30	to	350
59. 1,6-Dibromohexane	731.15	43.7	1.30	-2.90	3.90	-10	to	390
60. 1,6-Diiodohexane	813.15	36.0	1.75	-4.25	5.25	10	to	470
61. Tetradecafluorohexane	450.	42.4	0.20	0.40	0.60	-130	to	140
62. 2-Trifluoromethylundecafluoropentane	455.	39.9	0.20	0.40	0.60	-130	to	140
63. 3-Trifluoromethylundecafluoropentane	450.	39.9	0.20	0.40	0.60	-130	to	140
64. 2,3-Bis(trifluoromethyl)octafluorobutane	460.	37.4	0.20	0.40	0.60	-130	to	150
65. 1-Chloroheptane	621.	57.9	1.10	-2.30	3.30	-70	to	290
66. 1-Bromoheptane	644.	51.0	1.10	-2.30	3.30	-60	to	310
67. 1-Iodoheptane	683.15	39.5	1.65	-3.95	4.95	-50	to	350
68. Hexadecafluoroheptane	474.75	41.8	0.20	0.40	0.60	-110	to	160
69. 1-Chlorooctane	642.	59.4	1.00	-2.00	3.00	-60	to	310
70. 2-Chlorooctane	624.15	57.8	1.00	-2.00	3.00	-70	to	300
71. 1-Bromooctane	665.15	52.9	1.00	-2.00	3.00	-60	to	330
72. 2-Bromooctane	655.15	50.8	1.00	-2.00	3.00	-60	to	320
73. 1-Iodooctane	701.15	41.4	1.50	-3.50	4.50	-50	to	370
74. 1,8-Dichlorooctane	707.15	47.4	1.50	-3.50	4.50	-10	to	370
75. 1,8-Dibromooctane	769.15	42.9	1.50	-3.50	4.50	10	to	430
76. 1,8-Diiodooctane	834.15	38.0	1.65	-3.95	4.95	20	to	490
77. Octadecafluorooctane	497.	41.8	0.20	0.40	0.60	-100	to	180
78. 1-Chlorononane	663.	60.7	0.90	-1.70	2.70	-50	to	330
79. 1-Bromononane	686.15	54.4	0.90	-1.70	2.70	-30	to	350
80. 1-Iodononane	717.15	43.0	1.40	-3.20	4.20	-20	to	380
81. Eicosafluorononane	516.	42.4	0.20	0.40	0.60	-90	to	200
82. 1-Chlorodecane	682.	62.6	0.80	-1.40	2.40	-40	to	350
83. 1-Bromodecane	701.15	56.4	0.80	-1.40	2.40	-30	to	370
84. 1-Iododecane	732.15	44.8	1.30	-2.90	3.90	-20	to	390
85. 1,10-Dichlorodecane	731.15	53.8	0.90	-1.70	2.70	-20	to	390
86. 1,10-Dibromodecane	791.15	49.4	0.90	-1.70	2.70	30	to	450
87. 1,10-Diiododecane	851.15	41.9	1.35	-3.05	4.05	40	to	500
88. Docosafluorodecane	533.	42.4	0.20	0.40	0.60	-80	to	210
89. 1-Chloroundecane	699.	63.7	0.72	-1.16	2.16	-20	to	360
90. 1-Chlorododecane	714.	64.8	0.65	-0.95	1.95	-20	to	380
91. 1-Chlorotridecane	729.	65.9	0.58	-0.74	1.74	-10	to	390
92. 1-Chlorotetradecane	743.	66.9	0.52	-0.56	1.56	-10	to	400
93. 1-Chloropentadecane	756.	67.7	0.48	-0.44	1.44	30	to	420
94. 1-Chlorohexadecane	768.	68.6	0.43	-0.29	1.29	30	to	430

CH₃[CH₂]₂Cl 1-CHLOROPROPANE (PROPYL CHLORIDE)

