

3.Tabulated Data on Density - Ethers

3.1 Saturated Monoethers

3.1.1 Saturated Monoethers, C₂ - C₆

Dimethyl ether

[115-10-6]

C₂H₆O

MW = 46.07

510

$T_c = 400.10\text{ K}$ [1923-car/bru]
 $\rho_c = 271.00\text{ kg}\cdot\text{m}^{-3}$ [1923-car/cop]

Table 1. Coefficients for the polynomial expansion equations. Standard deviations (see introduction): $\sigma_l = 9.0724 \cdot 10^{-1}$ (low temperature range), $\sigma_{c,w} = (9.8507 \cdot 10^{-1})$ combined temperature ranges, weighted), $\sigma_{c,uw} = 2.9416 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 273.35\text{ to }325.00\text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$	$T = 325.00\text{ to }400.10\text{ K}$ $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)]$ $[\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$
A	$5.34731 \cdot 10^2$	$7.49492 \cdot 10^{-1}$
B	2.45391	$-1.54841 \cdot 10^{-2}$
C	$-6.81116 \cdot 10^{-3}$	$1.41635 \cdot 10^{-4}$
D		$-4.38594 \cdot 10^{-7}$

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg}\cdot\text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg}\cdot\text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg}\cdot\text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg}\cdot\text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
273.35	693.00 ± 1.00	-3.58	1923-car/cop(Δ)	285.55	680.50 ± 0.50	0.43	1936-pal/maa(\bigcirc)
303.00	645.80 ± 1.00	-7.14	1923-car/cop ¹⁾	287.00	678.40 ± 0.50	0.43	1936-pal/maa(\bigcirc)
329.20	601.20 ± 1.00	-3.30	1923-car/cop(Δ)	293.70	668.00 ± 0.50	0.08	1936-pal/maa(\bigcirc)
353.30	552.20 ± 1.50	-0.90	1923-car/cop(Δ)	295.70	664.70 ± 0.60	-0.09	1936-pal/maa(\bigcirc)
369.67	504.20 ± 1.50	-4.92	1923-car/cop(Δ)	299.15	659.30 ± 0.50	0.02	1936-pal/maa(\bigcirc)
383.65	455.00 ± 1.50	-2.32	1923-car/cop(Δ)	305.35	648.50 ± 0.60	-0.47	1936-pal/maa(\bigcirc)
389.05	430.80 ± 1.50	0.64	1923-car/cop(Δ)	308.20	644.30 ± 0.50	0.25	1936-pal/maa(\bigcirc)
394.27	395.00 ± 2.00	-0.36	1923-car/cop(Δ)	314.20	633.20 ± 0.60	-0.14	1936-pal/maa(\bigcirc)
397.34	364.60 ± 2.00	-0.70	1923-car/cop(Δ)	324.15	615.30 ± 0.60	0.81	1936-pal/maa(\bigcirc)
398.16	351.80 ± 3.00	-2.27	1923-car/cop(Δ)	333.30	597.50 ± 0.70	1.22	1936-pal/maa(\bigcirc)
399.16	329.30 ± 4.00	-6.08	1923-car/cop(Δ)	344.80	573.60 ± 0.70	1.30	1936-pal/maa(\bigcirc)
399.65	309.80 ± 4.00	-11.14	1923-car/cop ¹⁾	348.15	566.40 ± 0.70	1.47	1936-pal/maa(\bigcirc)
280.55	687.70 ± 0.50	0.62	1936-pal/maa(\bigcirc)	360.40	535.50 ± 0.70	0.04	1936-pal/maa(\bigcirc)
281.05	687.20 ± 0.50	0.81	1936-pal/maa(\bigcirc)	363.90	525.40 ± 0.80	-0.63	1936-pal/maa(\bigcirc)
281.95	685.70 ± 0.50	0.55	1936-pal/maa(\bigcirc)	370.55	506.00 ± 0.80	-0.37	1936-pal/maa(\bigcirc)
284.45	681.80 ± 0.50	0.16	1936-pal/maa(\bigcirc)	375.65	488.50 ± 0.80	-0.78	1936-pal/maa(\bigcirc)

cont.

Dimethyl ether (cont.)

Table 2. (cont.)

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
384.25	455.90 ± 1.00	1.31	1936-pal/maa(○)	393.20	404.80 ± 2.00	1.20	1936-pal/maa(○)
385.10	451.90 ± 1.00	1.30	1936-pal/maa(○)	293.15	668.90 ± 0.60	0.14	1953-ano-5(□)
387.55	440.50 ± 1.50	2.16	1936-pal/maa(○)				

¹⁾ Not included in Fig. 1.

Further references: [1922-maa/boo, 1928-stu, 1940-gro/wac, 1951-dem/sun, 1968-ano, 1986-cal/reb].

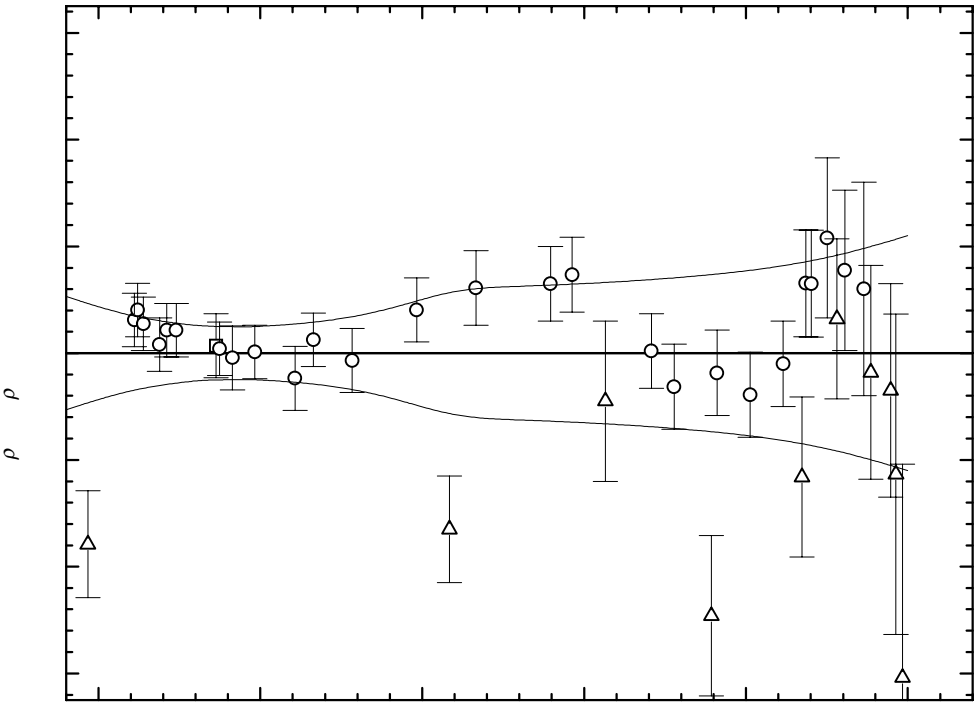


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

cont.

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	700.75 ± 1.06	310.00	640.89 ± 0.58	370.00	508.10 ± 1.47
280.00	687.83 ± 0.67	320.00	622.52 ± 0.81	380.00	472.85 ± 1.61
290.00	673.55 ± 0.51	330.00	602.90 ± 1.21	390.00	424.65 ± 1.84
293.15	668.76 ± 0.50	340.00	582.52 ± 1.25	400.00	301.01 ± 2.20
298.15	660.90 ± 0.49	350.00	560.76 ± 1.30		
300.00	657.90 ± 0.50	360.00	536.50 ± 1.37		

Ethyl methyl ether

[540-67-0]

C₃H₈O

MW = 60.1

511

$T_c = 437.80 \text{ K}$ [1924-ber/bru]
 $\rho_c = 272.00 \text{ kg} \cdot \text{m}^{-3}$ [1924-ber/bru]

Table 1. Coefficients for the polynomial expansion equations. Standard deviations (see introduction): $\sigma_\nu = 1.5748$ (low temperature range), $\sigma_{c,w} = (1.5120 \text{ combined temperature ranges, weighted})$, $\sigma_{c,uw} = 4.1659 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 273.15 \text{ to } 352.00 \text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$	$T = 352.00 \text{ to } 437.80 \text{ K}$ $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)]$ $[\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$
A	$1.10852 \cdot 10^3$	1.28859
B	-1.39893	$-4.33343 \cdot 10^{-2}$
C		$5.79269 \cdot 10^{-4}$
D		$-2.66938 \cdot 10^{-6}$

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
273.15	725.10 ± 1.00	-1.30	1888-dob(○)	367.65	588.30 ± 1.00	-0.75	1924-ber/bru(□)
273.15	726.00 ± 1.00	-0.40	1924-ber/bru(□)	392.45	540.60 ± 1.00	1.03	1924-ber/bru(□)
286.75	706.20 ± 1.00	-1.18	1924-ber/bru(□)	403.15	516.00 ± 1.00	0.18	1924-ber/bru(□)
294.25	697.30 ± 1.00	0.42	1924-ber/bru(□)	411.55	492.70 ± 1.00	-0.63	1924-ber/bru(□)
305.45	682.50 ± 1.00	1.28	1924-ber/bru(□)	418.35	469.00 ± 1.00	-1.40	1924-ber/bru(□)
315.05	670.10 ± 1.00	2.31	1924-ber/bru(□)	423.35	448.80 ± 1.50	-0.39	1924-ber/bru(□)
323.85	657.00 ± 1.00	1.53	1924-ber/bru(□)	427.65	430.60 ± 1.50	4.20	1924-ber/bru(□)
351.45	614.20 ± 1.00	-2.66	1924-ber/bru(□)	431.35	413.60 ± 2.00	12.31	1924-ber/bru ¹⁾

¹⁾ Not included in Fig. 1.

Ethyl methyl ether (cont.)

