

2.1.4 Saturated Monoesters, C₈

Butyl butanoate [109-21-7] C₈H₁₆O₂ MW = 144.21 59

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 5.9939 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 1.3013 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.15 to 404.45 K $\rho = A + BT + CT^2 + DT^3 + \dots$
A	$1.08977 \cdot 10^3$
B	$-6.10701 \cdot 10^{-1}$
C	$-4.76786 \cdot 10^{-4}$

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	888.36 ± 1.00	0.97	1871-lie/ros(∇)	371.05	797.10 ± 0.80	-0.43	1886-gar(○)
293.15	870.23 ± 1.00	0.46	1871-lie/ros(∇)	383.95	787.70 ± 1.00	2.69	1886-gar ¹⁾
313.15	851.23 ± 1.50	-0.55	1871-lie/ros(∇)	404.45	764.00 ± 1.00	-0.78	1886-gar(○)
273.15	887.70 ± 0.60	0.31	1886-gar(○)	293.15	869.20 ± 0.50	-0.57	1948-vog-9(□)
283.95	878.00 ± 0.60	0.08	1886-gar(○)	313.55	851.60 ± 0.50	0.19	1948-vog-9(□)
295.55	867.40 ± 0.60	-0.23	1886-gar(○)	333.95	833.00 ± 0.60	0.34	1948-vog-9(□)
306.05	857.90 ± 0.60	-0.31	1886-gar(○)	359.75	809.50 ± 0.60	1.13	1948-vog-9(□)
316.25	848.50 ± 0.60	-0.45	1886-gar(○)	288.15	874.00 ± 0.50	-0.21	1959-hof(◆)
338.25	828.30 ± 0.80	-0.35	1886-gar(○)	293.15	869.73 ± 0.50	-0.04	1959-hof(◆)
351.85	815.50 ± 0.80	-0.37	1886-gar(○)	293.15	870.60 ± 1.00	0.83	1970-bol/orl(Δ)

¹⁾ Not included in Fig. 1.

Further references: [1872-lin, 1924-lie, 1926-mun, 1934-gil/dex, 1935-sch-2, 1960-ser/tsi, 1970-ere, 1980-dia/pal].

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	890.13 ± 0.94	310.00	854.64 ± 0.70	370.00	798.54 ± 0.87
280.00	881.40 ± 0.85	320.00	845.53 ± 0.68	380.00	788.86 ± 1.01
290.00	872.57 ± 0.78	330.00	836.32 ± 0.68	390.00	779.08 ± 1.21
293.15	869.77 ± 0.76	340.00	827.02 ± 0.69	400.00	769.21 ± 1.46
298.15	865.31 ± 0.74	350.00	817.62 ± 0.72	410.00	759.24 ± 1.77
300.00	863.65 ± 0.73	360.00	808.13 ± 0.77		

cont.

Butyl butanoate (cont.)

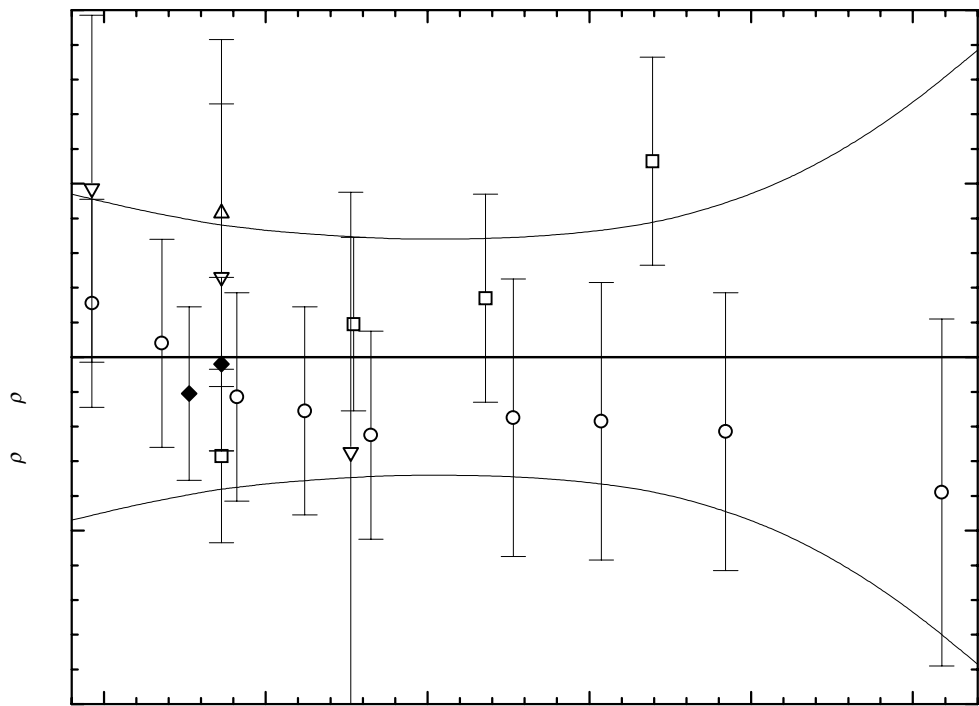


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the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

Butyl 2-methylpropanoate

[97-87-0]

C₈H₁₆O₂

MW = 144.21

60

Table 1. Fit with estimated *B* coefficient for 9 accepted points. Deviation $\sigma_w = 0.372$.