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

where

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

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

$$T_c = 503.2 \text{ K}$$

$$A = 59.7, \quad B = 1.30, \quad C = -2.90, \quad D = 3.90$$

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	(155.)	310	114.0	-120	(155.)	40	113.3
160	(153.)	320	(111.6)	-110	(152.)	50	(110.8)
170	(150.)	330	(109.2)	-100	(149.)	60	(108.4)
180	(147.)	340	(106.8)	-90	(146.)	70	(106.1)
190	(145.)	350	(104.4)	-80	(144.)	80	(103.7)
200	(142.)	360	(102.1)	-70	(141.)	90	(101.4)
210	(139.)	370	(99.8)	-60	(139.)	100	(99.1)
220	(137.)	380	(97.)	-50	(136.0)	110	(97.)
230	(134.2)	390	(95.)	-40	(133.4)	120	(95.)
240	(131.6)	400	(93.)	-30	(130.8)	130	(92.)
250	(129.1)	410	(91.)	-20	(128.3)	140	(90.)
260	(126.5)	420	(89.)	-10	(125.7)	150	(88.)
270	(124.0)	430	(86.)	0	123.2	160	(86.)
280	121.5	440	(84.)	10	120.7	170	(84.)
290	119.0	450	(82.)	20	118.2	180	(82.)
300	116.5	460	(80.)	30	115.7	190	(80.)

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SCHUHMANN, H.

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(CH₃)₂CHCl 2-CHLOROPROPANE (ISOPROPYL CHLORIDE, 1-METHYLETHYL CHLORIDE)

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

where

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

$T_r = T/T_c$, T = temperature (K)

$T_c = 488. \text{ K}$

$A = 57.8$, $B = 1.30$, $C = -2.90$, $D = 3.90$

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	(149.)	300	(110.6)	-120	(148.)	30	(109.8)
160	(147.)	310	(108.1)	-110	(146.)	40	(107.4)
170	(144.)	320	(105.7)	-100	(143.)	50	(105.0)
180	(141.)	330	(103.)	-90	(140.)	60	(103.)
190	(139.)	340	(101.)	-80	(138.)	70	(100.)
200	(136.)	350	(99.)	-70	(135.)	80	(98.)
210	(133.)	360	(96.)	-60	(132.)	90	(96.)
220	(131.)	370	(94.)	-50	(130.)	100	(93.)
230	(128.)	380	(92.)	-40	(127.)	110	(91.)
240	(126.)	390	(90.)	-30	(125.)	120	(89.)
250	(123.)	400	(87.)	-20	(122.)	130	(87.)
260	(120.)	410	(85.)	-10	(120.)	140	(85.)
270	(118.)	420	(83.)	0	(117.2)	150	(82.)
280	(115.5)	430	(81.)	10	(114.7)	160	(80.)
290	(113.0)	440	(79.)	20	(112.2)	170	(78.)

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CH₃[CH₂]₂Br 1-BROMOPROPANE (PROPYL BROMIDE)

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

where

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

$T_r = T/T_c$, T = temperature (K)

$T_c = 540. \text{ K}$

$A = 48.9$, $B = 1.30$, $C = -2.90$, $D = 3.90$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
160	(127.)	330	93.9	-110	(126.8)	60	93.3
170	(125.4)	340	92.0	-100	(124.8)	70	91.5
180	(123.4)	350	(90.2)	-90	(122.7)	80	(89.6)
190	(121.3)	360	(88.4)	-80	(120.7)	90	(87.8)
200	(119.3)	370	(86.6)	-70	(118.7)	100	(86.0)
210	(117.3)	380	(84.8)	-60	(116.6)	110	(84.2)
220	(115.3)	390	(83.0)	-50	114.6	120	(82.4)
230	113.3	400	(81.)	-40	112.6	130	(81.)
240	111.3	410	(79.)	-30	110.6	140	(79.)
250	109.3	420	(78.)	-20	108.7	150	(77.)
260	107.3	430	(76.)	-10	106.7	160	(76.)
270	105.4	440	(74.)	0	104.8	170	(74.)
280	103.4	450	(73.)	10	102.8	180	(72.)
290	101.5	460	(71.)	20	100.9	190	(71.)
300	99.6	470	(69.)	30	99.0	200	(69.)
310	97.7	480	(68.)	40	97.1	210	(67.)
320	95.8	490	(66.)	50	95.2	220	(66.)

WEBER, H.F.

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MARKEFSKI, M.

1970.

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(CH₃)₂CHBr 2-BROMOPROPANE (ISOPROPYL BROMIDE, 1-METHYLETHYL BROMIDE)

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

where

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

$T_r = T/T_c$, T = temperature (K)

