

6.1.2 Saturated Secondary Amines

N-Methylmethanamine**[124-40-3]****C₂H₇N****MW = 45.08****559**

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{c,w} = 3.4283 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{c,uw} = 1.2560 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	T = 194.15 to 308.15 K
	$\rho = A + BT + CT^2 + DT^3 + \dots$
A	$8.66770 \cdot 10^2$
B	$-2.40616 \cdot 10^{-1}$
C	$-1.63523 \cdot 10^{-3}$

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)
267.35	686.50 ± 0.60	0.94	1889-hof(○)	288.15	661.54 ± 0.30	-0.12	1942-swi(∇)
267.15	686.00 ± 1.50	0.22	1907-mey/jac(Δ)	298.15	649.59 ± 0.30	-0.08	1942-swi(∇)
194.15	758.10 ± 0.60	-0.32	1917-jae(□)	298.15	649.66 ± 0.30	-0.01	1942-swi(∇)
273.15	680.40 ± 0.60	1.36	1917-jae ¹⁾	308.15	637.24 ± 0.30	-0.11	1942-swi(∇)
273.15	678.60 ± 0.30	-0.44	1942-swi(∇)	308.15	637.36 ± 0.30	0.01	1942-swi(∇)
288.15	661.57 ± 0.30	-0.09	1942-swi(∇)				

¹⁾ Not included in Fig. 1.**Further references:** [1920-els, 1947-lef/rus].**Table 3.** Recommended values (fit to the reliable experimental values according to the equations

$$\rho = A + BT + CT^2 + DT^3 + \dots \text{ or } \rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$$

$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
190.00	762.02 ± 1.28	250.00	704.41 ± 0.77	298.15	649.67 ± 0.44
200.00	753.24 ± 1.16	260.00	693.67 ± 0.71	300.00	647.41 ± 0.43
210.00	744.13 ± 1.06	270.00	682.60 ± 0.63	310.00	635.03 ± 0.40
220.00	734.69 ± 0.98	280.00	671.20 ± 0.56	320.00	622.33 ± 0.43
230.00	724.92 ± 0.91	290.00	659.47 ± 0.49		
240.00	714.83 ± 0.84	293.15	655.71 ± 0.47		

cont.

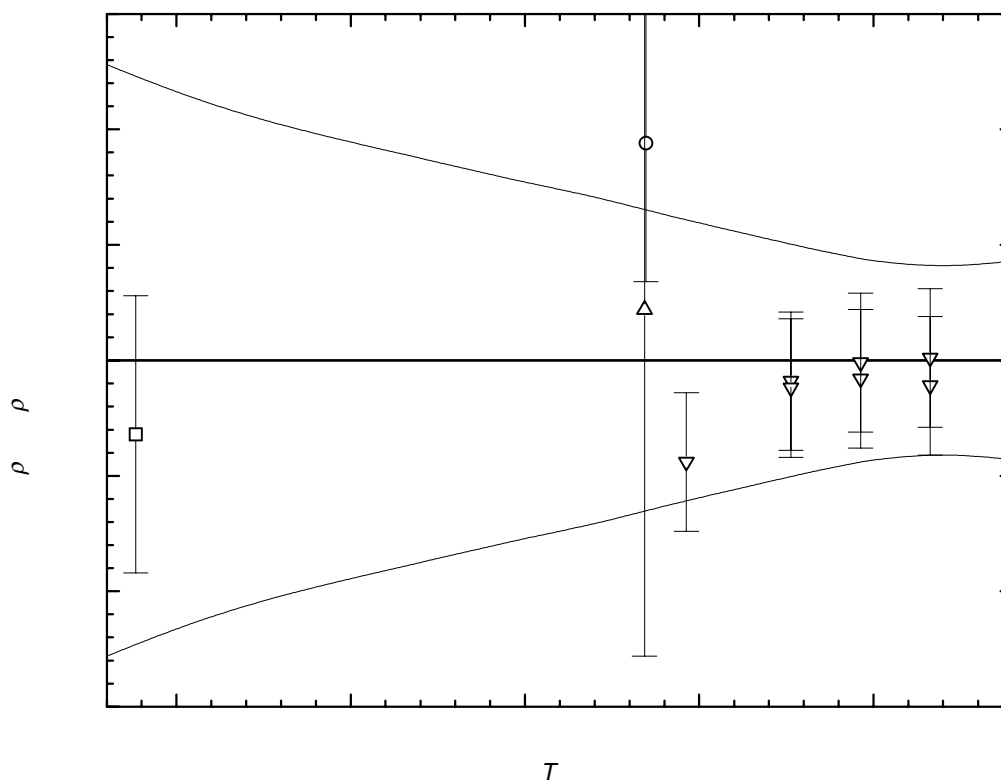
N-Methylmethanamine (cont.)

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.)

N-Ethylethanamine

[109-89-7]

 $C_4H_{11}N$

MW = 73.14

560

 $T_c = 496.95 \text{ K}$ [1923-her/neu] $\rho_c = 243.00 \text{ kg}\cdot\text{m}^{-3}$ [1923-her/neu]

Table 1. Coefficients for the polynomial expansion equations. Standard deviations (see introduction):

$\sigma_1 = 3.0011$ (low temperature range), $\sigma_{c,w} = (1.6940$ combined temperature ranges, weighted),

$\sigma_{c,uw} = 7.3867 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 233.15 \text{ to } 400.00 \text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$	$T = 400.00 \text{ to } 496.95 \text{ K}$ $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)]$ $[\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$
<i>A</i>	$1.06919 \cdot 10^3$	2.41325
<i>B</i>	-1.42683	$-9.01256 \cdot 10^{-2}$
<i>C</i>	$6.29022 \cdot 10^{-4}$	$1.26184 \cdot 10^{-3}$
<i>D</i>		$-5.68795 \cdot 10^{-6}$

cont.

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref. (Symbol in Fig. 1)	T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref. (Symbol in Fig. 1)
291.15	707.40 ± 0.60	0.31	1882-oud ¹⁾	324.85	675.60 ± 0.40	3.53	1944-fri/har-2(×)
309.15	688.70 ± 0.60	0.49	1882-oud ¹⁾	329.10	671.00 ± 0.40	3.25	1944-fri/har-2(×)
327.15	669.00 ± 0.60	-0.73	1882-oud(×)	293.15	707.40 ± 0.50	2.43	1948-vog-4 ¹⁾
329.15	668.40 ± 0.70	0.70	1886-sch(×)	314.65	684.90 ± 0.50	2.38	1948-vog-4(×)
273.15	726.23 ± 0.20	-0.16	1889-hof(○)	293.15	706.70 ± 0.50	1.73	1955-kus ¹⁾
298.15	699.95 ± 0.30	0.25	1913-kur/zem ¹⁾	298.15	701.20 ± 0.50	1.50	1955-kus ¹⁾
308.15	689.00 ± 0.30	-0.24	1913-kur/zem(◆)	303.15	696.00 ± 0.50	1.54	1955-kus ¹⁾
273.15	731.50 ± 0.30	5.11	1917-jae(∇)	313.15	685.50 ± 0.50	1.44	1955-kus ¹⁾
298.15	704.50 ± 0.30	4.80	1917-jae ¹⁾	323.15	674.40 ± 0.50	0.60	1955-kus(×)
323.15	677.10 ± 0.30	3.30	1917-jae(∇)	233.15	768.70 ± 0.50	-2.02	1959-cos/bow(×)
423.75	544.50 ± 0.64	-1.51	1923-her/neu(×)	253.15	748.00 ± 0.50	-0.30	1959-cos/bow(×)
460.15	472.50 ± 0.64	3.04	1923-her/neu(×)	273.15	727.20 ± 0.50	0.81	1959-cos/bow ¹⁾
460.25	472.30 ± 0.64	3.01	1923-her/neu(×)	293.15	706.30 ± 0.50	1.33	1959-cos/bow ¹⁾
476.55	427.50 ± 0.67	-4.74	1923-her/neu(×)	313.15	684.90 ± 0.50	0.84	1959-cos/bow ¹⁾
492.25	347.00 ± 0.92	-0.71	1923-her/neu(×)	333.15	663.70 ± 0.50	0.04	1959-cos/bow(×)
496.35	321.60 ± 3.50	31.42	1923-her/neu ¹⁾	353.15	641.40 ± 0.50	-2.36	1959-cos/bow(×)
496.95	260.50 ± 6.00	17.50	1923-her/neu(×)	373.15	618.50 ± 0.50	-5.86	1959-cos/bow(×)
273.15	725.10 ± 0.10	-1.29	1942-swi(×)	393.15	593.60 ± 0.50	-11.86	1959-cos/bow(×)
288.15	709.43 ± 0.10	-0.85	1942-swi(×)	413.15	566.20 ± 0.50	-8.19	1959-cos/bow(×)
288.15	709.40 ± 0.10	-0.88	1942-swi(×)	298.15	698.91 ± 0.10	-0.79	1970-nak/shi(□)
298.15	698.95 ± 0.10	-0.75	1942-swi(×)	278.00	723.30 ± 0.20	2.15	1984-jez/gli(Δ)
298.15	698.89 ± 0.10	-0.81	1942-swi(×)	283.00	718.00 ± 0.25	2.22	1984-jez/gli(Δ)
308.15	688.10 ± 0.10	-1.14	1942-swi(×)	288.00	712.80 ± 0.25	2.36	1984-jez/gli(Δ)
308.15	688.17 ± 0.10	-1.07	1942-swi(×)	293.00	707.40 ± 0.25	2.27	1984-jez/gli(Δ)
283.35	719.50 ± 0.40	4.10	1944-fri/har-2 ¹⁾	298.00	702.40 ± 0.30	2.54	1984-jez/gli ¹⁾
310.75	690.90 ± 0.40	4.35	1944-fri/har-2 ¹⁾	303.00	696.90 ± 0.30	2.29	1984-jez/gli ¹⁾
317.55	682.70 ± 0.40	3.17	1944-fri/har-2(×)				