Coefficient	$\rho = A + BT$
<i>A</i>	1140.61
<i>B</i>	-0.950

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.
289.55	865.2 ± 0.6	-0.34	1948-vog-9	334.05	823.9 ± 0.8	0.64	1948-vog-9
292.05	862.8 ± 0.6	-0.36	1948-vog-9	334.65	823.3 ± 0.8	0.61	1948-vog-9
293.15	861.8 ± 0.6	-0.32	1948-vog-9	360.05	799.1 ± 1.0	0.54	1948-vog-9
314.75	841.6 ± 0.6	0.00	1948-vog-9	360.65	798.4 ± 1.0	0.41	1948-vog-9
315.45	840.9 ± 0.6	-0.03	1948-vog-9				

cont.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	874.6 ± 1.0	310.00	846.1 ± 0.8	350.00	808.1 ± 1.1
290.00	865.1 ± 0.9	320.00	836.6 ± 0.8	360.00	798.6 ± 1.2
293.15	862.1 ± 0.8	330.00	827.1 ± 0.8	370.00	789.1 ± 1.4
298.15	857.4 ± 0.8	340.00	817.6 ± 0.9		

1,1-Diethylpropyl methanoate [500026-63-1] C₈H₁₆O₂ MW = 144.21 61

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	901.4 ± 1.0	1954-bar/naf

2,2-Dimethylbutyl ethanoate [500029-49-2] C₈H₁₆O₂ MW = 144.21 62

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	870.4 ± 1.0	1956-sar/new

3,3-Dimethylbutyl ethanoate [1421-87-0] C₈H₁₆O₂ MW = 144.21 63

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.
298.15	868.3 ± 2.0	1956-sar/new
293.15	867.9 ± 0.6	1957-ano-10

1,1-Dimethylpentyl methanoate [500026-62-0] C₈H₁₆O₂ MW = 144.21 64

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	898.1 ± 0.8	1954-bar/naf

Ethyl 2,2-dimethylbutanoate [5129-40-8] C₈H₁₆O₂ MW = 144.21 65

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
277.15	883.0 ± 2.0	1904-bou/bla-2

Ethyl 2,3-dimethylbutanoate

[54004-42-1]

C₈H₁₆O₂

MW = 144.21

66

Table 1. Fit with estimated *B* coefficient for 2 accepted points. Deviation σ_w = 0.090.

Coefficient	$\rho = A + BT$
<i>A</i>	1133.39
<i>B</i>	-0.900

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.
290.65	871.9 ± 1.0	0.09	1913-gor
298.45	864.7 ± 1.0	-0.09	1913-gor
298.15	866.0 ± 2.0	0.94	1935-lev/mar ¹⁾

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	872.4 ± 0.6
293.15	869.6 ± 0.6
298.15	865.1 ± 0.6

Ethyl 3,3-dimethylbutanoate

[5340-78-3]

C₈H₁₆O₂

MW = 144.21

67

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	860.4 ± 0.8	1933-hom/whi

Ethyl 2-ethylbutanoate

[2983-38-2]

C₈H₁₆O₂

MW =

68

Table 1. Fit with estimated *B* coefficient for 3 accepted points. Deviation σ_w = 1.546.

Coefficient	$\rho = A + BT$
<i>A</i>	1145.82
<i>B</i>	-0.960

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	882.1 ± 2.0	-1.49	1866-fra/dup ¹⁾
273.15	882.5 ± 1.5	-1.09	1878-say
291.15	868.5 ± 1.5	2.19	1878-say
293.15	863.3 ± 1.5	-1.09	1890-gar

¹⁾ Not included in calculation of linear coefficients.

cont.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	886.6 ± 2.0
280.00	877.0 ± 1.9
290.00	867.4 ± 1.9
293.15	864.4 ± 1.9
298.15	859.6 ± 1.9

Ethyl hexanoate [123-66-0] C₈H₁₆O₂ MW = 144.21 69

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{\text{c,w}} = 3.7232 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 8.3998 \cdot 10^{-2}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.15 to 383.65 K $\rho = A + BT + CT^2 + DT^3 + \dots$
A	1.10061 · 10 ³
B	-6.67121 · 10 ⁻¹
C	-3.93931 · 10 ⁻⁴

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

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{c}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref. (Symbol in Fig. 1)
273.15	888.80 ± 1.00	-0.19	1884-per(×)	298.15	866.30 ± 0.60	-0.39	1932-kao/ma -1(×)
288.15	876.28 ± 1.00	0.61	1884-per ¹⁾	287.65	876.10 ± 0.60	-0.02	1948-vog-9(×)
298.15	867.04 ± 1.00	0.35	1884-per ¹⁾	291.55	872.60 ± 0.60	-0.02	1948-vog-9(×)
273.15	888.70 ± 0.60	-0.29	1886-gar(×)	293.15	871.20 ± 0.60	0.01	1948-vog-9(×)
283.75	879.50 ± 0.60	-0.10	1886-gar(×)	314.15	852.30 ± 0.60	0.15	1948-vog-9(×)
296.95	867.60 ± 0.60	-0.17	1886-gar(×)	314.35	852.10 ± 0.60	0.13	1948-vog-9(×)
308.25	857.10 ± 0.60	-0.44	1886-gar(×)	334.35	834.30 ± 0.80	0.78	1948-vog-9(×)
321.45	845.10 ± 0.60	-0.36	1886-gar(×)	335.75	833.00 ± 0.80	0.78	1948-vog-9(×)
338.25	829.10 ± 0.80	-0.78	1886-gar(×)	358.15	812.10 ± 0.80	0.95	1948-vog-9(×)
351.45	817.10 ± 0.80	-0.39	1886-gar(×)	359.05	811.30 ± 0.80	1.01	1948-vog-9(×)
370.85	798.80 ± 0.80	-0.23	1886-gar(×)	293.15	871.70 ± 0.60	0.51	1950-mum/phi(◆)
383.65	786.00 ± 1.00	-0.69	1886-gar(×)	298.15	867.20 ± 0.60	0.51	1950-mum/phi(◆)
404.05	765.30 ± 1.00	-1.45	1886-gar ¹⁾	293.15	871.27 ± 0.20	0.08	1951-ser/wis-1(□)
273.15	889.56 ± 0.60	0.57	1929-sim(×)	348.15	819.80 ± 1.00	-0.80	1952-gro/feu(×)
288.15	875.83 ± 0.60	0.16	1929-sim(×)	293.15	871.10 ± 0.50	-0.09	1962-bel/shu(○)
303.15	861.96 ± 0.60	-0.21	1929-sim(×)	293.15	871.10 ± 0.50	-0.09	1962-bel/shu-1(▽)
288.15	875.70 ± 0.60	0.03	1932-kao/ma -1(×)	293.10	871.00 ± 0.50	-0.23	1970-ere(Δ)
293.15	871.00 ± 0.60	-0.19	1932-kao/ma -1(×)				

¹⁾ Not included in Fig. 1.

Further references: [1845-feh, 1872-lie/ros, 1873-lie, 1922-tro, 1925-hes/bap, 1925-hes/bap-1, 1934-gil/dex, 1955-shi/bon, 1963-nik].

cont.