$T_c = 525. \text{ K}$

$A = 46.6$, $B = 1.30$, $C = -2.90$, $D = 3.90$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
180	(117.)	340	(86.0)	-90	(116.)	70	(85.4)
190	(115.)	350	(84.2)	-80	(114.)	80	(83.7)
200	(113.)	360	(82.)	-70	(112.)	90	(82.)
210	(111.)	370	(81.)	-60	(110.)	100	(80.)
220	(109.)	380	(79.)	-50	(108.)	110	(78.)
230	(107.)	390	(77.)	-40	(106.)	120	(77.)
240	(105.)	400	(76.)	-30	(104.)	130	(75.)
250	(103.)	410	(74.)	-20	(102.2)	140	(73.)
260	(100.9)	420	(72.)	-10	(100.3)	150	(72.)
270	(99.0)	430	(71.)	0	(98.4)	160	(70.)
280	(97.1)	440	(69.)	10	(96.5)	170	(68.)
290	(95.2)	450	(67.)	20	94.6	180	(67.)
300	(93.3)	460	(66.)	30	(92.8)	190	(65.)
310	(91.5)	470	(64.)	40	(90.9)	200	(64.)
320	(89.6)	480	(63.)	50	(89.1)	210	(62.)
330	(87.8)			60	(87.2)		

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MARKEFSKI, M.

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CH₃[CH₂]₂I 1-iodopropane (propyl iodide)

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

where

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

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

$$T_c = 589.15 \text{ K}$$

$$A = 36.6, \quad B = 1.90, \quad C = -4.70, \quad D = 5.70$$

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	(110.)	360	76.8	-100	(109.)	90	76.3
180	(108.)	370	75.2	-90	(108.)	100	74.7
190	(106.)	380	(73.7)	-80	(106.)	110	(73.2)
200	(104.)	390	(72.1)	-70	(104.)	120	(71.6)
210	(103.)	400	(70.5)	-60	(102.)	130	(70.1)
220	(101.)	410	(69.0)	-50	(100.3)	140	(68.5)
230	(99.1)	420	(67.5)	-40	(98.5)	150	(67.0)
240	(97.3)	430	(66.)	-30	(96.7)	160	(66.)
250	(95.5)	440	(65.)	-20	(94.9)	170	(64.)
260	(93.7)	450	(63.)	-10	(93.2)	180	(63.)
270	(92.0)	460	(62.)	0	91.4	190	(61.)
280	90.2	470	(60.)	10	89.7	200	(60.)
290	88.5	480	(59.)	20	88.0	210	(59.)
300	86.8	490	(58.)	30	86.3	220	(57.)
310	85.1	500	(56.)	40	84.6	230	(56.)
320	83.4	510	(55.)	50	82.9	240	(55.)
330	81.8	520	(54.)	60	81.2	250	(54.)
340	80.1	530	(53.)	70	79.6	260	(52.)
350	78.5	540	(52.)	80	78.0	270	(51.)

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MARKEFSKI, M.

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$(\text{CH}_3)_2\text{CHI}$ 2-iodopropane (isopropyl iodide, 1-methylethyl iodide)

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

where

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

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

$$T_c = 572.15 \text{ K}$$

$$A = 35.2, \quad B = 1.90, \quad C = -4.70, \quad D = 5.70$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
180	(103.)	360	(72.3)	-90	(103.)	90	(71.8)
190	(101.)	370	(70.7)	-80	(101.)	100	(70.2)
200	(99.)	380	(69.1)	-70	(99.)	110	(68.7)
210	(98.)	390	(67.6)	-60	(97.)	120	(67.1)
220	(96.)	400	(66.1)	-50	(95.3)	130	(65.6)
230	(94.1)	410	(64.6)	-40	(93.5)	140	(64.1)
240	(92.3)	420	(63.1)	-30	(91.8)	150	(62.7)
250	(90.6)	430	(62.)	-20	(90.0)	160	(61.)
260	(88.9)	440	(60.)	-10	(88.3)	170	(60.)
270	(87.1)	450	(59.)	0	86.6	180	(58.)
280	85.4	460	(58.)	10	84.9	190	(57.)
290	83.7	470	(56.)	20	83.2	200	(56.)
300	82.0	480	(55.)	30	81.5	210	(55.)
310	80.4	490	(54.)	40	79.8	220	(53.)
320	78.7	500	(52.)	50	78.2	230	(52.)
330	77.1	510	(51.)	60	76.6	240	(51.)
340	(75.4)	520	(50.)	70	(74.9)	250	(50.)
350	(73.8)			80	(73.3)		

MUKHAMEDZYANOV, G.Kh.

Trudy Kazan Khim. Tekhnol. In.-ta, No. 39, pp. 55-69, 1968.

