

through tubes containing calcic chloride.

(b) The equation representing the decomposition is $\text{KClO}_3 = \text{KCl} + 3\text{O}$.

Now, since 11.2 litres of oxygen under normal conditions weigh 16 grains, 10 litres weigh $16 \times \frac{10}{11.2}$ grams.

From the equation given above it is seen that 48 grams of oxygen are obtained from 122.6 grams potassic chlorate.

$\therefore 16 \times \frac{100}{112}$ grams are obtained from $\frac{122.6}{48} \times 16 \times \frac{100}{112}$ grams of potassic chlorate.

3. The facts expressed in the equation are: (1) That hydrochloric acid acts on zinc yielding zinc chloride and hydrogen; (2) that two molecules of hydrochloric acid act on one atom (or molecule) of zinc, yielding one molecule of zinc chloride and one molecule of hydrogen; (3) that 65 parts by weight of zinc are acted upon by 73 parts by weight of hydrochloric acid, yielding 136 parts by weight of zinc chloride, and 2 parts by weight of hydrogen.

NOTE.—The consideration of the valency of the element is more than ought to be expected in answering this question.

4. (a) Three or four solutions of this question might be given, but here only the percentage of sodium, carbon, oxygen and water will be worked out.

The molecular weight is 286, made up, 46 of sodium, 12 of carbon, 48 of oxygen and 180 of water.

$\therefore \frac{46}{286} \times 100\% = 16.08$ sodium $\frac{12}{286} \times 100\% = 4.19$ carbon $\frac{48}{286} \times 100\% = 16.76$ oxygen $\frac{180}{286} \times 100\% = 62.97$ water.

(b) Divide each percentage by the atom's weight in the case of the elements, and by the molecular weight in the case of the water as follows:

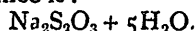
$$16.55 \div 23 = .806.$$

$$25.81 \div 32 = .806.$$

$$19.35 \div 16 = 1.209.$$

$$36.29 \div 18 = 2.016.$$

The nearest proportions to these expressed in whole numbers are, 2, 2, 3 and 5. $\therefore$ the simplest formula for the substance is:



5. (a) Sulphur occurs in nature in combination with metals as sulphides and sulphates. Of the sulphides iron pyrites Fe S_2 , Galena PbS , cinnabar Hg S and blende MS are the most commonly occurring ones, and barium, calcium and magnesium sulphates are the principal naturally occurring sulphates.

Sulphur is also found uncombined in volcanic regions, and this is the principal source of the sulphur of commerce.

Sulphur occurs in two crystallized forms, and also as non-crystalline or plastic sulphur. In one case the crystals are octahedral in the other they are monoclinic. The former are obtained by evaporating a carbon disulphide solution of sulphur. The latter are obtained from melted sulphur by cooling; this latter is not a permanent form, for when allowed to stand for a time the crystals become octahedral.

As already indicated, sulphur in the crystalline form is soluble, in carbon disulphide, but it is insoluble in water.

Sulphur at ordinary temperatures is a yellow solid, but as its temperature is increased it becomes darker in color.

At 115°C . it melts, forming a thin liquid; at a temperature of from 240° to 260°C . it becomes a viscid mass and will not pour. Above this temperature it again becomes liquid and at 440°C . it boils and its vapor density is 96. The density gradually diminishes, until at about 850°C . it becomes constant at 32. Plastic sulphur is obtained by pouring liquid sulphur, just before it reaches the boiling point into cold water. This is a dark colored substance, insoluble in