

89019

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Orthobaric densities and molar volumes of liquids

Aromatic hydrocarbons

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ESDU DATA ITEM No.89019

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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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The technical work involved in the assessment of the available information and the construction and subsequent development of the Data Item was undertaken (under contract to ESDU) by

Mr J.Walton — Independent.

in consultation with Dr D.Ambrose.

The person with overall responsibility for the work in this subject area is Mr G.H.Walter, Head of Heat Transfer, Internal Flow and Physical Data.

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ORTHOBARIC DENSITIES AND MOLAR VOLUMES OF LIQUIDS
AROMATIC HYDROCARBONS

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TABLE 1 - COMPOUND NAME INDEX

COMPOUND TABLES in the following order

Tables issued with the latest ammendment are indicated by an exclamation mark (!)

Formula	Name	Alternative Names
ALKYLBENZENES		
C ₆ H ₆	Benzene	
C ₇ H ₈	Toluene	Methylbenzene
C ₈ H ₁₀	Ethylbenzene	
	1,2-Dimethylbenzene	2-Methyltoluene o-Xylene
	1,3-Dimethylbenzene	3-Methyltoluene m-Xylene
	1,4-Dimethylbenzene	4-Methyltoluene p-Xylene
C ₉ H ₁₂	Propylbenzene	1-Phenylpropane
	Isopropylbenzene	2-Phenylpropane Cumene
	1-Methyl-2-ethylbenzene	2-Ethyltoluene
	1-Methyl-3-ethylbenzene	3-Ethyltoluene
	1-Methyl-4-ethylbenzene	4-Ethyltoluene
	1,2,3-Trimethylbenzene	Hemimellitene
	1,2,4-Trimethylbenzene	pseudoCumene
	1,3,5-Trimethylbenzene	Mesitylene
C ₁₀ H ₁₄	Butylbenzene	1-Phenylbutane
	sec-Butylbenzene	2-Phenylbutane
	Isobutylbenzene	1-Phenyl-2-methylpropane
	tert-Butylbenzene	2-Phenyl-2-methylpropane
	1-Methyl-2-propylbenzene	2-Propyltoluene
	1-Methyl-3-propylbenzene	3-Propyltoluene
	1-Methyl-4-propylbenzene	4-Propyltoluene
	1-Methyl-2-isopropylbenzene	2-Isopropyltoluene o-Cymene
	1-Methyl-3-isopropylbenzene	3-Isopropyltoluene m-Cymene
	1-Methyl-4-isopropylbenzene	4-Isopropyltoluene p-Cymene
	1,2-Diethylbenzene	o-Diethylbenzene
	1,3-Diethylbenzene	m-Diethylbenzene
	1,4-Diethylbenzene	p-Diethylbenzene
	1,2-Dimethyl-3-ethylbenzene	3-Ethyl-o-xylene
	1,2-Dimethyl-4-ethylbenzene	4-Ethyl-o-xylene
	1,3-Dimethyl-2-ethylbenzene	2-Ethyl-m-xylene
	1,3-Dimethyl-4-ethylbenzene	4-Ethyl-m-xylene
	1,3-Dimethyl-5-ethylbenzene	5-Ethyl-m-xylene
	1,4-Dimethyl-2-ethylbenzene	2-Ethyl-p-xylene
	1,2,3,4-Tetramethylbenzene	Prehenitene

Continued on next page

CONTENTS continued

Formula	Name	Alternative Names	
C ₁₀ H ₁₄	1,2,3,5-Tetramethylbenzene	Isodurene	
	1,2,4,5-Tetramethylbenzene	Durene	
! C ₁₁ H ₁₆	Pentylbenzene	1-Phenylpentane	
! C ₁₁ H ₁₆	Pentamethylbenzene		
! C ₁₂ H ₁₈	Hexylbenzene	1-Phenylhexane	
! C ₁₂ H ₁₈	1,2-Diisopropylbenzene	o-Diisopropylbenzene	
! C ₁₂ H ₁₈	1,3-Diisopropylbenzene	m-Diisopropylbenzene	
! C ₁₂ H ₁₈	1,4-Diisopropylbenzene	p-Diisopropylbenzene	
ALKENYLBENZENES			
! C ₈ H ₈	Styrene	Vinylbenzene	
! C ₉ H ₁₀	2-Methylstyrene	o-Methylstyrene	2-Vinyltoluene
! C ₉ H ₁₀	3-Methylstyrene	m-Methylstyrene	3-Vinyltoluene
! C ₉ H ₁₀	4-Methylstyrene	p-Methylstyrene	4-Vinyltoluene
! C ₁₀ H ₁₂	2-Ethylstyrene	o-Ethylstyrene	
! C ₁₀ H ₁₂	3-Ethylstyrene	m-Ethylstyrene	
! C ₁₀ H ₁₂	4-Ethylstyrene	p-Ethylstyrene	

ORTHOBARIC DENSITIES AND MOLAR VOLUMES OF LIQUIDS
AROMATIC HYDROCARBONS

1. INTRODUCTION

This Data Item presents orthobaric liquid densities and molar volumes of aromatic hydrocarbons arranged in the order shown on the Contents page. Table 1 is the Compound Name Index which 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 Table.

The values of density and molar volume for each compound have been obtained by calculation from the equation given, with the coefficients, at the top of each Table. This equation was fitted to the experimental and estimated data that had been selected and weighted in accordance with a critical assessment of all the data. The value of the critical temperature for each compound is, unless otherwise indicated, taken from the relevant Data Item giving the vapour pressure. For completeness all the critical parameters of each compound are given in the Tables which also show the density at 25 °C, where applicable, and for convenience, the approximate normal melting and boiling points.

The table of Data at Specified Temperatures gives the density, 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 'X', 'A', 'B' or 'C', at each temperature. Brackets enclose the letters at those temperatures which are outside the range of supporting experimental data. The estimated uncertainties in density and molar volume are shown below each letter and are given in the units of density or 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 4 and in Section 4 of the Introductory Item, Reference 2.

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 which were used to derive the critical density and the coefficients of the liquid density/molar volume equation are shown in bold type together with the temperature range (low, medium, high or critical) of their data. These arbitrary temperature ranges are defined more precisely in Section 2 of the Introductory Item, Reference 2.

2. NOTATION AND UNITS

All temperatures are based on the International Practical Temperature Scale (IPTS-68), which for practical purposes is interchangeable with thermodynamic temperature.

d	liquid density	kg/m ³
q	$(1-T/T_c)^{1/3}$	
T	thermodynamic temperature	K
t	Celsius temperature, (T-273.15)	°C
V	liquid molar volume	cm ³ /mol

Subscripts

- b denotes the normal boiling point
- c denotes the critical point
- m denotes the normal melting point

3. EVALUATION AND CORRELATION

Reliable data over most or all of the liquid range are available for benzene, toluene, o-, m- and p-xylene. Critical densities have been reported for ethylbenzene, propylbenzene and butylbenzene but their data at lower temperatures are less extensive. Except for isopropylbenzene data for the remaining compounds data are confined to ambient temperatures.

Because of the varying quality and extent of the data for each compound, the different procedures to obtain the coefficients of the density/molar volume equation for each compound were as follows.

- (a) benzene, toluene, ethylbenzene, o-, m-, p-xylene and isopropylbenzene. The selected data were fitted by the equation with the critical density adjusted to be in agreement with the value given by the Riedel equation, Reference 1. In general this value was also in good agreement with the reported critical density. The coefficients so obtained were then used to derive a correlation for these compounds similar to that derived for the alkanes which is described in Item 87010.
- (b) Remainder of compounds. The selected data for each compound were fitted by the correlation derived in (a) with critical density adjusted to be in agreement with the value given by the Riedel equation.

4. UNCERTAINTIES

Comparison of the tabulated values given here with those given in Reference 3 for benzene, toluene, ethylbenzene, o-, m-, and p-xylene and isopropylbenzene shows good agreement over the whole liquid range for each compound. Even in the cases where slightly different critical densities have been selected the differences in the tabulated values are in good accord with the estimated uncertainties.

For the remainder of the compounds reliable values of density are known only at ambient temperatures and these have uncertainties of less than 0.02 per cent. Tabulated values have uncertainties of less than 0.1 per cent up to the normal boiling point increasing to 0.5 per cent at a few degrees below the critical temperature.

5. REFERENCES

1. RIEDEL, L. The 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, p.259-264, 1954.
2. ESDU Orthobaric densities and molar volumes of liquids. Introduction to Data Items issued after July 1989. Item No. 89018, ESDU International, 1989.
3. TRC TRC Thermodynamic Tables - Hydrocarbons. Thermodynamics Research Center, Texas A & M University, College Station, Texas, USA. Loose leaf data sheets extant 1989.

TABLE 1
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

Benzene
Butylbenzene
sec-Butylbenzene
tert-Butylbenzene

Cumene
pseudoCumene
o-Cymene
m-Cymene
p-Cymene

1,2-Diethylbenzene
1,3-Diethylbenzene
1,4-Diethylbenzene
o-Diethylbenzene
m-Diethylbenzene
p-Diethylbenzene
1,2-Diisopropylbenzene
1,3-Diisopropylbenzene
1,4-Diisopropylbenzene
o-Diisopropylbenzene
m-Diisopropylbenzene
p-Diisopropylbenzene

1,2-Dimethylbenzene
1,3-Dimethylbenzene
1,4-Dimethylbenzene
1,2-Dimethyl-3-ethylbenzene
1,2-Dimethyl-4-ethylbenzene
1,3-Dimethyl-2-ethylbenzene
1,3-Dimethyl-4-ethylbenzene
1,3-Dimethyl-5-ethylbenzene
1,4-Dimethyl-2-ethylbenzene
Durene

Ethylbenzene
2-Ethylstyrene
3-Ethylstyrene
4-Ethylstyrene
o-Ethylstyrene
m-Ethylstyrene
p-Ethylstyrene
2-Ethyltoluene
3-Ethyltoluene
4-Ethyltoluene
3-Ethyl-o-xylene
4-Ethyl-o-xylene
2-Ethyl-m-xylene
4-Ethyl-m-xylene
5-Ethyl-m-xylene
2-Ethyl-p-xylene

Hemimellitene
Hexylbenzene

Isobutylbenzene
Isodurene
Isopropylbenzene
2-Isopropyltoluene
3-Isopropyltoluene
4-Isopropyltoluene

see **Isopropylbenzene**
see **1,2,4-Trimethylbenzene**
see **1-Methyl-2-isopropylbenzene**
see **1-Methyl-3-isopropylbenzene**
see **1-Methyl-4-isopropylbenzene**

see **1,2-Diethylbenzene**
see **1,3-Diethylbenzene**
see **1,4-Diethylbenzene**

see **1,2-Diisopropylbenzene**
see **1,3-Diisopropylbenzene**
see **1,4-Diisopropylbenzene**

see **1,2,4,5-Tetramethylbenzene**

see **2-Ethylstyrene**
see **3-Ethylstyrene**
see **4-Ethylstyrene**
see **1-Methyl-2-ethylbenzene**
see **1-Methyl-3-ethylbenzene**
see **1-Methyl-4-ethylbenzene**
see **1,2-Dimethyl-3-ethylbenzene**
see **1,2-Dimethyl-4-ethylbenzene**
see **1,3-Dimethyl-2-ethylbenzene**
see **1,3-Dimethyl-4-ethylbenzene**
see **1,3-Dimethyl-5-ethylbenzene**
see **1,4-Dimethyl-2-ethylbenzene**

see **1,2,3-Trimethylbenzene**

see **1,2,3,5-Tetramethylbenzene**

see **1-Methyl-2-isopropylbenzene**
see **1-Methyl-3-isopropylbenzene**
see **1-Methyl-4-isopropylbenzene**