$\text{CH}_3\text{CH}_2\text{CHCl}_2$ 1,1-DICHLOROPROPANE (PROPYLIDENE CHLORIDE)

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

where

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

$T_r = T/T_c$, T = temperature (K)

$T_c = 561.65 \text{ K}$

$A = 51.4$, $B = 1.50$, $C = -3.50$, $D = 4.50$

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	(140.)	350	(100.)	-100	(139.)	80	(100.)
180	(137.)	360	(98.)	-90	(137.)	90	(98.)
190	(135.)	370	(96.)	-80	(134.)	100	(96.)
200	(133.)	380	(94.)	-70	(132.)	110	(94.)
210	(131.)	390	(92.)	-60	(130.)	120	(92.)
220	(128.)	400	(90.)	-50	(128.)	130	(90.)
230	(126.)	410	(89.)	-40	(125.)	140	(88.)
240	(124.)	420	(87.)	-30	(123.)	150	(86.)
250	(122.)	430	(85.)	-20	(121.)	160	(84.)
260	(119.)	440	(83.)	-10	(119.)	170	(82.)
270	(117.)	450	(81.)	0	(117.)	180	(81.)
280	(115.)	460	(79.)	10	(114.)	190	(79.)
290	(113.)	470	(78.)	20	(112.)	200	(77.)
300	(111.)	480	(76.)	30	(110.)	210	(75.)
310	(109.)	490	(74.)	40	(108.)	220	(74.)
320	(107.)	500	(72.)	50	(106.)	230	(72.)
330	(105.)	510	(71.)	60	(104.)	240	(70.)
340	(102.)			70	(102.)		

CH₃CHClCH₂Cl 1,2-DICHLOROPROPANE
(PROPYLENE DICHLORIDE, PROPYLENE CHLORIDE)

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

where

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

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

$$T_c = 574. \text{ K}$$

$$A = 53.9, \quad B = 1.50, \quad C = -3.50, \quad D = 4.50$$

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	(147.)	350	(107.)	-100	(147.)	80	(106.)
180	(145.)	360	(105.)	-90	(144.)	90	(104.)
190	(143.)	370	(103.)	-80	(142.)	100	(102.)
200	(140.)	380	(101.)	-70	(140.)	110	(100.)
210	(138.)	390	(99.)	-60	(137.)	120	(98.)
220	(136.)	400	(97.)	-50	(135.)	130	(96.)
230	(133.)	410	(95.)	-40	(133.)	140	(94.)
240	(131.)	420	(93.)	-30	(130.)	150	(92.)
250	(129.)	430	(91.)	-20	(128.)	160	(90.)
260	(127.)	440	(89.)	-10	(126.)	170	(88.)
270	(124.)	450	(87.)	0	(124.)	180	(86.)
280	(122.)	460	(85.)	10	(121.)	190	(84.)
290	(120.)	470	(83.)	20	119.	200	(83.)
300	118.	480	(81.)	30	117.	210	(81.)
310	115.	490	(80.)	40	115.	220	(79.)
320	113.	500	(78.)	50	113.	230	(77.)
330	(111.)	510	(76.)	60	(110.)	240	(76.)
340	(109.)	520	(74.)	70	(108.)	250	(74.)

BATES O.K.
HAZZARD, G.
PALMER, G.

Ind. Eng. Chem., Vol. 33, No. 3, pp. 375-376, 1941.

Cl[CH₂]₃Cl 1,3-DICHLOROPROPANE
(TRIMETHYLENE DICHLORIDE, TRIMETHYLENE CHLORIDE)

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

where

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

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

$$T_c = 605.15 \text{ K}$$

$$A = 53.9, \quad B = 1.50, \quad C = -3.50, \quad D = 4.50$$

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	(149.)	370	(107.)	-100	(149.)	100	(106.)
180	(147.)	380	(105.)	-90	(146.)	110	(104.)
190	(145.)	390	(103.)	-80	(144.)	120	(102.)
200	(143.)	400	(101.)	-70	(142.)	130	(100.)
210	(140.)	410	(99.)	-60	(140.)	140	(98.)
220	(138.)	420	(97.)	-50	(138.)	150	(96.)
230	(136.)	430	(95.)	-40	(135.)	160	(94.)
240	(134.)	440	(93.)	-30	(133.)	170	(93.)
250	(132.)	450	(91.)	-20	(131.)	180	(91.)
260	(130.)	460	(89.)	-10	(129.)	190	(89.)
270	(127.)	470	(88.)	0	(127.)	200	(87.)
280	(125.)	480	(86.)	10	(125.)	210	(85.)
290	(123.)	490	(84.)	20	(122.)	220	(84.)
300	(121.)	500	(82.)	30	(120.)	230	(82.)
310	(119.)	510	(81.)	40	(118.)	240	(80.)
320	(117.)	520	(79.)	50	(116.)	250	(79.)
330	(115.)	530	(77.)	60	(114.)	260	(77.)
340	(113.)	540	(76.)	70	(112.)	270	(75.)
350	(111.)	550	(74.)	80	(110.)	280	(74.)
360	(109.)			90	(108.)		