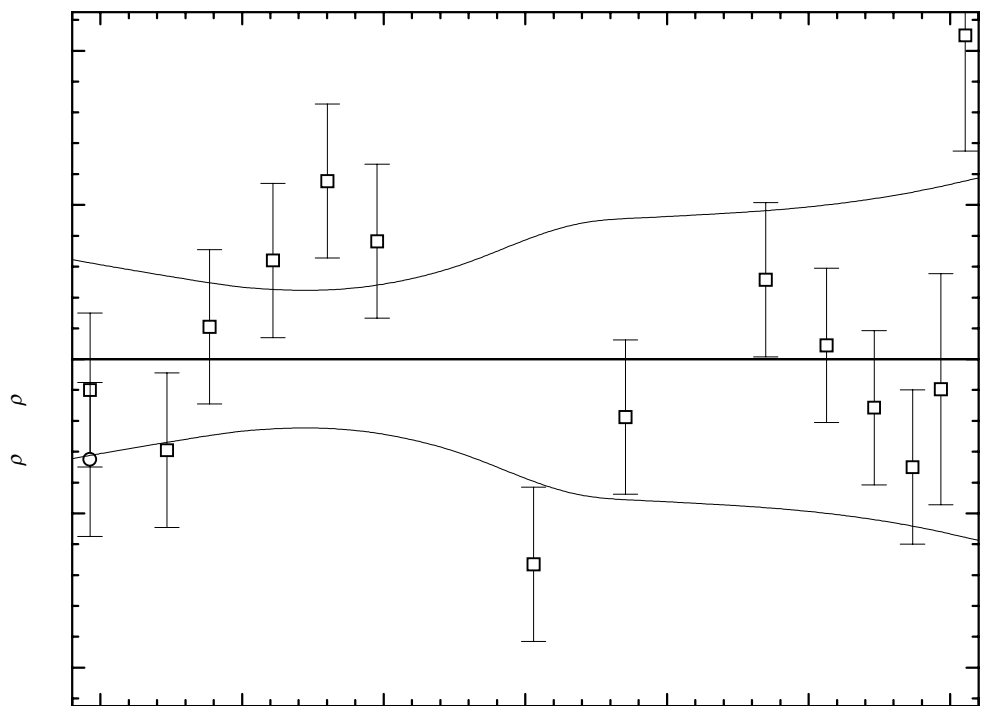


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	730.81 ± 1.29	320.00	660.86 ± 0.91	390.00	544.63 ± 1.91
280.00	716.82 ± 1.16	330.00	646.87 ± 1.03	400.00	523.21 ± 1.97
290.00	702.83 ± 1.04	340.00	632.88 ± 1.24	410.00	497.87 ± 2.06
293.15	698.42 ± 1.00	350.00	618.89 ± 1.56	420.00	463.89 ± 2.18
298.15	691.43 ± 0.95	360.00	603.27 ± 1.80	430.00	411.25 ± 2.35
300.00	688.84 ± 0.93	370.00	584.49 ± 1.83		
310.00	674.85 ± 0.88	380.00	564.74 ± 1.87		

Diethyl ether

[60-29-7]

C₄H₁₀O

MW = 74.12

512

$T_c = 466.70\text{ K}$ [1967-zaw]
 $\rho_c = 262.00\text{ kg}\cdot\text{m}^{-3}$ [1967-zaw]

Table 1. Coefficients for the polynomial expansion equations. Standard deviations (see introduction): $\sigma_{\text{v}} = 5.5135 \cdot 10^{-1}$ (low temperature range), $\sigma_{\text{c,w}} = (3.8239 \cdot 10^{-1})$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 3.7964 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 149.85\text{ to }370.00\text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$	$T = 370.00\text{ to }466.70\text{ K}$ $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)]$ $[\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$
A	$1.04971 \cdot 10^3$	1.08479
B	-1.50622	$-2.50768 \cdot 10^{-2}$
C	$2.52614 \cdot 10^{-3}$	$2.50968 \cdot 10^{-4}$
D	$-4.42809 \cdot 10^{-6}$	$-9.04918 \cdot 10^{-7}$

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
213.03	800.78 ± 0.50	0.11	1907-tim(X)	465.10	344.80 ± 4.00	10.87	1910-you-1(X)
273.55	736.22 ± 0.20	0.15	1907-tim(X)	466.10	330.00 ± 5.00	17.13	1910-you-1(X)
273.15	736.25 ± 0.20	-0.27	1910-tim(O)	273.15	736.25 ± 0.20	-0.27	1912-tim(Δ)
288.15	719.23 ± 0.20	-0.26	1910-tim(O)	149.85	865.38 ± 1.00	-0.45	1912-tim-1(X)
273.10	736.20 ± 0.60	-0.37	1910-you-1 ¹⁾	156.95	858.44 ± 1.00	0.03	1912-tim-1(X)
283.10	724.80 ± 0.60	-0.49	1910-you-1 ¹⁾	161.55	853.65 ± 1.00	0.01	1912-tim-1(X)
293.10	713.50 ± 0.60	-0.25	1910-you-1 ¹⁾	168.30	846.96 ± 1.00	0.31	1912-tim-1(X)
303.10	701.90 ± 0.60	-0.04	1910-you-1 ¹⁾	178.65	836.79 ± 1.00	0.79	1912-tim-1(X)
313.10	689.40 ± 0.60	-0.44	1910-you-1 ¹⁾	189.75	825.19 ± 1.00	0.59	1912-tim-1 ¹⁾
323.10	676.40 ± 0.60	-1.00	1910-you-1 ¹⁾	198.90	815.54 ± 1.00	0.33	1912-tim-1 ¹⁾
333.10	665.80 ± 0.60	1.18	1910-you-1 ¹⁾	199.20	815.00 ± 1.00	0.09	1912-tim-1 ¹⁾
343.10	653.20 ± 0.80	1.75	1910-you-1 ¹⁾	209.85	804.40 ± 1.00	0.45	1912-tim-1(X)
353.10	640.20 ± 0.80	2.32	1910-you-1 ¹⁾	219.55	794.59 ± 1.00	0.67	1912-tim-1 ¹⁾
363.10	625.00 ± 0.80	1.13	1910-you-1(X)	228.15	785.40 ± 1.00	0.43	1912-tim-1 ¹⁾
373.10	610.50 ± 0.80	1.16	1910-you-1(X)	235.95	777.07 ± 1.00	0.29	1912-tim-1 ¹⁾
383.10	594.20 ± 0.80	0.66	1910-you-1(X)	237.85	775.20 ± 1.00	0.42	1912-tim-1 ¹⁾
393.10	576.40 ± 0.80	-0.43	1910-you-1(X)	242.55	769.94 ± 1.00	0.14	1912-tim-1(X)
403.10	558.00 ± 1.00	-1.40	1910-you-1(X)	250.20	761.32 ± 1.00	-0.31	1912-tim-1(X)
413.10	538.50 ± 1.00	-2.40	1910-you-1(X)	260.05	750.92 ± 1.00	-0.05	1912-tim-1(X)
423.10	517.90 ± 1.00	-2.49	1910-you-1(X)	266.95	742.85 ± 1.00	-0.55	1912-tim-1 ¹⁾
433.10	494.70 ± 1.50	-1.60	1910-you-1(X)	273.15	736.27 ± 1.00	-0.25	1912-tim-1 ¹⁾
443.10	465.80 ± 1.50	-0.38	1910-you-1(X)	288.55	718.86 ± 1.00	-0.17	1912-tim-1 ¹⁾
453.10	426.80 ± 2.00	1.26	1910-you-1(X)	198.15	818.00 ± 1.00	2.02	1917-jae-1 ¹⁾
458.10	401.80 ± 2.00	3.81	1910-you-1(X)	252.65	758.00 ± 1.00	-1.00	1917-jae-1(X)
463.10	366.30 ± 3.00	7.34	1910-you-1(X)	273.35	735.00 ± 1.00	-1.29	1917-jae-1 ¹⁾

¹⁾ Not included in Fig. 1.

cont.

Diethyl ether (cont.)

Table 2. (cont.)

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
298.45	707.00 ± 1.00	-0.47	1917-jae-1 ¹⁾	393.10	582.20 ± 1.00	5.37	1955-kay/don(×)
302.65	703.00 ± 1.00	0.52	1917-jae-1 ¹⁾	403.10	563.30 ± 1.50	3.90	1955-kay/don(×)
153.15	861.93 ± 0.20	-0.44	1922-tay/smi(×)	413.10	543.50 ± 1.50	2.60	1955-kay/don(×)
163.15	851.90 ± 0.20	-0.08	1922-tay/smi(×)	423.10	521.00 ± 1.50	0.61	1955-kay/don(×)
193.15	821.39 ± 0.20	0.27	1922-tay/smi(×)	433.10	495.40 ± 1.50	-0.90	1955-kay/don(×)
198.15	816.38 ± 0.20	0.40	1922-tay/smi(×)	443.10	465.70 ± 2.00	-0.48	1955-kay/don(×)
203.15	811.12 ± 0.20	0.27	1922-tay/smi(×)	453.10	430.40 ± 2.00	4.86	1955-kay/don(×)
223.15	790.30 ± 0.20	0.12	1922-tay/smi(×)	463.10	386.70 ± 4.00	27.74	1955-kay/don ¹⁾
228.15	785.08 ± 0.20	0.11	1922-tay/smi(×)	466.56	265.00 ± 5.00	-27.92	1955-kay/don ¹⁾
233.15	779.68 ± 0.20	-0.05	1922-tay/smi(×)	293.15	713.61 ± 0.10	-0.08	1983-hal/gun(□)
238.15	774.23 ± 0.20	-0.23	1922-tay/smi(×)	298.15	707.82 ± 0.10	-0.00	1983-hal/gun(□)
273.15	736.27 ± 0.20	-0.25	1922-tay/smi(×)	303.15	701.85 ± 0.10	-0.03	1983-hal/gun(□)
293.15	713.47 ± 0.20	-0.22	1922-tay/smi(×)	308.15	695.91 ± 0.10	0.04	1983-hal/gun(□)
308.15	695.74 ± 0.20	-0.13	1922-tay/smi(×)	313.15	689.87 ± 0.10	0.09	1983-hal/gun(□)
313.15	689.77 ± 0.20	-0.01	1922-tay/smi(×)	330.00	668.98 ± 0.12	0.36	1983-hal/gun(□)
328.15	671.14 ± 0.20	0.15	1922-tay/smi(×)	350.00	642.21 ± 0.12	0.08	1983-hal/gun(□)
333.15	664.99 ± 0.20	0.44	1922-tay/smi(×)	370.00	613.45 ± 0.15	-0.49	1983-hal/gun(□)
273.15	736.20 ± 0.20	-0.32	1928-tim/mar(×)	293.15	713.60 ± 0.20	-0.09	1984-bau/mee(◆)
288.15	719.22 ± 0.20	-0.27	1928-tim/mar(×)	288.15	719.20 ± 0.20	-0.29	1985-oba/ood(∇)
303.15	702.03 ± 0.20	0.15	1928-tim/mar(×)	298.15	707.60 ± 0.20	-0.22	1985-oba/ood ¹⁾

¹⁾ Not included in Fig. 1.