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Documents

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TABLE 1 continued

Name

Mesitylene	see 1,3,5-Trimethylbenzene
Methylbenzene	see Toluene
1-Methyl-2-ethylbenzene	
1-Methyl-3-ethylbenzene	
1-Methyl-4-ethylbenzene	
1-Methyl-2-isopropylbenzene	
1-Methyl-3-isopropylbenzene	
1-Methyl-4-isopropylbenzene	
1-Methyl-2-propylbenzene	
1-Methyl-3-propylbenzene	
1-Methyl-4-propylbenzene	
2-Methylstyrene	
3-Methylstyrene	
4-Methylstyrene	
<i>o</i> -Methylstyrene	see 2-Methylstyrene
<i>m</i> -Methylstyrene	see 3-Methylstyrene
<i>p</i> -Methylstyrene	see 4-Methylstyrene
2-Methyltoluene	see 1,2-Dimethylbenzene
3-Methyltoluene	see 1,3-Dimethylbenzene
4-Methyltoluene	see 1,4-Dimethylbenzene
Pentamethylbenzene	
Pentylbenzene	
1-Phenylbutane	see Butylbenzene
2-Phenylbutane	see sec-Butylbenzene
1-Phenylhexane	see Hexylbenzene
1-Phenyl-2-methylpropane	see Isobutylbenzene
2-Phenyl-2-methylpropane	see tert-Butylbenzene
1-Phenylpentane	see Pentylbenzene
1-Phenylpropane	see Propylbenzene
2-Phenylpropane	see Isopropylbenzene
Prehenitene	see 1,2,3,4-Tetramethylbenzene
Propylbenzene	
2-Propyltoluene	see 1-Methyl-2-propylbenzene
3-Propyltoluene	see 1-Methyl-3-propylbenzene
4-Propyltoluene	see 1-Methyl-4-propylbenzene
Styrene	
1,2,3,4-Tetramethylbenzene	
1,2,3,5-Tetramethylbenzene	
1,2,4,5-Tetramethylbenzene	
Toluene	
1,2,3-Trimethylbenzene	
1,2,4-Trimethylbenzene	
1,3,5-Trimethylbenzene	
Vinylbenzene	see Styrene
2-Vinyltoluene	see 2-Methylstyrene
3-Vinyltoluene	see 3-Methylstyrene
4-Vinyltoluene	see 4-Methylstyrene
<i>o</i> -Xylene	see 1,2-Dimethylbenzene
<i>m</i> -Xylene	see 1,3-Dimethylbenzene
<i>p</i> -Xylene	see 1,4-Dimethylbenzene

C₆H₆ Benzene**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.

Molecular Weight	MW	=	78.11		
Critical Temperature	T_c	=	562.16 K	(t_c	= 289.01 °C)
Critical Pressure	p_c	=	4.898 MPa	(	= 48.34 atm)
Critical Density	d_c	=	304.00 kg/m ³	(	= 0.304 g/cm ³)
Critical Molar Volume	V_c	=	257.00 cm ³ /mol		
Critical Compression Factor	Z_c	=	0.269		

$$b_1 = 1.74509 \quad b_2 = -0.73294 \quad b_3 = 0.17091 \quad b_4 = 0.16897$$

$$\text{Density at 298.15 K (25 °C)} = 873.57 \text{ kg/m}^3$$

$$\text{Normal Melting Point} \quad T_m = 279 \text{ K} \quad (t_m = 6 \text{ °C})$$

$$\text{Normal Boiling Point} \quad T_b = 353 \text{ K} \quad (t_b = 80 \text{ °C})$$

Data at Specified Temperatures

$t/^\circ\text{C}$	6	20	30	80	280	285	289
$d/(\text{kg/m}^3)$	893.50	878.85	868.28	813.71	452.07	414.57	318.01
$(d(d)/dT)/(\text{kg/m}^3 \text{ } ^\circ\text{C})$	-1.04	-1.05	-1.06	-1.13	-5.98	-9.86	-472.40
$V/(\text{cm}^3/\text{mol})$	87.42	88.88	89.96	96.00	172.79	188.42	245.63
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.10	0.11	0.11	0.13	2.29	4.48	364.88
Data Quality	A	A	A	A	A	A	A
Uncertainty in d (kg/m ³)	0.05	0.05	0.05	0.05	0.1	0.2	10
Uncertainty in V (cm ³ /mol)	0.005	0.005	0.005	0.01	0.05	0.1	5

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

Uncert.			Uncert.			Uncert.			Uncert.		
t	d	in	t	d	in	t	d	in	t	d	in
°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
10	889.3	0.05	200	657.3	0.05	260	532.3	0.05	280	452.1	0.1
20	878.85	0.05	205	649.1	0.05	262	526.2	0.1	281	445.9	0.1
30	868.28	0.05	210	640.7	0.05	264	519.9	0.1	282	439.2	0.1
40	857.6	0.05	215	632.0	0.05	266	513.3	0.1	283	431.9	0.2
			220	623.0	0.05	268	506.3	0.1	284	423.8	0.2
50	846.8	0.05	225	613.7	0.05	270	498.9	0.1	285	414.6	0.2
60	835.9	0.05	230	603.9	0.05	272	491.0	0.1	286	403.8	0.2
70	824.9	0.05	235	593.7	0.05	274	482.5	0.1	287	390.5	0.2
80	813.7	0.05	240	583.0	0.05	276	473.4	0.1	288	372.	0.5
90	802.4	0.05	245	571.6	0.05	278	463.3	0.1	289	318.	10
100	790.8	0.05	250	559.5	0.05						
110	779.1	0.05	255	546.5	0.05						
120	767.1	0.05									
130	754.8	0.05									
140	742.2	0.05									
150	729.3	0.05									
160	716.0	0.05									
170	702.2	0.05									
180	687.9	0.05									
190	673.0	0.05									

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Orthobaric Liquid Molar Volume of Benzene

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
			450	112.80	0.01	520	137.71	0.02	550	166.5	0.05
			455	114.00	0.01	522	138.90	0.02	551	168.3	0.05
			460	115.25	0.01	524	140.15	0.02	552	170.3	0.05
280	87.51	0.005	465	116.56	0.01	526	141.46	0.02	553	172.4	0.05
290	88.55	0.005	470	117.94	0.01	528	142.83	0.02	554	174.8	0.05
300	89.62	0.005	475	119.38	0.01	530	144.29	0.02	555	177.4	0.05
310	90.73	0.005	480	120.91	0.01	532	145.82	0.02	556	180.4	0.05
320	91.87	0.005	485	122.52	0.01	534	147.45	0.02	557	183.8	0.1
330	93.06	0.005	490	124.24	0.01	536	149.19	0.02	558	187.8	0.1
340	94.30	0.005	495	126.07	0.01	538	151.06	0.02	559	192.6	0.1
350	95.58	0.01	500	128.03	0.01	540	153.07	0.02	560	198.9	0.2
360	96.92	0.01	505	130.15	0.01	542	155.24	0.02	561	208.1	0.2
370	98.32	0.01	510	132.44	0.01	544	157.62	0.02	562	230.	1
380	99.79	0.01	515	134.95	0.01	546	160.24	0.02			
390	101.33	0.01				548	163.17	0.02			
400	102.96	0.01									
410	104.68	0.01									
420	106.51	0.01									
430	108.46	0.01									
440	110.55	0.01									

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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

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SHRAIBER, L.S., PECHENYUK, N.G., et al.,	Russ. J. Phys. Chem., Vol. 39, p. 219, 1965.	M
CAMPBELL, A.N., CHATTERJEE, R.M.,	Can. J. Chem., Vol. 46, p. 575, 1968.	
HALES, J.L., TOWNSEND, R.,	J. Chem. Thermodynamics, Vol. 4, p. 763, 1972.	M, H
TUGAREV, I.A., AVDUS, Z.I., NOZDREV, V.F.,	Russ. J. Phys. Chem., Vol. 49, p. 732, 1975.	

C₇H₈ Toluene (Methylbenzene)**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.

Molecular Weight	MW =	92.14	
Critical Temperature	$T_c =$	591.80 K	($t_c = 318.65$ °C)
Critical Pressure	$p_c =$	4.106 MPa	($= 40.52$ atm)
Critical Density	$d_c =$	291.40 kg/m ³	($= 0.291$ g/cm ³)
Critical Molar Volume	$V_c =$	316.20 cm ³ /mol	
Critical Compression Factor	$Z_c =$	0.264	

$$b_1 = 1.85724 \quad b_2 = -1.02024 \quad b_3 = 0.51854 \quad b_4 = -0.00577$$

$$\text{Density at 298.15 K (25 °C)} \quad \square \quad 863.18 \text{ kg/m}^3$$

$$\text{Normal Melting Point} \quad T_m \square 178 \text{ K} \quad (t_m = -95 \text{ °C})$$

$$\text{Normal Boiling Point} \quad T_b \square 384 \text{ K} \quad (t_b = 111 \text{ °C})$$

Data at Specified Temperatures

$t/^\circ\text{C}$	-95	-55	20	30	111	300	318
$d/(\text{kg/m}^3)$	970.94	935.80	867.85	858.50	778.69	480.98	349.33
$(d(d)/dT)/(\text{kg/m}^3 \text{ } ^\circ\text{C})$	-0.87	-0.89	-0.93	-0.94	-1.04	-3.71	-30.74
$V/(\text{cm}^3/\text{mol})$	94.90	98.46	106.17	107.33	118.33	191.57	263.76
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.09	0.09	0.11	0.12	0.16	1.48	23.21
Data Quality	(C)	B	A	A	A	A	(A)
Uncertainty in d (kg/m ³)	5	0.5	0.05	0.05	0.05	0.1	0.5
Uncertainty in V (cm ³ /mol)	0.5	0.05	0.01	0.01	0.01	0.02	0.5

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

$\frac{t}{^\circ\text{C}}$	$\frac{d}{\text{kg/m}^3}$	Uncert. in $\frac{d}{\text{kg/m}^3}$	$\frac{t}{^\circ\text{C}}$	$\frac{d}{\text{kg/m}^3}$	Uncert. in $\frac{d}{\text{kg/m}^3}$	$\frac{t}{^\circ\text{C}}$	$\frac{d}{\text{kg/m}^3}$	Uncert. in $\frac{d}{\text{kg/m}^3}$	$\frac{t}{^\circ\text{C}}$	$\frac{d}{\text{kg/m}^3}$	Uncert. in $\frac{d}{\text{kg/m}^3}$
-90	967.	5	150	736.4	0.05	270	562.2	0.05	310	(435.0)	0.1
-80	958.	5	155	730.7	0.05	272	557.9	0.05	311	(428.8)	0.1
-70	949.	2	160	724.9	0.05	274	553.5	0.05	312	(422.1)	0.1
-60	940.	1	165	719.1	0.05	276	549.0	0.05	313	(414.8)	0.2
			170	713.2	0.05	278	544.4	0.05	314	(406.5)	0.2
-50	931.	0.5	175	707.1	0.05	280	539.6	0.05	315	(397.1)	0.2
-40	922.	0.5	180	701.0	0.05	282	534.7	0.05	316	(385.8)	0.2
-30	914.	0.5	185	694.8	0.05	284	529.7	0.05	317	(371.4)	0.2
-20	905.	0.5	190	688.5	0.05	286	524.5	0.05	318	(349.)	0.5
-10	895.4	0.2	195	682.1	0.05	288	519.0	0.05			
0	886.3	0.2	200	675.5	0.05	290	513.4	0.05			
10	877.1	0.1	205	668.8	0.05	292	507.5	0.05			
20	867.85	0.05	210	662.0	0.05	294	501.4	0.1			
30	858.50	0.05	215	655.0	0.05	296	495.0	0.1			
40	849.1	0.05	220	647.9	0.05	298	488.2	0.1			
50	839.5	0.05	225	640.6	0.05	300	481.0	0.1			
60	829.9	0.05	230	633.0	0.05	302	473.3	0.1			
70	820.1	0.05	235	625.3	0.05	304	(465.0)	0.1			
80	810.2	0.05	240	617.3	0.05	306	(456.0)	0.1			
90	800.2	0.05	245	609.0	0.05	308	(446.1)	0.1			
100	790.1	0.05	250	600.4	0.05						
110	779.7	0.05	255	591.5	0.05						
120	769.2	0.05	260	582.2	0.05						
130	758.5	0.05	265	572.4	0.05						
140	747.6	0.05									