¹⁾ Not included in Fig. 1.

Further references: [1884-gla, 1889-per, 1890-loe, 1891-gla, 1895-bru-1, 1906-mar, 1907-mey/jac, 1920-els, 1947-wat/ott, 1950-bar/lef-1, 1954-smi/otv, 1956-shi, 1960-pad/sub, 1967-dei, 1967-nak/shi, 1968-ano, 1970-kri/kom-1, 1971-let/bay, 1972-let-1, 1978-pat, 1985-cos/pat, 1985-man/kay].

Table 3. Recommended values (fit to the reliable experimental values according to the equations

$$\rho = A + BT + CT^2 + DT^3 + \dots \text{ or } \rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4].$$

T K	$\rho \pm \sigma_{\text{fit}}$ $\text{kg} \cdot \text{m}^{-3}$	T K	$\rho \pm \sigma_{\text{fit}}$ $\text{kg} \cdot \text{m}^{-3}$	T K	$\rho \pm \sigma_{\text{fit}}$ $\text{kg} \cdot \text{m}^{-3}$
230.00	774.30 ± 0.65	290.00	708.31 ± 0.21	330.00	666.84 ± 0.41
240.00	762.98 ± 0.49	293.15	704.97 ± 0.22	340.00	656.79 ± 0.49
250.00	751.80 ± 0.37	298.15	699.70 ± 0.23	350.00	646.86 ± 0.56
260.00	740.74 ± 0.28	300.00	697.76 ± 0.24	360.00	637.05 ± 0.63
270.00	729.80 ± 0.22	310.00	687.32 ± 0.28	370.00	627.38 ± 0.70
280.00	719.00 ± 0.20	320.00	677.02 ± 0.34	380.00	617.83 ± 0.76

cont.

N-Ethylethanamine (cont.)

Table 3. (cont.)

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
390.00	608.40 ± 0.81	430.00	529.48 ± 1.01	470.00	450.08 ± 1.24
400.00	599.10 ± 0.84	440.00	506.00 ± 1.04	480.00	420.08 ± 1.37
410.00	582.01 ± 0.96	450.00	486.76 ± 1.09	490.00	366.38 ± 1.58
420.00	556.23 ± 0.98	460.00	469.72 ± 1.15		

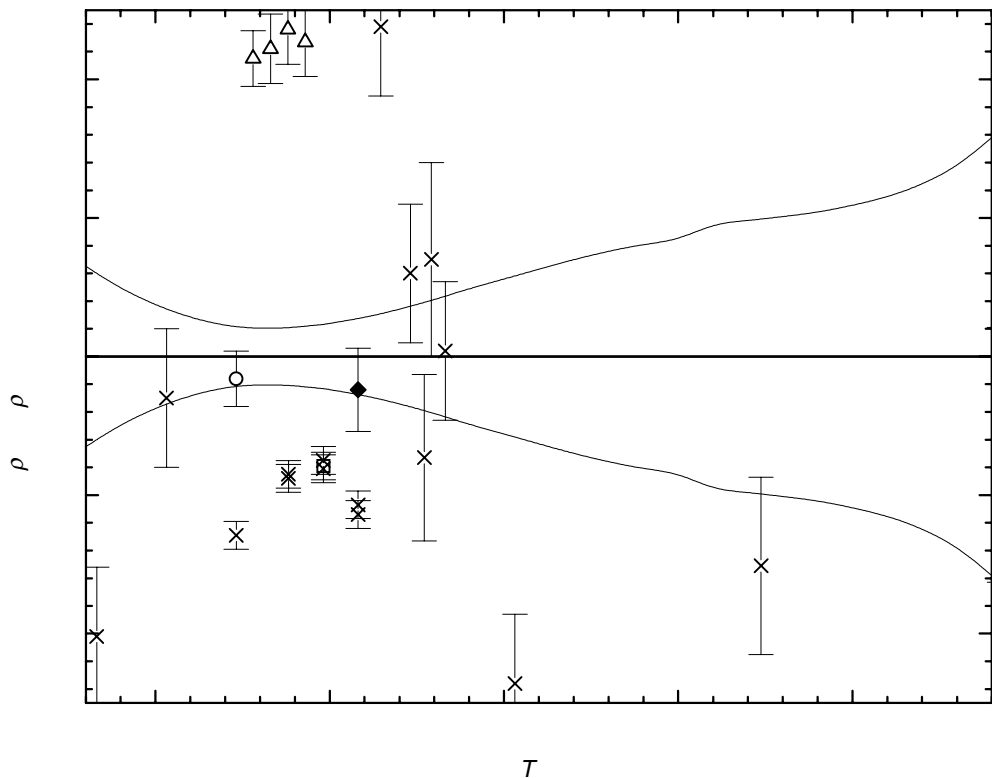


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the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

N-Methyl-1-propanamine [627-35-0] C₄H₁₁N MW = 73.14 561

Table 1. Experimental values with uncertainty.

$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
290.15	720.4 ± 1.0	1896-sto/von

***N*-Methyl-2-propanamine** [4747-21-1] $\text{C}_4\text{H}_{11}\text{N}$ MW = 73.14 562

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.
288.15	740.0 ± 15.0	1897-leb

***N*-Ethyl-1-propanamine** [20193-20-8] $\text{C}_5\text{H}_{13}\text{N}$ MW = 87.16 563

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.
297.15	773.0 ± 3.0	1907-com/are ¹⁾
293.15	731.8 ± 0.5	1944-cam/som
293.15	731.8 ± 0.5	Recommended

¹⁾ Not included in calculation of recommended value.

***N*-Methyl-1-butanamine** [110-68-9] $\text{C}_5\text{H}_{13}\text{N}$ MW = 87.16 564

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.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
288.15	737.5 ± 2.0	1895-fra/van ¹⁾	288.15	737.5 ± 2.0	1897-bru-1 ¹⁾
288.15	737.5 ± 2.0	1897-bru ¹⁾	288.15	736.7 ± 1.0	1909-lof/fre ¹⁾
293.15	734.4 ± 2.0	1897-bru ¹⁾	293.15	732.5 ± 0.5	1956-ano-14
291.25	736.3 ± 2.0	1897-bru ¹⁾	293.15	732.3 ± 0.6	1968-ano
291.25	736.3 ± 2.0	1897-bru-1 ¹⁾	293.15	732.4 ± 0.5	Recommended

¹⁾ Not included in calculation of recommended value.