Further references: [1848-kop, 1854-kop, 1883-sch-5, 1884-per, 1885-oud, 1890-gar, 1891-jah, 1891-sch/kos, 1896-lin-1, 1897-bru-1, 1898-kah, 1900-loo, 1907-che-1, 1909-wad/fin, 1910-daw, 1911-pou, 1911-sch, 1911-tyr, 1912-fau, 1912-kor, 1912-sch, 1912-sch-4, 1912-sch-6, 1913-bri, 1914-low, 1914-tyr, 1916-har-2, 1916-sei/alt, 1918-sam, 1919-key/fel, 1919-pau/sch, 1920-got, 1920-ken/wri, 1921-sch, 1922-isn, 1922-tim/van, 1923-tim, 1923-tim/van, 1923-wil/smi, 1924-cla, 1924-kur, 1925-lew, 1925-rak, 1925-ric/cha, 1926-cha-1, 1926-mat, 1926-sch, 1927-krc/wil, 1929-ham/and, 1930-bil/fis-1, 1931-maz-2, 1931-tre/spe, 1932-wol/maz, 1934-lal, 1934-lal-1, 1934-ste/smy, 1935-ear/gla, 1937-alb, 1937-coo-2, 1937-fru/may, 1941-suh/kle, 1948-vog-8, 1950-spu/zei, 1953-ani-1, 1953-ano-5, 1961-ano-1, 1961-inu/ito, 1962-zaa/kol, 1965-bar/kuc, 1968-ano, 1968-pih/hei, 1969-bra/fre, 1970-ras/nat, 1971-san/fel, 1972-cur/fel, 1972-mar/mur, 1973-bru/ker, 1973-san/hut, 1974-wol/ska, 1976-shv, 1977-dei-1, 1978-nit/fuj, 1979-pat/rae, 1986-hne/cib, 1991-vro/noo].

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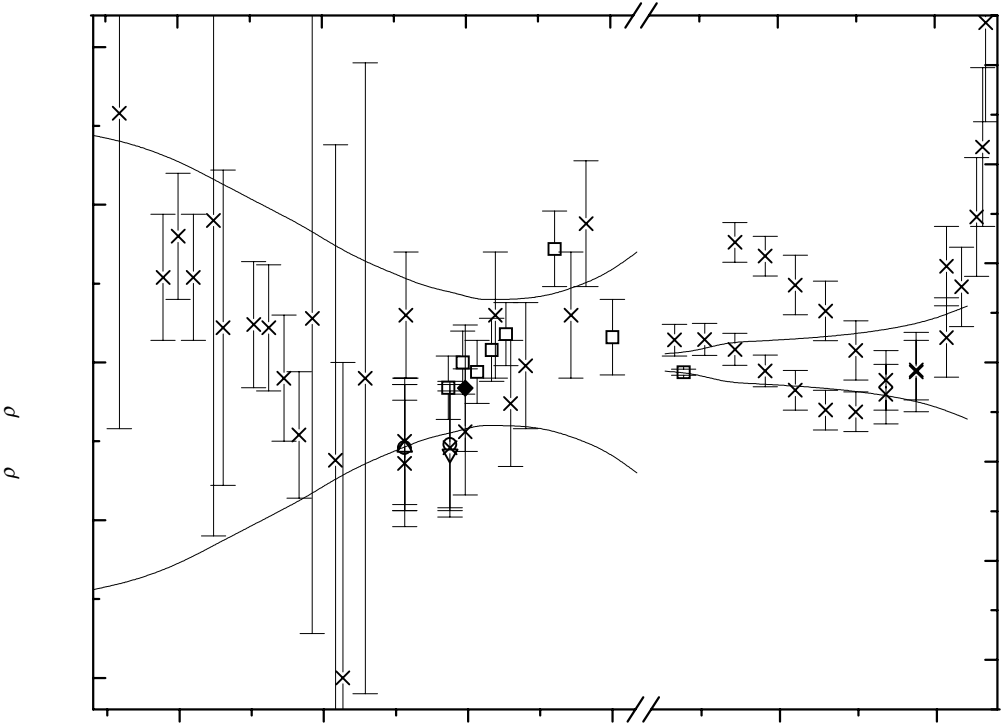


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{K}$	$\frac{\rho \pm \sigma_{fit}}{kg \cdot m^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{fit}}{kg \cdot m^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{fit}}{kg \cdot m^{-3}}$
140.00	876.20 ± 0.74	260.00	751.03 ± 0.32	360.00	628.26 ± 0.44
150.00	865.67 ± 0.74	270.00	740.03 ± 0.28	370.00	613.94 ± 0.56
160.00	855.24 ± 0.74	280.00	728.81 ± 0.24	380.00	598.56 ± 1.01
170.00	844.90 ± 0.72	290.00	717.36 ± 0.22	390.00	582.09 ± 1.07
180.00	834.61 ± 0.70	293.15	713.69 ± 0.21	400.00	564.89 ± 1.16
190.00	824.35 ± 0.67	298.15	707.82 ± 0.20	410.00	546.80 ± 1.26
200.00	814.08 ± 0.63	300.00	705.64 ± 0.20	420.00	527.04 ± 1.40
210.00	803.80 ± 0.58	310.00	693.62 ± 0.20	430.00	504.27 ± 1.59
220.00	793.45 ± 0.53	320.00	681.29 ± 0.21	440.00	476.36 ± 1.85
230.00	783.03 ± 0.48	330.00	668.62 ± 0.24	450.00	439.72 ± 2.23
240.00	772.51 ± 0.43	340.00	655.57 ± 0.28	460.00	385.18 ± 2.85
250.00	761.85 ± 0.37	350.00	642.13 ± 0.35		

Methyl propyl ether

[557-17-5]

C₄H₁₀O

MW = 74.12

513

Table 1. Fit with estimated *B* coefficient for 15 accepted points. Deviation $\sigma_w = 0.743$.

Coefficient	$\rho = A + BT$
<i>A</i>	1053.15
<i>B</i>	-1.120

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
273.15	747.1 ± 1.0	-0.12	1888-dob-1	293.15	738.1 ± 2.0	13.28	1891-hen ¹⁾
273.15	747.0 ± 1.0	-0.22	1888-dob	273.15	746.0 ± 1.0	-1.22	1893-kra
279.25	740.5 ± 1.0	0.11	1888-dob	287.45	731.7 ± 1.0	0.53	1914-kar
284.05	735.7 ± 1.0	0.69	1888-dob	273.15	749.4 ± 2.0	2.18	1928-ben/phi-1 ¹⁾
288.25	731.1 ± 1.0	0.79	1888-dob	286.15	735.6 ± 2.0	2.94	1928-ben/phi-1 ¹⁾
292.35	726.9 ± 1.0	1.19	1888-dob	298.15	723.0 ± 2.0	3.78	1950-spu/zei ¹⁾
297.25	721.3 ± 1.0	1.07	1888-dob	298.15	727.0 ± 2.0	7.78	1960-rob/wri ¹⁾
303.45	714.5 ± 1.0	1.22	1888-dob	288.15	730.2 ± 0.5	-0.22	1985-oba/ood
307.25	710.4 ± 1.0	1.37	1888-dob	298.15	718.5 ± 0.5	-0.72	1985-oba/ood
293.15	725.6 ± 1.0	0.78	1890-gar	308.15	707.4 ± 0.5	-0.62	1985-oba/ood

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	750.7 ± 1.3	290.00	728.3 ± 1.0	298.15	719.2 ± 1.0
280.00	739.5 ± 1.1	293.15	724.8 ± 1.0	310.00	705.9 ± 1.2

Methyl 1-methylethyl ether

[598-53-8]

C₄H₁₀O

MW = 74.12

514

Table 1. Fit with estimated *B* coefficient for 3 accepted points. Deviation $\sigma_w = 0.126$.

Coefficient	$\rho = A + BT$
<i>A</i>	1054.80
<i>B</i>	-1.160

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	733.4 ± 5.0	18.66	1904-hen ¹⁾	297.15	722.0 ± 2.0	11.90	1961-how/bro ¹⁾
273.15	738.3 ± 1.0	0.36	1928-ben/phi-1	293.15	723.0 ± 2.0	8.26	1968-vor/zha ¹⁾
288.15	723.7 ± 2.0	3.16	1928-ben/phi-1 ¹⁾	295.15	728.0 ± 2.0	15.58	1973-cof/ker ¹⁾
288.75	719.0 ± 2.0	-0.85	1946-kra/car ¹⁾	288.15	720.5 ± 0.5	-0.04	1985-oba/ood
298.15	720.0 ± 2.0	11.06	1960-rob/wri ¹⁾	298.15	708.9 ± 0.5	-0.04	1985-oba/ood

¹⁾ Not included in calculation of linear coefficients.

cont.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	741.6 ± 0.9	290.00	718.4 ± 0.2	298.15	708.9 ± 0.4
280.00	730.0 ± 0.5	293.15	714.7 ± 0.2		

Butyl methyl ether [628-28-4] C₅H₁₂O MW = 88.15 515

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{\text{c,w}} = 4.8855 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 1.1951 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.15 to 320.95 K $\rho = A + BT + CT^2 + DT^3 + \dots$
A	9.83616 · 10 ²
B	-6.48406 · 10 ⁻¹
C	-5.72764 · 10 ⁻⁴

