

93010

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Orthobaric densities and molar volumes of liquids

Aliphatic and cyclic ketones

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ORTHOBARIC DENSITIES AND MOLAR VOLUMES OF LIQUIDS
ALIPHATIC AND CYCLIC KETONES

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COMPOUND TABLES in the following order

Sheet No.	Formula	Name	Alternative Names
C3 and C4 ALKANONES			
3.1	C ₃ H ₆ O	Acetone	Propanone Dimethyl ketone
4.1	C ₄ H ₈ O	Butanone	Butan-2-one Methyl ethyl ketone
C5 ALKANONES			
5.1a	C ₅ H ₁₀ O	Pentan-2-one	Methyl propyl ketone
5.1b	C ₅ H ₁₀ O	Pentan-3-one	Diethyl ketone
5.2	C ₅ H ₁₀ O	3-Methylbutan-2-one	Methyl isopropyl ketone
C6 ALKANONES			
6.1a	C ₆ H ₁₂ O	Hexan-2-one	Methyl butyl ketone
6.1b	C ₆ H ₁₂ O	Hexan-3-one	Ethyl propyl ketone
6.2a	C ₆ H ₁₂ O	3-Methylpentan-2-one	Methyl sec-butyl ketone
6.2b	C ₆ H ₁₂ O	4-Methylpentan-2-one	Methyl isobutyl ketone
6.3	C ₆ H ₁₂ O	2-Methylpentan-3-one	Ethyl isopropyl ketone
6.4	C ₆ H ₁₂ O	3,3-Dimethylbutan-2-one	Methyl tert-butyl ketone Pinacolone
C7 ALKANONES			
7.1a	C ₇ H ₁₄ O	Heptan-2-one	Methyl pentyl ketone
7.1b	C ₇ H ₁₄ O	Heptan-3-one	Ethyl butyl ketone
7.1c	C ₇ H ₁₄ O	Heptan-4-one	Dipropyl ketone
7.2a	C ₇ H ₁₄ O	3-Methylhexan-2-one	Methyl sec-pentyl ketone
7.2b	C ₇ H ₁₄ O	4-Methylhexan-2-one	Methyl 2-methylbutyl ketone
7.2c	C ₇ H ₁₄ O	5-Methylhexan-2-one	Methyl isopentyl ketone
7.3a	C ₇ H ₁₄ O	2-Methylhexan-3-one	Propyl isopropyl ketone
7.3b	C ₇ H ₁₄ O	4-Methylhexan-3-one	Ethyl sec-butyl ketone
7.3c	C ₇ H ₁₄ O	5-Methylhexan-3-one	Ethyl isobutyl ketone
7.4a	C ₇ H ₁₄ O	3-Ethylpentan-2-one	Methyl 3-pentyl ketone
7.4b	C ₇ H ₁₄ O	3,3-Dimethylpentan-2-one	Methyl tert-pentyl ketone
7.4c	C ₇ H ₁₄ O	3,4-Dimethylpentan-2-one	Methyl 2-isopentyl ketone
7.4d	C ₇ H ₁₄ O	4,4-Dimethylpentan-2-one	Methyl neopentyl ketone
7.5a	C ₇ H ₁₄ O	2,2-Dimethylpentan-3-one	Ethyl tert-butyl ketone
7.5b	C ₇ H ₁₄ O	2,4-Dimethylpentan-3-one	Di-isopropyl ketone
C8 ALKANONES			
8.1a	C ₈ H ₁₆ O	Octan-2-one	Methyl hexyl ketone
	C ₈ H ₁₆ O	2,2,4-Trimethylpentan-3-one	(not issued)
C9 ALKANONES			
9.1a	C ₉ H ₁₈ O	Nonan-2-one	Methyl heptyl ketone
9.1d	C ₉ H ₁₈ O	Nonan-5-one	Dibutyl ketone
9.2	C ₉ H ₁₈ O	2,6-Dimethylheptan-4-one	Di-isobutyl ketone

NB. To allow for the future issue of omitted compounds sheet numbers are not always consecutive.

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CONTENTS continued

Sheet	Formula	Name	Alternative Names
C ₁₀ to C ₁₅ ALKANONES			
10.1a	C ₁₀ H ₂₀ O	Decan-2-one	Methyl octyl ketone
11.1a	C ₁₁ H ₂₂ O	Undecan-2-one	Methyl nonyl ketone
11.1e	C ₁₁ H ₂₂ O	Undecan-6-one	Dipentyl ketone
12.1a	C ₁₂ H ₂₄ O	Dodecan-2-one	Methyl decyl ketone
13.1a	C ₁₃ H ₂₆ O	Tridecan-2-one	Methyl undecyl ketone
13.1f	C ₁₃ H ₂₆ O	Tridecan-7-one	Dihexyl ketone
14.1a	C ₁₄ H ₂₈ O	Tetradecan-2-one	Methyl dodecyl ketone
15.1a	C ₁₅ H ₃₀ O	Pentadecan-2-one	Methyl tridecyl ketone
15.1g	C ₁₅ H ₃₀ O	Pentadecan-8-one	Diheptyl ketone

ALKENONES

106.1	C ₆ H ₁₀ O	4-Methylpent-3-en-2-one	Mesityl oxide
106.2	C ₆ H ₁₀ O	4-Methylpent-4-en-2-one	Isomesityl oxide

CYCLOALKANONES

404.1	C ₄ H ₆ O	Cyclobutanone
405.1	C ₅ H ₈ O	Cyclopentanone
406.1	C ₆ H ₁₀ O	Cyclohexanone
407.1	C ₇ H ₁₂ O	Cycloheptanone
408.1	C ₈ H ₁₄ O	Cyclooctanone

NB. To allow for the future issue of omitted compounds sheet numbers are not always consecutive.

ORTHOBARIC DENSITIES AND MOLAR VOLUMES OF LIQUIDS
ALIPHATIC AND CYCLIC KETONES

1. INTRODUCTION

This Data Item presents orthobaric densities and molar volumes of the aliphatic and cyclic ketones arranged in the order shown on the Contents page. The Compound Name Index lists alternative names of the compounds with, in bold, the first name used for each compound on the Contents page and at the head of each Sheet.

The values of density and molar volume for each compound have been obtained by calculation from the equation given, with its numerical coefficients, at the top of each Sheet. This equation was fitted to the data that had been selected after critical assessment of all the data. The value of the critical temperature for each compound was taken from Item 93009, which gives the vapour pressures. For completeness all the critical parameters of each compound are given in the Tables which also show the density at 298.15 K, where applicable, and for convenience, the normal boiling point and the approximate melting point. Brackets enclose the data at those temperatures which are outside the range of supporting experimental data.

The table of Data at Specified Temperatures for each compound gives the density, the molar volume and their derivatives with respect to temperature. In addition this table also gives an assessment of the data quality indicated, in decreasing order, by one of the letters 'A', 'B' or 'C', at each temperature. The estimated uncertainties in density and molar volume are shown below each letter in the units of density and molar volume rounded to 1, 2 or 5 times a power of 10.

In the main tables the uncertainties in the tabulated values of density and molar volume are shown for each value. The number of decimal places in each value is adjusted to be consistent with the uncertainty. Data quality and uncertainties are discussed at greater length in Section 5 and in Section 4 of the Introductory Data Item, Reference 5.

The sources of information which give liquid density or liquid molar volume data for the compound considered are listed on the reverse side of each sheet. Those sources that were used to derive the critical density and the coefficients of the liquid density/molar volume equation are shown together with the temperature ranges (ambient, low, medium, high or critical) of their data. These arbitrary temperature ranges are defined more precisely in Section 2 of the Introductory Data Item, Reference 5.

2. NOTATION AND UNITS

All temperatures are based on the International Temperature Scale (ITS-90).

b_1, b_2, b_3, b_4	non-dimensional coefficients of the density/molar volume equation
d	liquid density
q	$(1-T/T_c)^{1/3}$
T	kelvin temperature
t	Celsius temperature ($T-273.15$)
V	liquid molar volume

Note. The UNITS of temperature, density and molar volume are shown in each table.

Subscripts

b	denotes value at normal boiling point
c	denotes value at critical point
m	denotes value at normal melting point

3. THE CRITICAL DENSITY

Critical densities, some with large uncertainties, have been reported for five of the compounds considered here. Estimates of the critical density of each compound were made using both the Riedel equation, see Reference 1, and the latest form of Rackett equation, see References 2, 3 and 4. Both these equations require reliable values of critical temperature and critical pressure but neither represents experimental data over a long range of temperature as satisfactorily as does the equation used in this Item. However, provided the use of the Riedel equation is limited to non-associated liquids, both equations can yield reliable values of the critical density for a wide variety of compounds.

With the exception of acetone, both estimates of the critical density for all compounds were in good agreement and for several compounds there was no significant difference. The Rackett equation gave lower estimates than the Riedel equation for compounds with carbon numbers of three, four and five and its estimate gave the best fit to the data for these compounds. The mean of the two estimates gave the best fits to the data for the isomeric hexanes. For compounds with carbon numbers higher than six the Riedel equation gave the lower estimates and these values gave the best fits to the data for these compounds.

4. EVALUATION AND CORRELATION

Reliable data for the compounds considered are confined to medium reduced temperatures. The data for several compounds up to a carbon number of nine were the most extensive and these were fitted and correlated in the same way as for the haloethanes, see Item 92009. The equation for hexadecane was included in the present correlation to ensure that it merged into the correlation for the alkanes.

5. UNCERTAINTIES

At any temperature, the estimated uncertainties in the tabulated values of density and molar volume are dependent upon the rates of change of these properties with temperature and the quality of the experimental or estimated data upon which they are based. The table of Data at Specified Temperatures shows these derivatives, the assessed data quality (indicated by one of the letters 'A', 'B' or 'C') and the corresponding uncertainties at various points of the liquid range.