Ethyl hexanoate (cont.)

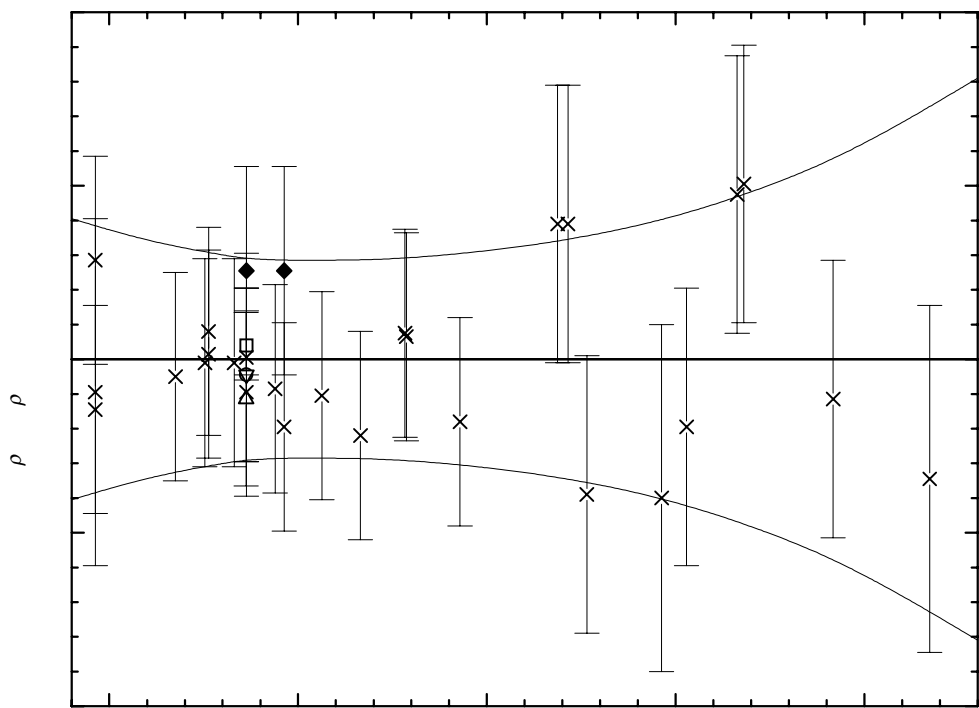


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the 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	891.77 ± 0.81	300.00	865.02 ± 0.57	350.00	818.86 ± 0.82
280.00	882.93 ± 0.68	310.00	855.94 ± 0.57	360.00	809.39 ± 0.96
290.00	874.01 ± 0.60	320.00	846.79 ± 0.60	370.00	799.84 ± 1.13
293.15	871.19 ± 0.58	330.00	837.56 ± 0.65	380.00	790.22 ± 1.36
298.15	866.69 ± 0.57	340.00	828.25 ± 0.72	390.00	780.51 ± 1.62

Ethyl 2-methylpentanoate [39255-32-8] C₈H₁₆O₂ MW = 144.21 70

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.
273.15	881.5 ± 3.0	1878-say
291.15	866.9 ± 3.0	1878-say
273.15	884.0 ± 3.0	1883-lie/zei
293.15	876.5 ± 3.0	1890-gar

Ethyl 3-methylpentanoate [5870-68-8] C₈H₁₆O₂ MW = 144.21 71

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.
293.15	878.0 ± 3.0	1931-lev/mar-2
288.15	873.0 ± 3.0	1949-lee

2-Ethylbutyl ethanoate [500018-98-4] C₈H₁₆O₂ MW = 144.21 72

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.
293.15	858.1 ± 0.8	1953-ano-15
298.15	876.4 ± 3.0	1956-sar/new

1-Ethyl-1-methylpropyl ethanoate [700012-16-4] C₈H₁₆O₂ MW = 144.21 73

Table 1. Fit with estimated *B* coefficient for 5 accepted points. Deviation σ_w = 0.372.

Coefficient	$\rho = A + BT$
<i>A</i>	1145.12
<i>B</i>	-0.900

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	881.9 ± 1.5	0.63	1887-ref
298.15	876.3 ± 1.5	-0.47	1887-ref
303.15	872.9 ± 1.5	0.61	1887-ref
308.15	866.9 ± 1.5	-0.90	1887-ref
298.15	876.8 ± 0.5	0.02	1952-mye/col

cont.

1-Ethyl-1-methylpropyl ethanoate (cont.)

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	884.1 ± 1.3
293.15	881.3 ± 1.2
298.15	876.8 ± 1.2
310.00	866.1 ± 1.3

Heptyl methanoate

[112-23-2]

C₈H₁₆O₂

MW = 144.21

74

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{\text{c,w}} = 8.8929 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 2.5782 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.15 to 419.15 K $\rho = A + BT + CT^2 + DT^3 + \dots$
A	$1.11296 \cdot 10^3$
A	$-7.24426 \cdot 10^{-1}$
B	$-2.65371 \cdot 10^{-4}$

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

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	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	893.56 ± 0.60	-1.72	1886-gar(□)	383.85	796.80 ± 1.00	1.02	1886-gar(□)
286.95	882.00 ± 0.60	-1.23	1886-gar(□)	405.55	776.60 ± 1.00	1.08	1886-gar(□)
302.25	869.00 ± 0.60	-0.76	1886-gar(□)	419.15	763.30 ± 1.00	0.61	1886-gar(□)
311.25	861.20 ± 0.60	-0.57	1886-gar(□)	273.15	895.84 ± 0.30	0.56	1935-bil/gis(×)
338.45	837.50 ± 0.80	0.12	1886-gar(□)	288.15	882.74 ± 0.30	0.56	1935-bil/gis(×)
351.85	825.50 ± 0.80	0.29	1886-gar(□)	303.15	869.65 ± 0.30	0.69	1935-bil/gis(×)
370.45	808.80 ± 0.80	0.63	1886-gar(□)	288.15	880.90 ± 1.00	-1.28	1937-rog/dvo(O)

¹⁾ Not included in Fig. 1.

Further references: [1960-sol/bar, 1967-bar/fro, 1976-nay/zor].