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
273.15	763.40 ± 1.00	-0.37	1888-dob(×)	290.15	747.20 ± 0.60	-0.06	1948-vog-8(○)
279.65	758.40 ± 1.00	0.90	1888-dob(×)	291.45	745.90 ± 0.60	-0.09	1948-vog-8(○)
302.45	735.30 ± 1.00	0.19	1888-dob(×)	293.15	744.30 ± 0.60	-0.01	1948-vog-8(○)
310.45	726.90 ± 1.00	-0.22	1888-dob(×)	299.65	738.10 ± 0.60	0.21	1948-vog-8(○)
320.95	716.00 ± 1.00	-0.51	1888-dob(×)	314.05	724.20 ± 0.80	0.71	1948-vog-8(○)
273.15	763.50 ± 1.00	-0.27	1888-dob-1(×)	314.55	723.70 ± 0.80	0.71	1948-vog-8(○)
288.15	747.73 ± 1.00	-1.49	1912-cla-1(Δ)	298.15	739.30 ± 0.40	-0.08	1950-spu/zei(□)
293.15	744.33 ± 1.00	0.02	1912-cla-1(Δ)	293.15	744.30 ± 1.00	-0.01	1969-cid/pol(◆)
273.15	763.50 ± 1.00	-0.27	1928-ben/phi-1(×)	288.15	749.20 ± 0.30	-0.02	1985-oba/ood(×)
293.15	744.10 ± 1.00	-0.21	1928-ben/phi-1(×)	298.15	739.40 ± 0.30	0.02	1985-oba/ood(×)
293.15	745.50 ± 1.00	1.19	1934-jac/dyk(V)	308.15	729.10 ± 0.30	-0.32	1985-oba/ood(×)

¹⁾ Not included in Fig. 1.

Further references: [1891-hen, 1952-doe/you, 1970-shi/sul, 1974-shi/vor, 1975-shi/vor, 1982-vil/cas-1, 1990-wan/ben].

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	766.79 ± 1.29	293.15	744.31 ± 0.70	310.00	727.57 ± 0.75
280.00	757.16 ± 0.97	298.15	739.38 ± 0.66	320.00	717.48 ± 1.18
290.00	747.41 ± 0.75	300.00	737.55 ± 0.65	330.00	707.27 ± 2.00

cont.

Butyl methyl ether (cont.)

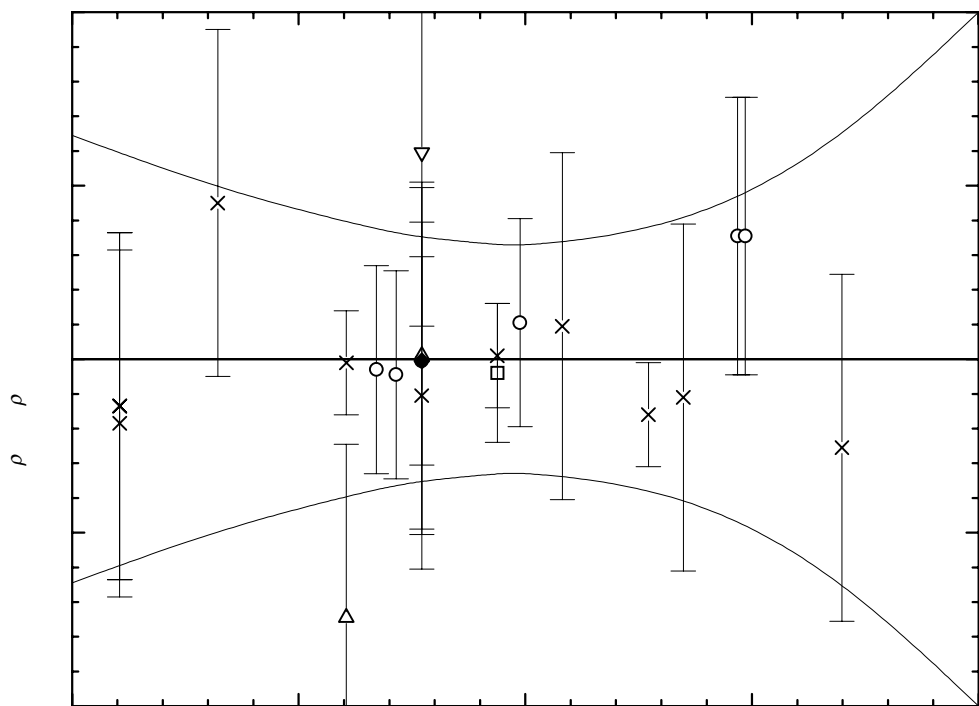


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

1,1-Dimethylethyl methyl ether

[1634-04-4]

C₅H₁₂O

MW = 88.15

516

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 4.2250 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 8.3642 \cdot 10^{-2}$ (combined temperature ranges, unweighted).

Coefficient	T = 288.10 to 313.15 K
	$\rho = A + BT + CT^2 + DT^3 + \dots$
A	$9.49105 \cdot 10^2$
B	$-3.67934 \cdot 10^{-1}$
C	$-1.17108 \cdot 10^{-3}$

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
298.15	735.40 ± 0.40	0.10	1932-nor/rig(X)	293.10	740.50 ± 0.60	-0.16	1936-eva/edl ¹⁾
288.10	745.60 ± 0.60	-0.30	1936-eva/edl(X)	298.10	735.20 ± 0.60	-0.16	1936-eva/edl ¹⁾

cont.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
293.15	740.54 ± 0.20	-0.07	1980-aim/cip(□)	313.15	719.07 ± 0.20	0.02	1994-sen(○)
288.15	745.30 ± 0.30	-0.55	1985-oba/ood(×)	288.70	746.11 ± 0.30	0.83	1995-pin/fal(▽)
298.15	735.10 ± 0.30	-0.20	1985-oba/ood(×)	288.15	743.39 ± 0.40	-2.46	1996-gov/let ¹⁾
308.15	724.40 ± 0.30	-0.12	1985-oba/ood(×)	298.15	734.80 ± 0.40	-0.50	1996-gov/let(×)
288.70	745.30 ± 0.30	0.02	1991-jan/all(Δ)	308.15	727.20 ± 0.40	2.68	1996-gov/let ¹⁾
298.15	735.66 ± 0.30	0.36	1991-mat/ber(◆)	318.15	718.75 ± 0.00	5.24	1996-gov/let ¹⁾
298.15	735.66 ± 0.30	0.36	1991-mat/ber-1(×)	328.15	715.18 ± 0.00	12.92	1996-gov/let ¹⁾
293.15	740.51 ± 0.20	-0.10	1994-sen(○)	298.15	735.60 ± 0.40	0.30	1999-arc/rod(×)
298.15	735.22 ± 0.20	-0.08	1994-sen(○)				

¹⁾ Not included in Fig. 1.

Further references: [1904-hen, 1928-ben/phi-1, 1931-mil, 1947-ols/hip, 1951-pau/tch, 1957-new, 1961-smu/bon, 1964-par/mir, 1968-vor/zha, 1973-cof/ker, 1980-nav/zil, 1982-sin/mac, 1998-arc/mar].

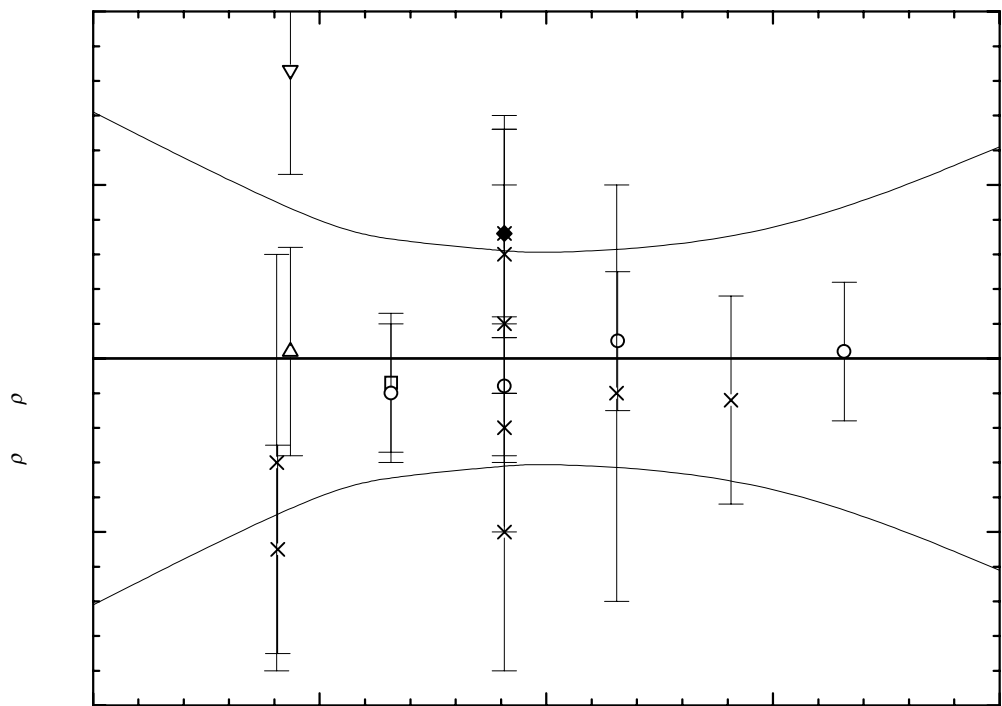


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

cont.

1,1-Dimethylethyl methyl ether (cont.)

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	754.27 ± 0.71	298.15	735.30 ± 0.31	320.00	711.45 ± 0.61
290.00	743.92 ± 0.38	300.00	733.33 ± 0.30		
293.15	740.61 ± 0.34	310.00	722.50 ± 0.34		

Ethyl 1-methylethyl ether

[625-54-7]

C₅H₁₂O

MW = 88.15

517

Table 1. Fit with estimated *B* coefficient for 6 accepted points. Deviation $\sigma_w = 0.423$.