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Orthobaric Liquid Molar Volume of Toluene

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
			400	120.93	0.01	520	152.08	0.01	570	187.23	0.02
			405	121.80	0.01	522	152.95	0.01	571	188.54	0.02
			410	122.68	0.01	524	153.84	0.01	572	189.91	0.02
180	95.	0.5	415	123.59	0.01	526	154.76	0.01	573	191.35	0.02
190	96.	0.5	420	124.52	0.01	528	155.70	0.01	574	192.9	0.05
200	97.	0.5	425	125.48	0.01	530	156.67	0.02	575	194.4	0.05
210	97.7	0.2	430	126.47	0.01	532	157.67	0.02	576	196.1	0.05
220	98.6	0.05	435	127.48	0.01	534	158.71	0.02	577	(197.9)	0.05
230	99.6	0.05	440	128.53	0.01	536	159.77	0.02	578	(199.7)	0.05
240	100.6	0.05	445	129.60	0.01	538	160.88	0.02	579	(201.7)	0.05
250	101.5	0.05	450	130.71	0.01	540	162.02	0.02	580	(203.9)	0.05
260	102.6	0.05	455	131.86	0.01	542	163.20	0.02	581	(206.2)	0.05
270	103.62	0.02	460	133.05	0.01	544	164.43	0.02	582	(208.7)	0.05
280	104.70	0.02	465	134.29	0.01	546	165.71	0.02	583	(211.4)	0.05
290	105.81	0.01	470	135.57	0.01	548	167.04	0.02	584	(214.4)	0.05
300	106.96	0.01	475	136.89	0.01	550	168.43	0.02	585	(217.7)	0.1
310	108.14	0.01	480	138.28	0.01	552	169.88	0.02	586	(221.5)	0.1
320	109.36	0.01	485	139.72	0.01	554	171.40	0.02	587	(225.9)	0.1
330	110.62	0.01	490	141.23	0.01	556	173.00	0.02	588	(231.2)	0.1
340	111.93	0.01	495	142.81	0.01	558	174.68	0.02	589	(237.7)	0.2
350	113.28	0.01	500	144.47	0.01	560	176.45	0.02	590	(246.4)	0.2
360	114.69	0.01	505	146.21	0.01	562	178.33	0.02	591	(261.)	0.5
370	116.15	0.01	510	148.05	0.01	564	180.33	0.02			
380	117.67	0.01	515	150.01	0.01	566	182.47	0.02			
390	119.27	0.01				568	184.76	0.02			

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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

FORZIATI, A.F., GLASGOW, A.R., et al.,	J. Res. Nat. Bur. Stand., Vol. 36, p. 129, 1946.	M
FORZIATI, A.F., ROSSINI, F.D.,	J. Res. Nat. Bur. Stand., Vol. 43, p. 473, 1949.	M
DONALDSON, R.E., QUAYLE, O.R.,	J. Am. Chem. Soc., Vol. 72, p. 35, 1950.	M
FRANCIS, A.W.,	Ind. Eng. Chem., Vol. 49, p. 1779, 1957.	
SIMON, M.,	Bull. Soc. Chim. Belges, Vol. 66, p. 375, 1957.	C
FRANCIS, A.W.,	Chem. Eng. Sci., Vol. 10, p. 37, 1959.	
SHRAIBER, L.S., PECHENYUK, N.G., et al.,	Russ. J. Phys. Chem., Vol. 39, p. 219, 1965.	
PRENGLE, H.W., FELTON, E.G., PIKE, M.A.,	J. Chem. Eng. Data, Vol. 12, p. 193, 1967.	
AKHUNDOV, T.S., IMANOV, Sh. Yu., Izv. Vys. Ucheb. Zaved., Neft Gaz,	Vol. 12, p. 102, 1969.	H
MOPSIK, F.I.,	J. Chem. Phys., Vol. 50, p. 2559, 1969.	
HALES, J.L., TOWNSEND, R.,	J. Chem. Thermodynamics, Vol. 4, p. 763, 1972.	M, H

C₈H₁₀ Ethylbenzene

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.

Molecular Weight	MW =	106.17	
Critical Temperature	$T_c =$	617.20 K	($t_c = 344.05$ °C)
Critical Pressure	$p_c =$	3.599 MPa	($= 35.52$ atm)
Critical Density	$d_c =$	284.00 kg/m ³	($= 0.284$ g/cm ³)
Critical Molar Volume	$V_c =$	374.00 cm ³ /mol	
Critical Compression Factor	$Z_c =$	0.262	

$$b_1 = 1.74537 \quad b_2 = -0.40648 \quad b_3 = -0.40242 \quad b_4 = 0.43382$$

$$\text{Density at } 298.15 \text{ K (25 °C)} = 862.54 \text{ kg/m}^3$$

$$\text{Normal Melting Point } T_m = 178 \text{ K} \quad (t_m = -95 \text{ °C})$$

$$\text{Normal Boiling Point } T_b = 409 \text{ K} \quad (t_b = 136 \text{ °C})$$

Data at Specified Temperatures

$t/^\circ\text{C}$	-95	-55	20	30	136	300	344
$d/(\text{kg/m}^3)$	965.20	931.34	866.91	858.15	759.69	537.61	306.04
$(d(d)/dT)/(\text{kg/m}^3 \text{ } ^\circ\text{C})$	-0.85	-0.85	-0.87	-0.88	-1.00	-2.23	-150.79
$V/(\text{cm}^3/\text{mol})$	109.99	113.99	122.47	123.72	139.75	197.48	346.91
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.10	0.10	0.12	0.13	0.18	0.82	170.93
Data Quality	(C)	B	A	A	B	B	B
Uncertainty in d (kg/m ³)	5	0.5	0.05	0.05	0.5	0.5	20
Uncertainty in V (cm ³ /mol)	1	0.1	0.01	0.01	0.1	0.2	20

Orthobaric Liquid Density of Ethylbenzene

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
-90	(961.)	5	150	746.	0.5	270	595.	0.5	320	485.	1
-80	953.	5	155	740.	0.5	272	592.	0.5	321	482.	1
-70	944.	2	160	735.	0.5	274	588.	0.5	322	478.	1
-60	936.	1	165	730.	0.5	276	585.	0.5	323	475.	1
			170	724.	0.5	278	581.	0.5	324	472.	1
-50	927.	0.5	175	719.	0.5	280	578.	0.5	325	468.	1
-40	919.	0.5	180	714.	0.5	282	574.	0.5	326	464.	1
-30	910.	0.5	185	708.	0.5	284	570.	0.5	327	460.	1
-20	902.	0.5	190	702.	0.5	286	566.	0.5	328	456.	1
-10	892.9	0.2	195	697.	0.5	288	563.	0.5	329	452.	1
0	884.3	0.2	200	691.	0.5	290	559.	0.5	330	448.	1
10	875.6	0.1	205	685.	0.5	292	555.	0.5	331	443.	1
20	866.91	0.05	210	679.	0.5	294	551.	0.5	332	439.	1
30	858.15	0.05	215	673.	0.5	296	546.	0.5	333	434.	1
40	849.3	0.1	220	667.	0.5	298	542.	0.5	334	429.	1
50	840.4	0.1	225	660.	0.5	300	538.	0.5	335	423.	1
60	831.4	0.2	230	654.	0.5	302	533.	0.5	336	417.	1
70	822.4	0.2	235	647.	0.5	304	528.	0.5	337	411.	1
80	813.2	0.2	240	640.	0.5	306	524.	0.5	338	404.	2
90	804.0	0.2	245	633.	0.5	308	519.	0.5	339	396.	2
100	795.	0.5	250	626.	0.5	310	514.	0.5	340	387.	2
110	785.	0.5	255	619.	0.5	312	508.	0.5	341	377.	2
120	775.	0.5	260	611.	0.5	314	503.	0.5	342	365.	2
130	766.	0.5	265	603.	0.5	316	497.	0.5	343	348.	5
140	756.	0.5				318	491.	0.5	344	306.	20

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Orthobaric Liquid Molar Volume of Ethylbenzene

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
			450	148.1	0.1	560	188.0	0.2	600	230.	0.5
			455	149.2	0.1	562	189.3	0.2	601	232.	0.5
			460	150.4	0.1	564	190.6	0.2	602	234.	0.5
			465	151.6	0.1	566	192.0	0.2	603	237.	0.5
180	(110.)	0.5	470	152.9	0.1	568	193.5	0.2	604	239.	0.5
200	112.	0.5	475	154.2	0.1	570	195.0	0.2	605	242.	0.5
220	114.2	0.1	480	155.5	0.1	572	196.5	0.2	606	244.	0.5
240	116.3	0.05	485	156.9	0.1	574	198.2	0.2	607	247.	0.5
260	118.5	0.05	490	158.3	0.1	576	199.9	0.2	608	250.	0.5
280	120.87	0.02	495	159.8	0.1	578	201.7	0.2	609	254.	1
300	123.32	0.01	500	161.4	0.1	580	203.6	0.2	610	258.	1
310	124.59	0.01	505	163.0	0.1	582	205.5	0.2	611	262.	1
320	125.91	0.02	510	164.7	0.1	584	207.6	0.2	612	267.	1
330	127.26	0.02	515	166.5	0.1	586	209.8	0.2	613	273.	1
340	128.65	0.02	520	168.4	0.1	588	212.2	0.2	614	280.	2
350	130.1	0.05	525	170.4	0.1	590	214.6	0.2	615	289.	2
360	131.6	0.05	530	172.4	0.1	592	217.3	0.2	616	303.	2
370	133.1	0.05	535	174.6	0.2	594	220.	0.5	617	332.	10
380	134.7	0.05	540	176.9	0.2	596	223.	0.5			
390	136.4	0.1	545	179.4	0.2	598	227.	0.5			
400	138.1	0.1	550	182.1	0.2						
410	139.9	0.1	555	184.9	0.2						
420	141.8	0.1									
430	143.8	0.1									
440	145.9	0.1									

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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

MASSART, L.,
FORZIATI, A.F., ROSSINI, F.D.,
DONALDSON, R.E., QUAYLE, O.R.,
SIMON, M.,
PETRO, A.J., SMYTH, C.P.,
FRANCIS, A.W.,
HALES, J.L., TOWNSEND, R.,

Bull.Soc.Chim.Belges, Vol.45, p.76, 1936.
J.Res.Nat.Bur.Stand., Vol.43, p.473, 1949.
J.Am.Chem.Soc., Vol.72, p.35, 1950.
Bull.Soc.Chim.Belges, Vol.66, p.375, 1957.
J.Am.Chem.Soc., Vol.80, p.732, 1958.
Chem.Eng.Sci., Vol.10, p.37, 1959.
J.Chem.Thermodynamics, Vol.4, p.763, 1972.