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	898.02 ± 0.59	320.00	853.97 ± 0.65	380.00	799.35 ± 0.86
280.00	889.31 ± 0.60	330.00	845.00 ± 0.66	390.00	790.07 ± 0.98
290.00	880.55 ± 0.61	340.00	835.97 ± 0.67	400.00	780.73 ± 1.14
293.15	877.79 ± 0.61	350.00	826.90 ± 0.69	410.00	771.33 ± 1.35
298.15	873.38 ± 0.62	360.00	817.77 ± 0.72	420.00	761.89 ± 1.61
300.00	871.74 ± 0.62	370.00	808.59 ± 0.78	430.00	752.39 ± 1.92
310.00	862.88 ± 0.64				

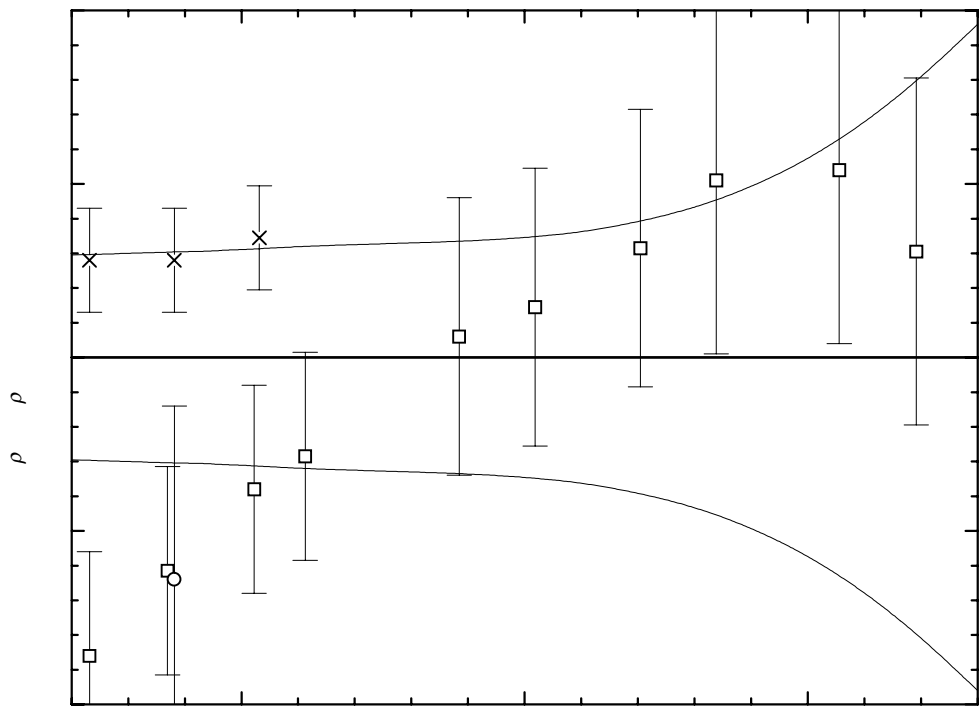


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the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

Hexyl ethanoate [142-92-7] C₈H₁₆O₂ MW = 144.21 75

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 5.5968 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 9.0510 \cdot 10^{-2}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.15 to 431.07 K
	$\rho = A + BT + CT^2 + DT^3 + \dots$
A	$1.09141 \cdot 10^3$
B	$-5.91124 \cdot 10^{-1}$
C	$-5.21990 \cdot 10^{-4}$

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	890.10 ± 0.60	-0.90	1886-gar(×)	318.95	849.80 ± 0.60	0.03	1886-gar(×)
286.65	878.40 ± 0.60	-0.67	1886-gar(×)	338.25	832.00 ± 0.80	0.26	1886-gar(×)

cont.

Hexyl ethanoate (cont.)

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho}{\text{kg} \cdot \text{m}^{-3}}$	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)
351.45	819.70 ± 0.80	0.51	1886-gar(×)	298.14	868.80 ± 0.30	0.02	1980-mey/awe(Δ)
370.15	802.00 ± 0.80	0.91	1886-gar(×)	311.08	856.80 ± 0.30	-0.21	1980-mey/awe(Δ)
384.05	788.40 ± 1.00	1.00	1886-gar(×)	320.75	847.90 ± 0.30	-0.21	1980-mey/awe(Δ)
403.25	769.80 ± 1.00	1.64	1886-gar(×)	329.21	840.00 ± 0.40	-0.23	1980-mey/awe(Δ)
428.95	743.60 ± 1.00	1.80	1886-gar ¹⁾	338.69	831.20 ± 0.40	-0.13	1980-mey/awe(Δ)
273.15	891.44 ± 0.50	0.44	1935-bil/gis(◆)	349.10	821.40 ± 0.40	-0.03	1980-mey/awe(Δ)
288.15	877.88 ± 0.50	0.14	1935-bil/gis(◆)	358.55	812.40 ± 0.40	0.04	1980-mey/awe(Δ)
303.15	864.24 ± 0.50	-0.00	1935-bil/gis(◆)	368.26	803.00 ± 0.40	0.07	1980-mey/awe(Δ)
293.15	871.80 ± 0.60	-1.47	1948-vog-9 ¹⁾	373.15	798.30 ± 0.40	0.15	1980-mey/awe(Δ)
313.95	854.40 ± 0.60	0.02	1948-vog-9(×)	383.15	788.10 ± 0.50	-0.19	1980-mey/awe(Δ)
332.85	836.40 ± 0.60	-0.42	1948-vog-9(×)	392.71	778.70 ± 0.50	-0.07	1980-mey/awe(Δ)
358.75	813.10 ± 0.80	0.94	1948-vog-9(×)	403.06	768.40 ± 0.50	0.05	1980-mey/awe(Δ)
273.15	889.66 ± 0.80	-1.34	1950-gor(×)	412.92	758.30 ± 0.50	-0.02	1980-mey/awe(Δ)
293.15	872.60 ± 0.50	-0.67	1950-mum/phi(∇)	423.17	747.50 ± 0.50	-0.29	1980-mey/awe(Δ)
298.15	868.10 ± 0.50	-0.67	1950-mum/phi(∇)	431.07	738.70 ± 0.50	-0.90	1980-mey/awe(Δ)
308.10	859.40 ± 0.60	-0.34	1955-shi/bon(×)	298.15	868.60 ± 0.30	-0.17	1994-arc/bla(○)
368.10	803.60 ± 0.60	0.51	1955-shi/bon(×)	298.15	868.42 ± 0.30	-0.35	1996-elb(□)
273.27	891.60 ± 0.30	0.71	1980-mey/awe(Δ)	298.15	868.60 ± 0.20	-0.17	1997-arc/bla(×)
283.53	882.30 ± 0.30	0.45	1980-mey/awe(Δ)				

¹⁾ Not included in Fig. 1.