Coefficient	$\rho = A + BT$
<i>A</i>	1044.98
<i>B</i>	-1.100

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
273.15	744.7 ± 1.0	0.18	1866-mar	293.15	779.2 ± 5.0	56.68	1964-mik/mik-1 ¹⁾
273.15	744.0 ± 1.0	-0.52	1928-ben/phi-1	293.15	745.0 ± 2.0	22.48	1968-vor/zha ¹⁾
293.15	721.1 ± 1.0	-1.42	1928-ben/phi-1	288.15	728.1 ± 0.5	0.08	1985-oba/ood
298.15	720.0 ± 2.0	2.98	1932-nor/rig ¹⁾	298.15	717.3 ± 0.5	0.28	1985-oba/ood
290.15	728.8 ± 5.0	2.98	1942-mee/rat ¹⁾	308.15	706.1 ± 0.5	0.08	1985-oba/ood

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	748.0 ± 1.1	290.00	726.0 ± 0.6	298.15	717.0 ± 0.6
280.00	737.0 ± 0.8	293.15	722.5 ± 0.6	310.00	704.0 ± 0.9

Ethyl propyl ether

[628-32-0]

C₅H₁₂O

MW = 88.15

518

$T_c = 500.23\text{ K}$ [1974-amb/bro]
 $\rho_c = 260.00\text{ kg}\cdot\text{m}^{-3}$ [1926-ber/bru]

Table 1. Coefficients for the polynomial expansion equations. Standard deviations (see introduction): $\sigma_\nu = 3.1331 \cdot 10^{-1}$ (low temperature range), $\sigma_{c,w} = (7.1443 \cdot 10^{-1})$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 2.6631 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 273.15\text{ to }395.00\text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$	$T = 395.00\text{ to }500.23\text{ K}$ $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)]$ $[\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$
A	$9.22384 \cdot 10^2$	$9.52191 \cdot 10^{-1}$
B	$-1.83885 \cdot 10^{-1}$	$-1.96726 \cdot 10^{-2}$
C	$-1.57742 \cdot 10^{-3}$	$1.61253 \cdot 10^{-4}$
D		$-4.54239 \cdot 10^{-7}$

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
273.15	754.50 ± 1.00	0.04	1888-dob-1(◆)	434.65	545.10 ± 1.00	-1.25	1924-ber/bru(×)
287.45	739.77 ± 1.00	0.58	1914-kar(∇)	443.55	531.20 ± 1.50	-0.90	1924-ber/bru(×)
273.15	754.60 ± 0.60	0.14	1924-ber/bru(×)	465.55	485.90 ± 1.50	-1.86	1924-ber/bru(×)
283.05	742.50 ± 0.60	-1.46	1924-ber/bru ¹⁾	475.95	457.70 ± 2.00	-0.64	1924-ber/bru(×)
310.35	712.90 ± 0.60	-0.48	1924-ber/bru(×)	482.85	436.50 ± 2.00	3.03	1924-ber/bru(×)
331.65	688.00 ± 0.80	0.11	1924-ber/bru(×)	489.35	405.50 ± 3.00	1.86	1924-ber/bru(×)
351.15	663.80 ± 0.80	0.49	1924-ber/bru(×)	492.05	391.50 ± 4.00	3.27	1924-ber/bru(×)
381.55	622.00 ± 0.80	-0.58	1924-ber/bru(×)	493.65	383.90 ± 5.00	6.16	1924-ber/bru ¹⁾
394.35	604.70 ± 0.80	0.14	1924-ber/bru(×)	273.15	754.10 ± 0.60	-0.36	1928-ben/phi-1(Δ)
403.95	589.80 ± 1.00	-1.03	1924-ber/bru(×)	293.15	733.00 ± 0.60	0.08	1928-ben/phi-1(Δ)
413.75	577.50 ± 1.00	0.64	1924-ber/bru(×)	298.15	727.00 ± 0.60	-0.34	1950-spu/zei(□)
421.25	568.00 ± 1.00	1.86	1924-ber/bru(×)	293.15	733.10 ± 0.60	0.18	1969-cid/pol(○)
427.75	557.90 ± 1.00	1.20	1924-ber/bru(×)				

¹⁾ Not included in Fig. 1.

Further references: [1880-bru-3, 1888-dob, 1891-hen, 1911-hil/dun, 1942-mee/rat, 1985-oba/ood].

Ethyl propyl ether (cont.)

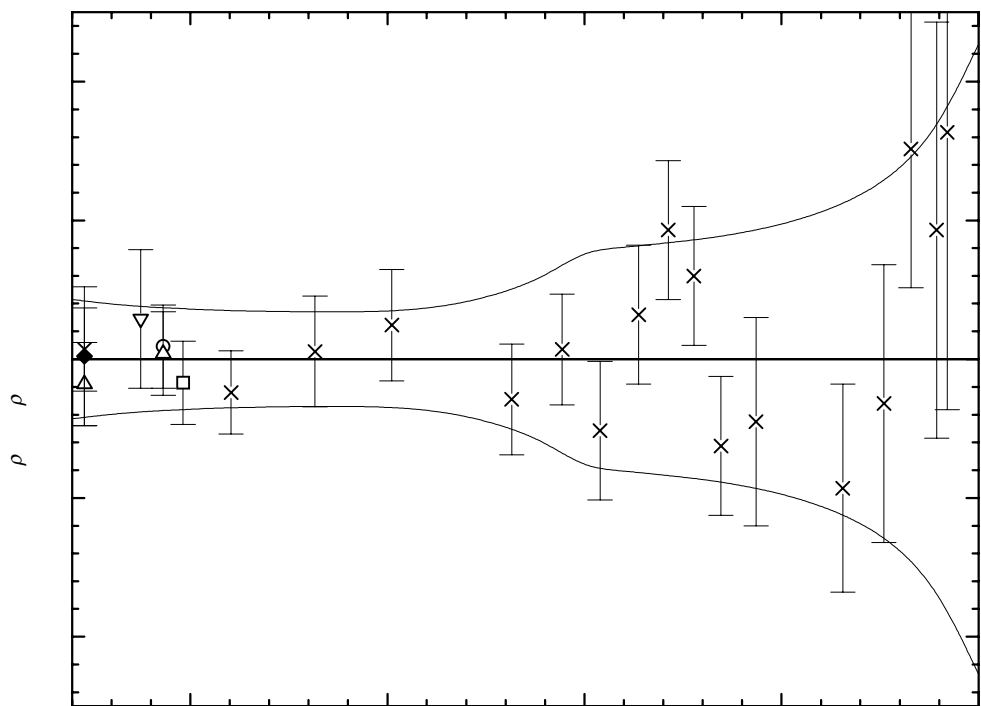


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	757.74 ± 0.86	340.00	677.51 ± 0.68	430.00	553.37 ± 1.73
280.00	747.23 ± 0.79	350.00	664.79 ± 0.69	440.00	537.94 ± 1.82
290.00	736.40 ± 0.75	360.00	651.75 ± 0.73	450.00	520.79 ± 1.94
293.15	732.92 ± 0.74	370.00	638.40 ± 0.82	460.00	500.73 ± 2.11
298.15	727.34 ± 0.73	380.00	624.73 ± 0.97	470.00	476.11 ± 2.35
300.00	725.25 ± 0.72	390.00	610.74 ± 1.19	480.00	444.40 ± 2.72
310.00	713.79 ± 0.70	400.00	596.48 ± 1.57	490.00	400.14 ± 3.35
320.00	702.01 ± 0.69	410.00	582.21 ± 1.61	500.00	295.46 ± 4.54
330.00	689.92 ± 0.68	420.00	567.94 ± 1.67		

Methyl 1-methylpropyl ether

[6795-87-5]

C₅H₁₂O

MW = 88.15

519

Table 1. Fit with estimated *B* coefficient for 6 accepted points. Deviation $\sigma_w = 0.232$.

Coefficient	$\rho = A + BT$
<i>A</i>	1046.60
<i>B</i>	-1.040

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
273.15	762.1 ± 1.0	-0.42	1928-ben/phi-1	288.15	746.7 ± 0.5	-0.22	1985-oba/ood
293.15	741.5 ± 1.0	-0.22	1928-ben/phi-1	298.15	736.7 ± 0.5	0.18	1985-oba/ood
298.15	737.0 ± 1.0	0.48	1952-doe/you	308.15	726.2 ± 0.5	0.08	1985-oba/ood
298.15	740.0 ± 4.0	3.48	1952-wib ¹⁾				

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	765.8 ± 1.2	290.00	745.0 ± 0.7	298.15	736.5 ± 0.6
280.00	755.4 ± 0.9	293.15	741.7 ± 0.6	310.00	724.2 ± 0.8

Methyl 2-methylpropyl ether

[625-44-5]

C₅H₁₂O

MW = 88.15

520

Table 1. Fit with estimated *B* coefficient for 6 accepted points. Deviation $\sigma_w = 0.665$.

Coefficient	$\rho = A + BT$
<i>A</i>	1036.88
<i>B</i>	-1.040

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
273.15	750.7 ± 1.0	-2.11	1897-tho/rod-1	293.15	736.4 ± 4.0	4.39	1975-shi/ask ¹⁾
273.15	752.3 ± 1.0	-0.51	1928-ben/phi-1	288.15	737.5 ± 0.5	0.29	1985-oba/ood
293.15	731.1 ± 1.0	-0.91	1928-ben/phi-1	298.15	727.2 ± 0.5	0.39	1985-oba/ood
298.15	729.9 ± 2.0	3.09	1959-hor/pet ¹⁾	308.15	716.6 ± 0.5	0.19	1985-oba/ood

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	756.1 ± 1.3	290.00	735.3 ± 0.9	298.15	726.8 ± 0.8
280.00	745.7 ± 1.0	293.15	732.0 ± 0.8	310.00	714.5 ± 1.0

Bis(1-methylethyl) ether

[108-20-3]

C₆H₁₄O

MW = 102.18

521

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 5.2235 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 1.4556 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.10 to 333.10 K $\rho = A + BT + CT^2 + DT^3 + \dots$
A	$1.03192 \cdot 10^3$
B	-1.05044

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
293.15	725.70 ± 0.60	1.72	1948-vog-8 ¹⁾	293.15	725.00 ± 0.50	1.02	1967-vij/des(×)
313.85	702.90 ± 0.60	0.66	1948-vog-8(×)	298.15	718.36 ± 0.40	-0.37	1970-nak/shi(◆)
331.25	682.40 ± 0.80	-1.56	1948-vog-8(×)	298.15	718.70 ± 0.40	-0.03	1970-ver(×)
273.10	744.30 ± 0.50	-0.75	1951-nic(×)	298.15	718.85 ± 0.20	0.12	1972-mar/mur(□)
293.10	724.10 ± 0.50	0.06	1951-nic(×)	288.15	729.20 ± 0.40	-0.04	1985-oba/ood(×)
298.10	718.40 ± 0.50	-0.38	1951-nic ¹⁾	298.15	718.90 ± 0.40	0.17	1985-oba/ood(×)
303.10	713.40 ± 0.50	-0.13	1951-nic(×)	308.15	708.30 ± 0.40	0.07	1985-oba/ood(×)
323.10	693.70 ± 0.60	1.18	1951-nic(×)	298.15	719.16 ± 0.40	0.43	1991-fen/doh(×)
333.10	681.40 ± 0.60	-0.62	1951-nic(×)	298.15	718.40 ± 0.40	-0.33	1991-gro/rou(Δ)
293.15	725.00 ± 0.50	1.02	1965-vij/des-1(×)	298.15	718.39 ± 0.40	-0.34	1994-kri/vis-1(∇)
298.15	718.36 ± 0.40	-0.37	1967-nak/nak(×)	298.15	718.56 ± 0.30	-0.17	1996-res/ech(○)

¹⁾ Not included in Fig. 1.