At low and medium reduced temperatures average quality data, denoted by the letter 'B', have uncertainties varying from 0.1 to 1 per cent, increasing to between 1 and 10 per cent at the critical point. Data with lower or higher uncertainties than these bands are graded 'A' and 'C' respectively. When the data quality is 'C' it will be appreciated that the uncertainties are necessarily rather speculative and that for some compounds they may be underestimated.

For those compounds for which the data quality at the critical pressure is denoted by 'C' the values of critical temperature and critical density given in the Tables should be regarded only as correlating parameters.

6. REFERENCES

1. RIEDEL, L., Liquid density in the saturation state. Investigations on an extension of the theorem of corresponding states. Part 2 (in German) Chem.-Ingr.-Tech., Vol.26, pp.259-264, 1954.
2. RACKETT, H.G. Equation of state for saturated liquids. J. Chem. Eng. Data, Vol.15, No.4, pp.514-517, 1970.
3. SPENCER, C.F., Improved equation for prediction of saturated liquid density. DANNER, R.P. J. Chem. Eng. Data, Vol.17, No.2, pp.236-241, 1972.
4. CAMPBELL, S.W. Prediction of saturated-liquid densities and critical volumes THODOS, G. for polar and non-polar substances. J. Chem. Eng. Data, Vol.30, No.1, pp.102-111, 1985.
5. ESDU Orthobaric densities and molar volumes of liquids. Introduction to Data Items issued after July 1989. Item No. 89018, ESDU ESDU International, 1989.

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COMPOUND NAME INDEX

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

Name		Sheet No.
Acetone		3.1
Butan-2-one	see Butanone	4.1
Butanone		4.1
Cyclobutanone		404.1
Cycloheptanone		407.1
Cyclohexanone		406.1
Cyclooctanone		408.1
Cyclopentanone		405.1
Decan-2-one		10.1a
Dibutyl ketone	see Nonan-5-one	9.1d
Di-isobutyl ketone	see 2,6-Dimethylheptan-4-one	9.2
Diethyl ketone	see Pentan-3-one	5.1b
Diheptyl ketone	see Pentadecan-8-one	15.1g
Dihexyl ketone	see Tridecan-7-one	13.1f
Dimethyl ketone	see Acetone	3.1
3,3-Dimethylbutan-2-one		6.4
2,6-Dimethylheptan-4-one		9.2
3,3-Dimethylpentan-2-one		7.4b
3,4-Dimethylpentan-2-one		7.4c
4,4-Dimethylpentan-2-one		7.4d
2,2-Dimethylpentan-3-one		7.5a
2,4-Dimethylpentan-3-one		7.5b
Dipentyl ketone	see Undecan-6-one	11.1e
Dipropyl ketone	see Heptan-4-one	7.1c
Di-isopropyl ketone	see 2,4-Dimethylpentan-3-one	7.5b
Dodecan-2-one		12.1a
Ethyl butyl ketone	see Heptan-3-one	7.1b
Ethyl isobutyl ketone	see 5-Methylhexan-3-one	7.3c
Ethyl sec-butyl ketone	see 4-Methylhexan-3-one	7.3b
Ethyl tert-butyl ketone	see 2,2-Dimethylpentan-3-one	7.5a
Ethyl propyl ketone	see Hexan-3-one	6.1b
Ethyl isopropyl ketone	see 2-Methylpentan-3-one	6.3
3-Ethylpentan-2-one		7.4a
Heptan-2-one		7.1a
Heptan-3-one		7.1b
Heptan-4-one		7.1c
Hexan-2-one		6.1a
Hexan-3-one		6.1b
Isomesityl oxide	see 4-Methylpent-4-en-2-one	106.2
Mesityl oxide	see 4-Methylpent-3-en-2-one	106.1
Methyl butyl ketone	see Hexan-2-one	6.1a
Methyl isobutyl ketone	see 4-Methylpentan-2-one	6.2b
Methyl sec-butyl ketone	see 3-Methylpentan-2-one	6.2a
Methyl tert-butyl ketone	see 3,3-Dimethylbutan-2-one	6.4
Methyl decyl ketone	see Dodecan-2-one	12.1a
Methyl dodecyl ketone	see Tetradecan-2-one	14.1a
Methyl ethyl ketone	see Butanone	4.1
Methyl heptyl ketone	see Nonan-2-one	9.1a
Methyl hexyl ketone	see Octan-2-one	8.1a
Methyl 2-methylbutyl ketone	see 4-Methylhexan-2-one	7.2b

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COMPOUND NAME INDEX continued

Name		Sheet No.
Methyl nonyl ketone	see Undecan-2-one	11.1a
Methyl octyl ketone	see Decan-2-one	10.1a
Methyl pentyl ketone	see Heptan-2-one	7.1a
Methyl 3-pentyl ketone	see 3-Ethylpentan-2-one	7.4a
Methyl isopentyl ketone	see 5-Methylhexan-2-one	7.2c
Methyl 2-isopentyl ketone	see 3,4-Dimethylpentan-2-one	7.4c
Methyl neopentyl ketone	see 4,4-Dimethylpentan-2-one	7.4d
Methyl sec-pentyl ketone	see 3-Methylhexan-2-one	7.2a
Methyl tert-pentyl ketone	see 3,3-Dimethylpentan-2-one	7.4b
Methyl propyl ketone	see Pentan-2-one	5.1a
Methyl isopropyl ketone	see 3-Methylbutan-2-one	5.2
Methyl tridecyl ketone	see Pentadecan-2-one	15.1a
Methyl undecyl ketone	see Tridecan-2-one	13.1a
3-Methylbutan-2-one		5.2
3-Methylhexan-2-one		7.2a
4-Methylhexan-2-one		7.2b
5-Methylhexan-2-one		7.2c
2-Methylhexan-3-one		7.3a
4-Methylhexan-3-one		7.3b
5-Methylhexan-3-one		7.3c
3-Methylpentan-2-one		6.2a
4-Methylpentan-2-one		6.2b
2-Methylpentan-3-one		6.3
4-Methylpent-3-en-2-one		106.1
4-Methylpent-4-en-2-one		106.2
Nonan-2-one		9.1a
Nonan-5-one		9.1d
Octan-2-one		8.1a
Pentadecan-2-one		15.1a
Pentadecan-8-one		15.1g
Pentan-2-one		5.1a
Pentan-3-one		5.1b
Pinacolone	see 3,3-Dimethylbutan-2-one	6.4
Propanone	see Acetone	3.1
Propyl isopropyl ketone	see 2-Methylhexan-3-one	7.3a
Tetradecan-2-one		14.1a
Tridecan-2-one		13.1a
Tridecan-7-one		13.1f
Undecan-2-one		11.1a
Undecan-6-one		11.1e

C₃H₆O Acetone (Propanone, Dimethyl ketone)

CAS Reg. No. 67-64-1

Mol. Wt. 58.080

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	$T_c =$	508.1 K	($t_c =$	234.95 °C)			
Critical Pressure	$p_c =$	4703 kPa	($p_c =$	46.42 atm)			
Critical Density	$d_c =$	264 kg/m ³	($V_c =$	220.00 cm ³ /mol)			
Critical Compression Factor	$Z_c =$	0.245					
$b_1 =$	1.94448	$b_2 =$	-0.81474	$b_3 =$	0.00000	$b_4 =$	0.30254
Density at 298.15 K (25 °C)	$d_{25} =$	784.75 kg/m ³	($V_{25} =$	74.01 cm ³ /mol)			
Normal Boiling Point	$T_b =$	329.21 K	($t_b =$	56.06 °C)			
Normal Melting Point	$T_m =$	178 K	($t_m =$	-95 °C)			

Data at Specified Temperatures

$t/^\circ\text{C}$	-95	0	25	56.06	100	200	234.95
T/K	178.15	273.15	298.15	329.21	373.15	473.15	508.10
$d/(\text{kg/m}^3)$	915.03	812.88	784.75	748.42	692.89	515.13	264.00
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	-1.06	-1.11	-1.14	-1.20	-1.34	-2.74	$-\infty$
$V/(\text{cm}^3/\text{mol})$	63.47	71.45	74.01	77.60	83.82	112.75	220.00
$(dV/dT)/(\text{cm}^3/\text{mol K})$	0.07	0.10	0.11	0.12	0.16	0.60	∞
Data Quality	B	B	B	B	B	B	B
Uncertainty in d (kg/m ³)	2	0.5	0.5	1	2	5	10
Uncertainty in V (cm ³ /mol)	0.1	0.05	0.05	0.1	0.2	1	10

Orthobaric Liquid Density of AcetoneUnits: kg/m³ v. °C

t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d
°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³
-90	910.	2	100	693.	2	200	515.	5	230	386.	10
-80	899.	2	105	686.	2	202	510.	5	231	376.	10
-70	889.	1	110	679.	2	204	504.	5	232	365.	10
-60	878.	1	115	672.	2	206	498.	5	233	351.	10
			120	665.	2	208	492.	5	234	331.	10
-50	867.	1	125	658.	2	210	485.	5			
-40	857.	1	130	650.	2	212	478.	5			
-30	846.	1	135	643.	2	214	471.	5			
-20	835.	0.5	140	635.	2	216	463.	5			
-10	824.	0.5	145	627.	2	218	455.	5			
0	813.	0.5	150	619.	2	220	446.	5			
10	802.	0.5	155	610.	2	222	437.	5			
20	790.	0.5	160	602.	2	224	427.	5			
30	779.	0.5	165	592.	5	226	415.	10			
40	767.	0.5	170	583.	5	228	402.	10			
50	756.	1	175	573.	5						
60	744.	1	180	563.	5						
70	731.	1	185	552.	5						
80	719.	1	190	541.	5						
90	706.	2	195	528.	5						