***N*-Methyl-2-butanamine** [7713-69-1] $\text{C}_5\text{H}_{13}\text{N}$ MW = 87.16 565

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.
288.15	740.0 ± 2.0	1910-lof-1

***N*-Methyl-2-methyl-1-propanamine** [625-43-4] $\text{C}_5\text{H}_{13}\text{N}$ MW = 87.16 566

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.
291.15	722.2 ± 1.0	1896-sto/von

***N*-Methyl-2-methyl-2-propanamine** [14610-37-8] $\text{C}_5\text{H}_{13}\text{N}$ MW = 87.16 567

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	730.1 ± 1.0	1956-bor/lus
298.15	727.0 ± 2.0	1958-mei/bol
298.15	729.5 ± 1.5	Recommended

***N*-Ethyl-1-butanamine** [13360-63-9] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 568

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.
293.15	739.1 ± 0.5	1944-cam/som
293.15	738.9 ± 0.6	1968-ano
293.15	738.9 ± 0.6	1970-kri/kom-1
293.15	739.0 ± 0.5	Recommended

***N*-Ethyl-2-butanamine** [21035-44-9] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 569

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	753.0 ± 1.0	1901-bew
293.15	734.6 ± 1.0	1901-bew

***N*-Ethyl-2-methyl-2-propanamine** [4432-77-3] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 570

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	716.1 ± 0.6	1957-cop/leb

***N*-(1-Methylethyl)-1-propylamine** [21968-17-2] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 571

Table 1. Experimental and recommended values with uncertainties.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
293.15	727.8 ± 0.7	1954-nor/hau
293.15	729.0 ± 2.0	1962-kuf/sat
293.15	727.9 ± 0.8	Recommended

***N*-(1-Methylethyl)-2-propanamine** [108-18-9] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 572

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction):

$\sigma_{\text{c,w}} = 1.2028$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 2.6617 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 213.15 \text{ to } 433.15 \text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$
<i>A</i>	$9.44304 \cdot 10^2$
<i>B</i>	$-5.84876 \cdot 10^{-1}$
<i>C</i>	$-6.48539 \cdot 10^{-4}$

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref. (Symbol in Fig. 1)	T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref. (Symbol in Fig. 1)
288.15	722.20 ± 1.00	0.28	1910-lof(×)	273.15	734.50 ± 0.50	-1.66	1959-cos/bow(○)
289.15	720.60 ± 0.60	-0.36	1948-vog-4(Δ)	293.15	715.30 ± 0.50	-1.81	1959-cos/bow(○)
293.15	716.90 ± 0.60	-0.21	1948-vog-4(Δ)	313.15	696.40 ± 0.50	-1.15	1959-cos/bow(○)
299.45	711.10 ± 0.60	0.09	1948-vog-4(Δ)	333.15	676.90 ± 0.50	-0.57	1959-cos/bow(○)
314.35	698.00 ± 0.60	1.64	1948-vog-4(Δ)	353.15	657.10 ± 0.50	0.23	1959-cos/bow(○)
314.65	697.70 ± 0.60	1.64	1948-vog-4(Δ)	373.15	636.60 ± 0.50	0.85	1959-cos/bow(○)
334.55	678.10 ± 0.60	2.05	1948-vog-4(Δ)	393.15	615.20 ± 0.50	1.08	1959-cos/bow(○)
334.65	677.70 ± 0.60	1.76	1948-vog-4(Δ)	413.15	592.30 ± 0.50	0.34	1959-cos/bow(○)
293.15	716.30 ± 0.70	-0.81	1954-nor/hau(◆)	433.15	567.10 ± 0.50	-2.19	1959-cos/bow(○)
213.15	791.80 ± 0.50	1.63	1959-cos/bow(○)	293.15	716.10 ± 0.60	-1.01	1968-ano(∇)
233.15	773.00 ± 0.50	0.31	1959-cos/bow(○)	293.15	715.80 ± 0.40	-1.31	1969-kom/kri(□)
253.15	753.90 ± 0.50	-0.78	1959-cos/bow(○)				

Further references: [1868-sie, 1889-zan, 1907-mey/jac].

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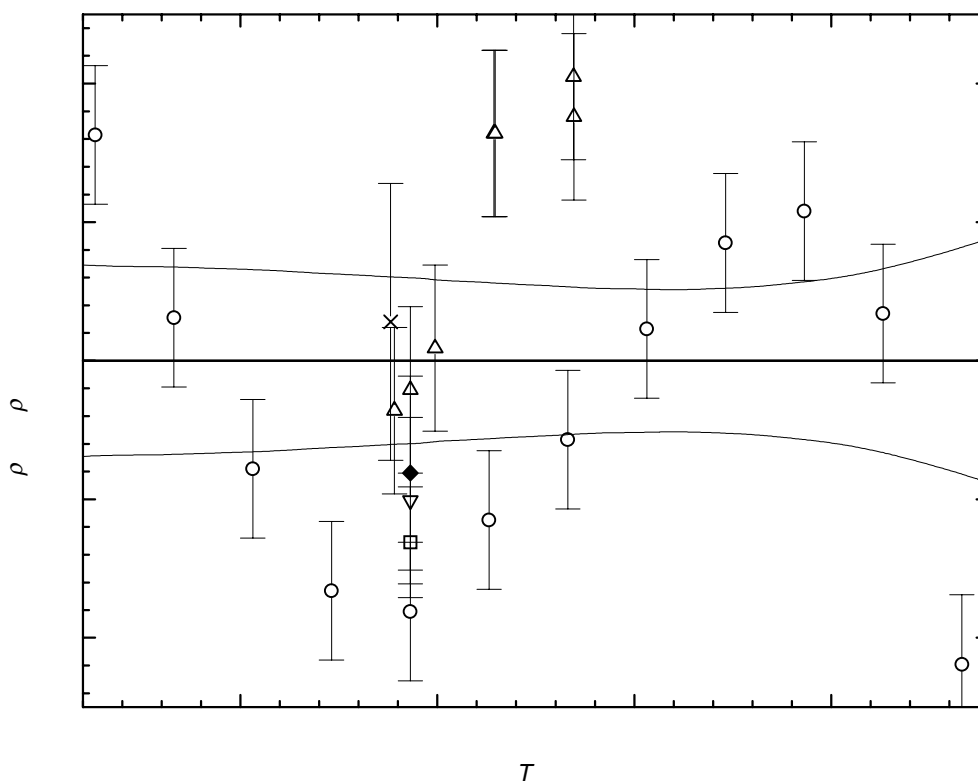
***N*-(1-Methylethyl)-2-propanamine (cont.)**

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 $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
210.00	792.88 ± 0.69	293.15	717.11 ± 0.60	370.00	639.11 ± 0.52
220.00	784.24 ± 0.68	298.15	712.27 ± 0.59	380.00	628.40 ± 0.53
230.00	775.47 ± 0.68	300.00	710.47 ± 0.58	390.00	617.56 ± 0.56
240.00	766.58 ± 0.67	310.00	700.67 ± 0.57	400.00	606.59 ± 0.59
250.00	757.55 ± 0.66	320.00	690.73 ± 0.55	410.00	595.49 ± 0.64
260.00	748.40 ± 0.65	330.00	680.67 ± 0.54	420.00	584.25 ± 0.71
270.00	739.11 ± 0.63	340.00	670.48 ± 0.52	430.00	572.89 ± 0.79
280.00	729.69 ± 0.62	350.00	660.15 ± 0.52	440.00	561.40 ± 0.88
290.00	720.15 ± 0.60	360.00	649.70 ± 0.51		

***N*-Methyl-3-methyl-1-butanamine** [4104-44-3] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 573

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.
295.15	739.0 ± 1.0	1896-sto/von
295.15	742.8 ± 1.0	1910-lof-1
295.15	740.9 ± 1.7	Recommended

***N*-Methyl-1-pentanamine** [25419-06-1] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 574

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.
288.15	760.0 ± 3.0	1911-von ¹⁾
288.15	738.0 ± 1.0	1910-lof-1
288.15	738.0 ± 1.0	Recommended

¹⁾ Not included in calculation of recommended value.