Further references: [1882-zan, 1890-gar, 1924-sen, 1930-fif/rei, 1935-ear/gla, 1938-tho, 1940-mil/bli, 1942-sny/gil, 1947-bis/kun, 1947-kru/bod, 1949-dre/kru, 1949-dre/mar, 1952-cam/lau, 1953-ano-5, 1954-bre, 1954-smi/otv, 1957-new, 1958-ano-3, 1961-ano-1, 1961-how/bro, 1961-min/kho, 1965-vij/des-3, 1968-ano, 1968-vor/zha, 1969-cid/pol, 1972-bon/pik, 1973-lin/wic].

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	748.30 ± 0.67	298.15	718.73 ± 0.40	330.00	685.28 ± 0.81
280.00	737.80 ± 0.57	300.00	716.79 ± 0.39	340.00	674.77 ± 1.27
290.00	727.29 ± 0.47	310.00	706.28 ± 0.40		
293.15	723.98 ± 0.44	320.00	695.78 ± 0.53		

cont.

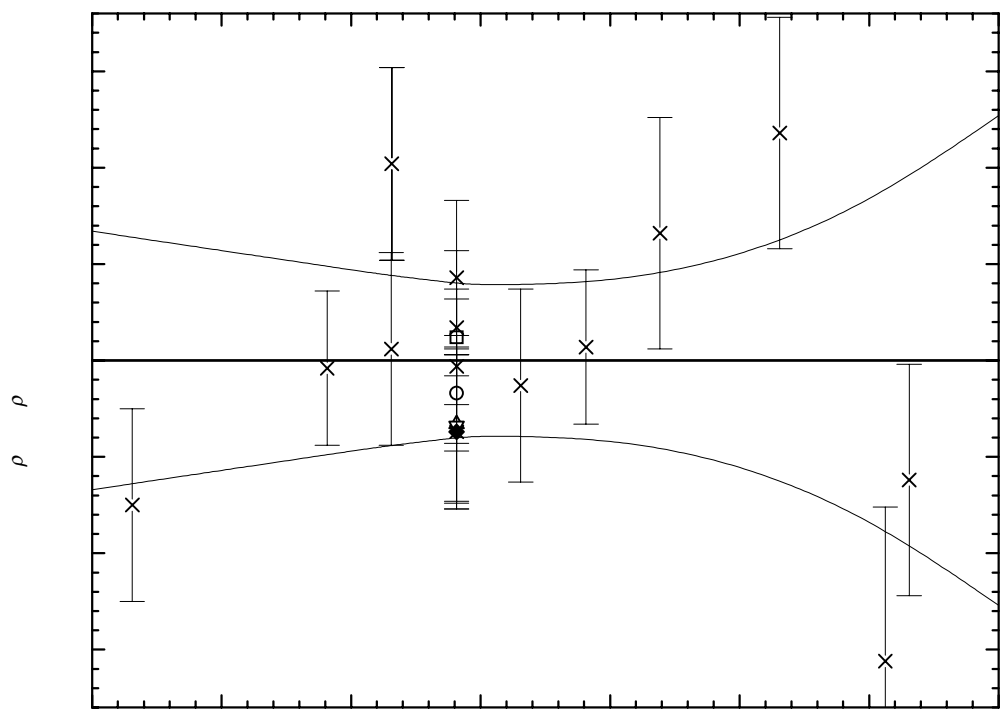


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

Butyl ethyl ether **[628-81-9]** **C₆H₁₄O** **MW = 102.18** **522**

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 5.3504 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 1.0380 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

T = 273.15 to 351.45 K	
$\rho = A + BT + CT^2 + DT^3 + \dots$	
Coefficient	
A	$9.96419 \cdot 10^2$
B	$-7.33972 \cdot 10^{-1}$
C	$-3.68849 \cdot 10^{-4}$

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
273.15	769.40 ± 1.00	0.99	1871-lie/ros(X)	313.15	731.00 ± 1.00	0.60	1871-lie/ros(X)
293.15	750.90 ± 1.00	1.34	1871-lie/ros ¹⁾	273.15	767.90 ± 1.00	-0.51	1888-dob(X)

cont.

Butyl ethyl ether (cont.)

Table 2. (cont.)

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
291.00	751.90 ± 1.00	0.30	1888-dob(×)	293.15	749.50 ± 0.60	-0.06	1950-mum/phi(∇)
301.25	742.40 ± 1.00	0.56	1888-dob(×)	298.15	744.80 ± 0.60	0.00	1950-mum/phi(∇)
311.05	732.70 ± 1.00	0.27	1888-dob(×)	298.15	745.20 ± 0.40	0.40	1950-spu/zei(×)
320.05	724.00 ± 1.00	0.27	1888-dob(×)	298.15	744.00 ± 0.60	-0.80	1957-new(Δ)
337.85	706.50 ± 1.00	0.16	1888-dob(×)	298.15	744.20 ± 0.60	-0.60	1959-zak/kho(◆)
351.45	692.00 ± 1.00	-0.91	1888-dob(×)	293.15	749.00 ± 0.60	-0.56	1969-cid/pol(×)
298.15	744.70 ± 0.40	-0.10	1932-nor/rig(□)	288.15	754.30 ± 0.50	0.00	1985-oba/ood(O)
293.15	749.00 ± 0.60	-0.56	1948-vog-8(×)	298.15	744.90 ± 0.50	0.10	1985-oba/ood(O)
314.05	729.80 ± 0.60	0.26	1948-vog-8(×)	308.15	734.80 ± 0.50	-0.42	1985-oba/ood(O)

¹⁾ Not included in Fig. 1.

Further references: [1888-dob-1, 1934-jac/dyk, 1948-rue/che, 1953-ano-5, 1964-mik/mik-1, 1978-fok/kom].

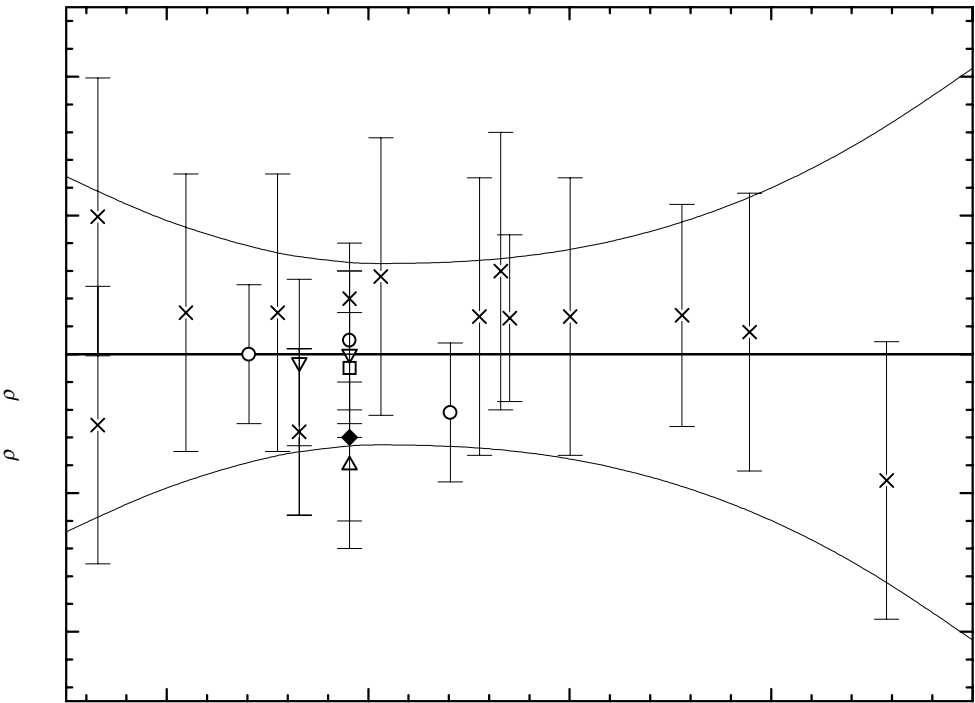


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

cont.

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	771.36 ± 1.28	298.15	744.80 ± 0.66	330.00	714.04 ± 0.91
280.00	761.99 ± 0.94	300.00	743.03 ± 0.65	340.00	704.23 ± 1.18
290.00	752.55 ± 0.74	310.00	733.44 ± 0.66	350.00	694.34 ± 1.56
293.15	749.56 ± 0.70	320.00	723.78 ± 0.74	360.00	684.39 ± 2.06

1,1-Dimethylethyl ethyl ether [637-92-3] C₆H₁₄O MW = 102.18 523

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{\text{c,w}} = 3.7712 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 5.7512 \cdot 10^{-2}$ (combined temperature ranges, unweighted).