Orthobaric Liquid Molar Volume of Acetone

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
180	63.6	0.1	350	80.3	0.2	450	102.	0.5	490	126.	2
190	64.4	0.1	355	81.1	0.2	452	103.	0.5	491	127.	2
			360	81.8	0.2	454	104.	1	492	129.	2
			365	82.5	0.2	456	104.	1	493	130.	2
			370	83.3	0.2	458	105.	1	494	131.	2
200	65.1	0.1	375	84.1	0.2	460	106.	1	495	133.	2
210	65.9	0.1	380	85.0	0.2	462	107.	1	496	134.	2
220	66.7	0.1	385	85.8	0.2	464	108.	1	497	136.	2
230	67.5	0.05	390	86.7	0.2	466	109.	1	498	138.	2
240	68.4	0.05	395	87.7	0.2	468	110.	1	499	140.	2
250	69.3	0.05	400	88.7	0.2	470	111.	1	500	142.	2
260	70.2	0.05	405	90.	0.5	472	112.	1	501	144.	2
270	71.1	0.05	410	91.	0.5	474	113.	1	502	147.	2
280	72.1	0.05	415	92.	0.5	476	115.	1	503	150.	2
290	73.15	0.05	420	93.	0.5	478	116.	1	504	154.	2
300	74.21	0.05	425	94.	0.5	480	117.	1	505	158.	5
310	75.3	0.05	430	96.	0.5	482	119.	1	506	164.	5
320	76.5	0.1	435	97.	0.5	484	120.	1	507	173.	5
330	77.7	0.1	440	99.	0.5	486	122.	2	508	197.	5
340	79.0	0.1	445	100.	0.5	488	124.	2			

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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C₄H₈O Butanone (Butan-2-one, Methyl ethyl ketone)

CAS Reg. No. 78-93-3

Mol. Wt. 72.107

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	$T_c =$	536.8 K	($t_c =$	263.65 °C)			
Critical Pressure	$p_c =$	4202 kPa	($p_c =$	41.47 atm)			
Critical Density	$d_c =$	269 kg/m ³	($V_c =$	268.06 cm ³ /mol)			
Critical Compression Factor	$Z_c =$	0.252					
$b_1 \blacksquare$	1.84509	$b_2 \blacksquare$	-0.68637	$b_3 \blacksquare$	0.00000	$b_4 \blacksquare$	0.24053
Density at 298.15 K (25 °C)	$d_{25} =$	800.09 kg/m ³	($V_{25} =$	90.12 cm ³ /mol)			
Normal Boiling Point	$T_b =$	352.72 K	($t_b =$	79.57 °C)			
Normal Melting Point	$T_m \blacksquare$	186 K	($t_m \blacksquare$	-87 °C)			

Data at Specified Temperatures

$t/^\circ\text{C}$	-87	0	25	50	79.57	200	263.65
T/K	186.15	273.15	298.15	323.15	352.72	473.15	536.80
$d/(\text{kg/m}^3)$	(911.63)	825.85	800.09	773.53	740.73	572.22	269.00
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.96)	-1.02	-1.04	-1.08	-1.14	-1.89	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(79.10)	87.31	90.12	93.22	97.35	126.01	268.06
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.08)	0.11	0.12	0.13	0.15	0.42	∞
Data Quality	(C)	B	B	B	B	B	B
Uncertainty in d (kg/m^3)	(5)	2	1	2	2	5	5
Uncertainty in V (cm^3/mol)	(0.5)	0.2	0.1	0.2	0.5	1	5

Orthobaric Liquid Density of ButanoneUnits: kg/m^3 v. $^\circ\text{C}$

t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d
$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3
-80	(905.)	5	125	686.	2	220	530.	5	250	437.	5
-70	895.	5	130	680.	2	222	526.	5	251	432.	5
-60	885.	5	135	673.	2	224	521.	5	252	427.	5
			140	666.	2	226	516.	5	253	422.	5
			145	660.	5	228	511.	5	254	417.	5
-50	876.	2	150	653.	5	230	505.	5	255	411.	5
-40	866.	2	155	645.	5	232	500.	5	256	404.	5
-30	856.	2	160	638.	5	234	494.	5	257	398.	5
-20	846.	2	165	631.	5	236	488.	5	258	390.	5
-10	836.	2	170	623.	5	238	482.	5	259	382.	5
0	826.	2	175	615.	5	240	476.	5	260	372.	5
10	816.	2	180	607.	5	242	469.	5	261	361.	5
20	805.	1	185	599.	5	244	462.	5	262	347.	5
30	795.	1	190	590.	5	246	454.	5	263	325.	5
40	784.	2	195	581.	5	248	446.	5			
50	774.	2	200	572.	5						
60	763.	2	205	563.	5						
70	752.	2	210	552.	5						
80	740.	2	215	542.	5						
90	729.	2									
100	717.	2									
110	705.	2									
120	692.	2									

Orthobaric Liquid Molar Volume of Butanone

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
			375	101.	0.5	490	134.	1	530	181.	2
			380	102.	0.5	492	135.	1	531	184.	2
			385	103.	0.5	494	136.	1	532	188.	2
			390	104.	0.5	496	138.	1	533	193.	2
190	(79.)	0.5	395	104.	0.5	498	139.	1	534	199.	2
200	80.	0.5	400	105.	0.5	500	140.	1	535	206.	2
210	81.	0.5	405	106.	0.5	502	142.	1	536	219.	2
220	82.1	0.2	410	108.	0.5	504	143.	1			
230	83.0	0.2	415	109.	0.5	506	145.	1			
240	83.9	0.2	420	110.	0.5	508	147.	1			
250	84.9	0.2	425	111.	0.5	510	148.	1			
260	85.9	0.2	430	112.	0.5	512	150.	1			
270	87.0	0.2	435	113.	0.5	514	153.	1			
280	88.1	0.2	440	115.	0.5	516	155.	2			
290	89.2	0.1	445	116.	0.5	518	157.	2			
300	90.3	0.1	450	118.	0.5	520	160.	2			
310	91.6	0.2	455	119.	1	522	163.	2			
320	92.8	0.2	460	121.	1	524	167.	2			
330	94.1	0.2	465	123.	1	526	171.	2			
340	95.5	0.2	470	125.	1	528	175.	2			
350	97.	0.5	475	127.	1						
360	98.	0.5	480	129.	1						
370	100.	0.5	485	131.	1						

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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C₅H₁₀O Pentan-2-one (Methyl propyl ketone)

CAS Reg. No. 107-87-9

Mol. Wt. 86.133

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	$T_c =$	561.1 K	($t_c =$	287.95 °C)
Critical Pressure	$p_c =$	3695 kPa	($p_c =$	36.47 atm)
Critical Density	$d_c =$	266 kg/m ³	($V_c =$	323.81 cm ³ /mol)
Critical Compression Factor	$Z_c =$	0.256		
$b_1 = 1.86704$	$b_2 = -0.75428$	$b_3 = 0.00000$	$b_4 = 0.30013$	
Density at 298.15 K (25 °C)	$d_{25} =$	802.62 kg/m ³	($V_{25} =$	107.32 cm ³ /mol)
Normal Boiling Point	$T_b =$	375.38 K	($t_b =$	102.24 °C)
Normal Melting Point	$T_m =$	196 K	($t_m =$	-77 °C)

Data at Specified Temperatures

$t/^\circ\text{C}$	-77	0	25	50	102.24	200	287.95
T/K	196.15	273.15	298.15	323.15	375.38	473.15	561.10
$d/(\text{kg/m}^3)$	(901.49)	827.25	802.62	777.49	(722.55)	(599.59)	(266.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.96)	-0.98	-0.99	-1.02	(-1.10)	(-1.52)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(95.55)	104.12	107.32	110.78	(119.21)	(143.65)	(323.81)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.10)	0.12	0.13	0.14	(0.18)	(0.36)	∞
Data Quality	(C)	B	B	B	(B)	(B)	(B)
Uncertainty in d (kg/m^3)	(5)	2	2	2	(2)	(5)	(5)
Uncertainty in V (cm^3/mol)	(0.5)	0.2	0.2	0.2	(0.2)	(1)	(5)

Orthobaric Liquid Density of Pentan-2-oneUnits: kg/m^3 v. $^\circ\text{C}$

t	d	Uncert.	t	d	Uncert.	t	d	Uncert.	t	d	Uncert.
$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3
			150	(667.)	2	250	(506.)	5	280	(400.)	5
			155	(661.)	2	252	(501.)	5	281	(394.)	5
			160	(655.)	2	254	(496.)	5	282	(387.)	5
-70	(895.)	5	165	(648.)	5	256	(491.)	5	283	(379.)	5
-60	885.	5	170	(642.)	5	258	(486.)	5	284	(370.)	5
-50	876.	5	175	(635.)	5	260	(480.)	5	285	(360.)	5
-40	866.	2	180	(628.)	5	262	(474.)	5	286	(347.)	5
-30	856.	2	185	(622.)	5	264	(468.)	5	287	(329.)	5
-20	847.	2	190	(614.)	5	266	(461.)	5			
-10	837.	2	195	(607.)	5	268	(455.)	5			
0	827.	2	200	(600.)	5	270	(447.)	5			
10	817.	2	205	(592.)	5	272	(440.)	5			
20	808.	2	210	(584.)	5	274	(431.)	5			
30	798.	2	215	(576.)	5	276	(422.)	5			
40	788.	2	220	(567.)	5	278	(412.)	5			
50	777.	2	225	(558.)	5						
60	767.	2	230	(549.)	5						
70	757.	2	235	(539.)	5						
80	746.	2	240	(529.)	5						
90	736.	2	245	(518.)	5						
100	(725.)	2									
110	(714.)	2									
120	(703.)	2									
130	(691.)	2									
140	(679.)	2									