C

M,H

C₈H₁₀ 1,2-Dimethylbenzene (2-Methyltoluene, o-Xylene)**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.

Molecular Weight	MW = 106.17		
Critical Temperature	$T_c = 630.33 \text{ K}$	($t_c = 357.18 \text{ }^\circ\text{C}$)	
Critical Pressure	$p_c = 3.734 \text{ MPa}$	($= 36.85 \text{ atm}$)	
Critical Density	$d_c = 288.00 \text{ kg/m}^3$	($= 0.288 \text{ g/cm}^3$)	
Critical Molar Volume	$V_c = 369.00 \text{ cm}^3/\text{mol}$		
Critical Compression Factor	$Z_c = 0.263$		
$b_1 = 1.74368$	$b_2 = -0.37721$	$b_3 = -0.45045$	$b_4 = 0.44024$
Density at 298.15 K (25 °C)	$= 875.94 \text{ kg/m}^3$		
Normal Melting Point	$T_m = 248 \text{ K}$	($t_m = -25 \text{ }^\circ\text{C}$)	
Normal Boiling Point	$T_b = 417 \text{ K}$	($t_b = 144 \text{ }^\circ\text{C}$)	

Data at Specified Temperatures

$t/^\circ\text{C}$	-25	20	30	144	300	350	357
$d/(\text{kg/m}^3)$	917.24	880.12	871.74	769.78	570.98	416.63	322.48
$(d(d)/dT)/(\text{kg/m}^3 \text{ }^\circ\text{C})$	-0.82	-0.84	-0.84	-0.97	-1.93	-6.64	-66.41
$V/(\text{cm}^3/\text{mol})$	115.75	120.63	121.79	137.92	185.94	254.82	329.22
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.10	0.11	0.12	0.17	0.63	4.06	67.80
Data Quality	(B)	A	A	A	B	B	B
Uncertainty in d (kg/m^3)	0.5	0.05	0.05	0.05	0.5	1	10
Uncertainty in V (cm^3/mol)	0.1	0.01	0.01	0.01	0.2	1	10

Orthobaric Liquid Density of 1,2-DimethylbenzeneUnits: 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
			200	711.8	0.2	300	571.	0.5	340	466.	1
			205	706.2	0.2	302	567.	0.5	341	462.	1
			210	700.5	0.2	304	563.	0.5	342	458.	1
-20	913.	0.5	215	694.7	0.2	306	559.	0.5	343	454.	1
-10	905.	0.5	220	688.8	0.2	308	555.	0.5	344	449.	1
0	896.7	0.2	225	682.8	0.2	310	551.	0.5	345	445.	1
10	888.5	0.2	230	676.6	0.2	312	546.	0.5	346	440.	1
20	880.12	0.05	235	670.4	0.2	314	542.	0.5	347	434.	1
30	871.74	0.05	240	664.0	0.2	316	537.	0.5	348	429.	1
40	863.3	0.05	245	657.4	0.2	318	532.	0.5	349	423.	1
50	854.8	0.05	250	650.7	0.2	320	527.	0.5	350	417.	1
60	846.2	0.05	255	643.8	0.2	322	522.	0.5	351	410.	2
70	837.5	0.05	260	636.8	0.2	324	517.	0.5	352	402.	2
80	828.8	0.05	265	630.	0.5	326	512.	0.5	353	393.	2
90	819.9	0.05	270	622.	0.5	328	506.	0.5	354	383.	2
100	810.9	0.05	275	614.	0.5	330	500.	0.5	355	371.	2
110	801.8	0.05	280	606.	0.5	332	494.	1	356	355.	5
120	792.6	0.05	285	598.	0.5	334	488.	1	357	322.	10
130	783.2	0.05	290	589.	0.5	336	481.	1			
140	773.6	0.05	295	580.	0.5	338	474.	1			
150	763.9	0.05									
160	754.0	0.1									
170	743.8	0.1									
180	733.5	0.1									
190	722.8	0.1									

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Orthobaric Liquid Molar Volume of 1,2-Dimethylbenzene

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
250	(115.9)	0.05	500	156.0	0.05	590	198.4	0.2	620	244.	0.5
260	117.0	0.05	505	157.4	0.05	592	200.2	0.2	621	247.	0.5
270	118.1	0.05	510	158.9	0.05	594	202.1	0.2	622	250.	1
280	119.15	0.02	515	160.5	0.05	596	204.1	0.2	623	254.	1
290	120.27	0.01	520	162.1	0.05	598	206.2	0.2	624	258.	1
300	121.42	0.01	525	163.8	0.1	600	208.4	0.2	625	263.	1
310	122.60	0.01	530	165.6	0.1	602	210.8	0.2	626	269.	1
320	123.81	0.01	535	167.4	0.1	604	213.3	0.2	627	276.	2
330	125.06	0.01	540	169.4	0.1	606	216.0	0.2	628	284.	2
340	126.35	0.01	545	171.5	0.1	608	219.	0.5	629	297.	2
350	127.68	0.01	550	173.6	0.1	610	222.	0.5	630	321.	10
360	129.05	0.01	555	176.0	0.1	612	226.	0.5			
370	130.47	0.01	560	178.5	0.1	614	229.	0.5			
380	131.93	0.01	565	181.1	0.2	616	234.	0.5			
390	133.46	0.01	570	184.0	0.2	618	238.	0.5			
400	135.04	0.01	575	187.1	0.2						
410	136.69	0.01	580	190.5	0.2						
420	138.42	0.01	585	194.3	0.2						
430	140.22	0.01									
440	142.11	0.02									
450	144.10	0.02									
460	146.20	0.02									
470	148.42	0.02									
480	150.8	0.05									
490	153.3	0.05									

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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

MASSART, L.,	Bull. Soc. Chim. Belges, Vol. 45, p. 76, 1936.	
FORZIATI, A.F., GLASGOW, A.R., et al.,	J. Res. Nat. Bur. Stand., Vol. 36, p. 129, 1946.	M
FORZIATI, A.F., ROSSINI, F.D.,	J. Res. Nat. Bur. Stand., Vol. 43, p. 473, 1949.	M
DONALDSON, R.E., QUAYLE, O.R.,	J. Am. Chem. Soc., Vol. 72, p. 35, 1950.	
FRANCIS, A.W.,	Ind. Eng. Chem., Vol. 49, p. 1779, 1957.	
SIMON, M.,	Bull. Soc. Chim. Belges, Vol. 66, p. 375, 1957.	C
PETRO, A.J., SMYTH, C.P.,	J. Am. Chem. Soc., Vol. 80, p. 732, 1958.	
FRANCIS, A.W.,	Chem. Eng. Sci., Vol. 10, p. 37, 1959.	
SHRAIBER, L.S., PECHENYUK, N.G., et al.,	Russ. J. Phys. Chem., Vol. 39, p. 219, 1965.	M
AKHUNDOV, T.S., IMANOV, Sh. Yu.,	Russ. J. Phys. Chem., Vol. 43, p. 872, 1969.	M, H
HALES, J.L., TOWNSEND, R.,	J. Chem. Thermodynamics, Vol. 4, p. 763, 1972.	M, H

C₈H₁₀ 1,3-Dimethylbenzene (3-Methyltoluene, m-Xylene)**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.

Molecular Weight	MW =	106.17		
Critical Temperature	$T_c =$	617.05 K	($t_c =$	343.90 °C)
Critical Pressure	$p_c =$	3.537 MPa	($=$	34.91 atm)
Critical Density	$d_c =$	283.00 kg/m ³	($=$	0.283 g/cm ³)
Critical Molar Volume	$V_c =$	375.00 cm ³ /mol		
Critical Compression Factor	$Z_c =$	0.259		
$b_1 =$	1.75014	$b_2 =$	-0.36074	$b_3 =$ -0.48974 $b_4 =$ 0.46373
Density at 298.15 K (25 °C)		=	859.92 kg/m ³	
Normal Melting Point	$T_m =$	225 K	($t_m =$	-48 °C)
Normal Boiling Point	$T_b =$	412 K	($t_b =$	139 °C)

Data at Specified Temperatures

$t/^\circ\text{C}$	-48	20	30	139	300	340	343.85
$d/(\text{kg/m}^3)$	920.95	864.18	855.64	756.28	537.82	385.35	305.05
$(d(d)/dT)/(\text{kg/m}^3 \text{ } ^\circ\text{C})$	-0.82	-0.85	-0.86	-0.99	-2.25	-9.61	-151.04
$V/(\text{cm}^3/\text{mol})$	115.28	122.85	124.08	140.38	197.40	275.51	348.03
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.10	0.12	0.12	0.18	0.83	6.87	172.32
Data Quality	(B)	A	A	A	B	B	B
Uncertainty in d (kg/m ³)	0.5	0.05	0.05	0.05	0.5	2	20
Uncertainty in V (cm ³ /mol)	0.1	0.01	0.01	0.01	0.2	1	20

Orthobaric Liquid Density of 1,3-DimethylbenzeneUnits: kg/m³ v. °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
-40	(914.)	0.5	200	691.2	0.2	300	538.	0.5	330	447.	1
-30	(906.)	0.5	205	685.3	0.2	302	533.	0.5	331	443.	1
-20	(898.)	0.5	210	679.3	0.2	304	529.	0.5	332	438.	1
-10	(889.5)	0.2	215	673.2	0.2	306	524.	0.5	333	433.	1
			220	667.0	0.2	308	519.	0.5	334	427.	1
0	881.1	0.2	225	660.6	0.2	310	514.	0.5	335	422.	1
10	872.7	0.1	230	654.1	0.2	312	508.	0.5	336	416.	1
20	864.18	0.05	235	647.5	0.2	314	503.	0.5	337	409.	1
30	855.64	0.05	240	640.7	0.2	316	497.	0.5	338	402.	2
40	847.0	0.05	245	633.7	0.2	318	491.	0.5	339	394.	2
50	838.4	0.05	250	626.5	0.2	320	485.	1	340	385.	2
60	829.6	0.05	255	619.1	0.2	322	478.	1	341	375.	2
70	820.7	0.05	260	611.5	0.2	324	471.	1	342	362.	2
80	811.8	0.05	265	604.	0.5	326	464.	1	343	343.	5
90	802.7	0.05	270	595.	0.5	328	456.	1			
100	793.5	0.05	275	587.	0.5						
110	784.2	0.05	280	578.	0.5						
120	774.7	0.05	285	569.	0.5						
130	765.1	0.05	290	559.	0.5						
140	755.3	0.05	295	549.	0.5						
150	745.3	0.05									
160	735.0	0.1									
170	724.5	0.1									
180	713.7	0.1									
190	702.6	0.1									

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Orthobaric Liquid Molar Volume of 1,3-Dimethylbenzene