Further references: [1949-eng/sch, 1954-ang/lle, 1964-bre/ulu, 1964-tur/den, 1965-mam, 1967-bar/fro, 1976-nay/zor, 1977-toj/arc].

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	893.75 ± 0.62	320.00	848.80 ± 0.44	390.00	781.48 ± 0.67
280.00	884.97 ± 0.53	330.00	839.50 ± 0.46	400.00	771.44 ± 0.70
290.00	876.09 ± 0.48	340.00	830.09 ± 0.49	410.00	761.30 ± 0.73
293.15	873.27 ± 0.47	350.00	820.57 ± 0.52	420.00	751.06 ± 0.75
298.15	868.77 ± 0.45	360.00	810.96 ± 0.56	430.00	740.71 ± 0.76
300.00	867.10 ± 0.45	370.00	801.23 ± 0.60	440.00	730.26 ± 0.77
310.00	858.00 ± 0.44	380.00	791.41 ± 0.64		

cont.

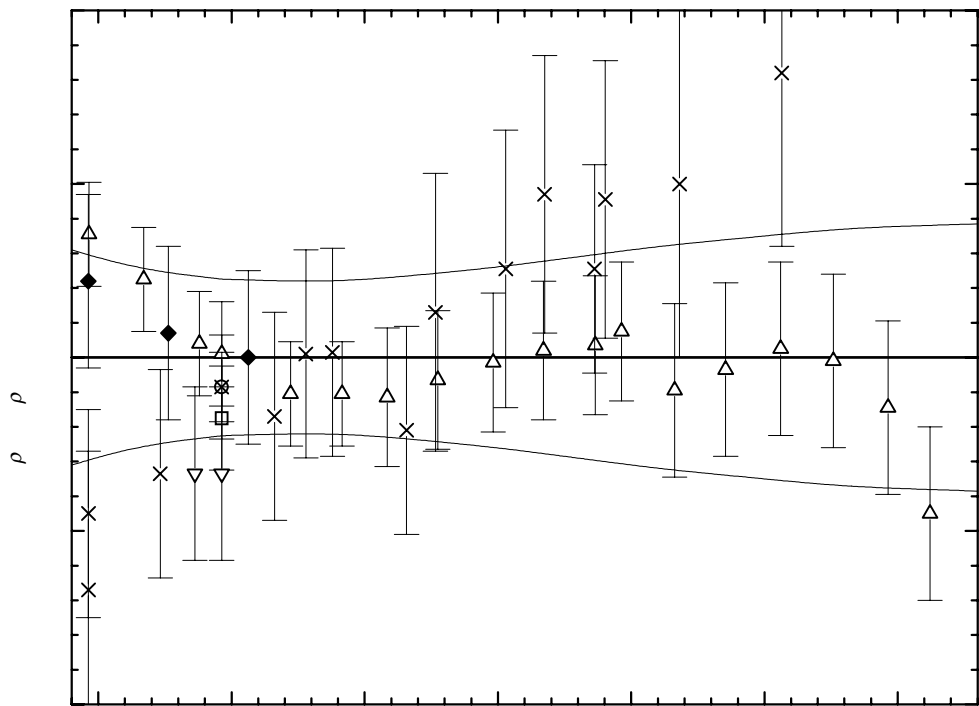


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the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

Methyl 2-ethylpentanoate [816-16-0] C₈H₁₆O₂ MW = 144.21 76

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	875.0 ± 2.0	1890-gar

Methyl heptanoate [106-73-0] C₈H₁₆O₂ MW = 144.21 77

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{\text{c,w}} = 5.9126 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 1.4075 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.15 to 418.95 K $\rho = A + BT + CT^2 + DT^3 + \dots$
A	$1.09047 \cdot 10^3$
A	$-5.64192 \cdot 10^{-1}$
B	$-5.16329 \cdot 10^{-4}$

cont.

Methyl heptanoate (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	898.00 ± 0.60	0.16	1886-gar(○)	303.15	871.13 ± 0.60	-0.85	1935-bil/gis(◆)
296.25	877.50 ± 0.60	-0.51	1886-gar(○)	289.95	884.40 ± 0.60	0.93	1948-vog-9(□)
307.85	867.30 ± 0.60	-0.55	1886-gar(○)	293.15	881.50 ± 0.60	0.79	1948-vog-9(□)
321.25	855.40 ± 0.80	-0.54	1886-gar(○)	298.15	877.00 ± 0.60	0.64	1948-vog-9(□)
338.15	840.10 ± 0.80	-0.55	1886-gar(○)	315.15	861.80 ± 0.60	0.42	1948-vog-9(□)
351.55	828.00 ± 0.80	-0.32	1886-gar(○)	315.35	861.60 ± 0.60	0.39	1948-vog-9(□)
370.15	810.80 ± 0.80	-0.09	1886-gar(○)	334.25	844.30 ± 0.80	0.10	1948-vog-9(□)
383.65	798.10 ± 1.00	0.08	1886-gar(○)	334.95	843.70 ± 0.80	0.13	1948-vog-9(□)
405.65	776.80 ± 1.00	0.16	1886-gar(○)	359.15	822.50 ± 0.80	1.26	1948-vog-9(□)
418.95	762.90 ± 1.00	-0.58	1886-gar(○)	360.35	821.40 ± 0.80	1.28	1948-vog-9(□)
273.15	898.00 ± 0.60	0.16	1935-bil/gis(◆)	293.15	880.00 ± 1.00	-0.71	1964-adr/dek(▽)
288.15	884.57 ± 0.60	-0.46	1935-bil/gis(◆)	313.15	861.80 ± 1.00	-1.36	1964-gou/vlu(Δ)

¹⁾ Not included in Fig. 1.