***N*-Propyl-1-propanamine** [142-84-7] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 575

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction):

$\sigma_{\text{c,w}} = 1.2324$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 2.4587 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 213.15 \text{ to } 433.15 \text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$
<i>A</i>	$9.86049 \cdot 10^2$
<i>B</i>	$-7.63431 \cdot 10^{-1}$
<i>C</i>	$-2.61736 \cdot 10^{-4}$

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)
277.15	752.40 ± 0.50	-1.96	1889-per(×)	318.15	716.40 ± 0.30	-0.27	1910-tur/mer(□)
283.15	746.90 ± 0.50	-2.00	1889-per(×)	333.15	702.50 ± 0.30	-0.16	1910-tur/mer(□)
288.15	742.30 ± 0.50	-2.03	1889-per(×)	290.05	742.80 ± 0.60	0.20	1948-vog-4 ¹⁾
293.15	738.10 ± 0.50	-1.66	1889-per ¹⁾	293.15	740.00 ± 0.60	0.24	1948-vog-4 ¹⁾
298.15	733.50 ± 0.50	-1.67	1889-per ¹⁾	297.65	735.90 ± 0.60	0.27	1948-vog-4 ¹⁾
293.15	739.00 ± 0.30	-0.76	1910-tur/mer(□)	314.25	721.30 ± 0.60	1.01	1948-vog-4(×)
303.15	729.90 ± 0.30	-0.66	1910-tur/mer(□)	314.45	721.10 ± 0.60	0.99	1948-vog-4(×)

¹⁾ Not included in Fig. 1.

cont.

N-Propyl-1-propanamine (cont.)**Table 2.** (cont.)

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	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)
333.05	704.30 ± 0.60	1.54	1948-vog-4(X)	333.15	703.20 ± 0.50	0.54	1959-cos/bow(X)
334.85	702.70 ± 0.60	1.63	1948-vog-4(X)	353.15	684.90 ± 0.50	1.10	1959-cos/bow(X)
358.35	680.80 ± 0.60	1.94	1948-vog-4(X)	373.15	665.80 ± 0.50	1.07	1959-cos/bow(X)
359.25	679.80 ± 0.60	1.79	1948-vog-4(X)	393.15	645.80 ± 0.50	0.35	1959-cos/bow(X)
293.15	739.10 ± 0.40	-0.66	1958-ano-3(◆)	413.15	625.30 ± 0.50	-0.66	1959-cos/bow(X)
213.15	813.00 ± 0.50	1.57	1959-cos/bow(X)	433.15	603.10 ± 0.50	-3.16	1959-cos/bow(X)
233.15	794.80 ± 0.50	0.97	1959-cos/bow(X)	453.15	579.90 ± 0.50	-6.45	1959-cos/bow ¹⁾
253.15	776.30 ± 0.50	0.29	1959-cos/bow(X)	293.15	738.90 ± 0.40	-0.86	1970-kri/kom(V)
273.15	758.00 ± 0.50	0.01	1959-cos/bow(X)	298.15	733.68 ± 0.30	-1.49	1972-let(O)
293.15	739.80 ± 0.50	0.04	1959-cos/bow ¹⁾	298.15	734.90 ± 0.30	-0.27	1972-let-1(Δ)
313.15	721.60 ± 0.50	0.29	1959-cos/bow(X)	293.15	739.60 ± 0.40	-0.16	1978-pat(X)

¹⁾ Not included in Fig. 1.

Further references: [1886-vin, 1889-gla/per, 1890-loe, 1891-gla, 1895-bru-1, 1907-mey/jac, 1917-jae, 1919-eyk, 1920-har/cla, 1944-fri/har-2, 1952-cow, 1968-ano, 1985-sar/paz, 1989-kat/tan].

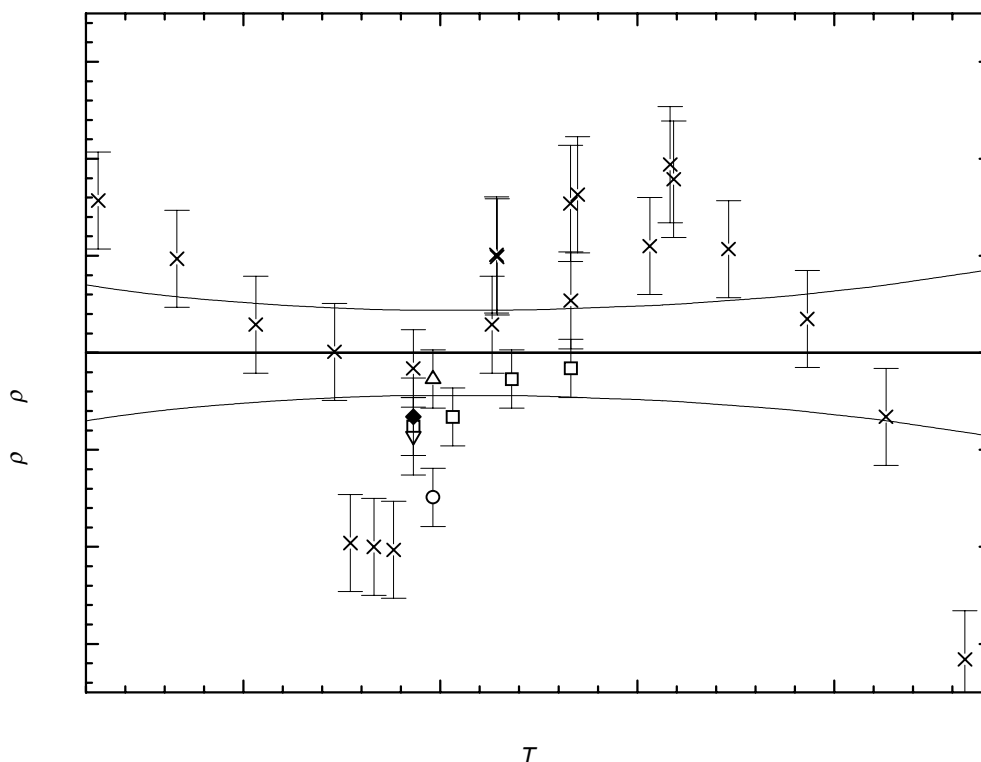


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the 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 $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
210.00	814.19 ± 0.70	293.15	739.76 ± 0.44	370.00	667.75 ± 0.53
220.00	805.43 ± 0.64	298.15	735.17 ± 0.44	380.00	658.15 ± 0.56
230.00	796.61 ± 0.59	300.00	733.46 ± 0.44	390.00	648.50 ± 0.59
240.00	787.75 ± 0.55	310.00	724.23 ± 0.44	400.00	638.80 ± 0.64
250.00	778.83 ± 0.52	320.00	714.95 ± 0.44	410.00	629.04 ± 0.68
260.00	769.86 ± 0.49	330.00	705.61 ± 0.45	420.00	619.24 ± 0.74
270.00	760.84 ± 0.47	340.00	696.23 ± 0.47	430.00	609.38 ± 0.80
280.00	751.77 ± 0.45	350.00	686.79 ± 0.48	440.00	599.47 ± 0.86
290.00	742.64 ± 0.44	360.00	677.29 ± 0.50		

***N*-(1-Methylethyl)-2-butanamine** [500044-66-6] $\text{C}_7\text{H}_{17}\text{N}$ MW = 115.22 576

Table 1. Experimental value with uncertainty.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	735.9 ± 1.0	1954-nor/hau

***N*-(1-Methylethyl)-2-methyl-1-propanamine** [500044-65-5] $\text{C}_7\text{H}_{17}\text{N}$ MW = 115.22 577

Table 1. Experimental value with uncertainty.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	732.2 ± 2.0	1954-nor/hau

***N*-Methyl-1-hexanamine** [35161-70-7] $\text{C}_7\text{H}_{17}\text{N}$ MW = 115.22 578

Table 1. Experimental value with uncertainty.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	778.7 ± 0.6	1924-dew/wec

***N*-Propyl-2-butanamine** [500044-68-8] $\text{C}_7\text{H}_{17}\text{N}$ MW = 115.22 579

Table 1. Experimental value with uncertainty.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
293.15	746.6 ± 2.0	1954-nor/hau

***N*-Propyl-2-methyl-2-propanamine** [500044-67-7] $C_7H_{17}N$ MW = 115.22 580

Table 1. Experimental value with uncertainty.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
298.15	742.1 ± 1.0	1956-bor/lus