Units: cm³/mol v. K

$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$
230	(115.8)	0.05	450	148.04	0.02	560	187.8	0.2	600	231.	0.5
240	(116.8)	0.05	455	149.17	0.02	562	189.1	0.2	601	233.	0.5
			460	150.34	0.02	564	190.5	0.2	602	235.	0.5
			465	151.55	0.02	566	191.9	0.2	603	237.	0.5
			470	152.80	0.02	568	193.4	0.2	604	240.	0.5
250	(117.9)	0.05	475	154.1	0.05	570	194.9	0.2	605	242.	0.5
260	(119.0)	0.05	480	155.4	0.05	572	196.5	0.2	606	245.	0.5
270	(120.14)	0.02	485	156.8	0.05	574	198.1	0.2	607	248.	0.5
280	121.29	0.02	490	158.2	0.05	576	199.8	0.2	608	251.	0.5
290	122.47	0.01	495	159.7	0.05	578	201.6	0.2	609	255.	1
300	123.69	0.01	500	161.3	0.05	580	203.5	0.2	610	259.	1
310	124.94	0.01	505	162.9	0.05	582	205.5	0.2	611	263.	1
320	126.22	0.01	510	164.6	0.05	584	207.6	0.2	612	268.	1
330	127.55	0.01	515	166.4	0.05	586	209.8	0.2	613	274.	1
340	128.91	0.01	520	168.2	0.1	588	212.2	0.2	614	282.	2
350	130.33	0.01	525	170.2	0.1	590	214.7	0.2	615	292.	2
360	131.79	0.01	530	172.3	0.1	592	217.4	0.2	616	306.	5
370	133.30	0.01	535	174.5	0.1	594	220.	0.5	617	348.	20
380	134.87	0.01	540	176.8	0.1	596	223.	0.5			
390	136.51	0.01	545	179.3	0.1	598	227.	0.5			
400	138.21	0.01	550	181.9	0.1						
410	139.99	0.01	555	184.8	0.1						
420	141.85	0.01									
430	143.81	0.02									
440	145.86	0.02									

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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

MASSART, L.,	Bull. Soc. Chim. Belges, Vol. 45, p. 76, 1936.	
FORZIATI, A.F., ROSSINI, F.D.,	J. Res. Nat. Bur. Stand., Vol. 43, p. 473, 1949.	M
FRANCIS, A.W.,	Ind. Eng. Chem., Vol. 49, p. 1779, 1957.	
SIMON, M.,	Bull. Soc. Chim. Belges, Vol. 66, p. 375, 1957.	C
PETRO, A.J., SMYTH, C.P.,	J. Am. Chem. Soc., Vol. 80, p. 732, 1958.	
FRANCIS, A.W.,	Chem. Eng. Sci., Vol. 10, p. 37, 1959.	
SHRAIBER, L.S., PECHENYUK, N.G., et al.,	Russ. J. Phys. Chem., Vol. 39, p. 219, 1965.	M
MAMEDOV, A.M., AKHUNDOV, T.S., et al.,	Thermal Engineering, Vol. 14, p. 108, 1967.	M, H
HALES, J.L., TOWNSEND, R.,	J. Chem. Thermodynamics, Vol. 4, p. 763, 1972.	M, H

C_8H_{10} 1,4-Dimethylbenzene (4-Methyltoluene, p-Xylene)

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.

Molecular Weight	MW	=	106.17		
Critical Temperature	T_c	=	616.23 K	(t_c	= 343.08 °C)
Critical Pressure	p_c	=	3.514 MPa	(	= 34.68 atm)
Critical Density	d_c	=	282.00 kg/m ³	(	= 0.282 g/cm ³)
Critical Molar Volume	V_c	=	376.00 cm ³ /mol		
Critical Compression Factor	Z_c	=	0.258		

$$b_1 = 1.75286 \quad b_2 = -0.38453 \quad b_3 = -0.46614 \quad b_4 = 0.46614$$

$$\text{Density at 298.15 K (25 °C)} = 856.59 \text{ kg/m}^3$$

$$\text{Normal Melting Point} \quad T_m = 286 \text{ K} \quad (t_m = 13 \text{ °C})$$

$$\text{Normal Boiling Point} \quad T_b = 411 \text{ K} \quad (t_b = 138 \text{ °C})$$

Data at Specified Temperatures

$t/^\circ\text{C}$	13	20	30	138	300	340	343
$d/(\text{kg/m}^3)$	866.91	860.90	852.27	753.20	533.56	375.57	307.85
$(d(d)/dT)/(\text{kg/m}^3 \text{ } ^\circ\text{C})$	-0.86	-0.86	-0.87	-0.99	-2.26	-11.05	-111.10
$V/(\text{cm}^3/\text{mol})$	122.47	123.32	124.57	140.95	198.98	282.69	344.86
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.12	0.12	0.13	0.19	0.84	8.32	124.46
Data Quality	(A)	A	A	A	B	B	B
Uncertainty in d (kg/m ³)	0.05	0.05	0.05	0.05	0.5	2	20
Uncertainty in V (cm ³ /mol)	0.01	0.01	0.01	0.01	0.2	2	20

Orthobaric Liquid Density of 1,4-Dimethylbenzene

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
			200	687.0	0.2	300	534.	0.5	330	442.	1
			205	681.1	0.2	302	529.	0.5	331	437.	1
20	860.90	0.05	210	675.1	0.2	304	524.	0.5	332	432.	1
30	852.27	0.05	215	669.0	0.2	306	519.	0.5	333	427.	1
40	843.6	0.05	220	662.8	0.2	308	514.	0.5	334	421.	1
50	834.8	0.05	225	656.4	0.2	310	509.	0.5	335	415.	1
60	826.0	0.05	230	649.9	0.2	312	504.	0.5	336	409.	1
70	817.0	0.05	235	643.3	0.2	314	498.	0.5	337	402.	2
80	808.0	0.05	240	636.5	0.2	316	492.	0.5	338	394.	2
90	798.9	0.05	245	629.5	0.2	318	486.	0.5	339	386.	2
100	789.7	0.05	250	622.3	0.2	320	480.	1	340	376.	2
110	780.3	0.05	255	614.9	0.2	322	473.	1	341	363.	2
120	770.8	0.05	260	607.3	0.2	324	466.	1	342	346.	5
130	761.1	0.05	265	599.	0.5	326	459.	1	343	308.	20
140	751.2	0.05	270	591.	0.5	328	450.	1			
150	741.2	0.05	275	583.	0.5						
160	730.9	0.1	280	574.	0.5						
170	720.3	0.1	285	565.	0.5						
180	709.5	0.1	290	555.	0.5						
190	698.4	0.1	295	545.	0.5						

Orthobaric Liquid Molar Volume of 1,4-Dimethylbenzene

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
			500	162.3	0.05	590	216.7	0.2	610	263.	1
			505	164.0	0.05	592	219.5	0.2	611	268.	1
			510	165.7	0.05	594	222.	0.5	612	274.	1
			515	167.5	0.05	596	226.	0.5	613	281.	2
290	122.93	0.01	520	169.4	0.1	598	229.	0.5	614	291.	2
300	124.17	0.01	525	171.3	0.1	600	233.	0.5	615	304.	2
310	125.45	0.01	530	173.4	0.1	602	238.	0.5	616	333.	10
320	126.75	0.01	535	175.7	0.1	604	243.	0.5			
330	128.10	0.01	540	178.0	0.1	606	248.	0.5			
340	129.49	0.01	545	180.5	0.1	608	255.	1			
350	130.93	0.01	550	183.2	0.1						
360	132.41	0.01	555	186.1	0.1						
370	133.95	0.01	560	189.2	0.2						
380	135.55	0.01	565	192.7	0.2						
390	137.21	0.01	570	196.4	0.2						
400	138.94	0.01	575	200.6	0.2						
410	140.74	0.01	580	205.2	0.2						
420	142.63	0.01	585	210.6	0.2						
430	144.61	0.02									
440	146.70	0.02									
450	148.91	0.02									
460	151.24	0.02									
470	153.73	0.02									
480	156.4	0.05									
490	159.2	0.05									

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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

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FORZIATI, A.F., ROSSINI, F.D.,	J. Res. Nat. Bur. Stand., Vol. 43, p. 473, 1949.	M
DONALDSON, R.E., QUAYLE, O.R.,	J. Am. Chem. Soc., Vol. 72, p. 35, 1950.	
FRANCIS, A.W.,	Ind. Eng. Chem., Vol. 49, p. 1779, 1957.	
SIMON, M.,	Bull. Soc. Chim. Belges, Vol. 66, p. 375, 1957.	C
PETRO, A.J., SMYTH, C.P.,	J. Am. Chem. Soc., Vol. 80, p. 732, 1958.	
FRANCIS, A.W.,	Chem. Eng. Sci., Vol. 10, p. 37, 1959.	
SHRAIBER, L.S., KUKOLENKO, O.V.,	Russ. J. Phys. Chem., Vol. 39, p. 281, 1965.	M
SHRAIBER, L.S., PECHENYUK, N.G., et al.,	Russ. J. Phys. Chem., Vol. 39, p. 219, 1965.	
AKHUNDOV, T.S., IMANOV, Sh.-Yu., Izv. Vys. Ucheb. Zaved., Neft Gaz, Vol. 12, p. 66, 1969.		M, H
HALES, J.L., TOWNSEND, R.,	J. Chem. Thermodynamics, Vol. 4, p. 763, 1972.	M, H

C₉H₁₂ Propylbenzene (1-Phenylpropane)

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.

Molecular Weight	MW = 120.19	
Critical Temperature	$T_c = 638.32$ K	($t_c = 365.17$ °C)
Critical Pressure	$p_c = 3.200$ MPa	($= 31.58$ atm)
Critical Density	$d_c = 277.00$ kg/m ³	($= 0.277$ g/cm ³)
Critical Molar Volume	$V_c = 433.91$ cm ³ /mol	
Critical Compression Factor	$Z_c = 0.262$	

$$b_1 = 1.77259 \quad b_2 = -0.42715 \quad b_3 = -0.41897 \quad b_4 = 0.45674$$

$$\text{Density at } 298.15 \text{ K (25 °C)} = 857.85 \text{ kg/m}^3$$

$$\text{Normal Melting Point } T_m = 173 \text{ K} \quad (t_m = -100 \text{ °C})$$

$$\text{Normal Boiling Point } T_b = 432 \text{ K} \quad (t_b = 159 \text{ °C})$$

Data at Specified Temperatures

$t/^\circ\text{C}$	-100	-50	20	30	159	300	365
$d/(\text{kg/m}^3)$	960.50	919.71	862.03	853.67	738.80	565.78	309.88
$(d(d)/dT)/(\text{kg/m}^3 \text{ } ^\circ\text{C})$	-0.82	-0.82	-0.83	-0.84	-0.97	-1.74	-66.96
$V/(\text{cm}^3/\text{mol})$	125.14	130.69	139.43	140.80	162.69	212.44	387.87
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.11	0.12	0.13	0.14	0.21	0.65	83.81
Data Quality	(C)	B	A	A	B	B	B
Uncertainty in d (kg/m ³)	5	0.5	0.05	0.05	0.5	0.5	10
Uncertainty in V (cm ³ /mol)	1	0.1	0.01	0.01	0.1	0.2	20

Orthobaric Liquid Density of Propylbenzene

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
-100	(961.)	5	200	697.	0.5	320	527.	0.5	350	442.	1
-80	944.	5	205	692.	0.5	322	523.	0.5	351	438.	1
-60	928.	2	210	686.	0.5	324	519.	0.5	352	434.	1
-40	912.	0.5	215	681.	0.5	326	514.	0.5	353	429.	1
-20	895.	0.5	220	675.	0.5	328	509.	0.5	354	424.	1
0	878.6	0.2	225	669.	0.5	330	504.	0.5	355	419.	1
10	870.4	0.1	230	664.	0.5	332	499.	0.5	356	414.	1
20	862.03	0.05	235	658.	0.5	334	494.	0.5	357	408.	1
30	853.67	0.05	240	652.	0.5	336	489.	0.5	358	402.	1
40	845.3	0.1	245	646.	0.5	338	483.	0.5	359	395.	1
50	836.8	0.1	250	639.	0.5	340	477.	0.5	360	388.	2
60	828.3	0.2	255	633.	0.5	342	471.	1	361	379.	2
70	819.7	0.2	260	626.	0.5	344	464.	1	362	370.	2
80	811.0	0.2	265	619.	0.5	346	457.	1	363	358.	2
90	802.3	0.2	270	612.	0.5	348	450.	1	364	342.	5
100	793.4	0.2	275	605.	0.5				365	310.	10
110	784.5	0.2	280	598.	0.5						
120	775.	0.5	285	590.	0.5						
130	766.	0.5	290	582.	0.5						
140	757.	0.5	295	574.	0.5						
150	747.	0.5	300	566.	0.5						
160	738.	0.5	305	557.	0.5						
170	728.	0.5	310	548.	0.5						
180	718.	0.5	315	538.	0.5						
190	708.	0.5									

