

CHAPTER V.

LIQUIDS

General Characteristics of Liquids. The most marked characteristic of the liquid state is that a given mass of liquid has a definite volume but no definite form. The volume of a liquid is dependent upon temperature and pressure but to a much smaller degree than is the volume of a gas. The formulas in which the volume of a liquid is expressed as a function of temperature and pressure are largely empirical, and contain constants dependent upon the nature of the liquid. This is undoubtedly due to the fact that in the liquid state the molecules are much less mobile than in the gaseous state. The distance between contiguous molecules being much less in liquids than in gases, the mutual attraction is increased while the mobility is correspondingly diminished. That liquids represent a more condensed form of matter than gases is shown by the change in volume which results when a liquid is vaporized: thus, 1 cc. of water at the boiling point when vaporized at the same temperature occupies a volume of about 1700 cc. A liquid contains less energy than a gas, since energy is always required to transform it into the gaseous state. Since gases can be liquefied by increasing the pressure and lowering the temperature, and since liquids can be vaporized by lowering the pressure and increasing the temperature, it is apparent that there is no generic difference between the two states of matter.

Connection Between the Gaseous and Liquid States. If a gas is compressed isothermally, its state may change in either of two ways depending upon the temperature:— (1) The volume at first diminishes more rapidly than the pressure increases, then in the same ratio and lastly more slowly. When the pressure attains a very high value the volume is but slightly altered. This case has already been considered in the preceding chapter. (2) The volume changes more rapidly than the pressure until, when a cer-