***N*-Butyl-1-butanamine** [111-92-2] $C_8H_{19}N$ MW = 129.25 581

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction):

$\sigma_{\text{c,w}} = 1.0908$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 1.9125 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 253.15 \text{ to } 473.15 \text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$
<i>A</i>	$9.32376 \cdot 10^2$
<i>B</i>	$-4.02277 \cdot 10^{-1}$
<i>C</i>	$-6.31970 \cdot 10^{-4}$

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref. (Symbol in Fig. 1)	T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref. (Symbol in Fig. 1)
332.05	728.70 ± 0.50	-0.42	1944-fri/har-2(X)	293.15	759.50 ± 0.50	-0.64	1959-cos/bow(X)
356.25	708.30 ± 0.50	-0.56	1944-fri/har-2(X)	313.15	743.10 ± 0.50	-1.33	1959-cos/bow(X)
374.45	693.10 ± 0.50	-0.03	1944-fri/har-2(X)	333.15	726.90 ± 0.50	-1.32	1959-cos/bow(X)
383.75	685.40 ± 0.50	0.46	1944-fri/har-2(X)	353.15	709.90 ± 0.50	-1.60	1959-cos/bow(X)
394.15	676.80 ± 0.50	1.16	1944-fri/har-2(X)	373.15	693.20 ± 0.50	-1.07	1959-cos/bow(X)
403.45	668.60 ± 0.70	1.39	1944-fri/har-2(X)	393.15	676.20 ± 0.50	-0.34	1959-cos/bow(X)
412.85	660.60 ± 0.70	2.02	1944-fri/har-2(X)	413.15	657.60 ± 0.50	-0.70	1959-cos/bow(X)
424.35	650.80 ± 0.70	2.93	1944-fri/har-2(X)	433.15	639.00 ± 0.50	-0.56	1959-cos/bow(X)
432.15	644.10 ± 0.70	3.59	1944-fri/har-2 ¹⁾	453.15	619.10 ± 0.50	-1.21	1959-cos/bow(X)
293.15	760.10 ± 0.60	-0.04	1948-vog-4(X)	473.15	598.50 ± 0.50	-2.06	1959-cos/bow(X)
314.05	744.10 ± 0.60	0.39	1948-vog-4(X)	493.15	576.40 ± 0.50	-3.90	1959-cos/bow ¹⁾
314.85	743.50 ± 0.60	0.43	1948-vog-4(X)	513.15	552.20 ± 0.50	-7.34	1959-cos/bow ¹⁾
333.55	728.20 ± 0.60	0.31	1948-vog-4(X)	533.15	527.10 ± 0.50	-11.17	1959-cos/bow ¹⁾
334.15	727.70 ± 0.60	0.31	1948-vog-4(X)	293.15	761.70 ± 0.60	1.56	1968-ano(X)
358.05	708.10 ± 0.60	0.78	1948-vog-4(X)	298.15	755.72 ± 0.25	-0.54	1972-let(X)
359.35	707.10 ± 0.60	0.89	1948-vog-4(X)	298.15	755.55 ± 0.25	-0.71	1972-let-1(□)
293.15	760.10 ± 0.50	-0.04	1952-cow(◆)	293.15	760.90 ± 0.40	0.76	1977-rat/sal(Δ)
310.35	746.10 ± 0.50	-0.56	1954-smi/otv(X)	293.15	760.30 ± 0.40	0.16	1978-pat(▽)
233.15	808.60 ± 0.50	4.37	1959-cos/bow ¹⁾	293.15	759.29 ± 0.30	-0.85	1981-koh/atr(O)
253.15	792.10 ± 0.50	2.06	1959-cos/bow(X)	313.15	742.84 ± 0.30	-1.59	1981-koh/atr(O)
273.15	775.90 ± 0.50	0.56	1959-cos/bow(X)				

¹⁾ Not included in Fig. 1.

Further references: [1961-bel/shu-1, 1972-zhi/amp].

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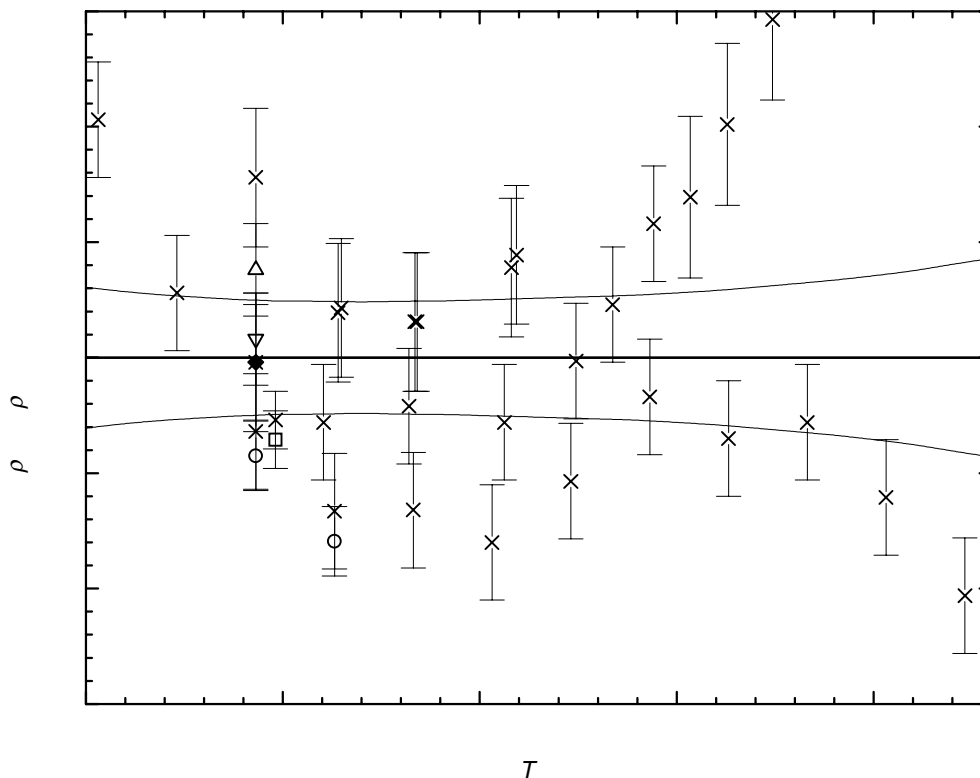


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the 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 $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
250.00	792.31 ± 0.61	320.00	738.93 ± 0.48	410.00	661.21 ± 0.58
260.00	785.06 ± 0.57	330.00	730.80 ± 0.49	420.00	651.94 ± 0.61
270.00	777.69 ± 0.54	340.00	722.55 ± 0.49	430.00	642.55 ± 0.64
280.00	770.19 ± 0.52	350.00	714.16 ± 0.50	440.00	633.03 ± 0.67
290.00	762.57 ± 0.50	360.00	705.65 ± 0.51	450.00	623.38 ± 0.71
293.15	760.14 ± 0.50	370.00	697.02 ± 0.52	460.00	613.60 ± 0.75
298.15	756.26 ± 0.49	380.00	688.25 ± 0.53	470.00	603.70 ± 0.81
300.00	754.82 ± 0.49	390.00	679.37 ± 0.54	480.00	593.68 ± 0.86
310.00	746.94 ± 0.49	400.00	670.35 ± 0.56		

***N*-Methyl-1-heptanamine** [36343-05-2] $\text{C}_8\text{H}_{19}\text{N}$ MW = 129.25 582

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.
273.15	771.2 ± 0.6	1947-tio

***N*-(1-Methylpropyl)-2-butanamine** [626-23-3] $\text{C}_8\text{H}_{19}\text{N}$ MW = 129.25 583

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction):

$\sigma_{\text{c,w}} = 2.8210 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 1.8249 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 293.15 \text{ to } 358.25 \text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$
<i>A</i>	$9.97415 \cdot 10^2$
<i>B</i>	$-8.33123 \cdot 10^{-1}$

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)
293.15	753.40 ± 0.60	0.22	1948-vog-4(□)	358.25	698.90 ± 0.60	-0.05	1948-vog-4(□)
313.95	736.20 ± 0.60	0.34	1948-vog-4(□)	293.15	752.50 ± 1.00	-0.68	1954-nor/hau(○)
334.15	719.20 ± 0.60	0.17	1948-vog-4(□)				

Further references: [1909-sab/mai].

