from 18°C. (*i.e.*, 18 + 273 = 291 Abs.) to 0°C. (273 Abs.) is a lowering of temperature, accompanied by a contraction of the gas; therefore our fraction must be less than 1, *i.e.*, $\frac{273}{291}$. The whole thing works out as follows:

$$\text{Vol.} = 927 . \frac{775}{760} . \frac{273}{291}$$

Where gases are collected over water, they always contain a certain quantity of aqueous vapor, depending on the temperature; and the tension (pressure) of this vapor, plus the actual pressure of the gas, is the pressure which we measure (indirectly) by means of the barometer. In accurate work, the tension of aqueous vapor (taken from a table) should be deducted from the barometric pressure in order to obtain the correct pressure of the gas. Under laboratory conditions, this will be only about 2% of the total pressure; hence, the error introduced by neglecting the tension of aqueous vapor may be ignored in ordinary work.

In addition to the two laws mentioned above, there is another very striking fact connected with all gases. Suppose we have a cylinder full of hydrogen and another full of air, and place these mouth to mouth, the one full of the lighter hydrogen being above, and leave them like this for a little while; then, if we examine the gas in each cylinder, we find that the air and hydrogen have mixed completely, so that the whole mass of gas is uniform throughout, half of the lighter hydrogen having passed into the lower cylinder, while half the heavier air has passed into the upper. This process, by virtue of which gases mix with one another, and pass spontaneously through small openings, is known as *diffusion of gases*, and it is found that the lighter a gas is, the faster it diffuses. It is on account of this (in part) that the composition of the atmosphere is kept so nearly uniform, as we shall see later; and also, this explains why it is so hard to keep any particular gas pure and free from other gases, especially from air.

We have just been considering two very important natural laws concerning gases, one dealing with the relation between the pressure and volume of the gas, and the other with the relation between the temperature and volume.