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Orthobaric Liquid Molar Volume of Propylbenzene

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
180	126.	0.5	450	166.7	0.1	570	210.4	0.2	620	265.	0.5
			455	167.8	0.1	572	211.7	0.2	621	267.	0.5
			460	169.1	0.1	574	213.0	0.2	622	269.	0.5
			465	170.3	0.1	576	214.3	0.2	623	272.	0.5
			470	171.6	0.1	578	215.7	0.2	624	274.	0.5
200	128.	0.5	475	172.9	0.1	580	217.2	0.2	625	277.	0.5
220	130.3	0.1	480	174.2	0.1	582	218.6	0.2	626	280.	0.5
240	132.7	0.05	485	175.6	0.1	584	220.2	0.2	627	283.	0.5
260	135.1	0.05	490	177.1	0.1	586	221.7	0.2	628	286.	1
280	137.68	0.02	495	178.6	0.1	588	223.4	0.2	629	290.	1
300	140.36	0.01	500	180.1	0.1	590	225.1	0.2	630	294.	1
310	141.75	0.01	505	181.7	0.1	592	226.9	0.2	631	298.	1
320	143.18	0.02	510	183.4	0.1	594	228.7	0.2	632	303.	1
330	144.65	0.02	515	185.1	0.1	596	230.7	0.2	633	309.	1
340	146.15	0.02	520	186.9	0.1	598	232.7	0.2	634	316.	2
350	147.7	0.05	525	188.7	0.1	600	234.8	0.2	635	324.	2
360	149.3	0.05	530	190.7	0.1	602	237.0	0.2	636	334.	2
370	151.0	0.05	535	192.7	0.2	604	239.3	0.2	637	349.	5
380	152.7	0.05	540	194.8	0.2	606	241.8	0.2	638	378.	10
390	154.4	0.05	545	197.1	0.2	608	244.4	0.2			
400	156.3	0.1	550	199.5	0.2	610	247.	0.5			
410	158.2	0.1	555	202.0	0.2	612	250.	0.5			
420	160.2	0.1	560	204.6	0.2	614	253.	0.5			
430	162.2	0.1	565	207.4	0.2	616	257.	0.5			
440	164.4	0.1				618	261.	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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

MASSART, L.,
FORZIATI, A.F., ROSSINI, F.D.,
SIMON, M.,

Bull.Soc.Chim.Belges, Vol.45, p.76, 1936. L,M
J.Res.Nat.Bur.Stand., Vol.43, p.473, 1949. M
Bull.Soc.Chim.Belges, Vol.66, p.375, 1957. C

C₉H₁₂ Isopropylbenzene (2-Phenylpropane, Cumene)

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.

Molecular Weight	MW = 120.19		
Critical Temperature	$T_c = 631.13 \text{ K}$	($t_c = 357.98 \text{ }^\circ\text{C}$)	
Critical Pressure	$p_c = 3.209 \text{ MPa}$	($= 31.67 \text{ atm}$)	
Critical Density	$d_c = 279.00 \text{ kg/m}^3$	($= 0.279 \text{ g/cm}^3$)	
Critical Molar Volume	$V_c = 430.80 \text{ cm}^3/\text{mol}$		
Critical Compression Factor	$Z_c = 0.263$		
$b_1 = 1.74735$	$b_2 = -0.40893$	$b_3 = -0.40116$	$b_4 = 0.43592$
Density at 298.15 K (25 °C)	$= 854.34 \text{ kg/m}^3$		
Normal Melting Point	$T_m = 177 \text{ K}$	($t_m = -96 \text{ }^\circ\text{C}$)	
Normal Boiling Point	$T_b = 425 \text{ K}$	($t_b = 152 \text{ }^\circ\text{C}$)	

Data at Specified Temperatures

$t/^\circ\text{C}$	-96	-45	20	30	152	300	357.85
$d/(\text{kg/m}^3)$	954.25	912.49	858.55	850.12	740.58	554.25	308.86
$(d(d)/dT)/(\text{kg/m}^3 \text{ }^\circ\text{C})$	-0.82	-0.82	-0.84	-0.85	-0.98	-1.86	-79.29
$V/(\text{cm}^3/\text{mol})$	125.96	131.72	140.00	141.39	162.30	216.86	389.15
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.11	0.12	0.14	0.14	0.21	0.73	99.90
Data Quality	(C)	(B)	A	A	A	B	(B)
Uncertainty in d (kg/m^3)	5	0.5	0.05	0.05	0.05	0.5	20
Uncertainty in V (cm^3/mol)	1	0.1	0.01	0.01	0.01	0.2	20

Orthobaric Liquid Density of Isopropylbenzene

Units: 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	(941.)	5	200	691.2	0.1	320	512.	0.5	350	408.	1
-60	(925.)	2	205	685.6	0.2	322	508.	0.5	351	402.	1
-40	(908.)	0.5	210	680.0	0.2	324	503.	0.5	352	395.	2
-20	(892.)	0.5	215	674.4	0.2	326	498.	0.5	353	388.	2
			220	668.6	0.2	328	492.	0.5	354	379.	2
0	(875.3)	0.2	225	662.7	0.2	330	487.	0.5	355	369.	2
10	(866.9)	0.1	230	656.7	0.2	332	481.	0.5	356	(357.)	2
20	858.55	0.05	235	650.6	0.2	334	475.	0.5	357	(340.)	5
30	850.12	0.05	240	644.3	0.2	336	468.	1			
40	841.6	0.05	245	638.0	0.2	338	462.	1			
50	833.1	0.05	250	631.4	0.2	340	454.	1			
60	824.5	0.05	255	624.7	0.2	342	447.	1			
70	815.8	0.05	260	617.9	0.2	344	439.	1			
80	807.0	0.05	265	610.8	0.2	346	430.	1			
90	798.2	0.05	270	604.	0.5	348	420.	1			
100	789.2	0.05	275	596.	0.5						
110	780.1	0.05	280	588.	0.5						
120	771.0	0.05	285	580.	0.5						
130	761.6	0.05	290	572.	0.5						
140	752.2	0.05	295	563.	0.5						
150	742.5	0.05	300	554.	0.5						
160	732.7	0.05	305	545.	0.5						
170	722.7	0.1	310	535.	0.5						
180	712.4	0.1	315	524.	0.5						
190	701.9	0.1									

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Orthobaric Liquid Molar Volume of Isopropylbenzene

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
			450	167.94	0.02	570	214.6	0.2	620	282.	0.5
			455	169.16	0.02	572	216.0	0.2	621	286.	1
			460	170.42	0.02	574	217.5	0.2	622	290.	1
			465	171.71	0.02	576	219.0	0.2	623	294.	1
180	(126.)	1	470	173.04	0.02	578	220.5	0.2	624	298.	1
200	(128.)	0.5	475	174.4	0.05	580	222.2	0.2	625	303.	1
220	(130.8)	0.2	480	175.8	0.05	582	223.8	0.2	626	309.	1
240	(133.1)	0.1	485	177.3	0.05	584	225.6	0.2	627	316.	2
260	(135.6)	0.05	490	178.8	0.05	586	227.4	0.2	628	324.	2
280	(138.22)	0.02	495	180.4	0.05	588	229.3	0.2	629	(335.)	2
300	140.94	0.01	500	182.0	0.05	590	231.2	0.2	630	(351.)	5
310	142.36	0.01	505	183.7	0.05	592	233.3	0.2	631	(389.)	20
320	143.81	0.01	510	185.4	0.05	594	235.5	0.2			
330	145.30	0.01	515	187.2	0.05	596	237.7	0.2			
340	146.84	0.01	520	189.1	0.1	598	240.1	0.2			
350	148.43	0.01	525	191.1	0.1	600	242.7	0.2			
360	150.06	0.01	530	193.2	0.1	602	245.4	0.2			
370	151.75	0.01	535	195.3	0.1	604	248.	0.5			
380	153.50	0.01	540	197.6	0.1	606	251.	0.5			
390	155.32	0.01	545	200.0	0.1	608	255.	0.5			
400	157.20	0.01	550	202.6	0.1	610	258.	0.5			
410	159.16	0.01	555	205.3	0.1	612	262.	0.5			
420	161.21	0.01	560	208.2	0.2	614	266.	0.5			
430	163.34	0.01	565	211.3	0.2	616	271.	0.5			
440	165.59	0.02				618	276.	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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

FORZIATI, A.F., GLASGOW, A.R., et.al.,	J. Res. Nat. Bur. Stand., Vol. 36, p. 129, 1946.	M
FORZIATI, A.F., ROSSINI, F.D.,	J. Res. Nat. Bur. Stand., Vol. 43, p. 473, 1949.	M
DONALDSON, R.E., QUAYLE, O.R.,	J. Am. Chem. Soc., Vol. 72, p. 35, 1950.	
PETRO, A.J., SMYTH, C.P.,	J. Am. Chem. Soc., Vol. 80, p. 732, 1958.	
HALES, J.L., TOWNSEND, R.,	J. Chem. Thermodynamics, Vol. 4, p. 763, 1972.	M, H

C₉H₁₂ 1-Methyl-2-ethylbenzene (2-Ethyltoluene)

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.