Orthobaric Liquid Molar Volume of Pentan-2-one

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
200	(96.)	0.5	400	(124.)	0.5	500	(155.)	1	540	(188.)	2
210	97.	0.5	405	(125.)	0.5	502	(156.)	1	541	(189.)	2
220	98.	0.5	410	(126.)	0.5	504	(157.)	1	542	(191.)	2
230	99.	0.5	415	(127.)	0.5	506	(158.)	1	543	(192.)	2
240	100.2	0.2	420	(128.)	0.5	508	(160.)	1	544	(194.)	2
250	101.4	0.2	425	(130.)	0.5	510	(161.)	2	545	(196.)	2
260	102.5	0.2	430	(131.)	0.5	512	(162.)	2	546	(198.)	2
270	103.7	0.2	435	(132.)	0.5	514	(163.)	2	547	(199.)	2
280	105.0	0.2	440	(133.)	1	516	(165.)	2	548	(202.)	2
290	106.2	0.2	445	(135.)	1	518	(166.)	2	549	(204.)	2
300	107.6	0.2	450	(136.)	1	520	(168.)	2	550	(206.)	2
310	108.9	0.2	455	(138.)	1	522	(169.)	2	551	(209.)	2
320	110.3	0.2	460	(139.)	1	524	(171.)	2	552	(212.)	2
330	111.8	0.2	465	(141.)	1	526	(173.)	2	553	(215.)	2
340	113.3	0.2	470	(143.)	1	528	(174.)	2	554	(218.)	2
350	114.9	0.2	475	(144.)	1	530	(176.)	2	555	(222.)	2
360	116.5	0.2	480	(146.)	1	532	(178.)	2	556	(227.)	2
370	118.2	0.2	485	(148.)	1	534	(180.)	2	557	(232.)	2
380	(120.1)	0.2	490	(150.)	1	536	(183.)	2	558	(238.)	2
390	(122.)	0.5	495	(153.)	1	538	(185.)	2	559	(247.)	5

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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C₅H₁₀O Pentan-3-one (Diethyl ketone)

CAS Reg. No. 96-22-0

Mol. Wt. 86.133

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	$T_c =$	561.5 K	($t_c \blacksquare$	288.35 °C)
Critical Pressure	$p_c =$	3731 kPa	($p_c =$	36.82 atm)
Critical Density	$d_c =$	269 kg/m ³	($V_c =$	320.20 cm ³ /mol)
Critical Compression Factor	$Z_c \blacksquare$	0.256		
$b_1 = 1.82428$	$b_2 = -0.66221$	$b_3 = 0.00000$	$b_4 = 0.23087$	
Density at 298.15 K (25 °C)	$d_{25} =$	809.55 kg/m ³	($V_{25} =$	106.40 cm ³ /mol)
Normal Boiling Point	$T_b =$	375.08 K	($t_b \blacksquare$	101.93 °C)
Normal Melting Point	$T_m \blacksquare$	234 K	($t_m \blacksquare$	-39 °C)

Data at Specified Temperatures

$t/^\circ\text{C}$	-39	0	25	50	101.93	200	288.35
T/K	234.15	273.15	298.15	323.15	375.08	473.15	561.50
$d/(\text{kg/m}^3)$	(870.43)	833.70	809.55	784.75	(730.31)	(605.58)	(269.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.93)	-0.96	-0.98	-1.01	(-1.10)	(-1.55)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(98.95)	103.31	106.40	109.76	(117.94)	(142.23)	(320.20)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.11)	0.12	0.13	0.14	(0.18)	(0.36)	∞
Data Quality	(C)	B	B	B	(B)	(B)	(B)
Uncertainty in d (kg/m^3)	(5)	2	1	2	(2)	(5)	(5)
Uncertainty in V (cm^3/mol)	(0.5)	0.2	0.1	0.2	(0.2)	(1)	(5)

Orthobaric Liquid Density of Pentan-3-oneUnits: kg/m^3 v. $^\circ\text{C}$

t	d	Uncert.	t	d	Uncert.	t	d	Uncert.	t	d	Uncert.
$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3
-30	(862.)	5	150	(674.)	2	250	(511.)	5	280	(405.)	5
-20	853.	2	155	(668.)	2	252	(506.)	5	281	(399.)	5
-10	843.	2	160	(662.)	2	254	(501.)	5	282	(392.)	5
			165	(655.)	5	256	(496.)	5	283	(385.)	5
			170	(649.)	5	258	(490.)	5	284	(376.)	5
0	834.	2	175	(642.)	5	260	(484.)	5	285	(367.)	5
10	824.	2	180	(635.)	5	262	(478.)	5	286	(355.)	5
20	814.	1	185	(628.)	5	264	(472.)	5	287	(339.)	5
30	805.	1	190	(621.)	5	266	(466.)	5	288	(313.)	5
40	795.	2	195	(613.)	5	268	(459.)	5			
50	785.	2	200	(606.)	5	270	(452.)	5			
60	775.	2	205	(598.)	5	272	(444.)	5			
70	764.	2	210	(590.)	5	274	(435.)	5			
80	(754.)	2	215	(581.)	5	276	(426.)	5			
90	(743.)	2	220	(573.)	5	278	(416.)	5			
100	(732.)	2	225	(564.)	5						
110	(721.)	2	230	(554.)	5						
120	(710.)	2	235	(544.)	5						
130	(699.)	2	240	(534.)	5						
140	(687.)	2	245	(523.)	5						

Orthobaric Liquid Molar Volume of Pentan-3-one

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
			400 (123.)		0.5	500 (154.)		1	540 (186.)		2
			405 (124.)		0.5	502 (155.)		1	541 (188.)		2
			410 (125.)		0.5	504 (156.)		1	542 (189.)		2
			415 (126.)		0.5	506 (157.)		1	543 (191.)		2
240 (100.)		0.5	420 (127.)		0.5	508 (158.)		1	544 (192.)		2
250 (101.)		0.5	425 (128.)		0.5	510 (159.)		1	545 (194.)		2
260 101.8		0.2	430 (129.)		0.5	512 (161.)		1	546 (196.)		2
270 102.9		0.2	435 (131.)		0.5	514 (162.)		2	547 (198.)		2
280 104.1		0.2	440 (132.)		0.5	516 (163.)		2	548 (200.)		2
290 105.4		0.2	445 (133.)		1	518 (165.)		2	549 (202.)		2
300 106.6		0.1	450 (135.)		1	520 (166.)		2	550 (204.)		2
310 108.0		0.2	455 (136.)		1	522 (168.)		2	551 (206.)		2
320 109.3		0.2	460 (138.)		1	524 (169.)		2	552 (209.)		2
330 110.7		0.2	465 (139.)		1	526 (171.)		2	553 (212.)		2
340 112.2		0.2	470 (141.)		1	528 (173.)		2	554 (215.)		2
350 113.8		0.2	475 (143.)		1	530 (175.)		2	555 (219.)		2
360 (115.4)		0.2	480 (145.)		1	532 (177.)		2	556 (223.)		2
370 (117.1)		0.2	485 (147.)		1	534 (179.)		2	557 (228.)		2
380 (118.8)		0.2	490 (149.)		1	536 (181.)		2	558 (234.)		2
390 (121.)		0.5	495 (151.)		1	538 (183.)		2	559 (241.)		2

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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31	TRC Thermodynamic Tables,	Texas A & M Univ.,	Loose leaf data sheets	extant	1993.*	

C₅H₁₀O 3-Methylbutan-2-one (Methyl isopropyl ketone)

CAS Reg. No. 563-80-4

Mol. Wt. 86.133

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	T_c □	555 K	(t_c =	281.85 °C)
Critical Pressure	p_c =	3780 kPa	(p_c □	37.31 atm)
Critical Density	d_c =	271 kg/m ³	(V_c □	317.84 cm ³ /mol)
Critical Compression Factor	Z_c □	0.260		
b_1 = 1.80695	b_2 = -0.66335	b_3 = 0.00000	b_4 = 0.24754	
Density at 298.15 K (25 °C)	d_{25} =	805.55 kg/m ³	(V_{25} =	106.92 cm ³ /mol)
Normal Boiling Point	T_b =	367.46 K	(t_b =	94.31 °C)
Normal Melting Point	T_m =	181 K	(t_m =	-92 °C)

Data at Specified Temperatures

$t/^\circ\text{C}$	-92	0	25	50	94.31	200	281.85
T/K	181.15	273.15	298.15	323.15	367.46	473.15	555.00
$d/(\text{kg/m}^3)$	(918.30)	830.32	805.55	(780.16)	(733.00)	(596.40)	(271.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.94)	-0.98	-1.00	(-1.03)	(-1.10)	(-1.61)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(93.80)	103.74	106.92	(110.40)	(117.51)	(144.42)	(317.83)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.10)	0.12	0.13	(0.15)	(0.18)	(0.39)	∞
Data Quality	(C)	C	C	(C)	(C)	(C)	(C)
Uncertainty in d (kg/m^3)	(10)	5	5	(5)	(5)	(10)	(10)
Uncertainty in V (cm^3/mol)	(1)	0.5	0.5	(0.5)	(1)	(2)	(10)