Table 3. Recommended values (fit to the reliable experimental values according to the equations

$$\rho = A + BT + CT^2 + DT^3 + \dots \text{ or } \rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4].$$

$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{\text{K}}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	755.81 ± 1.01	310.00	739.15 ± 0.61	350.00	705.82 ± 0.73
293.15	753.18 ± 0.94	320.00	730.82 ± 0.50	360.00	697.49 ± 1.01
298.15	749.02 ± 0.83	330.00	722.48 ± 0.47	370.00	689.16 ± 1.40
300.00	747.48 ± 0.79	340.00	714.15 ± 0.55		

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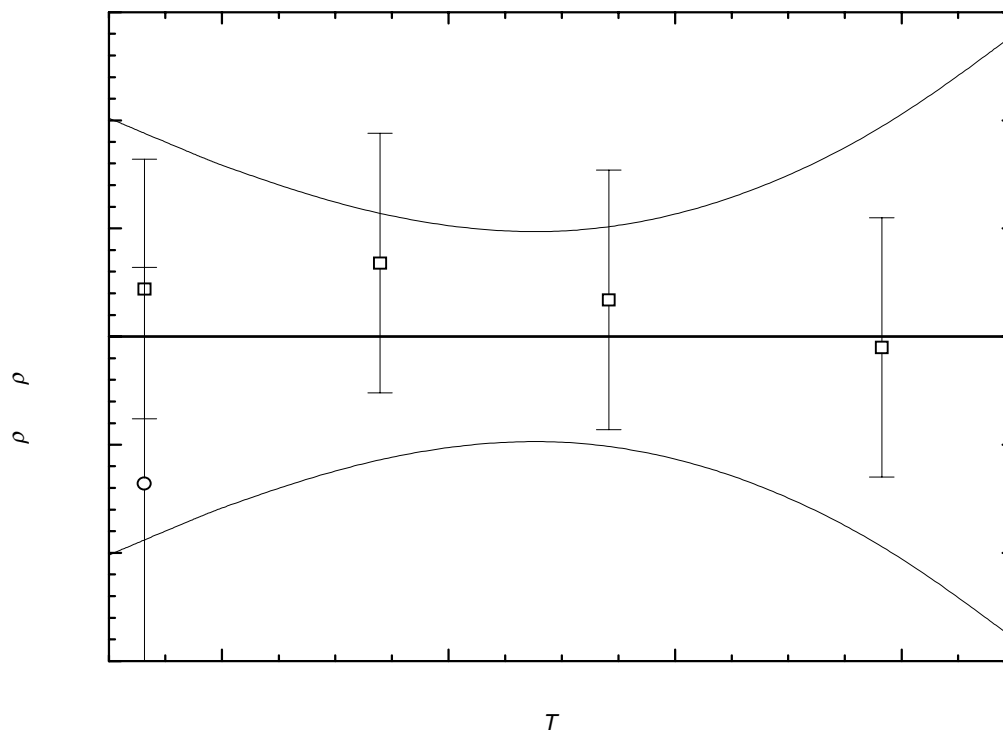


Fig. 1. The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given in Table 3. The error bars represent the experimental errors. (Error bars smaller than the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

***N*-(2-Methylpropyl)-2-butanamine** [500044-69-9] $\text{C}_8\text{H}_{19}\text{N}$ MW = 129.25 584

Table 1. Experimental value with uncertainty.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
293.15	748.6 ± 2.0	1954-nor/hau

***N*-(2-Methylpropyl)-2-methyl-1-propanamine** [110-96-3] $\text{C}_8\text{H}_{19}\text{N}$ MW = 129.25 585

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction):

$\sigma_{\text{c,w}} = 1.0963$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 2.4851 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

Coefficient	$T = 213.15 \text{ to } 473.15 \text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$
<i>A</i>	$9.60541 \cdot 10^2$
<i>B</i>	$-6.28461 \cdot 10^{-1}$
<i>C</i>	$-3.64716 \cdot 10^{-4}$

cont.

N*-(2-Methylpropyl)-2-methyl-1-propanamine (cont.)*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)
277.15	757.70 \pm 0.50	-0.65	1889-per(\square)	293.15	744.30 \pm 0.50	-0.67	1959-cos/bow(Δ)
283.15	752.60 \pm 0.50	-0.75	1889-per(\square)	313.15	727.30 \pm 0.50	-0.67	1959-cos/bow(Δ)
288.15	748.40 \pm 0.50	-0.77	1889-per(\square)	333.15	710.40 \pm 0.50	-0.29	1959-cos/bow(Δ)
293.15	744.40 \pm 0.50	-0.57	1889-per(\square)	353.15	693.80 \pm 0.50	0.69	1959-cos/bow(Δ)
298.15	740.30 \pm 0.50	-0.44	1889-per(\square)	373.15	676.30 \pm 0.50	1.05	1959-cos/bow(Δ)
293.15	744.90 \pm 1.00	-0.07	1890-loe(∇)	393.15	658.60 \pm 0.50	1.51	1959-cos/bow(Δ)
293.15	744.26 \pm 0.50	-0.71	1920-har/cia(\circ)	413.15	640.20 \pm 0.50	1.56	1959-cos/bow(Δ)
213.15	811.80 \pm 0.50	1.79	1959-cos/bow(Δ)	433.15	621.50 \pm 0.50	1.60	1959-cos/bow(Δ)
233.15	794.90 \pm 0.50	0.71	1959-cos/bow(Δ)	453.15	600.90 \pm 0.50	0.04	1959-cos/bow(Δ)
253.15	778.20 \pm 0.50	0.13	1959-cos/bow(Δ)	473.15	578.70 \pm 0.50	-2.84	1959-cos/bow(Δ)
273.15	761.00 \pm 0.50	-0.67	1959-cos/bow(Δ)	493.15	554.50 \pm 0.50	-7.42	1959-cos/bow ¹⁾

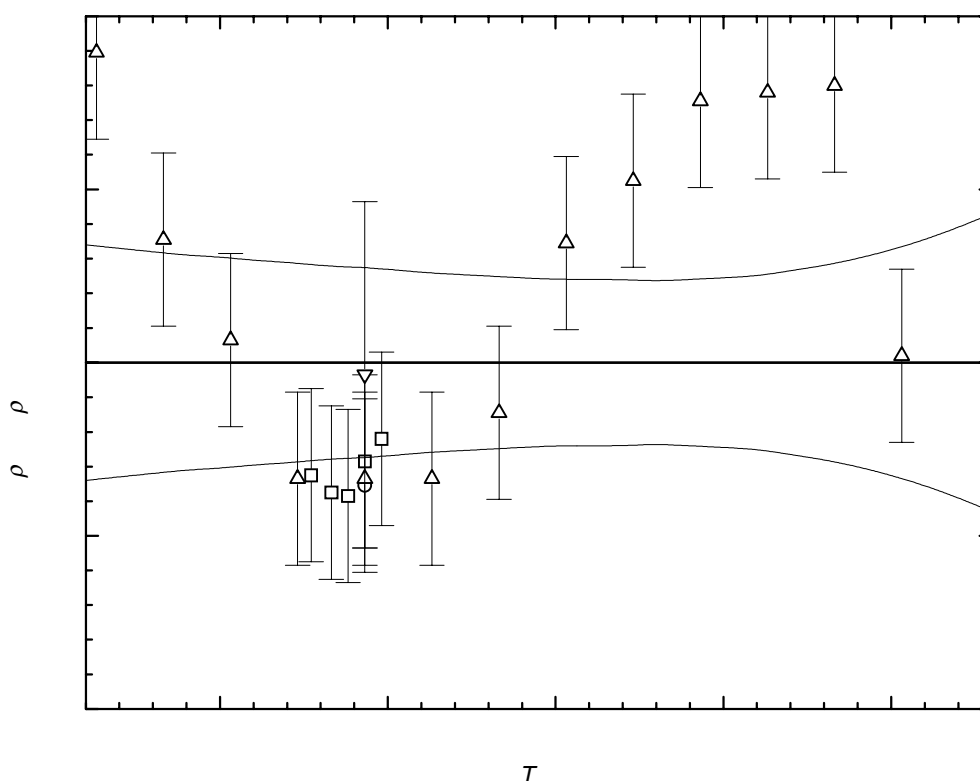
¹⁾ Not included in Fig. 1.**Further references:** [1889-gla/per, 1919-eyk, 1948-vog-4].**Fig. 1.** The symbols show the deviation of the calculated from the experimental values from Table 2. The curves above and below the zero line indicate the calculated error region of the recommended values given 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 $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
210.00	812.48 ± 0.68	298.15	740.74 ± 0.54	390.00	659.97 ± 0.48
220.00	804.63 ± 0.66	300.00	739.18 ± 0.54	400.00	650.80 ± 0.49
230.00	796.70 ± 0.64	310.00	730.67 ± 0.52	410.00	641.56 ± 0.50
240.00	788.70 ± 0.62	320.00	722.09 ± 0.51	420.00	632.25 ± 0.53
250.00	780.63 ± 0.61	330.00	713.43 ± 0.50	430.00	622.87 ± 0.56
260.00	772.49 ± 0.59	340.00	704.70 ± 0.49	440.00	613.41 ± 0.60
270.00	764.27 ± 0.58	350.00	695.90 ± 0.48	450.00	603.88 ± 0.65
280.00	755.98 ± 0.56	360.00	687.03 ± 0.48	460.00	594.28 ± 0.71
290.00	747.61 ± 0.55	370.00	678.08 ± 0.48	470.00	584.60 ± 0.78
293.15	744.97 ± 0.55	380.00	669.06 ± 0.47	480.00	574.85 ± 0.86