Further references: [1905-lum].

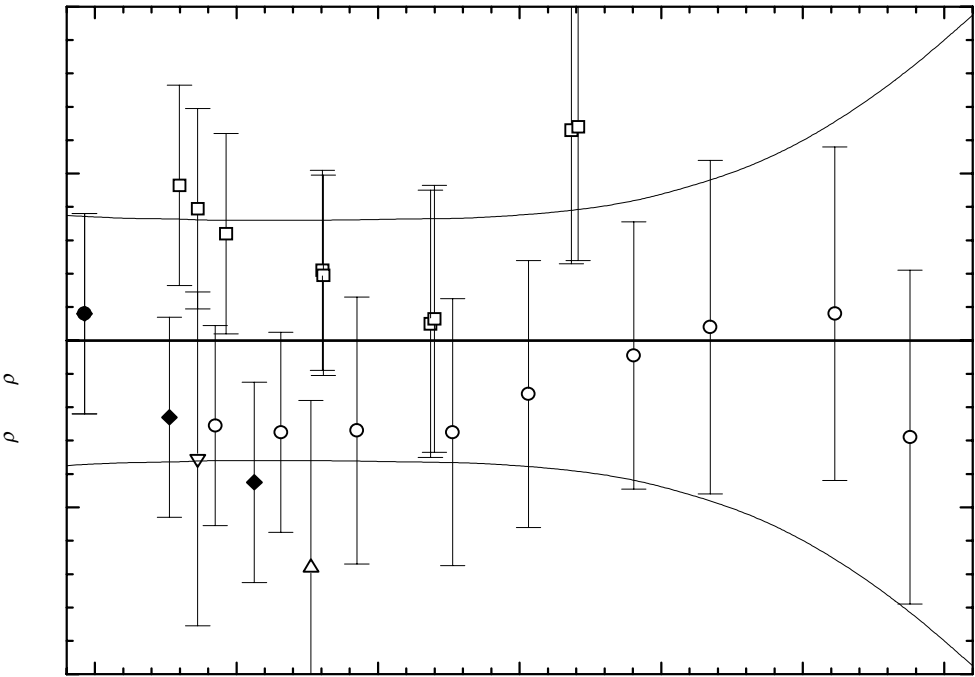


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the 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	900.50 ± 0.75	320.00	857.06 ± 0.72	380.00	801.52 ± 0.92
280.00	892.02 ± 0.73	330.00	848.06 ± 0.73	390.00	791.90 ± 1.03
290.00	883.43 ± 0.73	340.00	838.96 ± 0.73	400.00	782.18 ± 1.19
293.15	880.71 ± 0.72	350.00	829.75 ± 0.75	410.00	772.36 ± 1.40
298.15	876.36 ± 0.72	360.00	820.44 ± 0.78	420.00	762.43 ± 1.65
300.00	874.74 ± 0.72	370.00	811.03 ± 0.83	430.00	752.40 ± 1.95
310.00	865.95 ± 0.72				

Methyl 2,3,3-trimethylbutanoate [19910-30-6] C₈H₁₆O₂ MW = 144.21 78

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	874.9 ± 1.0	1956-sar/new

1-Methylbutyl propanoate [54004-43-2] C₈H₁₆O₂ MW = 144.21 79

Table 1. Fit with estimated *B* coefficient for 4 accepted points. Deviation $\sigma_w = 0.784$.

Coefficient	$\rho = A + BT$
<i>A</i>	1159.43
<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.
291.65	867.9 ± 1.0	0.12	1914-pic/ken-1
322.15	837.9 ± 1.0	0.62	1914-pic/ken-1
351.15	808.4 ± 1.4	0.12	1914-pic/ken-1
369.15	788.5 ± 1.5	-1.78	1914-pic/ken-1

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	869.4 ± 1.5	320.00	839.4 ± 1.3	350.00	809.4 ± 1.4
293.15	866.3 ± 1.5	330.00	829.4 ± 1.4	360.00	799.4 ± 1.5
298.15	861.3 ± 1.4	340.00	819.4 ± 1.4	370.00	789.4 ± 1.6
310.00	849.4 ± 1.4				

3-Methylbutyl propanoate

[105-68-0]

C₈H₁₆O₂

MW = 144.21

80

Table 1. Fit with estimated *B* coefficient for 2 accepted points. Deviation $\sigma_w = 0.000$.

Coefficient	$\rho = A + BT$
<i>A</i>	1163.15
<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.
433.65	729.5 ± 1.5	-0.00	1884-sch-6
298.15	865.0 ± 1.0	-0.00	1926-mun

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	873.2 ± 1.9	340.00	823.2 ± 1.1	400.00	763.2 ± 2.1
293.15	870.0 ± 1.8	350.00	813.2 ± 1.2	410.00	753.2 ± 2.4
298.15	865.0 ± 1.7	360.00	803.2 ± 1.3	420.00	743.2 ± 2.7
310.00	853.2 ± 1.4	370.00	793.2 ± 1.4	430.00	733.2 ± 2.9
320.00	843.2 ± 1.3	380.00	783.2 ± 1.6	440.00	723.2 ± 3.2
330.00	833.2 ± 1.2	390.00	773.2 ± 1.9		

1-Methylethyl 2,2-dimethylpropanoate

[5129-36-2]

C₈H₁₆O₂

MW = 144.21

81

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	830.0 ± 2.0	1957-tra/bat

1-Methylethyl 3-methylbutanoate

[32665-23-9]

C₈H₁₆O₂

MW = 144.21

82

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	846.1 ± 2.0	1926-mun

1-Methylethyl pentanoate

[18362-97-5]

C₈H₁₆O₂

MW = 144.21

83

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	857.9 ± 1.0	1935-sch-2

1-Methylpentyl ethanoate [5953-49-1] C₈H₁₆O₂ MW = 144.21 84

Table 1. Fit with estimated *B* coefficient for 4 accepted points. Deviation σ_w = 1.220.