Orthobaric Liquid Density of 3-Methylbutan-2-oneUnits: kg/m^3 v. $^\circ\text{C}$

t	d	Uncert.	t	d	Uncert.	t	d	Uncert.	t	d	Uncert.
$^\circ\text{C}$	kg/m^3	in d	$^\circ\text{C}$	kg/m^3	in d	$^\circ\text{C}$	kg/m^3	in d	$^\circ\text{C}$	kg/m^3	in d
-90	(916.)	10	125	(698.)	5	222	(558.)	10	261	(462.)	10
-80	(907.)	10	130	(692.)	5	224	(554.)	10	262	(459.)	10
-70	(898.)	10	135	(686.)	5	226	(550.)	10	263	(455.)	10
-60	(888.)	10	140	(680.)	5	228	(546.)	10	264	(451.)	10
			145	(674.)	5	230	(542.)	10	265	(447.)	10
-50	(879.)	5	150	(667.)	5	232	(538.)	10	266	(443.)	10
-40	(869.)	5	155	(661.)	5	234	(534.)	10	267	(439.)	10
-30	(859.)	5	160	(654.)	10	236	(530.)	10	268	(435.)	10
-20	(850.)	5	165	(648.)	10	238	(525.)	10	269	(430.)	10
-10	(840.)	5	170	(641.)	10	240	(521.)	10	270	(426.)	10
0	830.	5	175	(634.)	10	242	(516.)	10	271	(421.)	10
10	820.	5	180	(627.)	10	244	(511.)	10	272	(415.)	10
20	811.	5	185	(619.)	10	246	(506.)	10	273	(410.)	10
30	801.	5	190	(612.)	10	248	(501.)	10	274	(404.)	10
40	790.	5	195	(604.)	10	250	(496.)	10	275	(397.)	10
50	(780.)	5	200	(596.)	10	252	(490.)	10	276	(390.)	10
60	(770.)	5	205	(588.)	10	254	(484.)	10	277	(382.)	10
70	(759.)	5	210	(580.)	10	256	(478.)	10	278	(374.)	10
80	(749.)	5	215	(571.)	10	258	(472.)	10	279	(363.)	10
90	(738.)	5	220	(562.)	10	260	(466.)	10	280	(350.)	10
100	(727.)	5									
110	(715.)	5									
120	(704.)	5									

Orthobaric Liquid Molar Volume of 3-Methylbutan-2-one

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
190	(95.)	1	400	(124.)	1	500	(157.)	2	540	(196.)	5
			405	(125.)	1	502	(158.)	2	541	(198.)	5
			410	(126.)	1	504	(159.)	2	542	(200.)	5
			415	(127.)	1	506	(161.)	2	543	(202.)	5
			420	(128.)	1	508	(162.)	2	544	(204.)	5
200	(96.)	1	425	(130.)	1	510	(163.)	2	545	(207.)	5
210	(97.)	1	430	(131.)	1	512	(165.)	2	546	(210.)	5
220	(98.)	1	435	(132.)	2	514	(166.)	2	547	(213.)	5
230	(99.)	1	440	(134.)	2	516	(168.)	2	548	(216.)	5
240	(100.)	0.5	445	(135.)	2	518	(169.)	2	549	(220.)	5
250	(101.)	0.5	450	(136.)	2	520	(171.)	2	550	(224.)	5
260	(102.)	0.5	455	(138.)	2	522	(173.)	2	551	(230.)	5
270	(103.)	0.5	460	(140.)	2	524	(175.)	5	552	(236.)	5
280	105.	0.5	465	(141.)	2	526	(177.)	5	553	(245.)	5
290	106.	0.5	470	(143.)	2	528	(179.)	5	554	(258.)	10
300	107.	0.5	475	(145.)	2	530	(181.)	5	555	(318.)	10
310	109.	0.5	480	(147.)	2	532	(183.)	5			
320	110.	0.5	485	(149.)	2	534	(186.)	5			
330	(111.)	0.5	490	(152.)	2	536	(189.)	5			
340	(113.)	0.5	495	(154.)	2	538	(192.)	5			
350	(115.)	1									
360	(116.)	1									
370	(118.)	1									
380	(120.)	1									
390	(122.)	1									

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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- TRC Thermodynamic Tables, Texas A & M Univ., Loose leaf data sheets extant 1993.*

C₆H₁₂O Hexan-2-one (Methyl butyl ketone)

CAS Reg. No. 591-78-6

Mol. Wt. 100.160

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	T_c ■	587.0 K	(t_c = 313.85 °C)
Critical Pressure	p_c =	3270 kPa	(p_c = 32.27 atm)
Critical Density	d_c ■	264 kg/m ³	(V_c = 379.39 cm ³ /mol)
Critical Compression Factor	Z_c ■	0.254	
b_1 = 1.84362	b_2 = -0.70824	b_3 ■ 0.00000	b_4 = 0.26746
Density at 298.15 K (25 °C)	d_{25} =	807.49 kg/m ³	(V_{25} = 124.04 cm ³ /mol)
Normal Boiling Point	T_b =	400.70 K	(t_b = 127.55 °C)
Normal Melting Point	T_m =	217 K	(t_m = -56 °C)

Data at Specified Temperatures

$t/^\circ\text{C}$	-56	0	25	50	127.55	200	313.85
T/K	217.15	273.15	298.15	323.15	400.70	473.15	587.00
$d/(\text{kg/m}^3)$	(880.44)	830.32	807.49	784.23	(707.60)	(623.81)	(264.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.89)	-0.91	-0.92	-0.94	(-1.05)	(-1.30)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(113.76)	120.63	124.04	127.72	(141.55)	(160.56)	(379.39)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.11)	0.13	0.14	0.15	(0.21)	(0.34)	∞
Data Quality	(C)	B	B	B	(B)	(B)	(B)
Uncertainty in d (kg/m ³)	(5)	2	2	2	(2)	(5)	(5)
Uncertainty in V (cm ³ /mol)	(0.5)	0.2	0.2	0.2	(0.5)	(1)	(5)

Orthobaric Liquid Density of Hexan-2-oneUnits: kg/m³ v. °C

t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d
°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³
-50	(875.)	5	175	(655.)	5	270	(510.)	5	300	(423.)	5
-40	(866.)	5	180	(649.)	5	272	(506.)	5	301	(419.)	5
-30	(857.)	2	185	(643.)	5	274	(501.)	5	302	(414.)	5
-20	(848.)	2	190	(637.)	5	276	(497.)	5	303	(410.)	5
-10	(839.)	2	195	(630.)	5	278	(492.)	5	304	(405.)	5
0	830.	2	200	(624.)	5	280	(487.)	5	305	(399.)	5
10	821.	2	205	(617.)	5	282	(482.)	5	306	(393.)	5
20	812.	2	210	(611.)	5	284	(477.)	5	307	(387.)	5
30	803.	2	215	(604.)	5	286	(471.)	5	308	(380.)	5
40	794.	2	220	(597.)	5	288	(465.)	5	309	(372.)	5
50	784.	2	225	(589.)	5	290	(459.)	5	310	(364.)	5
60	775.	2	230	(582.)	5	292	(453.)	5	311	(354.)	5
70	765.	2	235	(574.)	5	294	(446.)	5	312	(341.)	5
80	756.	2	240	(566.)	5	296	(439.)	5	313	(322.)	5
90	(746.)	2	245	(558.)	5	298	(432.)	5			
100	(736.)	2	250	(549.)	5						
110	(726.)	2	255	(540.)	5						
120	(715.)	2	260	(531.)	5						
130	(705.)	2	265	(521.)	5						
140	(694.)	2									
150	(683.)	2									
160	(672.)	2									
170	(661.)	2									

Orthobaric Liquid Molar Volume of Hexan-2-one

Units: cm³/mol v. K

T	V	Uncert.	T	V	Uncert.	T	V	Uncert.	T	V	Uncert.
K	cm ³ /mol	in V cm ³ /mol	K	cm ³ /mol	in V cm ³ /mol	K	cm ³ /mol	in V cm ³ /mol	K	cm ³ /mol	in V cm ³ /mol
220	(114.)	0.5	450	(153.)	1	550	(202.)	2	580	(258.)	2
230	(115.)	0.5	455	(155.)	1	552	(204.)	2	581	(263.)	2
240	(116.)	0.5	460	(156.)	1	554	(207.)	2	582	(268.)	5
			465	(158.)	1	556	(209.)	2	583	(274.)	5
			470	(160.)	1	558	(211.)	2	584	(282.)	5
250	(118.)	0.5	475	(161.)	1	560	(214.)	2	585	(292.)	5
260	(119.)	0.5	480	(163.)	1	562	(216.)	2	586	(307.)	5
270	(120.2)	0.2	485	(165.)	1	564	(219.)	2	587	(379.)	5
280	(121.5)	0.2	490	(167.)	1	566	(222.)	2			
290	(122.9)	0.2	495	(169.)	1	568	(226.)	2			
300	124.3	0.2	500	(171.)	1	570	(230.)	2			
310	125.7	0.2	505	(173.)	1	572	(234.)	2			
320	127.2	0.2	510	(175.)	2	574	(239.)	2			
330	128.8	0.2	515	(178.)	2	576	(244.)	2			
340	130.4	0.2	520	(181.)	2	578	(250.)	2			
350	132.0	0.2	525	(183.)	2						
360	(134.)	0.5	530	(187.)	2						
370	(136.)	0.5	535	(190.)	2						
380	(137.)	0.5	540	(194.)	2						
390	(139.)	0.5	545	(198.)	2						
400	(141.)	0.5									
410	(144.)	0.5									
420	(146.)	0.5									
430	(148.)	0.5									
440	(151.)	0.5									

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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$C_6H_{12}O$ Hexan-3-one (Ethyl propyl ketone)