Molecular Weight	MW =	120.19	
Critical Temperature	T_c =	647.15 K	(t_c = 374.00 °C)
Critical Pressure	p_c =	3.285 MPa	(= 32.42 atm)
Critical Density	d_c =	282.00 kg/m ³	(= 0.282 g/cm ³)
Critical Molar Volume	V_c =	426.22 cm ³ /mol	
Critical Compression Factor	Z_c =	0.260	

$$b_1 = 1.81068 \quad b_2 = -0.53979 \quad b_3 = -0.28086 \quad b_4 = 0.38593$$

$$\text{Density at 298.15 K (25 °C)} = 876.60 \text{ kg/m}^3$$

$$\text{Normal Melting Point} \quad T_m = 192 \text{ K} \quad (t_m = -81 \text{ °C})$$

$$\text{Normal Boiling Point} \quad T_b = 438 \text{ K} \quad (t_b = 165 \text{ °C})$$

Data at Specified Temperatures

$t/^\circ\text{C}$	-81	20	30	165	300	370	373.85
$d/(\text{kg/m}^3)$	961.97	880.71	872.48	753.64	591.64	385.57	314.52
$(d(d)/dT)/(\text{kg/m}^3 \text{ °C})$	-0.80	-0.82	-0.82	-0.97	-1.64	-9.40	-74.77
$V/(\text{cm}^3/\text{mol})$	124.95	136.47	137.76	159.48	203.15	311.73	382.15
$(dV/dT)/(\text{cm}^3/\text{mol °C})$	0.10	0.13	0.13	0.20	0.56	7.60	90.85
Data Quality	(B)	A	A	(B)	(B)	(B)	(B)
Uncertainty in d (kg/m ³)	0.5	0.05	0.05	0.5	0.5	2	10
Uncertainty in V (cm ³ /mol)	0.1	0.01	0.01	0.1	0.2	2	20

Orthobaric Liquid Density of 1-Methyl-2-ethylbenzene

Units: kg/m³ v. °C

Uncert. in d			Uncert. in d			Uncert. in d			Uncert. in d		
t	d		t	d		t	d		t	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
-80	(961.)	0.5	200	(718.)	0.5	320	(556.)	0.5	360	(446.)	1
-60	(945.)	0.5	205	(713.)	0.5	322	(552.)	0.5	361	(442.)	1
-40	(929.)	0.5	210	(708.)	0.5	324	(548.)	0.5	362	(437.)	1
-20	(913.2)	0.2	215	(702.)	0.5	326	(544.)	0.5	363	(432.)	1
			220	(697.)	0.5	328	(540.)	0.5	364	(427.)	1
0	(897.0)	0.2	225	(691.)	0.5	330	(535.)	0.5	365	(421.)	1
10	(888.9)	0.1	230	(686.)	0.5	332	(531.)	0.5	366	(415.)	1
20	880.71	0.05	235	(680.)	0.5	334	(526.)	0.5	367	(409.)	1
30	872.48	0.05	240	(674.)	0.5	336	(521.)	0.5	368	(402.)	2
40	(864.2)	0.1	245	(668.)	0.5	338	(516.)	0.5	369	(394.)	2
50	(855.9)	0.1	250	(662.)	0.5	340	(511.)	0.5	370	(386.)	2
60	(847.5)	0.1	255	(656.)	0.5	342	(506.)	0.5	371	(375.)	2
70	(839.0)	0.2	260	(649.)	0.5	344	(501.)	0.5	372	(363.)	2
80	(830.5)	0.2	265	(643.)	0.5	346	(495.)	0.5	373	(345.)	5
90	(821.9)	0.2	270	(636.)	0.5	348	(489.)	0.5			
100	(813.2)	0.2	275	(629.)	0.5	350	(483.)	1			
110	(804.4)	0.2	280	(622.)	0.5	352	(477.)	1			
120	(795.5)	0.2	285	(615.)	0.5	354	(470.)	1			
130	(786.)	0.5	290	(607.)	0.5	356	(462.)	1			
140	(777.)	0.5	295	(600.)	0.5	358	(455.)	1			
150	(768.)	0.5	300	(592.)	0.5						
160	(758.)	0.5	305	(583.)	0.5						
170	(749.)	0.5	310	(575.)	0.5						
180	(739.)	0.5	315	(566.)	0.5						
190	(729.)	0.5									

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Orthobaric Liquid Molar Volume of 1-Methyl-2-ethylbenzene

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	(125.8)	0.1	500	(174.4)	0.1	610	(231.5)	0.2	640	(293.)	1
220	(127.9)	0.05	505	(175.8)	0.1	612	(233.7)	0.2	641	(298.)	1
240	(130.1)	0.05	510	(177.3)	0.1	614	(236.0)	0.2	642	(304.)	1
260	(132.4)	0.05	515	(178.9)	0.1	616	(238.5)	0.2	643	(311.)	2
280	(134.83)	0.02	520	(180.5)	0.1	618	(241.2)	0.2	644	(319.)	2
300	137.35	0.01	525	(182.2)	0.1	620	(244.)	0.5	645	(329.)	2
310	(138.66)	0.01	530	(184.0)	0.1	622	(247.)	0.5	646	(345.)	5
320	(140.00)	0.02	535	(185.8)	0.1	624	(250.)	0.5	647	(382.)	20
330	(141.38)	0.02	540	(187.7)	0.1	626	(254.)	0.5			
340	(142.80)	0.02	545	(189.7)	0.1	628	(258.)	0.5			
350	(144.25)	0.02	550	(191.8)	0.2	630	(262.)	0.5			
360	(145.8)	0.05	555	(194.0)	0.2	632	(266.)	0.5			
370	(147.3)	0.05	560	(196.3)	0.2	634	(272.)	0.5			
380	(148.9)	0.05	565	(198.8)	0.2	636	(278.)	0.5			
390	(150.6)	0.05	570	(201.4)	0.2	638	(285.)	1			
400	(152.3)	0.05	575	(204.2)	0.2						
410	(154.1)	0.1	580	(207.2)	0.2						
420	(155.9)	0.1	585	(210.4)	0.2						
430	(157.8)	0.1	590	(213.9)	0.2						
440	(159.9)	0.1	595	(217.6)	0.2						
450	(162.0)	0.1	600	(221.8)	0.2						
460	(164.2)	0.1	605	(226.3)	0.2						
470	(166.5)	0.1									
480	(169.0)	0.1									
490	(171.6)	0.1									

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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

FORZIATI, A.F., ROSSINI, F.D.,

J. Res. Nat. Bur. Stand., Vol. 43, p. 473, 1949. M

C₉H₁₂ 1-Methyl-3-ethylbenzene (3-Ethyltoluene)**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.

Molecular Weight	MW = 120.19		
Critical Temperature	$T_c = 637.15$ K	($t_c = 364.00$ °C)	
Critical Pressure	$P_c = 3.150$ MPa	($= 31.09$ atm)	
Critical Density	$d_c = 277.00$ kg/m ³	($= 0.277$ g/cm ³)	
Critical Molar Volume	$V_c = 433.91$ cm ³ /mol		
Critical Compression Factor	$Z_c = 0.258$		

$$b_1 = 1.82145 \quad b_2 = -0.54973 \quad b_3 = -0.28222 \quad b_4 = 0.39097$$

$$\text{Density at } 298.15 \text{ K (25 °C)} = 860.41 \text{ kg/m}^3$$

$$\text{Normal Melting Point } T_m = 177 \text{ K} \quad (t_m = -96 \text{ °C})$$

$$\text{Normal Boiling Point } T_b = 434 \text{ K} \quad (t_b = 161 \text{ °C})$$

Data at Specified Temperatures

$t/^\circ\text{C}$	-96	20	30	161	300	360	363.85
$d/(\text{kg/m}^3)$	958.23	864.54	856.27	740.10	567.84	379.94	309.31
$(d(d)/dT)/(\text{kg/m}^3 \text{ } ^\circ\text{C})$	-0.80	-0.82	-0.83	-0.97	-1.77	-9.34	-74.30
$V/(\text{cm}^3/\text{mol})$	125.43	139.03	140.37	162.40	211.67	316.35	388.59
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.10	0.13	0.14	0.21	0.66	7.78	93.35
Data Quality	(B)	A	A	(B)	(B)	(B)	(B)
Uncertainty in d (kg/m ³)	0.5	0.05	0.05	0.5	0.5	2	10
Uncertainty in V (cm ³ /mol)	0.1	0.01	0.01	0.1	0.2	2	20

Orthobaric Liquid Density of 1-Methyl-3-ethylbenzeneUnits: kg/m³ v. °C

Uncert. in d			Uncert. in d			Uncert. in d			Uncert. in d		
t	d		t	d		t	d		t	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
-80	(945.)	0.5	200	(700.)	0.5	320	(529.)	0.5	350	(440.)	1
-60	(929.)	0.5	205	(695.)	0.5	322	(524.)	0.5	351	(436.)	1
-40	(913.)	0.5	210	(689.)	0.5	324	(520.)	0.5	352	(431.)	1
-20	(897.2)	0.2	215	(684.)	0.5	326	(515.)	0.5	353	(426.)	1
0	(880.9)	0.2	220	(678.)	0.5	328	(510.)	0.5	354	(421.)	1
10	(872.8)	0.1	225	(673.)	0.5	330	(505.)	0.5	355	(416.)	1
20	864.54	0.05	230	(667.)	0.5	332	(500.)	0.5	356	(410.)	1
30	856.27	0.05	235	(661.)	0.5	334	(494.)	0.5	357	(403.)	1
40	(847.9)	0.1	240	(655.)	0.5	336	(489.)	0.5	358	(396.)	2
50	(839.6)	0.1	245	(648.)	0.5	338	(483.)	0.5	359	(389.)	2
60	(831.1)	0.1	250	(642.)	0.5	340	(477.)	0.5	360	(380.)	2
70	(822.6)	0.2	255	(636.)	0.5	342	(470.)	1	361	(370.)	2
80	(814.0)	0.2	260	(629.)	0.5	344	(464.)	1	362	(357.)	2
90	(805.3)	0.2	265	(622.)	0.5	346	(456.)	1	363	(340.)	5
100	(796.5)	0.2	270	(615.)	0.5	348	(449.)	1			
110	(787.6)	0.2	275	(608.)	0.5						
120	(778.6)	0.2	280	(600.)	0.5						
130	(769.)	0.5	285	(593.)	0.5						
140	(760.)	0.5	290	(585.)	0.5						
150	(751.)	0.5	295	(576.)	0.5						
160	(741.)	0.5	300	(568.)	0.5						
170	(731.)	0.5	305	(559.)	0.5						
180	(721.)	0.5	310	(549.)	0.5						
190	(711.)	0.5	315	(539.)	0.5						

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Orthobaric Liquid Molar Volume of 1-Methyl-3-ethylbenzene

Units: cm^3/mol v. K

$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$
			450 (165.9)	0.1		570 (209.6)	0.2		620 (265.)	0.5	
			455 (167.1)	0.1		572 (210.9)	0.2		621 (268.)	0.5	
			460 (168.3)	0.1		574 (212.2)	0.2		622 (270.)	0.5	
			465 (169.5)	0.1		576 (213.6)	0.2		623 (273.)	0.5	
180 (125.7)	0.1		470 (170.8)	0.1		578 (215.0)	0.2		624 (275.)	0.5	
200 (127.9)	0.05		475 (172.1)	0.1		580 (216.4)	0.2		625 (278.)	0.5	
220 (130.1)	0.05		480 (173.5)	0.1		582 (217.9)	0.2		626 (282.)	0.5	
240 (132.4)	0.05		485 (174.8)	0.1		584 (219.5)	0.2		627 (285.)	1	
260 (134.80)	0.02		490 (176.3)	0.1		586 (221.1)	0.2		628 (289.)	1	
280 (137.31)	0.02		495 (177.8)	0.1		588 (222.7)	0.2		629 (293.)	1	
300 139.94	0.01		500 (179.3)	0.1		590 (224.5)	0.2		630 (297.)	1	
310 (141.31)	0.01		505 (180.9)	0.1		592 (226.3)	0.2		631 (302.)	1	
320 (142.71)	0.02		510 (182.5)	0.1		594 (228.2)	0.2		632 (308.)	1	
330 (144.16)	0.02		515 (184.2)	0.1		596 (230.1)	0.2		633 (315.)	2	
340 (145.64)	0.02		520 (186.0)	0.1		598 (232.2)	0.2		634 (324.)	2	
350 (147.2)	0.05		525 (187.9)	0.1		600 (234.4)	0.2		635 (335.)	2	
360 (148.7)	0.05		530 (189.8)	0.1		602 (236.6)	0.2		636 (351.)	5	
370 (150.4)	0.05		535 (191.9)	0.2		604 (239.0)	0.2		637 (389.)	20	
380 (152.1)	0.05		540 (194.0)	0.2		606 (241.6)	0.2				
390 (153.8)	0.05		545 (196.2)	0.2		608 (244.3)	0.2				
400 (155.6)	0.05		550 (198.6)	0.2		610 (247.)	0.5				
410 (157.5)	0.1		555 (201.1)	0.2		612 (250.)	0.5				
420 (159.5)	0.1		560 (203.8)	0.2		614 (254.)	0.5				
430 (161.5)	0.1		565 (206.6)	0.2		616 (257.)	0.5				
440 (163.7)	0.1					618 (261.)	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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

FORZIATI, A.F., ROSSINI, F.D.,

J. Res. Nat. Bur. Stand., Vol. 43, p. 473, 1949.

M

C₉H₁₂ 1-Methyl-4-ethylbenzene (4-Ethyltoluene)**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.