N-Ethyl-1-heptanamine

[66793-76-8]

 $\text{C}_9\text{H}_{21}\text{N}$

MW = 143.27

586

Table 1. Fit with estimated B coefficient for 2 accepted points. Deviation $\sigma_w = 0.020$.

Coefficient	$\rho = A + BT$
A	994.11
B	-0.760

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.
298.15	783.1 ± 3.0	15.58	1934-woj/adk ¹⁾
292.15	772.1 ± 0.6	0.02	1947-tio
273.15	786.5 ± 0.6	-0.02	1947-tio

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
270.00	788.9 ± 1.3
280.00	781.3 ± 0.4
290.00	773.7 ± 0.8
293.15	771.3 ± 1.1
298.15	767.5 ± 1.6

***N*-Methyl-1-octylamine** [2439-54-5] $\text{C}_9\text{H}_{21}\text{N}$ MW = 143.27 587

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	782.4 ± 0.6	1952-leo/sen

***N*-Methyl-1,1,3,3-tetramethyl-1-butylamine** [500044-71-3] $\text{C}_9\text{H}_{21}\text{N}$ MW = 143.27 588

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	780.0 ± 1.0	1956-bor/lus

***d*-*N*-Ethyl-2-butanamine** [500003-65-6] $\text{C}_6\text{H}_{15}\text{N}$ MW = 101.19 589

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.
288.15	739.6 ± 0.7	1930-lei

***N*-Ethyl-1-octanamine** [4088-36-2] $\text{C}_{10}\text{H}_{23}\text{N}$ MW = 157.3 590

Table 1. Fit with estimated B coefficient for 3 accepted points. Deviation $\sigma_w = 0.026$.

Coefficient	$\rho = A + BT$
A	1003.86
B	-0.770

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.
291.15	779.7 ± 0.6	0.02	1947-tio
273.15	793.5 ± 0.6	-0.04	1947-tio
298.15	774.3 ± 0.6	0.01	1947-tio

cont.

Table 3. Recommended values.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$
270.00	796.0 ± 1.0
280.00	788.3 ± 0.7
290.00	780.6 ± 0.6
293.15	778.1 ± 0.6
298.15	774.3 ± 0.8

N-Ethyl-1,1,3,3-tetramethyl-1-butanamine

[500044-73-5]

 $\text{C}_{10}\text{H}_{23}\text{N}$

MW = 157.3

591

Table 1. Experimental value with uncertainty.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
293.15	775.7 ± 1.0	1956-bor/lus

N-(2-Methylbutyl)-2-methyl-1-butanamine

[27094-65-1]

 $\text{C}_{10}\text{H}_{23}\text{N}$

MW = 157.3

592

Table 1. Fit with estimated B coefficient for 2 accepted points. Deviation $\sigma_w = 0.010$.

Coefficient	$\rho = A + BT$
A	987.21
B	-0.730

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
273.15	787.8 ± 1.0	-0.01	1881-pli
287.15	777.6 ± 1.0	0.01	1881-pli

Table 3. Recommended values.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$
270.00	790.1 ± 1.0
280.00	782.8 ± 0.9
290.00	775.5 ± 1.0

(*R*)-*N*-(2-Methylbutyl)-2-methyl-1-butanamine [500003-33-8] $\text{C}_{10}\text{H}_{23}\text{N}$ MW = 157.3 593

Table 1. Experimental value with uncertainty.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
273.15	787.8 ± 1.0	1881-pli

***N*-(3-Methylbutyl)-3-methyl-1-butanamine** [544-00-3] $\text{C}_{10}\text{H}_{23}\text{N}$ MW = 157.3 594

Table 1. Fit with estimated B coefficient for 4 accepted points. Deviation $\sigma_w = 0.144$.

Coefficient	$\rho = A + BT$
A	990.49
B	-0.750

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.	T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
273.15	784.0 ± 2.0	-1.63	1917-jae-2 ¹⁾	313.85	755.2 ± 0.6	0.09	1948-vog-4
298.15	764.0 ± 2.0	-2.88	1917-jae-2 ¹⁾	333.25	740.5 ± 0.6	-0.06	1948-vog-4
323.15	745.0 ± 2.0	-3.13	1917-jae-2 ¹⁾	358.65	721.3 ± 0.6	-0.21	1948-vog-4
293.15	770.8 ± 0.6	0.17	1948-vog-4				

¹⁾ Not included in calculation of linear coefficients.

Table 3. Recommended values.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$
290.00	773.0 ± 1.8	310.00	758.0 ± 0.8	340.00	735.5 ± 0.8
293.15	770.6 ± 1.6	320.00	750.5 ± 0.4	350.00	728.0 ± 1.3
298.15	766.9 ± 1.4	330.00	743.0 ± 0.4	360.00	720.5 ± 1.8

***N*-Methyl-1-nonanamine** [39093-27-1] $\text{C}_{10}\text{H}_{23}\text{N}$ MW = 157.3 595

Table 1. Fit with estimated B coefficient for 2 accepted points. Deviation $\sigma_w = 0.020$.

Coefficient	$\rho = A + BT$
A	1006.01
B	-0.760

cont.

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
292.15	784.0 ± 0.6	0.02	1947-tio
273.15	798.4 ± 0.6	-0.02	1947-tio

Table 3. Recommended values.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$
270.00	800.8 ± 0.8
280.00	793.2 ± 0.6
290.00	785.6 ± 0.7
293.15	783.2 ± 0.8
298.15	779.4 ± 0.9

N-Pentyl-1-pentanamine

[2050-92-2]

 $\text{C}_{10}\text{H}_{23}\text{N}$

MW = 157.3

596

Table 1. Coefficients of the polynomial expansion equation. Standard deviations (see introduction): $\sigma_{\text{c,w}} = 2.8678 \cdot 10^{-1}$ (combined temperature ranges, weighted), $\sigma_{\text{c,uw}} = 1.0210 \cdot 10^{-1}$ (combined temperature ranges, unweighted).

T = 287.25 to 394.25 K	
Coefficient	$\rho = A + BT + CT^2 + DT^3 + \dots$
A	$9.98698 \cdot 10^2$
B	$-7.56154 \cdot 10^{-1}$

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref. (Symbol in Fig. 1)	T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref. (Symbol in Fig. 1)
287.25	781.60 ± 0.60	0.11	1948-vog-4(□)	359.15	726.90 ± 0.60	-0.23	1948-vog-4(□)
293.15	777.10 ± 0.60	0.07	1948-vog-4(□)	360.55	725.80 ± 0.70	-0.27	1948-vog-4(□)
299.05	772.60 ± 0.60	0.03	1948-vog-4(□)	392.95	701.80 ± 0.70	0.23	1948-vog-4(□)
333.55	746.90 ± 0.60	0.42	1948-vog-4(□)	394.25	700.80 ± 0.70	0.22	1948-vog-4(□)
333.95	745.60 ± 0.60	-0.58	1948-vog-4(□)				

Further references: [1919-eyk].

cont.