CH₃CH₂CHBr₂ 1,1-DIBROMOPROPANE (PROPYLIDENE BROMIDE)

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

where

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

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

$$T_c = 630.15 \text{ K}$$

$$A = 40.4, \quad B = 1.50, \quad C = -3.50, \quad D = 4.50$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
200	(108.)	390	(79.)	-70	(108.)	120	(79.)
210	(107.)	400	(78.)	-60	(106.)	130	(77.)
220	(105.)	410	(76.)	-50	(105.)	140	(76.)
230	(103.)	420	(75.)	-40	(103.)	150	(75.)
240	(102.)	430	(74.)	-30	(101.)	160	(73.)
250	(100.)	440	(72.)	-20	(100.)	170	(72.)
260	(99.)	450	(71.)	-10	(98.)	180	(71.)
270	(97.)	460	(70.)	0	(97.)	190	(69.)
280	(96.)	470	(68.)	10	(95.)	200	(68.)
290	(94.)	480	(67.)	20	(94.)	210	(67.)
300	(93.)	490	(66.)	30	(92.)	220	(65.)
310	(91.)	500	(64.)	40	(91.)	230	(64.)
320	(90.)	510	(63.)	50	(89.)	240	(63.)
330	(88.)	520	(62.)	60	(88.)	250	(61.)
340	(87.)	530	(61.)	70	(86.)	260	(60.)
350	(85.)	540	(59.)	80	(85.)	270	(59.)
360	(84.)	550	(58.)	90	(83.)	280	(58.)
370	(82.)	560	(57.)	100	(82.)	290	(57.)
380	(81.)	570	(56.)	110	(80.)	300	(56.)

CH₃CHBrCH₂Br 1,2-DIBROMOPROPANE
(PROPYLENE DIBROMIDE, PROPYLENE BROMIDE)

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

where

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

$T_r = T/T_c$, T = temperature (K)

$T_c = 650. \text{ K}$

$A = 42.4$, $B = 1.50$, $C = -3.50$, $D = 4.50$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
210	(113.)	410	(82.)	-60	(112.)	140	(82.)
220	(111.)	420	(81.)	-50	(111.)	150	(80.)
230	(110.)	430	(79.)	-40	(109.)	160	(79.)
240	(108.)	440	(78.)	-30	(108.)	170	(77.)
250	(107.)	450	(76.)	-20	(106.)	180	(76.)
260	(105.)	460	(75.)	-10	(104.)	190	(75.)
270	(103.)	470	(74.)	0	(103.)	200	(73.)
280	(102.)	480	(72.)	10	(101.)	210	(72.)
290	(100.)	490	(71.)	20	(100.)	220	(71.)
300	(99.)	500	(70.)	30	(98.)	230	(69.)
310	(97.)	510	(68.)	40	(97.)	240	(68.)
320	(96.)	520	(67.)	50	(95.)	250	(67.)
330	(94.)	530	(66.)	60	(94.)	260	(65.)
340	(93.)	540	(64.)	70	(92.)	270	(64.)
350	(91.)	550	(63.)	80	(91.)	280	(63.)
360	(89.)	560	(62.)	90	(89.)	290	(62.)
370	(88.)	570	(61.)	100	(88.)	300	(60.)
380	(86.)	580	(60.)	110	(86.)	310	(59.)
390	(85.)	590	(58.)	120	(85.)	320	(58.)
400	(84.)			130	(83.)		

Br[CH₂]₃Br 1,3-DIBROMOPROPANE
(TRIMETHYLENE DIBROMIDE, TRIMETHYLENE BROMIDE)

