

(2). Sulphur has two allotropic forms which differ from each other chemically and physically. (a). One of these occurs free in nature, in crystals of the orthorhombic system. Sulphur in this modification has the specific gravity of 2.07. If melted Sulphur be allowed to cool slowly, it crystallizes in long transparent needle shaped crystals of the oblique rhombic system. These crystals are not stable. Exposed to air they return to the orthorhombic form. (S. G. 1.98.)

Both of these modifications are soluble in Carbon Disulphide. They, therefore, form one of the allotropic forms of Sulphur, and are dimorphous.

(b.) The other form of Sulphur is a plastic substance, and is formed by pouring melted Sulphur heated to 230° into cold water. This form is not soluble in Carbon Disulphide, and returns to the first allotropic form after a few hours, or by plunging it into boiling water.

(3). Sulphur is called dimorphous, that is, two formed, because it crystallizes in two different systems of crystallization, the ortho and oblique rhombic systems.

Q.—6. Calculate the percentage composition by weight of Potassium Nitrate, and of the two Oxides of Carbon.

Ans.— $\text{KNO}_3 = 39.1 + 14 + 48 = 101.1$

$$101.1 = 39 \text{ K}$$

$$100 = 38.5 \% \text{ K}$$

$$101.1 = 14 \text{ N}$$

$$100 = 13.8 \% \text{ N}$$

$$101.1 = 48 \text{ O}$$

$$100 = 47.4 \% \text{ O}$$

$$\text{CO}_2 = 12 + 2 \times 16 = 44$$

$$44 = 12 \text{ C}$$

$$100 = 27.27 \% \text{ C}$$

$$44 = 32 \text{ O}$$

$$100 = 72.73 \% \text{ O}$$

$$\text{CO} = 12 + 16 = 28$$

$$28 = 12 \text{ C}$$

$$100 = 42.8 \% \text{ C}$$

$$28 = 16 \text{ O}$$

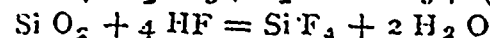
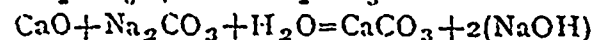
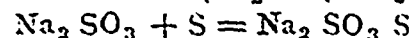
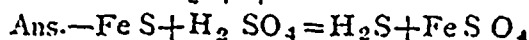
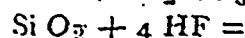
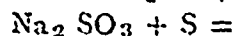
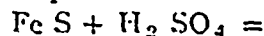
$$100 = 57.2 \% \text{ O}$$

Q.—7. Write down the atomic weight, the molecular weight, the relative weight, the specific gravity, the atomic and the molecular

Vol. of Chlorine, and fully explain the meaning of these terms.

Ans.—The law of Multiple Proportion, which has been established by direct experiment, affirms that definite *weights* or *multiples* of definite weights of the elements unite with each other to form chemical compounds. Upon this law Dalton based his atomic theory. He assumed that chemical combination consisted in the approximation of individual, indivisible atoms to one another. An atom, according to this theory, became the smallest particle by weight of an element capable of taking part in a chemical reaction; a *molecule*, a group of atoms, the smallest particle of a compound capable of existing in a free state. The atoms have all the same size but not the same weight. The relation between their weights is represented by the weights with which they combine with one another. The atomic weight, relative weight and combining weight mean the same thing. The molecular weight is double the atomic weight. Specific gravity of Chlorine, compared with the weight of same vol. of air taken as the unit, is found to be 2.47. The atomic volume is one vol. of any unit of vol. taken as standard. The molecular volume is double the atomic vol. The weight of an atom or atomic vol. of Chlorine, an atom or atomic vol. of Hydrogen, taken as standard, is 35.5 grammes or grains, &c. Its molecular weight, $35.5 \times 2 = 71$; its relative weight, 35.5; its atomic vol., one vol. of the unit of vol.; its molecular vol. double the atomic.

Q.—8. Complete the following equations:



Q.—9. Describe a mode of preparing Sulphur Dioxide, and give and explain the equations representing the reactions. Explain the difference between the bleaching action of Chlorine and Sulphurous Acid.