of hydrochloric acid gas as of the hydrogen, or of the chlorine entering into its composition. But each molecule of hydrochloric acid must contain at least one atom of hydrogen and one atom of chlorine, and so there must be at least twice as many atoms of hydrogen as there are molecules of hydrogen, and at least twice as many atoms of chlorine as there are molecules of chlorine. If the formula for hydrochloric acid is taken as HCl, the formula for hydrogen is H_2. If H_2Cl_2 were the formula for hydrochloric acid, H_4 would be the formula for hydrogen. Neither the hydrogen nor the chlorine of hydrochloric acid have been found capable of division, and for this and other reasons the formula for hydrochloric acid is taken to be HCl.

Though in a manner similar to the above, it can be proved that a number of elementary gases contain two atoms in the molecule, there are elements whose molecules contain only one atom, and some whose molecules contain more than two atoms.

The best volume, then, to use as the standard volume is the volume occupied by *two* grammes of hydrogen, which at the temperature of 0°C and the pressure of the atmosphere 760 mm. of mercury is 22.412 litres. The molecular weight in grammes of each gas, then, occupies 22.412 litres under standard conditions. If a new gas is discovered its molecular weight is ascertained by determining the weight of 22.412 litres of it. This is, of course, a matter of experiment.

Last July the question was asked in Grade XII: "How may Avogadro's law be used to establish the formula H_2O with O=16 as better representing the molecular formula of water than HO with O=8?" There were only three candidates who had any measure of success with this question, though it is really very easy when the principle is understood. If H_2O is the formula for water vapor, it follows that a volume of water vapour will weigh nine times as much as the same volume of hydrogen, since the formula of hydrogen is H_2, the conditions of temperature and pressure being of course the same in both cases. If the formula is HO with O=8, water vapour will weigh four and a half times as much as the same volume of hydrogen. It is found that the ratio of the weight is nine to one, thus establishing the formula H_2O with O=16.

In Grade X there was the question: "What volume is represented by the formula of a gas? Given the equation $MnO_2+4HCl=MnCl_2+2H_2O+Cl_2$ how many litres of chlorine at standard temperature and pressure can be obtained from 87 grammes of manganese dioxide."

As we have seen, the formula of a gas represents a perfectly definite volume, namely, 22.412 litres at zero centigrade and atmospheric pressure. (In "A School Chemistry" the volume is given as 22.253 litres, but later investigations give 22.412 litres as more correct. The discrepancy is due to the difficulty in weighing gases, because of the large volume for a small weight).

The volume represented by Cl_2 is therefore 22.412 litres, hence 22.412 litres of chlorine are obtained from the weight of manganese dioxide represented by MnO_2. This weight is 87 grammes since Mn represents 55 grammes of manganese, and O represents 16 grammes of oxygen. The equation gives the data at once for answering the question; if the problem had been to calculate the volume of chlorine obtainable from 100 grammes of manganese dioxide, or from 200 grammes, or from any other number, a very little arithmetic would be necessary. And here I may say that chemical arithmetic is no harder than any other, and it is just as easy to calculate about litres of oxygen as about tons of hay.

In Grade XII the volume of sulphuretted hydrogen obtainable from 100 grammes of ferrous sulphide was required at 730 mm. pressure and 20°C.

From the equation $FeS+H_2SO_4=FeSO_4+H_2S$ it appears that from 88 grammes of ferrous sulphide 22.412 litres of sulphurated hydrogen are obtained, because FeS represents 88 grammes and H_2S represents 22.412 litres. The gas is supposed to be measured at zero centigrade and at atmospheric pressure, namely, 760 mm of mercury. As the measurements in the problem are made at 20°C and 730 mm., a correction must be made, and the calculation worked out for 100 grammes ferrous sulphide instead of 88 grammes.

It will be noticed that since ferrous sulphide is a solid, its *volume* is not indicated by the formula; it is only in the case of gases that the formula indicates the volume as well as the weight. FeS represents 88 grains, H_2S represents not only 34 grammes but also 22.412 litres at the standard temperature and pressure. The weight does not vary with temperature and pressure; the volume does.

An old colored woman was seriously injured in a railway accident. One and all her friends urged the necessity of suing the wealthy railroad corporation for damages.

"I 'clar to gracious," she scornfully replied to their advice, "ef I ain't done git more'n nuff o' damages! What I'se wantin' now and what I'se done gwine to sue dat company foh is repairs."—*Cleveland Leader.*