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

where

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

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

$$T_c = 670.15 \text{ K}$$

$$A = 42.4, \quad B = 1.50, \quad C = -3.50, \quad D = 4.50$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
230	(111.)	430	(81.)	-40	(110.)	160	(81.)
240	(109.)	440	(80.)	-30	(109.)	170	(79.)
250	(108.)	450	(78.)	-20	(107.)	180	(78.)
260	(106.)	460	(77.)	-10	(106.)	190	(77.)
270	(105.)	470	(76.)	0	(104.)	200	(75.)
280	(103.)	480	(74.)	10	(103.)	210	(74.)
290	(102.)	490	(73.)	20	(101.)	220	(73.)
300	(100.)	500	(72.)	30	(100.)	230	(71.)
310	(99.)	510	(70.)	40	(98.)	240	(70.)
320	(97.)	520	(69.)	50	(97.)	250	(69.)
330	(96.)	530	(68.)	60	(95.)	260	(67.)
340	(94.)	540	(67.)	70	(94.)	270	(66.)
350	(93.)	550	(65.)	80	(92.)	280	(65.)
360	(91.)	560	(64.)	90	(91.)	290	(64.)
370	(90.)	570	(63.)	100	(89.)	300	(62.)
380	(88.)	580	(62.)	110	(88.)	310	(61.)
390	(87.)	590	(61.)	120	(86.)	320	(60.)
400	(85.)	600	(59.)	130	(85.)	330	(59.)
410	(84.)	610	(58.)	140	(83.)	340	(58.)
420	(82.)			150	(82.)		

I[CH₂]₃I 1,3-DIIODOPROPANE (TRIMETHYLENE DIIODIDE, TRIMETHYLENE IODIDE)

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

where

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

$T_r = T/T_c$, T = temperature (K)

$T_c = 776.15$ K

$A = 32.4$, $B = 2.10$, $C = -5.30$, $D = 6.30$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
260	(97.)	490	(68.)	-10	(96.)	220	(68.)
270	(95.)	500	(67.)	0	(95.)	230	(67.)
280	(94.)	510	(66.)	10	(94.)	240	(66.)
290	(93.)	520	(65.)	20	(92.)	250	(64.)
300	(91.)	530	(64.)	30	(91.)	260	(63.)
310	(90.)	540	(63.)	40	(90.)	270	(62.)
320	(89.)	550	(62.)	50	(88.)	280	(61.)
330	(88.)	560	(60.)	60	(87.)	290	(60.)
340	(86.)	570	(59.)	70	(86.)	300	(59.)
350	(85.)	580	(58.)	80	(85.)	310	(58.)
360	(84.)	590	(57.)	90	(83.)	320	(57.)
370	(83.)	600	(56.)	100	(82.)	330	(56.)
380	(81.)	610	(55.)	110	(81.)	340	(55.)
390	(80.)	620	(54.)	120	(80.)	350	(54.)
400	(79.)	630	(53.)	130	(78.)	360	(53.)
410	(78.)	640	(52.)	140	(77.)	370	(52.)
420	(76.)	650	(52.)	150	(76.)	380	(51.)
430	(75.)	660	(51.)	160	(75.)	390	(50.)
440	(74.)	670	(50.)	170	(74.)	400	(50.)
450	(73.)	680	(49.)	180	(72.)	410	(49.)
460	(72.)	690	(48.)	190	(71.)	420	(48.)
470	(70.)	700	(47.)	200	(70.)	430	(47.)
480	(69.)			210	(69.)		

CH₂ClCHClCH₂Cl 1,2,3-TRICHLOROPROPANE

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

where

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

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

$$T_c = 648.15 \text{ K}$$

$$A = 48.0, \quad B = 1.75, \quad C = -4.25, \quad D = 5.25$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
250	(127.)	430	(93.)	-20	(126.)	160	(92.)
260	(125.)	440	(91.)	-10	(124.)	170	(90.)
270	(123.)	450	(89.)	0	(122.)	180	(89.)
280	(121.)	460	(87.)	10	(120.)	190	(87.)
290	(119.)	470	(86.)	20	(118.)	200	(85.)
300	(117.)	480	(84.)	30	(116.)	210	(83.)
310	(115.)	490	(82.)	40	(114.)	220	(82.)
320	(113.)	500	(81.)	50	(112.)	230	(80.)
330	(111.)	510	(79.)	60	(110.)	240	(79.)
340	(109.)	520	(78.)	70	(109.)	250	(77.)
350	(107.)	530	(76.)	80	(107.)	260	(75.)
360	(105.)	540	(74.)	90	(105.)	270	(74.)
370	(103.)	550	(73.)	100	(103.)	280	(73.)
380	(102.)	560	(72.)	110	(101.)	290	(71.)
390	(100.)	570	(70.)	120	(99.)	300	(70.)
400	(98.)	580	(69.)	130	(97.)	310	(68.)
410	(96.)	590	(67.)	140	(96.)	320	(67.)
420	(94.)			150	(94.)		