Coefficient	T = 288.10 to 328.15 K $\rho = A + BT + CT^2 + DT^3 + \dots$
A	1.04846 · 10 ³
B	-1.05080

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
288.10	745.60 ± 1.00	-0.13	1936-eva/edl(×)	308.15	725.00 ± 0.40	0.34	1985-oba/ood(∇)
293.10	740.40 ± 1.00	-0.07	1936-eva/edl(×)	288.70	745.11 ± 0.30	0.01	1991-jan/all(○)
298.10	735.30 ± 1.00	0.08	1936-eva/edl ¹⁾	293.15	740.47 ± 0.20	0.05	1994-sen(□)
303.10	730.00 ± 1.00	0.03	1936-eva/edl(×)	298.15	735.31 ± 0.20	0.14	1994-sen(□)
293.15	739.90 ± 0.70	-0.52	1947-ols/hip(×)	303.15	730.16 ± 0.20	0.25	1994-sen(□)
298.15	735.30 ± 0.50	0.13	1957-new(◆)	313.15	719.11 ± 0.20	-0.30	1994-sen(□)
288.15	745.60 ± 0.40	-0.08	1985-oba/ood(∇)	328.15	703.73 ± 0.20	0.09	1994-sen(□)
298.15	735.40 ± 0.40	0.23	1985-oba/ood(∇)	298.15	735.00 ± 0.40	-0.17	1998-oh /par(Δ)

¹⁾ Not included in Fig. 1.

Further references: [1904-hen, 1932-nor/rig, 1949-miy/and, 1951-pau/tch, 1968-vor/zha, 1982-sin/mac].

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	754.24 ± 0.90	298.15	735.17 ± 0.46	320.00	712.21 ± 0.30
290.00	743.73 ± 0.63	300.00	733.22 ± 0.43	330.00	701.70 ± 0.36
293.15	740.42 ± 0.56	310.00	722.72 ± 0.32	340.00	691.19 ± 0.48

cont.

1,1-Dimethylethyl ethyl ether (cont.)

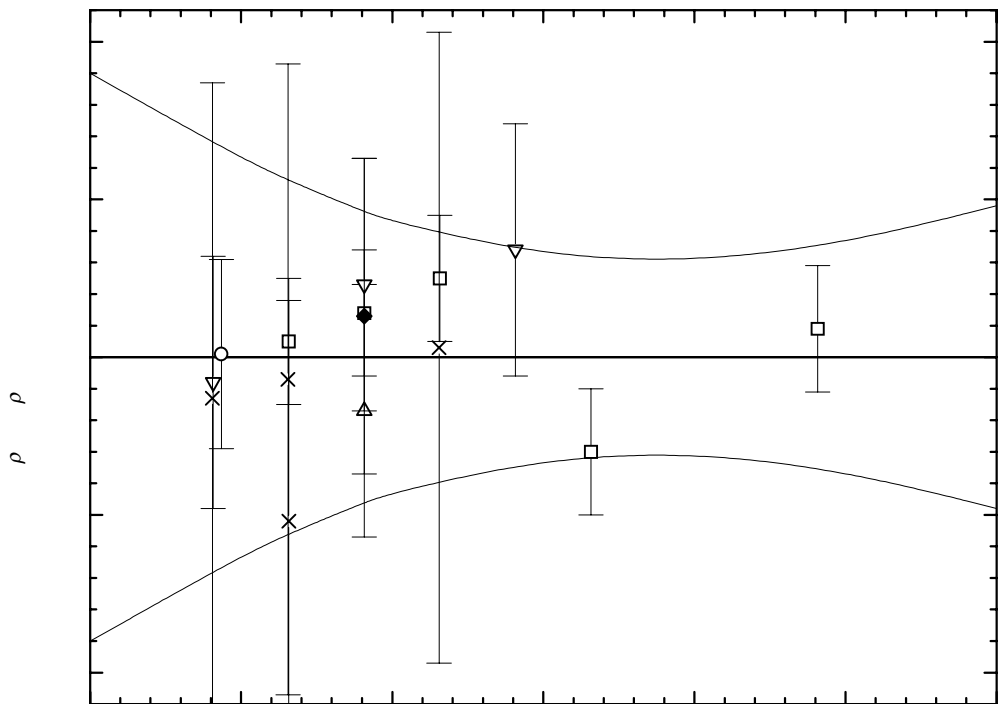


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

1,1-Dimethylpropyl methyl ether [994-05-8] C₆H₁₄O MW = 102.1 524

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 4.7594 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 1.1860 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	T = 293.15 to 395.85 K
	$\rho = A + BT + CT^2 + DT^3 + \dots$
A	$9.20096 \cdot 10^2$
B	$-1.12060 \cdot 10^{-1}$
C	$-1.35525 \cdot 10^{-3}$

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
293.15	770.74 ± 0.20	-0.04	1984-cer/bou(▽)	298.15	765.77 ± 0.20	-0.44	1987-lin(O)
293.15	770.47 ± 0.30	-0.31	1986-lin/ber(◆)	293.15	771.44 ± 0.20	0.66	1994-sen(Δ)

cont.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
303.15	761.95 ± 0.20	0.37	1994-sen(Δ)	373.15	689.50 ± 0.50	-0.08	1994-ste/chi-2(×)
313.15	752.22 ± 0.20	0.12	1994-sen(Δ)	383.15	678.40 ± 0.50	0.20	1994-ste/chi-2(×)
328.15	737.73 ± 0.20	0.34	1994-sen(Δ)	395.85	664.00 ± 0.50	0.63	1994-ste/chi-2(×)
298.15	765.90 ± 0.50	-0.31	1994-ste/chi-2(×)	298.15	765.67 ± 0.20	-0.54	1997-wit/gol(□)
323.15	741.60 ± 0.50	-0.76	1994-ste/chi-2(×)				

¹⁾ Not included in Fig. 1.

Further references: [1936-eva/edl, 1996-gov/let].

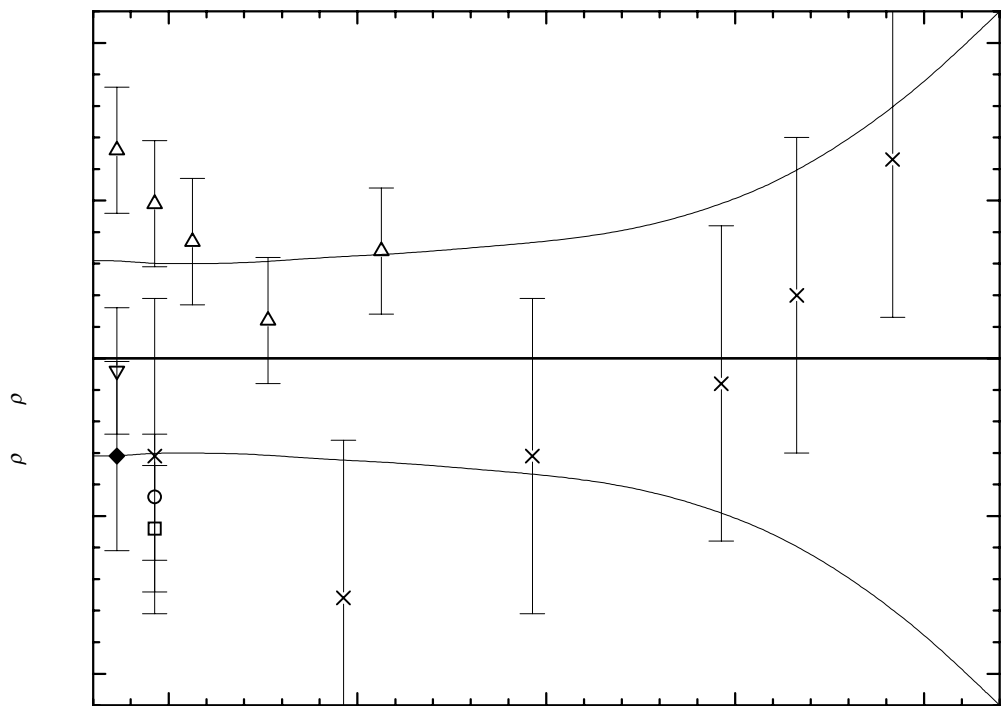


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

cont.

1,1-Dimethylpropyl methyl ether (cont.)

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	773.62 ± 0.31	320.00	745.46 ± 0.32	370.00	693.10 ± 0.46
293.15	770.78 ± 0.31	330.00	735.53 ± 0.33	380.00	681.82 ± 0.55
298.15	766.21 ± 0.30	340.00	725.33 ± 0.35	390.00	670.26 ± 0.69
300.00	764.51 ± 0.30	350.00	714.86 ± 0.37	400.00	658.43 ± 0.87
310.00	755.12 ± 0.30	360.00	704.11 ± 0.40	410.00	646.33 ± 1.10

1,2-Dimethylpropyl methyl ether [62016-49-3] C₆H₁₄O MW = 102.18 525

Table 1. Fit with estimated *B* coefficient for 2 accepted points. Deviation $\sigma_w = 0.300$.

Coefficient	$\rho = A + BT$
<i>A</i>	1052.05
<i>B</i>	-1.000

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	758.6 ± 1.0	-0.30	1933-gus/ste
298.15	754.2 ± 1.0	0.30	1952-win/ing

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	762.0 ± 1.0
293.15	758.9 ± 1.0
298.15	753.9 ± 1.0

Dipropyl ether [111-43-3] C₆H₁₄O MW = 102.18 526

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 8.4145 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 7.6305 \cdot 10^{-2}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.15 to 308.15 K $\rho = A + BT + CT^2 + DT^3 + \dots$
<i>A</i>	$1.02682 \cdot 10^3$
<i>B</i>	$-9.55117 \cdot 10^{-1}$

cont.

