

## 4.2 Chlorocycloalkanes

**1,1-Dichlorocyclopropane** [2088-35-9]  $\text{C}_3\text{H}_4\text{Cl}_2$  MW = 110.97 837

**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	$1215.90 \pm 0.60$	1952-sla

**(E)-1,2-Dichlorocyclopropane** [39199-87-6]  $\text{C}_3\text{H}_4\text{Cl}_2$  MW = 110.97 838

**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	$1245.90 \pm 0.60$	1952-sla

**Chlorocyclopropane** [7393-45-5]  $\text{C}_3\text{H}_5\text{Cl}$  MW = 76.53 839

**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	$996.20 \pm 0.40$	1952-sla
298.15	$989.90 \pm 0.40$	1952-sla

**(Chloromethyl)cyclopropane** [5911-08-0]  $\text{C}_4\text{H}_7\text{Cl}$  MW = 90.55 840

**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	$981.00 \pm 2.00$	1952-bro/bor

**(E)-1,2-Dichlorocyclopentane** [14376-81-9]  $\text{C}_5\text{H}_8\text{Cl}_2$  MW = 139.02 841

**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	$1200.00 \pm 3.00$	1956-goe/mcc

**1,1-Dichloro-2,2-dimethylcyclopropane** [694-16-6]  $\text{C}_5\text{H}_8\text{Cl}_2$  MW = 139.02 842

**Table 1.** Experimental value with uncertainty.

$T$ K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
295.15	$1085.40 \pm 0.80$	1964-doe/hof

**Chlorocyclopentane** [930-28-9]  $\text{C}_5\text{H}_9\text{Cl}$  MW = 104.58 843

**Table 1.** Fit with estimated B coefficient for 3 accepted points. Deviation  $\sigma_w = 0.043$ .

Coefficient	$\rho = A + BT$
A	1316.49
B	-1.050

**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	$1029.60 \pm 0.50$	-0.06	1955-tim/hen
288.15	$1014.00 \pm 0.50$	0.02	1955-tim/hen
303.15	$998.20 \pm 0.50$	0.04	1955-tim/hen
298.15	$1011.00 \pm 3.00$	7.57	1956-goe/mcc <sup>1)</sup>

<sup>1)</sup> Not included in calculation of linear coefficients.

**Table 3.** Recommended values.

$T$ K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$
270.00	$1033.0 \pm 1.1$
280.00	$1022.5 \pm 0.6$
290.00	$1012.0 \pm 0.4$
293.15	$1008.7 \pm 0.5$
298.15	$1003.4 \pm 0.7$
310.00	$991.0 \pm 1.4$

**1,1,2,4,4,5-Hexachlorocyclohexane** [60184-62-5]  $\text{C}_6\text{H}_6\text{Cl}_6$  MW = 290.83 844

**Table 1.** Fit with estimated B coefficient for 6 accepted points. Deviation  $\sigma_w = 0.221$ .

Coefficient	$\rho = A + BT$
A	1361.46
B	-0.920

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.	$\frac{T}{\text{K}}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$	$\frac{\rho_{\text{exp}} - \rho_{\text{calc}}}{\text{kg} \cdot \text{m}^{-3}}$	Ref.
288.15	$1096.30 \pm 1.00$	-0.07	1896-per	303.15	$1082.10 \pm 1.00$	-0.47	1896-per
293.15	$1091.90 \pm 1.00$	0.13	1896-per	308.15	$1078.10 \pm 1.00$	0.13	1896-per
298.15	$1087.30 \pm 1.00$	0.13	1896-per	313.15	$1073.50 \pm 1.00$	0.13	1896-per

**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	$1103.9 \pm 1.5$
290.00	$1094.7 \pm 1.1$
293.15	$1091.8 \pm 1.0$
298.15	$1087.2 \pm 0.9$
310.00	$1076.3 \pm 1.1$
320.00	$1067.1 \pm 1.5$

**1,1-Dichlorocyclohexane**

[2108-92-1]

 $\text{C}_6\text{H}_{10}\text{Cl}_2$ 

MW = 153.05

845

**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	$1154.00 \pm 3.00$	1957-goe/sim

**(E)-1,2-Dichlorocyclohexane**

[822-86-6]

 $\text{C}_6\text{H}_{10}\text{Cl}_2$ 

MW = 153.05

846

**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	$1184.20 \pm 1.50$	1952-ste/gru
298.15	$1180.00 \pm 3.00$	1956-goe/mcc

**(Z)-1,2-Dichlorocyclohexane**

[10498-35-8]

 $\text{C}_6\text{H}_{10}\text{Cl}_2$ 

MW = 153.05

847

**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	$1204.20 \pm 1.50$	1952-ste/gru

**(Z)-1,4-Dichlorocyclohexane****[16749-11-4]****C<sub>6</sub>H<sub>10</sub>Cl<sub>2</sub>****MW = 153.05****848****Table 1.** Fit with estimated B coefficient for 2 accepted points. Deviation  $\sigma_w = 0.000$ .