CH₂BrCHBrCH₂Br 1,2,3-TRIBROMOPROPANE

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

where

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

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

$$T_c = 753. \text{ K}$$

$$A = 36.5, \quad B = 1.75, \quad C = -4.25, \quad D = 5.25$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
280	(98.)	490	(71.)	10	(97.)	220	(71.)
290	(96.)	500	(70.)	20	(96.)	230	(70.)
300	(95.)	510	(69.)	30	(95.)	240	(69.)
310	(94.)	520	(68.)	40	(93.)	250	(68.)
320	(93.)	530	(67.)	50	(92.)	260	(67.)
330	(91.)	540	(66.)	60	(91.)	270	(65.)
340	(90.)	550	(65.)	70	(90.)	280	(64.)
350	(89.)	560	(64.)	80	(88.)	290	(63.)
360	(87.)	570	(63.)	90	(87.)	300	(62.)
370	(86.)	580	(61.)	100	(86.)	310	(61.)
380	(85.)	590	(60.)	110	(84.)	320	(60.)
390	(84.)	600	(59.)	120	(83.)	330	(59.)
400	(82.)	610	(58.)	130	(82.)	340	(58.)
410	(81.)	620	(57.)	140	(81.)	350	(57.)
420	(80.)	630	(56.)	150	(79.)	360	(56.)
430	(79.)	640	(55.)	160	(78.)	370	(55.)
440	(77.)	650	(54.)	170	(77.)	380	(54.)
450	(76.)	660	(54.)	180	(76.)	390	(53.)
460	(75.)	670	(53.)	190	(75.)	400	(52.)
470	(74.)	680	(52.)	200	(73.)	410	(51.)
480	(73.)			210	(72.)		

$\text{CCl}_3\text{CH}_2\text{CCl}_3$ 1,1,1,3,3,3-HEXACHLOROPROPANE

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

where

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

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

$$T_c = 738.15 \text{ K}$$

$$A = 37.6, \quad B = 2.50, \quad C = -6.50, \quad D = 7.50$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
270	(117.)	480	(81.)	0	(116.)	210	(81.)
280	(115.)	490	(80.)	10	(114.)	220	(79.)
290	(113.)	500	(78.)	20	(113.)	230	(78.)
300	(111.)	510	(77.)	30	(111.)	240	(76.)
310	(110.)	520	(75.)	40	(109.)	250	(75.)
320	(108.)	530	(74.)	50	(107.)	260	(73.)
330	(106.)	540	(72.)	60	(105.)	270	(72.)
340	(104.)	550	(71.)	70	(104.)	280	(70.)
350	(103.)	560	(69.)	80	(102.)	290	(69.)
360	(101.)	570	(68.)	90	(100.)	300	(68.)
370	(99.)	580	(67.)	100	(99.)	310	(66.)
380	(97.)	590	(65.)	110	(97.)	320	(65.)
390	(96.)	600	(64.)	120	(95.)	330	(64.)
400	(94.)	610	(63.)	130	(93.)	340	(63.)
410	(92.)	620	(62.)	140	(92.)	350	(61.)
420	(91.)	630	(61.)	150	(90.)	360	(60.)
430	(89.)	640	(59.)	160	(89.)	370	(59.)
440	(87.)	650	(58.)	170	(87.)	380	(58.)
450	(86.)	660	(57.)	180	(85.)	390	(57.)
460	(84.)	670	(56.)	190	(84.)	400	(56.)
470	(83.)			200	(82.)		

$\text{CBr}_3\text{CH}_2\text{CBr}_3$ 1,1,1,3,3,3-HEXABROMOPROPANE

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

where

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

$T_r = T/T_c$, T = temperature (K)

$T_c = 870.15 \text{ K}$

$A = 37.6$, $B = 2.50$, $C = -6.50$, $D = 7.50$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
300	(120.)	550	(83.)	30	(119.)	280	(83.)
310	(118.)	560	(82.)	40	(118.)	290	(81.)
320	(117.)	570	(81.)	50	(116.)	300	(80.)
330	(115.)	580	(79.)	60	(115.)	310	(79.)
340	(113.)	590	(78.)	70	(113.)	320	(78.)
350	(112.)	600	(77.)	80	(111.)	330	(76.)
360	(110.)	610	(75.)	90	(110.)	340	(75.)
370	(109.)	620	(74.)	100	(108.)	350	(74.)
380	(107.)	630	(73.)	110	(107.)	360	(73.)
390	(106.)	640	(72.)	120	(105.)	370	(71.)
400	(104.)	650	(71.)	130	(104.)	380	(70.)
410	(103.)	660	(69.)	140	(102.)	390	(69.)
420	(101.)	670	(68.)	150	(101.)	400	(68.)
430	(100.)	680	(67.)	160	(100.)	410	(67.)
440	(99.)	690	(66.)	170	(98.)	420	(66.)
450	(97.)	700	(65.)	180	(97.)	430	(65.)
460	(96.)	710	(64.)	190	(95.)	440	(64.)
470	(94.)	720	(63.)	200	(94.)	450	(63.)
480	(93.)	730	(62.)	210	(92.)	460	(61.)
490	(91.)	740	(61.)	220	(91.)	470	(61.)
500	(90.)	750	(60.)	230	(90.)	480	(60.)
510	(89.)	760	(59.)	240	(88.)	490	(59.)
520	(87.)	770	(58.)	250	(87.)	500	(58.)
530	(86.)	780	(57.)	260	(85.)	510	(57.)
540	(85.)	790	(56.)	270	(84.)	520	(56.)