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
273.15	766.11 ± 0.60	0.18	1930-tim/hen(×)	298.15	741.83 ± 0.20	-0.22	1983-kim/dar(□)
288.15	751.78 ± 0.60	0.18	1930-tim/hen(×)	288.15	751.36 ± 0.20	-0.24	1983-kim/tre(○)
303.15	737.37 ± 0.60	0.09	1930-tim/hen(×)	298.15	741.94 ± 0.20	-0.11	1983-kim/tre(○)
273.15	766.00 ± 2.00	0.07	1930-wuy/lac(×)	308.15	732.64 ± 0.20	0.14	1983-kim/tre(○)
293.15	746.50 ± 0.60	-0.33	1930-wuy/lac(×)	288.15	751.60 ± 0.30	-0.00	1985-oba/ood(Δ)
298.15	741.60 ± 0.40	-0.45	1950-spu/zei(×)	298.15	742.10 ± 0.30	0.05	1985-oba/ood(Δ)
288.15	751.68 ± 0.60	0.08	1969-cid/pol(×)	308.15	732.00 ± 0.30	-0.50	1985-oba/ood(Δ)
298.15	741.68 ± 0.30	-0.37	1972-mar/mur(∇)	298.15	742.77 ± 0.30	0.72	1988-wan/ben(×)
303.15	737.50 ± 0.60	0.22	1972-mar/rat(×)	298.15	742.59 ± 0.30	0.54	1989-wan/ben-l(◆)

¹⁾ Not included in Fig. 1.

Further references: [1882-zan, 1890-gar, 1893-kra, 1914-kar, 1923-pop, 1928-ben/phi-1, 1941-suh/kle, 1948-vog-8, 1957-new, 1964-shu/poz].

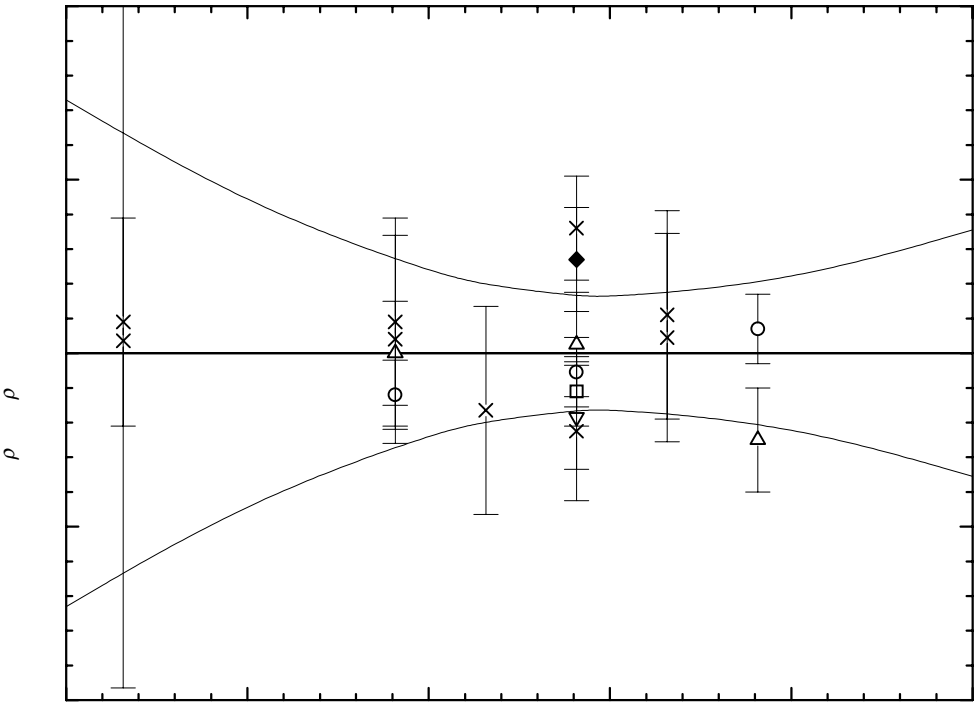


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the symbols are omitted for clarity of the figure.)

cont.

Dipropyl ether (cont.)

Table 3. Recommended values (fit to the reliable experimental values according to the equations $\rho = A + BT + CT^2 + DT^3 + \dots$ or $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	768.94 ± 1.46	293.15	746.83 ± 0.39	310.00	730.74 ± 0.41
280.00	759.39 ± 0.85	298.15	742.05 ± 0.33	320.00	721.18 ± 0.71
290.00	749.84 ± 0.47	300.00	740.29 ± 0.32		

Ethyl 1-methylpropyl ether

[2679-87-0]

C₆H₁₄O

MW = 102.18

527

Table 1. Fit with estimated *B* coefficient for 4 accepted points. Deviation $\sigma_w = 0.149$.

Coefficient	$\rho = A + BT$
<i>A</i>	1036.34
<i>B</i>	-1.000

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	737.7 ± 1.0	-0.49	1932-nor/rig	288.15	748.2 ± 0.5	0.01	1985-oba/ood
293.15	745.0 ± 2.0	1.81	1935-ken/phi ¹⁾	298.15	738.3 ± 0.5	0.11	1985-oba/ood
293.15	750.3 ± 2.0	7.11	1937-wat/dek ¹⁾	308.15	728.2 ± 0.5	0.01	1985-oba/ood

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	756.3 ± 0.8
290.00	746.3 ± 0.5
293.15	743.2 ± 0.4
298.15	738.2 ± 0.4
310.00	726.3 ± 0.6

Ethyl 2-methylpropyl ether

[627-02-1]

C₆H₁₄O

MW = 102.18

528

Table 1. Fit with estimated *B* coefficient for 4 accepted points. Deviation $\sigma_w = 0.512$.

Coefficient	$\rho = A + BT$
<i>A</i>	1038.14
<i>B</i>	-1.020

cont.

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
273.15	754.5 ± 2.0	-5.07	1897-tho/rod-1 ¹⁾
298.15	732.3 ± 1.0	-1.72	1932-nor/rig
288.15	744.2 ± 0.5	-0.02	1985-oba/ood
298.15	734.2 ± 0.5	0.18	1985-oba/ood
308.15	724.1 ± 0.5	0.28	1985-oba/ood

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	752.5 ± 1.0
290.00	742.3 ± 0.8
293.15	739.1 ± 0.7
298.15	734.0 ± 0.7
310.00	721.9 ± 0.8

Methyl 1-methylbutyl ether

[6795-88-6]

C₆H₁₄O

MW = 102.18

529

Table 1. Experimental and recommended values with uncertainties.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	750.0 ± 2.0	1952-doe/you ¹⁾
293.15	756.4 ± 1.0	1956-pet/ral
293.15	756.4 ± 1.0	Recommended

¹⁾ Not included in calculation of recommended value.

Methyl 2-methylbutyl ether

[62016-48-2]

C₆H₁₄O

MW = 102.18

530

Table 1. Experimental values with uncertainties.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
291.15	754.00 ± 1.0	1896-guy/cha
293.15	753.00 ± 1.0	1957-all/wri

Methyl 3-methylbutyl ether

[626-91-5]

C₆H₁₄O

MW = 102.18

531

Table 1. Fit with estimated *B* coefficient for 4 accepted points. Deviation σ_w = 0.417.

Coefficient	$\rho = A + BT$
<i>A</i>	1035.27
<i>B</i>	-0.960

Methyl 3-methylbutyl ether (cont.)

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
364.15	687.1 ± 1.0	1.41	1886-sch
293.15	751.7 ± 2.0	-2.15	1948-naz/aze ¹⁾
288.15	758.4 ± 0.5	-0.25	1985-oba/ood
298.15	749.0 ± 0.5	-0.05	1985-oba/ood
308.15	739.4 ± 0.5	-0.05	1985-oba/ood

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	766.5 ± 1.1	310.00	737.7 ± 0.7	350.00	699.3 ± 2.0
290.00	756.9 ± 0.8	320.00	728.1 ± 0.9	360.00	689.7 ± 2.4
293.15	753.9 ± 0.7	330.00	718.5 ± 1.2	370.00	680.1 ± 2.7
298.15	749.1 ± 0.6	340.00	708.9 ± 1.6		

Methyl pentyl ether

[628-80-8]

C₆H₁₄O

MW = 102.18

532

Table 1. Fit with estimated *B* coefficient for 7 accepted points. Deviation σ_w = 0.497.

Coefficient	$\rho = A + BT$
<i>A</i>	1035.65
<i>B</i>	-0.940

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
292.15	767.0 ± 3.0	5.97	1926-kir ¹⁾	333.25	722.9 ± 0.8	0.50	1948-vog-8
295.15	759.0 ± 1.0	0.79	1936-gre	288.15	764.2 ± 0.5	-0.59	1985-oba/ood
293.15	760.6 ± 0.6	0.51	1948-vog-8	298.15	755.2 ± 0.5	-0.19	1985-oba/ood
314.55	740.6 ± 0.6	0.62	1948-vog-8	308.15	745.6 ± 0.5	-0.39	1985-oba/ood

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	772.5 ± 1.1	298.15	755.4 ± 0.7	330.00	725.5 ± 1.3
290.00	763.1 ± 0.9	310.00	744.3 ± 0.8	340.00	716.1 ± 1.7
293.15	760.1 ± 0.8	320.00	734.9 ± 1.0		

1-Methylethyl propyl ether

[627-08-7]

C₆H₁₄O

MW = 102.18

533

Table 1. Fit with estimated *B* coefficient for 5 accepted points. Deviation $\sigma_w = 0.216$.

Coefficient	$\rho = A + BT$
<i>A</i>	1036.36
<i>B</i>	-1.020

Table 2. Experimental values with uncertainties and deviation from calculated values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{cal}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
273.15	759.7 ± 2.0	1.95	1928-ben/phi-1 ¹⁾	294.15	740.0 ± 2.0	3.67	1932-tru/gra ¹⁾
285.65	747.4 ± 2.0	2.40	1928-ben/phi-1 ¹⁾	288.15	742.5 ± 0.5	0.05	1985-oba/ood
273.15	757.1 ± 1.0	-0.65	1930-wuy/lac	298.15	732.4 ± 0.5	0.15	1985-oba/ood
293.15	737.0 ± 1.0	-0.35	1930-wuy/lac	308.15	722.1 ± 0.5	0.05	1985-oba/ood

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	761.0 ± 1.1	290.00	740.6 ± 0.5	298.15	732.2 ± 0.5
280.00	750.8 ± 0.8	293.15	737.4 ± 0.5	310.00	720.2 ± 0.7