CAS Reg. No. 589-38-8

Mol. Wt. 100.160

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	T _c ■	582.8 K	(t _c =	309.65 °C)
Critical Pressure	p _c =	3319 kPa	(p _c ■	32.76 atm)
Critical Density	d _c =	267 kg/m ³	(V _c =	375.13 cm ³ /mol)
Critical Compression Factor	Z _c ■	0.257		
b ₁ = 1.82630	b ₂ = -0.68703	b ₃ = 0.00000	b ₄ = 0.25805	
Density at 298.15 K (25 °C)	d ₂₅ =	811.32 kg/m ³	(V ₂₅ =	123.45 cm ³ /mol)
Normal Boiling Point	T _b =	396.63 K	(t _b =	123.48 °C)
Normal Melting Point	T _m =	218 K	(t _m ■	-55 °C)

Data at Specified Temperatures

$t/^\circ\text{C}$	-55	0	25	50	123.48	200	309.65
T/K	218.15	273.15	298.15	323.15	396.63	473.15	582.80
$d/(\text{kg/m}^3)$	(884.29)	834.47	811.32	787.72	(714.08)	(623.89)	(267.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.90)	-0.92	-0.93	-0.96	(-1.06)	(-1.34)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(113.27)	120.03	123.45	127.15	(140.26)	(160.54)	(375.13)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.11)	0.13	0.14	0.15	(0.21)	(0.34)	∞
Data Quality	(C)	B	B	B	(B)	(B)	(B)
Uncertainty in d (kg/m ³)	(5)	2	2	2	(2)	(5)	(5)
Uncertainty in V (cm ³ /mol)	(0.5)	0.2	0.2	0.2	(0.5)	(1)	(5)

Orthobaric Liquid Density of Hexan-3-one

Units: kg/m³ v. °C

t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d
°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³
-50	(880.)	5	175	(656.)	5	270	(505.)	5	300	(407.)	5
-40	(871.)	5	180	(650.)	5	272	(501.)	5	301	(402.)	5
-30	(862.)	2	185	(643.)	5	274	(496.)	5	302	(396.)	5
-20	(853.)	2	190	(637.)	5	276	(491.)	5	303	(389.)	5
-10	(844.)	2	195	(631.)	5	278	(486.)	5	304	(382.)	5
0	834.	2	200	(624.)	5	280	(480.)	5	305	(374.)	5
10	825.	2	205	(617.)	5	282	(475.)	5	306	(365.)	5
20	816.	2	210	(610.)	5	284	(469.)	5	307	(355.)	5
30	807.	2	215	(603.)	5	286	(463.)	5	308	(341.)	5
40	797.	2	220	(596.)	5	288	(456.)	5	309	(320.)	5
50	788.	2	225	(588.)	5	290	(450.)	5			
60	778.	2	230	(580.)	5	292	(442.)	5			
70	768.	2	235	(572.)	5	294	(435.)	5			
80	759.	2	240	(564.)	5	296	(426.)	5			
90	(749.)	2	245	(556.)	5	298	(417.)	5			
100	(739.)	2	250	(547.)	5						
110	(728.)	2	255	(537.)	5						
120	(718.)	2	260	(527.)	5						
130	(707.)	2	265	(517.)	5						
140	(696.)	2									
150	(685.)	2									
160	(674.)	2									
170	(662.)	2									

Orthobaric Liquid Molar Volume of Hexan-3-one

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
220	(113.)	0.5	450	(153.)	1	550	(205.)	2	580	(281.)	5
230	(115.)	0.5	455	(155.)	1	552	(207.)	2	581	(292.)	5
240	(116.)	0.5	460	(156.)	1	554	(210.)	2	582	(309.)	5
			465	(158.)	1	556	(212.)	2			
			470	(159.)	1	558	(215.)	2			
250	(117.)	0.5	475	(161.)	1	560	(218.)	2			
260	(118.3)	0.2	480	(163.)	1	562	(221.)	2			
270	(119.6)	0.2	485	(165.)	1	564	(224.)	2			
280	120.9	0.2	490	(167.)	1	566	(228.)	2			
290	122.3	0.2	495	(169.)	1	568	(232.)	2			
300	123.7	0.2	500	(171.)	1	570	(237.)	2			
310	125.2	0.2	505	(173.)	2	572	(242.)	2			
320	126.7	0.2	510	(176.)	2	574	(249.)	2			
330	128.2	0.2	515	(179.)	2	576	(257.)	2			
340	129.8	0.2	520	(181.)	2	578	(267.)	5			
350	131.5	0.2	525	(184.)	2						
360	(133.)	0.5	530	(188.)	2						
370	(135.)	0.5	535	(191.)	2						
380	(137.)	0.5	540	(195.)	2						
390	(139.)	0.5	545	(200.)	2						
400	(141.)	0.5									
410	(143.)	0.5									
420	(145.)	0.5									
430	(148.)	0.5									
440	(150.)	1									

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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C₆H₁₂O 3-Methylpentan-2-one (Methyl sec-butyl ketone)

CAS Reg. No. 565-61-7

Mol. Wt. 100.160

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	$T_c =$	579 K	($t_c =$	305.85 °C)			
Critical Pressure	$p_c =$	3350 kPa	($p_c =$	33.06 atm)			
Critical Density	$d_c =$	269 kg/m ³	($V_c =$	372.34 cm ³ /mol)			
Critical Compression Factor	$Z_c =$	0.259					
$b_1 =$	1.79389	$b_2 =$	-0.64735	$b_3 =$	0.00000	$b_4 =$	0.24043
Density at 298.15 K (25 °C)	$d_{25} =$	809.32 kg/m ³	($V_{25} =$	123.76 cm ³ /mol)			
Normal Boiling Point	$T_b =$	390.55 K	($t_b =$	117.40 °C)			
Normal Melting Point	$T_m =$	167 K	($t_m =$	-106 °C)			

Data at Specified Temperatures

$t/^\circ\text{C}$	-106	0	25	50	117.40	200	305.85
T/K	167.15	273.15	298.15	323.15	390.55	473.15	579.00
$d/(\text{kg/m}^3)$	(927.85)	(832.54)	809.32	(785.59)	(717.81)	(619.72)	(269.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.89)	(-0.92)	-0.94	(-0.96)	(-1.06)	(-1.37)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(107.95)	(120.31)	123.76	(127.50)	(139.54)	(161.62)	(372.34)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.10)	(0.13)	0.14	(0.16)	(0.21)	(0.36)	∞
Data Quality	(C)	(C)	C	(C)	(C)	(C)	(C)
Uncertainty in d (kg/m ³)	(10)	(5)	5	(5)	(5)	(10)	(10)
Uncertainty in V (cm ³ /mol)	(1)	(1)	1	(1)	(1)	(2)	(20)

Orthobaric Liquid Density of 3-Methylpentan-2-oneUnits: kg/m³ v. °C

t	d	Uncert.	t	d	Uncert.	t	d	Uncert.	t	d	Uncert.
°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³	°C	kg/m ³	kg/m ³
-100	(923.)	10	150	(682.)	10	272	(492.)	10	301	(377.)	10
-90	(914.)	10	155	(676.)	10	274	(487.)	10	302	(369.)	10
-80	(905.)	5	160	(670.)	10	276	(482.)	10	303	(358.)	10
-70	(896.)	5	165	(664.)	10	278	(476.)	10	304	(346.)	10
-60	(887.)	5	170	(658.)	10	280	(470.)	10	305	(327.)	10
-50	(878.)	5	175	(652.)	10	282	(464.)	10			
-40	(869.)	5	180	(646.)	10	284	(458.)	10			
-30	(860.)	5	185	(640.)	10	286	(451.)	10			
-20	(851.)	5	190	(633.)	10	288	(444.)	10			
-10	(842.)	5	195	(626.)	10	290	(436.)	10			
0	(833.)	5	200	(620.)	10	292	(428.)	10			
10	(823.)	5	205	(613.)	10	294	(419.)	10			
20	(814.)	5	210	(606.)	10	296	(409.)	10			
30	(805.)	5	215	(598.)	10	298	(398.)	10			
40	(795.)	5	220	(591.)	10	300	(385.)	10			
50	(786.)	5	225	(583.)	10						
60	(776.)	5	230	(575.)	10						
70	(766.)	5	235	(567.)	10						
80	(756.)	5	240	(558.)	10						
90	(746.)	5	245	(550.)	10						
100	(736.)	5	250	(540.)	10						
110	(726.)	5	255	(530.)	10						
120	(715.)	5	260	(520.)	10						
130	(704.)	5	265	(509.)	10						
140	(693.)	5	270	(497.)	10						

Orthobaric Liquid Molar Volume of 3-Methylpentan-2-one

Units: cm^3/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm^3/mol	cm^3/mol	K	cm^3/mol	cm^3/mol	K	cm^3/mol	cm^3/mol	K	cm^3/mol	cm^3/mol
170	(108.)	1	400	(142.)	1	520	(183.)	2	560	(223.)	5
180	(109.)	1	405	(143.)	1	522	(185.)	2	561	(225.)	5
190	(110.)	1	410	(144.)	2	524	(186.)	2	562	(227.)	5
			415	(145.)	2	526	(187.)	2	563	(229.)	5
			420	(146.)	2	528	(189.)	5	564	(231.)	5
200	(111.)	1	425	(147.)	2	530	(190.)	5	565	(234.)	5
210	(113.)	1	430	(149.)	2	532	(192.)	5	566	(236.)	5
220	(114.)	1	435	(150.)	2	534	(193.)	5	567	(239.)	5
230	(115.)	1	440	(151.)	2	536	(195.)	5	568	(241.)	5
240	(116.)	1	445	(153.)	2	538	(197.)	5	569	(244.)	5
250	(117.)	1	450	(154.)	2	540	(198.)	5	570	(248.)	5
260	(119.)	1	455	(156.)	2	542	(200.)	5	571	(251.)	5
270	(120.)	1	460	(157.)	2	544	(202.)	5	572	(255.)	5
280	(121.)	1	465	(159.)	2	546	(204.)	5	573	(260.)	5
290	(123.)	1	470	(161.)	2	548	(207.)	5	574	(265.)	10
300	124.	1	475	(162.)	2	550	(209.)	5	575	(271.)	10
310	(125.)	1	480	(164.)	2	552	(211.)	5	576	(278.)	10
320	(127.)	1	485	(166.)	2	554	(214.)	5	577	(288.)	10
330	(129.)	1	490	(168.)	2	556	(217.)	5	578	(303.)	10
340	(130.)	1	495	(170.)	2	558	(220.)	5	579	(372.)	20
350	(132.)	1	500	(173.)	2						
360	(134.)	1	505	(175.)	2						
370	(135.)	1	510	(178.)	2						
380	(137.)	1	515	(180.)	2						
390	(139.)	1									