Coefficient	$\rho = A + BT$
<i>A</i>	1164.02
<i>B</i>	-1.020

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

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	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	877.7 ± 2.0	-7.75	1865-erl/wan ¹⁾	329.15	829.9 ± 1.0	1.61	1914-pic/ken-1
323.15	821.1 ± 2.5	-13.35	1865-erl/wan ¹⁾	361.15	796.4 ± 1.0	0.75	1914-pic/ken-1
291.15	865.8 ± 1.0	-1.25	1914-pic/ken-1	398.15	756.8 ± 1.0	-1.11	1914-pic/ken-1

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	868.2 ± 1.7	330.00	827.4 ± 1.4	370.00	786.6 ± 1.4
293.15	865.0 ± 1.7	340.00	817.2 ± 1.4	380.00	776.4 ± 1.5
298.15	859.9 ± 1.6	350.00	807.0 ± 1.4	390.00	766.2 ± 1.6
310.00	847.8 ± 1.5	360.00	796.8 ± 1.4	400.00	756.0 ± 1.7
320.00	837.6 ± 1.4				

2-Methylpentyl ethanoate [7789-99-3] C₈H₁₆O₂ MW = 144.21 85

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	869.1 ± 1.5	1883-lie/zei

(S)-(+)-3-Methylpentyl ethanoate [500025-41-2] C₈H₁₆O₂ MW = 144.21 86

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
292.15	879.0 ± 0.8	1959-pin/lar

1-Methylpropyl butanoate [819-97-6] C₈H₁₆O₂ MW = 144.21 87

Table 1. Fit with estimated *B* coefficient for 3 accepted points. Deviation σ_w = 1.482.

Coefficient	$\rho = A + BT$
<i>A</i>	1154.53
<i>B</i>	-0.977

cont.

1-Methylpropyl butanoate (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.
286.65	873.7 ± 1.0	-0.77	1914-pic/ken-1
328.15	836.0 ± 1.0	2.07	1914-pic/ken-1
353.15	808.2 ± 1.0	-1.30	1914-pic/ken-1
399.15	757.2 ± 2.0	-7.36	1914-pic/ken-1 ¹⁾
289.15	857.2 ± 3.0	-14.83	1938-zav ¹⁾

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	881.0 ± 1.8	310.00	851.7 ± 1.6	340.00	822.3 ± 1.6
290.00	871.2 ± 1.7	320.00	841.9 ± 1.6	350.00	812.6 ± 1.7
293.15	868.1 ± 1.7	330.00	832.1 ± 1.6	360.00	802.8 ± 1.7
298.15	863.2 ± 1.7				

2-Methylpropyl butanoate

[539-90-2]

C₈H₁₆O₂

MW = 144.21

88

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.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
430.15	726.9 ± 2.0	1884-sch-6	298.15	860.0 ± 2.0	1926-mun
273.15	871.9 ± 2.0	1872-pie/puc	288.15	866.0 ± 2.0	1928-bur-1
323.95	823.8 ± 2.0	1872-pie/puc	288.15	864.0 ± 2.0	1959-hof
372.95	775.3 ± 2.0	1872-pie/puc	298.15	860.6 ± 2.0	1959-hof
401.45	743.9 ± 2.5	1872-pie/puc			

1-Methylpropyl 2-methylpropanoate

[23412-21-7]

C₈H₁₆O₂

MW = 144.21

89

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
289.15	870.0 ± 2.0	1938-zav

2-Methylpropyl 2-methylpropanoate **[97-85-8]** **C₈H₁₆O₂** **MW = 144.21** **90**

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.
422.15	724.9 ± 2.0	1884-sch-6 ¹⁾
293.15	847.5 ± 1.0	1925-ter
293.15	846.0 ± 1.0	1938-fic/sut
293.15	847.5 ± 1.0	1941-whi/whi
293.15	847.0 ± 1.0	Recommended

¹⁾Not included in calculation of recommended value.

Pentyl propenoate **[624-54-4]** **C₈H₁₆O₂** **MW = 144.21** **91**

Table 1. Fit with estimated *B* coefficient for 7 accepted points. Deviation σ_w = 0.447.

Coefficient	$\rho = A + BT$
<i>A</i>	1145.17
<i>B</i>	-0.930

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.
433.15	729.5 ± 2.0	-12.84	1883-sch-3 ¹⁾	273.15	891.3 ± 1.0	0.19	1959-tim/hen
433.15	729.5 ± 2.0	-12.84	1883-sch-3 ¹⁾	288.15	877.4 ± 1.0	0.16	1959-tim/hen
273.15	891.3 ± 1.0	0.16	1924-lie	303.15	863.4 ± 1.0	0.20	1959-tim/hen
288.15	876.1 ± 1.0	-1.09	1924-lie	293.15	874.2 ± 2.0	1.66	1964-kul/zil ¹⁾
293.15	872.7 ± 1.0	0.20	1958-hen	293.15	875.0 ± 2.0	2.46	1964-tur/den ¹⁾
298.15	868.1 ± 1.0	0.21	1958-hen				

¹⁾Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	894.1 ± 1.0
280.00	884.8 ± 0.8
290.00	875.5 ± 0.7
293.15	872.5 ± 0.8
298.15	867.9 ± 0.8
310.00	856.9 ± 1.1

Propyl 2-methylbutanoate **[37064-20-3]** **C₈H₁₆O₂** **MW = 144.21** **92**

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.
407.95	744.6 ± 2.0	1884-sch-6
293.15	869.7 ± 2.0	1890-gar

Propyl 3-methylbutanoate

[557-00-6]

C₈H₁₆O₂

MW = 144.21

93

Table 1. Fit with estimated *B* coefficient for 9 accepted points. Deviation $\sigma_w = 0.272$.

Coefficient	$\rho = A + BT$
<i>A</i>	1125.82
<i>B</i>	-0.900

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	870.0 ± 2.0	12.52	1926-mun ¹⁾	314.15	843.3 ± 0.6	0.22	1948-vog-9
291.85	862.9 ± 0.6	-0.25	1948-vog-9	334.15	825.5 ± 0.8	0.42	1948-vog-9
293.15	861.7 ± 0.6	-0.28	1948-vog-9	335.25	824.5 ± 0.8	0.41	1948-vog-9
294.25	860.7 ± 0.6	-0.29	1948-vog-9	359.15	802.5 ± 0.8	-0.08	1948-vog-9
313.85	843.6 ± 0.6	0.25	1948-vog-9	360.05	801.7 ± 0.8	-0.07	1948-vog-9

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	864.8 ± 0.8	320.00	837.8 ± 0.6	350.00	810.8 ± 0.9
293.15	862.0 ± 0.8	330.00	828.8 ± 0.7	360.00	801.8 ± 1.1
298.15	857.5 ± 0.7	340.00	819.8 ± 0.8	370.00	792.8 ± 1.3
310.00	846.8 ± 0.6				

Propyl pentanoate

[141-06-0]

C₈H₁₆O₂

MW = 144.21

94

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 4.1358 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 9.4741 \cdot 10^{-2}$ (combined temperature ranges, unweighted).