Molecular Weight	MW =	120.19	
Critical Temperature	$T_c =$	638.15 K	($t_c = 365.00\text{ }^\circ\text{C}$)
Critical Pressure	$P_c =$	3.100 MPa	($= 30.59\text{ atm}$)
Critical Density	$d_c =$	276.00 kg/m ³	($= 0.276\text{ g/cm}^3$)
Critical Molar Volume	$V_c =$	435.48 cm ³ /mol	
Critical Compression Factor	$Z_c =$	0.254	

$$b_1 = 1.81931 \quad b_2 = -0.54776 \quad b_3 = -0.28195 \quad b_4 = 0.38997$$

$$\text{Density at } 298.15\text{ K (25 }^\circ\text{C)} = 857.06\text{ kg/m}^3$$

$$\text{Normal Melting Point} \quad T_m = 211\text{ K} \quad (t_m = -62\text{ }^\circ\text{C})$$

$$\text{Normal Boiling Point} \quad T_b = 435\text{ K} \quad (t_b = 162\text{ }^\circ\text{C})$$

Data at Specified Temperatures

$t/^\circ\text{C}$	-62	20	30	162	300	360	364.85
$d/(\text{kg/m}^3)$	927.22	861.17	852.95	736.62	567.03	387.04	308.13
$(d(d)/dT)/(\text{kg/m}^3\text{ }^\circ\text{C})$	-0.80	-0.82	-0.82	-0.97	-1.74	-8.10	-73.90
$V/(\text{cm}^3/\text{mol})$	129.63	139.57	140.92	163.17	211.97	310.54	390.07
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.11	0.13	0.14	0.21	0.65	6.50	93.56
Data Quality	(B)	A	A	(B)	(B)	(B)	(B)
Uncertainty in d (kg/m ³)	0.5	0.05	0.05	0.5	0.5	2	10
Uncertainty in V (cm ³ /mol)	0.1	0.01	0.01	0.1	0.2	1	20

Orthobaric Liquid Density of 1-Methyl-4-ethylbenzeneUnits: kg/m³ v. °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
			200 (698.)	0.5		320 (528.)	0.5		350 (443.)	1	
			205 (693.)	0.5		322 (524.)	0.5		351 (438.)	1	
-60 (926.)	0.5		210 (687.)	0.5		324 (520.)	0.5		352 (434.)	1	
-40 (910.)	0.5		215 (682.)	0.5		326 (515.)	0.5		353 (429.)	1	
-20 (893.6)	0.2		220 (676.)	0.5		328 (510.)	0.5		354 (424.)	1	
0 (877.5)	0.2		225 (671.)	0.5		330 (505.)	0.5		355 (419.)	1	
10 (869.3)	0.1		230 (665.)	0.5		332 (500.)	0.5		356 (414.)	1	
20 861.17	0.05		235 (659.)	0.5		334 (495.)	0.5		357 (408.)	1	
30 852.95	0.05		240 (653.)	0.5		336 (490.)	0.5		358 (402.)	1	
40 (844.7)	0.1		245 (647.)	0.5		338 (484.)	0.5		359 (395.)	2	
50 (836.3)	0.1		250 (640.)	0.5		340 (478.)	0.5		360 (387.)	2	
60 (828.0)	0.1		255 (634.)	0.5		342 (472.)	1		361 (378.)	2	
70 (819.5)	0.2		260 (627.)	0.5		344 (465.)	1		362 (368.)	2	
80 (810.9)	0.2		265 (621.)	0.5		346 (458.)	1		363 (356.)	2	
90 (802.3)	0.2		270 (614.)	0.5		348 (451.)	1		364 (338.)	5	
100 (793.6)	0.2		275 (607.)	0.5							
110 (784.8)	0.2		280 (599.)	0.5							
120 (775.8)	0.2		285 (592.)	0.5							
130 (767.)	0.5		290 (584.)	0.5							
140 (757.)	0.5		295 (576.)	0.5							
150 (748.)	0.5		300 (567.)	0.5							
160 (739.)	0.5		305 (558.)	0.5							
170 (729.)	0.5		310 (549.)	0.5							
180 (719.)	0.5		315 (539.)	0.5							
190 (709.)	0.5										

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Orthobaric Liquid Molar Volume of 1-Methyl-4-ethylbenzene

Units: cm³/mol v. K

$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$	$\frac{T}{K}$	$\frac{V}{\text{cm}^3/\text{mol}}$	Uncert. in $\frac{V}{\text{cm}^3/\text{mol}}$
220	(130.6)	0.1	500	(179.8)	0.1	600	(234.3)	0.2	630	(294.)	1
240	(132.9)	0.05	505	(181.4)	0.1	602	(236.5)	0.2	631	(299.)	1
260	(135.3)	0.05	510	(183.0)	0.1	604	(238.9)	0.2	632	(304.)	1
280	(137.85)	0.02	515	(184.7)	0.1	606	(241.3)	0.2	633	(310.)	1
			520	(186.5)	0.1	608	(244.0)	0.2	634	(316.)	2
300	140.49	0.01	525	(188.4)	0.1	610	(247.)	0.5	635	(325.)	2
310	(141.86)	0.01	530	(190.3)	0.1	612	(250.)	0.5	636	(336.)	2
320	(143.26)	0.02	535	(192.3)	0.1	614	(253.)	0.5	637	(352.)	5
330	(144.71)	0.02	540	(194.5)	0.2	616	(256.)	0.5	638	(390.)	20
340	(146.19)	0.02	545	(196.7)	0.2	618	(260.)	0.5			
350	(147.7)	0.05	550	(199.0)	0.2	620	(264.)	0.5			
360	(149.3)	0.05	555	(201.5)	0.2	622	(269.)	0.5			
370	(150.9)	0.05	560	(204.2)	0.2	624	(274.)	0.5			
380	(152.6)	0.05	565	(207.0)	0.2	626	(280.)	0.5			
390	(154.4)	0.05	570	(210.0)	0.2	628	(286.)	1			
400	(156.2)	0.05	575	(213.2)	0.2						
410	(158.1)	0.1	580	(216.7)	0.2						
420	(160.0)	0.1	585	(220.5)	0.2						
430	(162.1)	0.1	590	(224.6)	0.2						
440	(164.2)	0.1	595	(229.2)	0.2						
450	(166.5)	0.1									
460	(168.8)	0.1									
470	(171.3)	0.1									
480	(174.0)	0.1									
490	(176.8)	0.1									

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 shown in bold type together with the temperature range (low 'L', medium 'M', high 'H' or critical 'C') of the data.

FORZIATI, A.F., ROSSINI, F.D.,

J. Res. Nat. Bur. Stand., Vol. 43, p. 473, 1949.

M

C₉H₁₂ 1,2,3-Trimethylbenzene (Hemimellitene)

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.

Molecular Weight	MW = 120.19		
Critical Temperature	$T_c = 664.47$ K	($t_c = 391.32$ °C)	
Critical Pressure	$p_c = 3.454$ MPa	($= 34.09$ atm)	
Critical Density	$d_c = 284.00$ kg/m ³	($= 0.284$ g/cm ³)	
Critical Molar Volume	$V_c = 423.22$ cm ³ /mol		
Critical Compression Factor	$Z_c = 0.265$		
$b_1 = 1.80434$	$b_2 = -0.43223$	$b_3 = -0.46483$	$b_4 = 0.46483$
Density at 298.15 K (25 °C)	$= 890.45$ kg/m ³		
Normal Melting Point	$T_m = 248$ K	($t_m = -25$ °C)	
Normal Boiling Point	$T_b = 449$ K	($t_b = 176$ °C)	

Data at Specified Temperatures

$t/^\circ\text{C}$	-25	20	30	176	300	390	391
$d/(\text{kg/m}^3)$	929.29	894.37	886.51	762.97	622.72	353.60	326.21
$(d(d)/dT)/(\text{kg/m}^3 \text{ } ^\circ\text{C})$	-0.77	-0.78	-0.79	-0.94	-1.46	-18.83	-46.05
$V/(\text{cm}^3/\text{mol})$	129.34	134.39	135.58	157.53	193.02	339.92	368.45
$(dV/dT)/(\text{cm}^3/\text{mol } ^\circ\text{C})$	0.11	0.12	0.12	0.19	0.45	18.10	52.01
Data Quality	(B)	A	A	(B)	(B)	(B)	(B)
Uncertainty in d (kg/m ³)	0.5	0.05	0.05	0.5	0.5	5	10
Uncertainty in V (cm ³ /mol)	0.1	0.01	0.01	0.1	0.2	5	10

Orthobaric Liquid Density of 1,2,3-Trimethylbenzene

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
			200 (740.)	0.5		320 (592.)	0.5		370 (477.)	1	
			205 (735.)	0.5		322 (588.)	0.5		371 (474.)	1	
			210 (730.)	0.5		324 (585.)	0.5		372 (470.)	1	
-20 (925.)	0.5		215 (725.)	0.5		326 (581.)	0.5		373 (467.)	1	
-10 (918.)	0.5		220 (720.)	0.5		328 (578.)	0.5		374 (463.)	1	
0 910.0	0.2		225 (714.)	0.5		330 (574.)	0.5		375 (459.)	1	
10 902.2	0.2		230 (709.)	0.5		332 (570.)	0.5		376 (455.)	1	
20 894.37	0.05		235 (704.)	0.5		334 (566.)	0.5		377 (451.)	1	
30 886.51	0.05		240 (698.)	0.5		336 (563.)	0.5		378 (446.)	1	
40 (878.6)	0.1		245 (693.)	0.5		338 (559.)	0.5		379 (441.)	1	
50 (870.7)	0.1		250 (687.)	0.5		340 (555.)	0.5		380 (436.)	1	
60 (862.6)	0.1		255 (681.)	0.5		342 (551.)	0.5		381 (431.)	1	
70 (854.6)	0.2		260 (675.)	0.5		344 (546.)	0.5		382 (426.)	1	
80 (846.4)	0.2		265 (669.)	0.5		346 (542.)	0.5		383 (420.)	1	
90 (838.2)	0.2		270 (663.)	0.5		348 (538.)	0.5		384 (414.)	1	
100 (829.9)	0.2		275 (657.)	0.5		350 (533.)	0.5		385 (407.)	2	
110 (821.5)	0.2		280 (650.)	0.5		352 (528.)	0.5		386 (399.)	2	
120 (813.0)	0.2		285 (644.)	0.5		354 (523.)	0.5		387 (391.)	2	
130 (804.4)	0.2		290 (637.)	0.5		356 (518.)	0.5		388 (381.)	2	
140 (796.)	0.5		295 (630.)	0.5		358 (513.)	0.5		389 (369.)	2	
150 (787.)	0.5		300 (623.)	0.5		360 (508.)	0.5		390 (354.)	5	
160 (778.)	0.5		305 (615.)	0.5		362 (502.)	0.5		391 (326.)	10	
170 (769.)	0.5		310 (608.)	0.5		364 (497.)	0.5				
180 (759.)	0.5		315 (600.)	0.5		366 (491.)	0.5				
190 (750.)	0.5					368 (484.)	1				

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