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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| 12 | TRC Thermodynamic Tables, | Texas A & M Univ., Loose leaf data sheets extant 1993.* | |

C₆H₁₂O 4-Methylpentan-2-one (Methyl isobutyl ketone)

CAS Reg. No. 108-10-1

Mol. Wt. 100.160

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	$T_c =$	574.6.0 K	($t_c =$	301.45 °C)
Critical Pressure	$p_c =$	3270 kPa	($p_c =$	32.27 atm)
Critical Density	$d_c =$	265 kg/m ³	($V_c =$	377.96 cm ³ /mol)
Critical Compression Factor	$Z_c =$	0.259		
$b_1 = 1.80279$	$b_2 = -0.65826$	$b_3 = 0.00000$	$b_4 = 0.24528$	
Density at 298.15 K (25 °C)	$d_{25} =$	796.84 kg/m ³	($V_{25} =$	125.70 cm ³ /mol)
Normal Boiling Point	$T_b =$	389.12 K	($t_b =$	115.97 °C)
Normal Melting Point	$T_m =$	189 K	($t_m =$	-84 °C)

Data at Specified Temperatures

$t/^\circ\text{C}$	-84	0	25	50	115.97	200	301.45
T/K	189.15	273.15	298.15	323.15	389.12	473.15	574.60
$d/(\text{kg/m}^3)$	(895.59)	820.01	796.84	773.17	(706.95)	(606.81)	(265.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.89)	-0.92	-0.94	-0.96	(-1.06)	(-1.38)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(111.84)	122.14	125.70	129.54	(141.68)	(165.06)	(377.96)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.11)	0.14	0.15	0.16	(0.21)	(0.38)	∞
Data Quality	(C)	B	B	B	(B)	(B)	(B)
Uncertainty in d (kg/m^3)	(5)	2	2	2	(2)	(5)	(5)
Uncertainty in V (cm^3/mol)	(0.5)	0.2	0.2	0.2	(0.5)	(1)	(5)

Orthobaric Liquid Density of 4-Methylpentan-2-oneUnits: kg/m^3 v. $^\circ\text{C}$

t	d	Uncert.	t	d	Uncert.	t	d	Uncert.	t	d	Uncert.
$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3
-80	(892.)	5	150	(669.)	2	250	(525.)	5	290	(412.)	5
-70	(883.)	5	155	(664.)	2	252	(521.)	5	291	(407.)	5
-60	(874.)	5	160	(658.)	2	254	(517.)	5	292	(402.)	5
-50	(865.)	2	165	(652.)	2	256	(513.)	5	293	(397.)	5
-40	(856.)	2	170	(646.)	5	258	(509.)	5	294	(391.)	5
-30	(847.)	2									
-20	(838.)	2	175	(640.)	5	260	(504.)	5	295	(384.)	5
-10	(829.)	2	180	(633.)	5	262	(500.)	5	296	(377.)	5
0	820.	2	185	(627.)	5	264	(495.)	5	297	(369.)	5
10	811.	2	190	(620.)	5	266	(490.)	5	298	(360.)	5
20	802.	2	195	(614.)	5	268	(485.)	5	299	(349.)	5
30	792.	2									
40	783.	2	200	(607.)	5	270	(480.)	5	300	(335.)	5
50	773.	2	205	(600.)	5	272	(475.)	5	301	(311.)	5
60	764.	2	210	(593.)	5	274	(469.)	5			
70	754.	2	215	(585.)	5	276	(464.)	5			
80	744.	2	220	(578.)	5	278	(458.)	5			
90	734.	2									
100	(724.)	2	225	(570.)	5	280	(451.)	5			
110	(713.)	2	230	(562.)	5	282	(444.)	5			
120	(703.)	2	235	(553.)	5	284	(437.)	5			
130	(692.)	2	240	(544.)	5	286	(430.)	5			
140	(681.)	2	245	(535.)	5	288	(421.)	5			

Orthobaric Liquid Molar Volume of 4-Methylpentan-2-one

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
			400 (144.)		0.5	520 (188.)		2	560 (235.)		2
			405 (145.)		0.5	522 (190.)		2	561 (237.)		2
			410 (146.)		0.5	524 (191.)		2	562 (240.)		2
			415 (148.)		0.5	526 (193.)		2	563 (243.)		2
190 (112.)		0.5	420 (149.)		0.5	528 (194.)		2	564 (245.)		2
200 (113.)		0.5	425 (150.)		0.5	530 (196.)		2	565 (249.)		2
210 (114.)		0.5	430 (151.)		0.5	532 (198.)		2	566 (252.)		2
220 (115.)		0.5	435 (153.)		1	534 (199.)		2	567 (256.)		2
230 (117.)		0.5	440 (154.)		1	536 (201.)		2	568 (260.)		2
240 (118.)		0.5	445 (156.)		1	538 (203.)		2	569 (265.)		5
250 (119.)		0.5	450 (157.)		1	540 (205.)		2	570 (270.)		5
260 (120.4)		0.2	455 (159.)		1	542 (207.)		2	571 (277.)		5
270 (121.7)		0.2	460 (160.)		1	544 (210.)		2	572 (286.)		5
280 123.1		0.2	465 (162.)		1	546 (212.)		2	573 (297.)		5
290 124.5		0.2	470 (164.)		1	548 (214.)		2	574 (317.)		5
300 126.0		0.2	475 (166.)		1	550 (217.)		2			
310 127.5		0.2	480 (168.)		1	552 (220.)		2			
320 129.0		0.2	485 (170.)		1	554 (223.)		2			
330 130.7		0.2	490 (172.)		1	556 (227.)		2			
340 132.3		0.2	495 (174.)		2	558 (231.)		2			
350 134.		0.5	500 (177.)		2						
360 136.		0.5	505 (179.)		2						
370 138.		0.5	510 (182.)		2						
380 (140.)		0.5	515 (185.)		2						
390 (142.)		0.5									

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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C₆H₁₂O 2-Methylpentan-3-one (Ethyl isopropyl ketone)

CAS Reg. No. 565-69-5

Mol. Wt. 100.160

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	$T_c =$	572 K	($t_c =$	298.85 °C)			
Critical Pressure	$p_c =$	3200 kPa	($p_c =$	31.58 atm)			
Critical Density	$d_c =$	268 kg/m ³	($V_c =$	373.73 cm ³ /mol)			
Critical Compression Factor	$Z_c =$	0.251					
$b_1 =$	1.81457	$b_2 =$	-0.67267	$b_3 =$	0.00000	$b_4 =$	0.25167
Density at 298.15 K (25 °C)	$d_{25} =$	806.83 kg/m ³	($V_{25} =$	124.14 cm ³ /mol)			
Normal Boiling Point	$T_b =$	387.60 K	($t_b =$	114.45 °C)			
Normal Melting Point	$T_m =$	-	($t_m =$	-)			

Data at Specified Temperatures

$t/^\circ\text{C}$	-160	0	25	50	114.45	200	298.85
T/K	113.15	273.15	298.15	323.15	387.60	473.15	572.00
$d/(\text{kg/m}^3)$	(976.39)	830.49	(806.83)	(782.65)	(716.64)	(612.31)	(268.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.90)	-0.94	(-0.96)	(-0.98)	(-1.08)	(-1.43)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(102.58)	120.60	(124.14)	(127.98)	(139.76)	(163.58)	(373.73)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.10)	0.14	(0.15)	(0.16)	(0.21)	(0.38)	∞
Data Quality	(C)	B	(B)	(B)	(C)	(C)	(C)
Uncertainty in d (kg/m^3)	(5)	2	(2)	(5)	(5)	(10)	(10)
Uncertainty in V (cm^3/mol)	(0.5)	0.2	(0.2)	(0.5)	(1)	(2)	(10)