Coefficient	T = 273.15 to 404.25 K $\rho = A + BT + CT^2 + DT^3 + \dots$
<i>A</i>	$1.10299 \cdot 10^3$
<i>B</i>	$-6.87716 \cdot 10^{-1}$
<i>C</i>	$-3.61859 \cdot 10^{-4}$

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

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	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	888.60 ± 0.60	0.46	1886-gar(Δ)	371.05	798.10 ± 0.80	0.10	1886-gar(Δ)
281.75	880.80 ± 0.60	0.30	1886-gar(Δ)	383.75	786.00 ± 1.00	0.21	1886-gar(Δ)
293.05	870.60 ± 0.60	0.22	1886-gar(Δ)	404.25	765.40 ± 1.00	-0.45	1886-gar(Δ)
306.05	858.70 ± 0.60	0.08	1886-gar(Δ)	293.15	869.50 ± 1.00	-0.79	1890-gar(V)
319.55	846.00 ± 0.60	-0.28	1886-gar(Δ)	273.15	889.30 ± 1.00	1.16	1924-lie(◆)
338.15	829.10 ± 0.80	0.04	1886-gar(Δ)	288.15	874.10 ± 1.00	-0.68	1924-lie(◆)

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	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)
293.15	869.90 ± 0.60	-0.39	1935-sch-2(□)	333.85	833.00 ± 0.80	-0.07	1948-vog-9(○)
291.45	870.70 ± 0.60	-1.12	1948-vog-9(○)	333.85	833.00 ± 0.60	-0.07	1948-vog-9(○)
293.15	870.20 ± 0.50	-0.09	1948-vog-9(○)	334.45	832.40 ± 0.80	-0.11	1948-vog-9(○)
293.15	870.20 ± 0.60	-0.09	1948-vog-9(○)	359.25	809.20 ± 0.80	-0.03	1948-vog-9(○)
302.25	861.90 ± 0.60	-0.17	1948-vog-9(○)	359.45	809.20 ± 0.70	0.16	1948-vog-9(○)
314.05	851.60 ± 0.60	0.27	1948-vog-9(○)	359.85	806.70 ± 0.80	-1.96	1948-vog-9 ¹⁾
314.25	851.40 ± 0.60	0.26	1948-vog-9(○)				

¹⁾ Not included in Fig. 1.

Further references: [1884-sch-6, 1934-gil/dex].

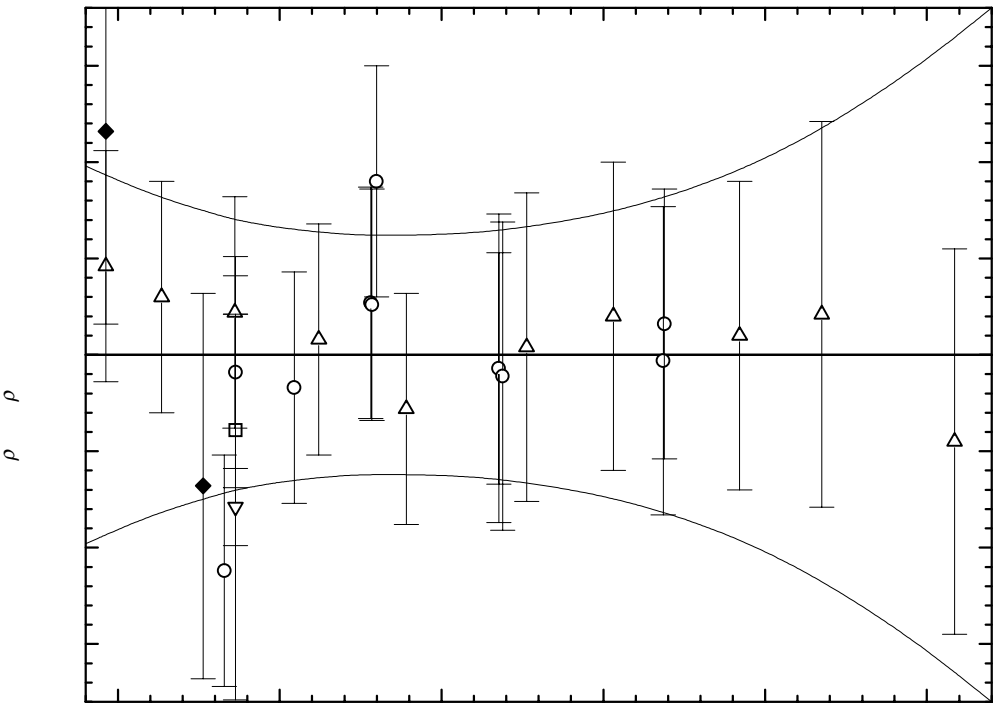


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the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

cont.

Propyl pentanoate (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	890.93 ± 0.98	310.00	855.03 ± 0.62	370.00	799.00 ± 0.94
280.00	882.06 ± 0.83	320.00	845.87 ± 0.62	380.00	789.41 ± 1.10
290.00	873.12 ± 0.73	330.00	836.64 ± 0.63	390.00	779.74 ± 1.30
293.15	870.29 ± 0.70	340.00	827.34 ± 0.67	400.00	770.01 ± 1.53
298.15	865.78 ± 0.67	350.00	817.96 ± 0.73	410.00	760.20 ± 1.80
300.00	864.11 ± 0.66	360.00	808.52 ± 0.82		

1,2,2-Trimethylpropyl ethanoate

[500013-05-8]

C₈H₁₆O₂

MW = 144.21

95

Table 1. Experimental value with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
298.15	856.0 ± 2.0	1933-ste