Coefficient	$\rho = A + BT$
A	1500.74
B	-1.060

**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.
293.15	$1190.00 \pm 1.00$	-0.00	1952-lun/wha
298.15	$1184.70 \pm 1.00$	0.00	1952-lun/wha

**Table 3.** Recommended values.

$\frac{T}{K}$	$\frac{\rho_{\text{exp}} \pm 2\sigma_{\text{est}}}{\text{kg} \cdot \text{m}^{-3}}$
290.00	$1193.3 \pm 1.0$
293.15	$1190.0 \pm 0.9$
298.15	$1184.7 \pm 0.9$

**Chlorocyclohexane****[542-18-7]****C<sub>6</sub>H<sub>11</sub>Cl****MW = 118.61****849****Table 1.** Coefficients of the polynomial expansion equation. Standard deviations (see introduction):  $\sigma_{c,w} = 6.0923 \cdot 10^{-1}$  (combined temperature ranges, weighted),  $\sigma_{c,uw} = 3.0697 \cdot 10^{-1}$  (combined temperature ranges, unweighted).

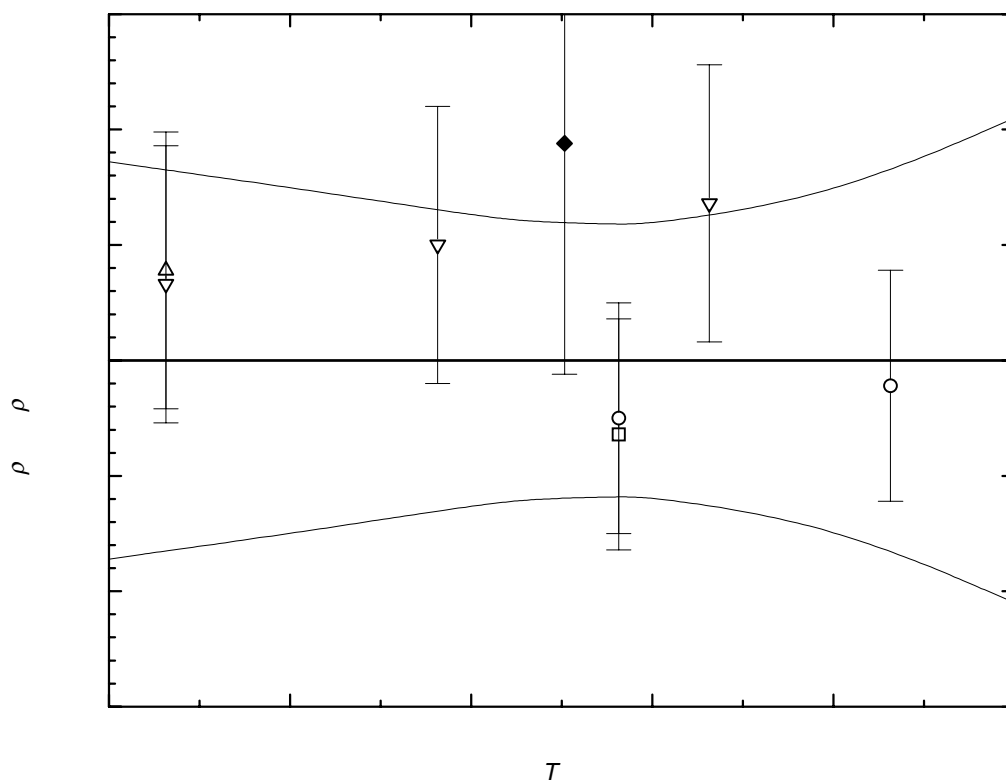
Coefficient	$T = 273.15 \text{ to } 313.15 \text{ K}$ $\rho = A + BT + CT^2 + DT^3 + \dots$
A	$1.28651 \cdot 10^3$
B	$-9.82601 \cdot 10^{-1}$