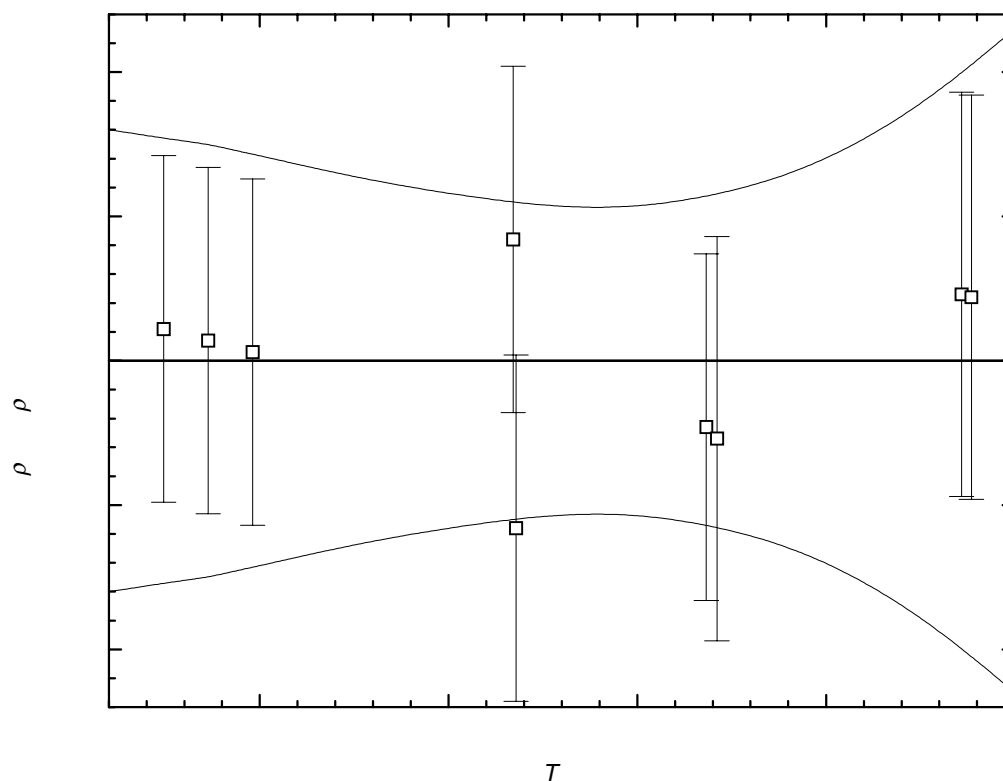
***N*-Pentyl-1-pentanamine** (cont.)

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 $\rho = [1 + 1.75(1 - T/T_c)^{1/3} + 0.75(1 - T/T_c)][\rho_c + A(T_c - T) + B(T_c - T)^2 + C(T_c - T)^3 + D(T_c - T)^4]$).

$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{T}{K}$	$\frac{\rho \pm \sigma_{\text{fit}}}{\text{kg} \cdot \text{m}^{-3}}$
280.00	786.97 \pm 0.80	310.00	764.29 \pm 0.65	360.00	726.48 \pm 0.57
290.00	779.41 \pm 0.76	320.00	756.73 \pm 0.60	370.00	718.92 \pm 0.64
293.15	777.03 \pm 0.75	330.00	749.17 \pm 0.56	380.00	711.36 \pm 0.76
298.15	773.25 \pm 0.72	340.00	741.61 \pm 0.53	390.00	703.80 \pm 0.93
300.00	771.85 \pm 0.71	350.00	734.04 \pm 0.53	400.00	696.24 \pm 1.15

***N*-Methyl-1-decanamine** [7516-82-7] $\text{C}_{11}\text{H}_{25}\text{N}$ MW = 171.33 597

Table 1. Fit with estimated B coefficient for 2 accepted points. Deviation $\sigma_w = 0.010$.

Coefficient	$\rho = A + BT$
A	1004.94
B	-0.740

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
291.15	789.5 ± 0.6	0.01	1947-tio
273.15	802.8 ± 0.6	-0.01	1947-tio

Table 3. Recommended values.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$
270.00	805.1 ± 0.8
280.00	797.7 ± 0.5
290.00	790.3 ± 0.7
293.15	788.0 ± 0.8
298.15	784.3 ± 1.0

***N*-(1-Methylethyl)-1,1,3,3-tetramethyl-1-butanamine** [500044-75-7] $\text{C}_{11}\text{H}_{25}\text{N}$ MW = 171.33 598

Table 1. Experimental value with uncertainty.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
298.15	780.3 ± 1.0	1956-bor/lus

***N*-Hexyl-1-hexanamine** [143-16-8] $\text{C}_{12}\text{H}_{27}\text{N}$ MW = 185.35 599

Table 1. Experimental values with uncertainties.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.	T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
293.15	797.0 ± 2.0	1963-sud/phr ¹⁾	357.25	741.0 ± 2.0	1952-vog/cre ¹⁾
293.15	788.0 ± 2.0	1952-vog/cre ¹⁾	293.15	793.0 ± 0.6	1955-ano-13
314.35	773.0 ± 2.0	1952-vog/cre ¹⁾	293.15	793.7 ± 0.6	Recommended
333.25	759.0 ± 2.0	1952-vog/cre ¹⁾			

¹⁾ Not included in calculation of recommended value.

***N*-(1-Methylpropyl)-1,1,3,3-tetramethyl-1-butanamine** [500044-76-8] $\text{C}_{12}\text{H}_{27}\text{N}$ MW = 185.35 600

Table 1. Experimental value with uncertainty.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
298.15	787.0 ± 1.0	1956-bor/lus

***N*-Ethyl-1-dodecanamine** [35902-57-9] $\text{C}_{14}\text{H}_{31}\text{N}$ MW = 213.41 601

Table 1. Experimental value with uncertainty.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
298.15	924.4 ± 0.6	1934-woj/adk

***N*-Heptyl-1-heptanamine** [2470-68-0] $\text{C}_{14}\text{H}_{31}\text{N}$ MW = 213.41 602

Table 1. Fit with estimated B coefficient for 2 accepted points. Deviation $\sigma_w = 0.100$.

Coefficient	$\rho = A + BT$
A	980.45
B	-0.620

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

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	$\rho_{\text{exp}} - \rho_{\text{calc}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
293.15	798.6 ± 0.6	-0.10	1963-sud/phr
298.15	795.7 ± 0.6	0.10	1963-sud/phr

Table 3. Recommended values.

T K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$
290.00	800.7 ± 0.6
293.15	798.7 ± 0.6
298.15	795.6 ± 0.6

***N*-Octyl-1-octanamine** [1120-48-5] $\text{C}_{16}\text{H}_{35}\text{N}$ MW = 241.46 603

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.
299.15	796.8 ± 1.0	1948-car/wri ¹⁾
293.15	806.5 ± 2.0	1963-sud/phr ¹⁾
298.15	802.0 ± 2.0	1963-sud/phr ¹⁾
298.15	796.0 ± 0.6	1996-ste/chi-2
298.15	796.0 ± 0.6	Recommended

¹⁾ Not included in calculation of recommended value.

***N*-Nonyl-1-nonanamine** [2044-21-5] $\text{C}_{18}\text{H}_{39}\text{N}$ MW = 269.51 604

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	803.9 ± 0.6	1963-sud/phr

***N*-Decyl-1-decanamine** [1120-49-6] $\text{C}_{20}\text{H}_{43}\text{N}$ MW = 297.57 605

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.
323.15	794.4 ± 0.6	1963-sud/phr

***N*-[3,5-Dimethyl-1-(2-methylpropyl)hexyl]-2,6,8-trimethyl-4-nonanamine** [2757-29-1] $\text{C}_{24}\text{H}_{51}\text{N}$ MW = 353.68 606

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	807.2 ± 0.6	1957-ano-10