

Table 1-42. ISOTHERMAL COMPRESSIBILITY OF LIQUIDS*

The following table lists the approximate compressibility (change in volume/unit volume) per atmosphere increase in pressure at constant temperature. Unit compressibility is less at the higher pressures, but no large amount of data is available. In the usual range of 0–100°C, compressibility is not greatly affected by temperature (see References). For water and many common liquids, a rough approximation is that the volume is reduced about 5 percent by a pressure of 1,000 atmospheres. The reciprocal of the compressibility varies almost linearly with the pressure. Adiabatic compressibility can hardly be determined experimentally but may be computed, using the velocity of sound in the liquid. The resulting values are generally slightly lower than those given here for the isothermal compressibility. The compressibility of concentrated water solutions is ordinarily lower than that of pure water. Compressibility of liquified gases is of about the same order of magnitude as that of other liquids.

Liquid	Compressibility at room temperature $\Delta V/V$, in % for each atmosphere change in pressure at or around pressure of			
	1 atm†	250 atm	1,000 atm	5,000 atm
Acetic acid	.009	—	—	—
Acetone	.0125	—	.0055	.002
Aniline	.0045	—	.003	—
Benzene	.0095	—	.005	—
<i>n</i> -Butyl alcohol	.0095	—	—	—
Carbon disulfide	.0095	—	.005	.002
Carbon tetrachloride	.0106	—	.0052	—
Chloroform	.0100	.008	.0052	—
Dodecane	.009	—	.005	—
Ethanol	.0114	.009	.005	.002
Ethyl ether	.019	—	.006	—
Glycerol	.0025	—	.002	.0012
<i>n</i> -Heptane	.014	—	.006	—
<i>n</i> -Hexane	.016	.011	.0064	—
Kerosene	—	—	.0045	—
Mercury	.0004	—	.0004	—
Methanol	.012	—	.005	.002
<i>n</i> -Octane	.012	—	.0056	.002
Oils, petroleum	.007	—	—	—
Oils, vegetable	.005	—	—	—
Phenol	.005	—	—	—
<i>n</i> -Propyl alcohol	.009	—	.004	—
Toluene	.009	—	—	—
Water	.0046	.004	.0035	.0016
<i>m</i> -Xylene	.008	—	—	—

†1 atm = 14.696 psi = 1.013 bars = 1.033 kg/cm² = 1.013 × 10⁶ dynes/cm².

*Compiled from several sources.

REFERENCES

- "American Institute of Physics Handbook", 2nd ed., D.E. Gray, Ed., McGraw-Hill Book Company, 1963, pp. 2–162 to 2–179 (gives extensive data and references).
- "CRC Handbook of Chemistry and Physics", 50th ed., R.C. Weast, Ed., The Chemical Rubber Co., 1969, p. F–12 (lists 45 liquids).
- "International Critical Tables of Numerical Data", National Research Council, Vol. I, McGraw-Hill Book Company, 1926.
- "The Physics of High Pressure", P.W. Bridgman, G. Bell & Sons, 1949.
- "Smithsonian Physical Tables", 9th ed., W.E. Forsythe, Ed., The Smithsonian Institution, 1956.