**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	$1015.94 \pm 1.00$	-2.18	1903-sab/mai(◆)	303.15	$989.32 \pm 0.60$	0.68	1955-tim/hen(▽)
295.15	$997.44 \pm 1.00$	0.94	1903-sab/mai(◆)	298.15	$993.23 \pm 0.50$	-0.32	1998-art/dom(□)
273.15	$1018.51 \pm 0.60$	0.39	1939-van(Δ)	298.15	$993.30 \pm 0.50$	-0.25	1999-rod/laf(○)
273.15	$1018.45 \pm 0.60$	0.33	1955-tim/hen(▽)	313.15	$978.70 \pm 0.50$	-0.11	1999-rod/laf(○)
288.15	$1003.88 \pm 0.60$	0.50	1955-tim/hen(▽)				

**Further references:** [1898-for, 1900-you/for-1, 1921-far/gar, 1944-fri/har-1, 1956-goe/mcc, 1972-let-1].

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	$1021.21 \pm 0.86$	293.15	$998.46 \pm 0.60$	310.00	$981.91 \pm 0.71$
280.00	$1011.38 \pm 0.75$	298.15	$993.55 \pm 0.59$	320.00	$972.08 \pm 1.05$
290.00	$1001.56 \pm 0.63$	300.00	$991.73 \pm 0.59$		

**1-Chloro-1-methylcyclopentane**

[6196-85-6]

$\text{C}_6\text{H}_{11}\text{Cl}$

MW = 118.61

850

**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	$968.00 \pm 2.00$	1948-lut/bea

**1-Chloro-2-methylcyclopentane** [53501-51-2]  $\text{C}_6\text{H}_{11}\text{Cl}$  MW = 118.61 851

**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	$966.00 \pm 2.00$	1948-lut/bea

**1-Chloro-3-methylcyclopentane** [142857-44-1]  $\text{C}_6\text{H}_{11}\text{Cl}$  MW = 118.61 852

**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	$966.00 \pm 2.00$	1948-lut/bea

**1-Butyl-2,2-dichlorocyclopropane** [3722-08-5]  $\text{C}_7\text{H}_{12}\text{Cl}_2$  MW = 167.08 853

**Table 1.** Experimental value with uncertainty.

$T$ K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
299.15	$1052.20 \pm 1.00$	1964-doe/hof

**1-Chloro-1,3-dimethylcyclopentane** [500023-39-2]  $\text{C}_7\text{H}_{13}\text{Cl}$  MW = 132.63 854

**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	$934.70 \pm 0.70$	1945-mck/ste

**1-Chloro-1,2-dimethylcyclohexane** [1122-02-7]  $\text{C}_8\text{H}_{15}\text{Cl}$  MW = 146.66 855

**Table 1.** Experimental values with uncertainties.

$T$ K	$\rho_{\text{exp}} \pm 2\sigma_{\text{est}}$ $\text{kg} \cdot \text{m}^{-3}$	Ref.
286.45	$970.80 \pm 1.50$	1920-von-2
293.15	$965.00 \pm 2.00$	1920-von-2

**1-Chloro-1,4-dimethylcyclohexane** [1073-15-0]  $\text{C}_8\text{H}_{15}\text{Cl}$  MW = 146.66 856

**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.
291.65	$943.80 \pm 1.50$	1920-von-2
293.15	$943.00 \pm 2.00$	1920-von-2

**1-Chloro-3,3-dimethylcyclohexane** [35188-27-3]  $\text{C}_8\text{H}_{15}\text{Cl}$  MW = 146.66 857

**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	$954.00 \pm 2.00$	1956-goe/mcc

**1,1-Dichloro-2,2,3-triethylcyclopropane** [24551-90-4]  $\text{C}_9\text{H}_{16}\text{Cl}_2$  MW = 195.13 858

**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.
299.15	$1092.70 \pm 2.00$	1964-doe/hof

**1-Chloro-1,3,5-trimethylcyclohexane** [500031-19-6]  $\text{C}_9\text{H}_{17}\text{Cl}$  MW = 160.69 859

**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.
288.65	$921.70 \pm 2.00$	1915-von/hin	286.85	$934.40 \pm 1.50$	1920-von-2
288.35	$921.90 \pm 2.00$	1915-von/hin	287.05	$934.20 \pm 1.50$	1920-von-2
293.15	$918.00 \pm 2.00$	1915-von/hin	293.15	$929.00 \pm 2.00$	1920-von-2

**1-Chloro-1,2,4,5-tetramethylcyclohexane** [500031-25-4]  $\text{C}_{10}\text{H}_{19}\text{Cl}$  MW = 174.71 860

**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.
287.10	$940.60 \pm 2.00$	1920-von-2
293.15	$936.00 \pm 2.00$	1920-von-2