CF₃CF₂CF₃ OCTAFLUOROPROPANE (PERFLUOROPROPANE, REFRIGERANT 218)

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

where

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

$T_r = T/T_c$, T = temperature (K)

$T_c = 345.04$ K

$A = 29.5$, $B = 3.30$, $C = -8.90$, $D = 9.90$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
100	(114.8)	220	71.3	-170	(113.5)	-50	70.3
110	(110.8)	230	68.1	-160	(109.6)	-40	67.2
120	(106.9)	240	65.1	-150	105.7	-30	64.1
130	103.1	250	62.1	-140	101.9	-20	61.2
140	99.3	260	59.3	-130	98.1	-10	58.4
150	95.6	270	56.6	-120	94.4	0	55.8
160	91.9	280	54.1	-110	90.8	10	53.3
170	88.3	290	51.7	-100	87.2	20	50.9
180	84.7	300	49.4	-90	83.6	30	48.8
190	81.3	310	47.4	-80	80.2	40	46.8
200	77.9	320	45.6	-70	76.8	50	45.1
210	74.5			-60	73.5		

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CClF₂CClF₃ 1,2-DICHLOROHEXAFLUOROPROPANE (REFRIGERANT 216)

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

where

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

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

$$T_c = 450.15 \text{ K}$$

$$A = 31.5, \quad B = 2.00, \quad C = -5.00, \quad D = 6.00$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
190	(84.)	310	(60.7)	-80	(83.)	40	(60.1)
200	81.9	320	(58.9)	-70	81.2	50	(58.4)
210	79.8	330	(57.2)	-60	79.2	60	(56.7)
220	77.8	340	(55.5)	-50	77.2	70	(55.0)
230	75.8	350	(53.9)	-40	75.2	80	(53.4)
240	73.8	360	(52.3)	-30	73.2	90	(51.8)
250	71.9	370	(50.7)	-20	71.3	100	(50.3)
260	69.9	380	(49.)	-10	69.3	110	(49.)
270	68.0	390	(48.)	0	67.4	120	(47.)
280	66.2	400	(46.)	10	65.6	130	(46.)
290	64.3	410	(45.)	20	63.7	140	(45.)
300	(62.5)			30	(61.9)		

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$\text{CCl}_3\text{CF}_2\text{CF}_3$ 1,1,1-TRICHLOROPENTAFLUOROPROPANE (REFRIGERANT 215)

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

where

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

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

$$T_c = 490.15 \text{ K}$$

$$A = 32.4, \quad B = 2.00, \quad C = -5.00, \quad D = 6.00$$

T K	λ mW/m K	T K	λ mW/m K	t °C	λ mW/m K	t °C	λ mW/m K
190	(90.)	330	63.7	-80	89.0	60	63.2
200	87.7	340	62.0	-70	87.1	70	61.5
210	85.7	350	(60.4)	-60	85.1	80	(59.9)
220	83.8	360	(58.7)	-50	83.2	90	(58.2)
230	81.8	370	(57.2)	-40	81.2	100	(56.7)
240	79.9	380	(55.6)	-30	79.3	110	(55.1)
250	78.0	390	(54.1)	-20	77.5	120	(53.6)
260	76.2	400	(52.6)	-10	75.6	130	(52.2)
270	74.3	410	(51.2)	0	73.8	140	(50.7)
280	72.5	420	(50.)	10	71.9	150	(49.)
290	70.7	430	(48.)	20	70.1	160	(48.)
300	68.9	440	(47.)	30	68.3	170	(47.)
310	67.1	450	(46.)	40	66.6	180	(46.)
320	65.4			50	64.9		

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