Orthobaric Liquid Density of 2-Methylpentan-3-oneUnits: kg/m^3 v. $^\circ\text{C}$

t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d	t	d	Uncert. in d
$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3	$^\circ\text{C}$	kg/m^3	kg/m^3
-100	(922.)	5	150	(677.)	5	250	(528.)	10	290	(404.)	10
-90	(913.)	2	155	(671.)	5	252	(524.)	10	291	(398.)	10
-80	(904.)	2	160	(665.)	5	254	(519.)	10	292	(392.)	10
-70	(895.)	2	165	(659.)	5	256	(515.)	10	293	(385.)	10
-60	(886.)	2	170	(652.)	5	258	(511.)	10	294	(377.)	10
-50	(877.)	2	175	(646.)	5	260	(506.)	10	295	(369.)	10
-40	(868.)	2	180	(640.)	5	262	(501.)	10	296	(358.)	10
-30	(858.)	2	185	(633.)	10	264	(496.)	10	297	(345.)	10
-20	(849.)	2	190	(626.)	10	266	(491.)	10	298	(327.)	10
-10	(840.)	2	195	(619.)	10	268	(486.)	10			
0	830.	2	200	(612.)	10	270	(480.)	10			
10	821.	2	205	(605.)	10	272	(475.)	10			
20	(812.)	2	210	(598.)	10	274	(469.)	10			
30	(802.)	2	215	(590.)	10	276	(462.)	10			
40	(792.)	2	220	(582.)	10	278	(456.)	10			
50	(783.)	5	225	(574.)	10	280	(449.)	10			
60	(773.)	5	230	(566.)	10	282	(441.)	10			
70	(763.)	5	235	(557.)	10	284	(433.)	10			
80	(753.)	5	240	(548.)	10	286	(425.)	10			
90	(742.)	5	245	(538.)	10	288	(415.)	10			
100	(732.)	5									
110	(721.)	5									
120	(711.)	5									
130	(700.)	5									
140	(688.)	5									

Orthobaric Liquid Molar Volume of 2-Methylpentan-3-one

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
160	(107.)	0.5	400	(142.)	1	520	(187.)	2	560	(238.)	5
170	(108.)	0.5	405	(144.)	1	522	(189.)	2	561	(241.)	5
180	(109.)	0.5	410	(145.)	1	524	(190.)	2	562	(244.)	5
190	(110.)	0.5	415	(146.)	1	526	(192.)	2	563	(247.)	5
			420	(147.)	1	528	(193.)	2	564	(251.)	5
200	(112.)	0.5	425	(149.)	1	530	(195.)	2	565	(255.)	5
210	(113.)	0.5	430	(150.)	2	532	(197.)	5	566	(259.)	5
220	(114.)	0.5	435	(151.)	2	534	(199.)	5	567	(264.)	5
230	(115.1)	0.2	440	(153.)	2	536	(201.)	5	568	(271.)	5
240	(116.3)	0.2	445	(154.)	2	538	(203.)	5	569	(278.)	10
250	(117.6)	0.2	450	(156.)	2	540	(205.)	5	570	(288.)	10
260	(118.8)	0.2	455	(157.)	2	542	(207.)	5	571	(303.)	10
270	(120.2)	0.2	460	(159.)	2	544	(210.)	5	572	(314.)	10
280	(121.5)	0.2	465	(161.)	2	546	(212.)	5			
290	(123.0)	0.2	470	(162.)	2	548	(215.)	5			
300	(124.4)	0.2	475	(164.)	2	550	(218.)	5			
310	(126.)	0.5	480	(166.)	2	552	(221.)	5			
320	(127.)	0.5	485	(168.)	2	554	(225.)	5			
330	(129.)	0.5	490	(171.)	2	556	(229.)	5			
340	(131.)	1	495	(173.)	2	558	(233.)	5			
350	(133.)	1	500	(175.)	2						
360	(134.)	1	505	(178.)	2						
370	(136.)	1	510	(181.)	2						
380	(138.)	1	515	(184.)	2						
390	(140.)	1									

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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| 6 | TRC Thermodynamic Tables, Texas A & M Univ., | Loose leaf data sheets extant 1993.* | |

C₆H₁₂O 3,3-Dimethylbutan-2-one (Methyl tert-butyl ketone, Pinacolone)

CAS Reg. No. 75-97-8

Mol. Wt. 100.160

Orthobaric Liquid Density and Molar Volume

$$\ln(d/d_c) = -\ln(V/V_c) = b_1q + b_2q^2 + b_3q^3 + b_4q^4$$

where d is the density, d_c the critical density, V the molar volume, V_c the critical molar volume and $q = (1-T/T_c)^{1/3}$, T being the temperature and T_c the critical temperature in kelvins.

Critical Temperature	$T_c =$	567 K	($t_c =$	293.85 °C)			
Critical Pressure	$p_c =$	3430 kPa	($p_c =$	33.85 atm)			
Critical Density	$d_c =$	271 kg/m ³	($V_c =$	369.59 cm ³ /mol)			
Critical Compression Factor	$Z_c =$	0.269					
$b_1 =$	1.75117	$b_2 =$	-0.59505	$b_3 =$	0.00000	$b_4 =$	0.21722
Density at 298.15 K (25 °C)	$d_{25} =$	801.23 kg/m ³	($V_{25} =$	125.01 cm ³ /mol)			
Normal Boiling Point	$T_b =$	379.24 K	($t_b =$	106.09 °C)			
Normal Melting Point	$T_m =$	221 K	($t_m =$	-52 °C)			

Data at Specified Temperatures

$t/^\circ\text{C}$	-52	0	25	50	106.09	200	293.85
T/K	221.15	273.15	298.15	323.15	379.24	473.15	567.00
$d/(\text{kg/m}^3)$	(872.73)	824.88	801.23	776.99	(719.53)	(604.24)	(271.00)
$(d(d)/dT)/(\text{kg/m}^3 \text{ K})$	(-0.91)	-0.94	-0.96	-0.98	(-1.07)	(-1.46)	$-\infty$
$V/(\text{cm}^3/\text{mol})$	(114.77)	121.42	125.01	128.91	(139.20)	(165.76)	(369.59)
$(dV/dT)/(\text{cm}^3/\text{mol K})$	(0.12)	0.14	0.15	0.16	(0.21)	(0.40)	∞
Data Quality	(C)	C	C	C	(C)	(C)	(C)
Uncertainty in d (kg/m^3)	(10)	5	5	5	(5)	(10)	(10)
Uncertainty in V (cm^3/mol)	(1)	1	1	1	(1)	(2)	(10)

Orthobaric Liquid Density of 3,3-Dimethylbutan-2-oneUnits: kg/m^3 v. $^\circ\text{C}$

t	d	Uncert.	t	d	Uncert.	t	d	Uncert.	t	d	Uncert.
$^\circ\text{C}$	kg/m^3	in d	$^\circ\text{C}$	kg/m^3	in d	$^\circ\text{C}$	kg/m^3	in d	$^\circ\text{C}$	kg/m^3	in d
-50	(871.)	10	150	(670.)	5	250	(517.)	10	280	(429.)	10
-40	(862.)	10	155	(664.)	10	252	(512.)	10	281	(425.)	10
-30	(853.)	10	160	(658.)	10	254	(508.)	10	282	(420.)	10
-20	(843.)	5	165	(652.)	10	256	(503.)	10	283	(415.)	10
-10	(834.)	5	170	(645.)	10	258	(498.)	10	284	(410.)	10
0	825.	5	175	(639.)	10	260	(493.)	10	285	(405.)	10
10	815.	5	180	(632.)	10	262	(488.)	10	286	(399.)	10
20	806.	5	185	(625.)	10	264	(483.)	10	287	(393.)	10
30	796.	5	190	(618.)	10	266	(477.)	10	288	(386.)	10
40	787.	5	195	(611.)	10	268	(471.)	10	289	(378.)	10
50	777.	5	200	(604.)	10	270	(465.)	10	290	(370.)	10
60	767.	5	205	(597.)	10	272	(459.)	10	291	(360.)	10
70	757.	5	210	(589.)	10	274	(452.)	10	292	(347.)	10
80	747.	5	215	(581.)	10	276	(445.)	10	293	(329.)	10
90	737.	5	220	(573.)	10	278	(437.)	10			
100	726.	5	225	(565.)	10						
110	(715.)	5	230	(556.)	10						
120	(704.)	5	235	(547.)	10						
130	(693.)	5	240	(537.)	10						
140	(682.)	5	245	(527.)	10						

Orthobaric Liquid Molar Volume of 3,3-Dimethylbutan-2-one

Units: cm³/mol v. K

T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V	T	V	Uncert. in V
K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol	K	cm ³ /mol	cm ³ /mol
			425 (150.)		2	520 (191.)		2	560 (254.)		5
			430 (151.)		2	522 (193.)		2	561 (259.)		5
			435 (153.)		2	524 (195.)		2	562 (264.)		5
230 (116.)		1	440 (154.)		2	526 (196.)		2	563 (270.)		5
240 (117.)		1	445 (156.)		2	528 (198.)		5	564 (277.)		10
250 (118.)		1	450 (157.)		2	530 (200.)		5	565 (287.)		10
260 (120.)		1	455 (159.)		2	532 (202.)		5	566 (302.)		10
270 (121.)		1	460 (161.)		2	534 (204.)		5	567 (370.)		10
280 (122.)		1	465 (163.)		2	536 (206.)		5			
290 (124.)		1	470 (165.)		2	538 (209.)		5			
300 (125.)		1	475 (167.)		2	540 (211.)		5			
310 (127.)		1	480 (169.)		2	542 (214.)		5			
320 (128.)		1	485 (171.)		2	544 (217.)		5			
330 (130.)		1	490 (173.)		2	546 (220.)		5			
340 (132.)		1	495 (176.)		2	548 (223.)		5			
350 (134.)		1	500 (178.)		2	550 (227.)		5			
360 (135.)		1	505 (181.)		2	552 (231.)		5			
370 (137.)		1	510 (184.)		2	554 (235.)		5			
380 (139.)		1	515 (188.)		2	556 (241.)		5			
390 (142.)		1				558 (247.)		5			
400 (144.)		1									
410 (146.)		2									
420 (149.)		2									

The following Sources give liquid density or liquid molar volume data for this compound. Those Sources used to derive the coefficients of the liquid density/molar volume equation are indicated by the temperature range (ambient 'A', low 'L', medium 'M', high 'H' or critical 'C') of their data. An asterisk (*) indicates that the Source is not a primary source of experimental data.

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