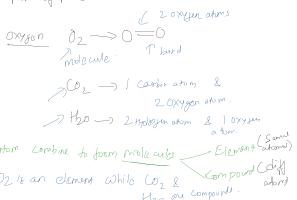




Banba Kato yama

He states that atoms may not exist in their free state but may exist in the combined state in the form of molecules.



Any combination of atoms is called a molecule but the formation of chemical reactions by combining two different atoms is called combination.

Law of Chemical Combination

Elements — substances whose molecules are made up of only one type of atoms.

Compounds — substances whose molecules are made up of more than one type of atoms and called compounds.

Properties of compound are different from the properties of elements they are made up of.

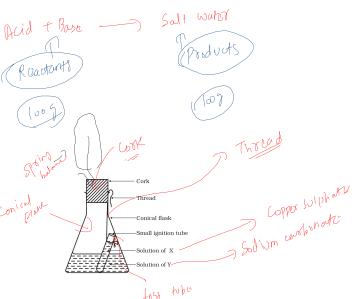
The combination takes place via chemical reaction following certain laws called laws of chemical combination



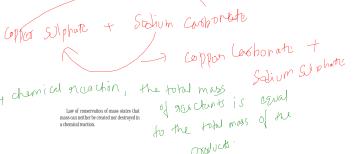
When two or more substances combine to form an entirely different product

Principle Law of Chemical combination

LAW OF CONSERVATION OF MASS



i) $X \text{ gm}$
ii) $X \text{ gm}$



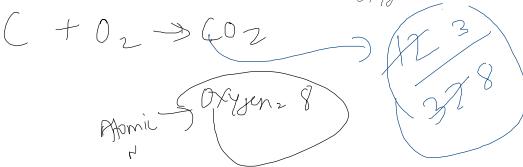
- Z^{-2}
- Compound
 - Molecule
 - Element
 - Both a & b

✓ Mass can be created in chemical reaction.

LAW OF CONSTANT PROPORTIONS



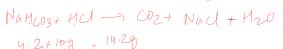
$$\text{Mass of H/Mass of O} = 2/16 = 1:8$$



"In a chemical substance the elements are always present in definite proportions by mass".

Q) When 12g of NaHCO_3 is added to a solution of HCl weighing 12g , it is observed that 2.2g of CO_2 is released into atmosphere. The residue left behind is found to weigh 12g .

is in agreement of which law?



mass of reactants = mass of products

$$\text{mass of products} = 2.2\text{g} + 12\text{g} = 14.2\text{g}$$

✓ There is no loss or gain of mass during the reaction.

✓ Hence, the given observation prove the law of conservation of mass.

a) Calculate the mass of carbon present in 1g of CO_2



3g of Carbon combine with 8g of oxygen to form 11g of CO_2

$$11\text{g of CO}_2 \text{ contains C} = 3\text{g}$$

$$11\text{g of CO}_2 \text{ contains O} = \frac{3}{11} \times 8 = \frac{24}{11} = 2.18\text{g}$$

Q) CaCO_3 contains 40% calcium, 12% carbon and 48% oxygen by mass. Knowing that the law of constant composition holds good, calculate the mass of the constituent elements present in 2g of CaCO_3



$$1\text{g Ca} + 12\text{g C} + 48\text{g O}$$

$$= 100\text{g CaCO}_3$$

$$10\text{g Ca} + 3\text{g of C} + 12\text{g of O}$$

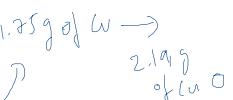
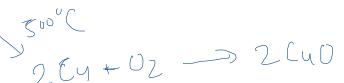
$$= 25\text{g of CaCO}_3$$

of if your model

$$1190$$

b) What mass of AgNO_3 will react with 5.85g of NaCl to produce 14.3g of AgCl & 8.5g of NaNO_3 , if the law of conservation of mass holds true.

$$\begin{array}{ll} \text{Mass of reactants} & \text{Mass of products} \\ n + 5.85 & = 8.5 + 14.35 \end{array}$$



$$\begin{aligned} \text{o/o of Cu in the oxide} &= \frac{1.75}{2.19} \times 100 \\ &= 79.9\text{o/o} \end{aligned}$$

CuO

$$\begin{aligned} \text{o/o of Cu in the oxide} &= \frac{1.14}{1.13} \times 100 \\ &= 100 - 79.9 \\ &= 20.1\text{o/o} \end{aligned}$$

CuO

$$\begin{aligned} \text{o/o of Cu in the oxide} &= \frac{1.14}{1.13} \times 100 \\ &= 20.0\text{o/o} \end{aligned}$$

law of constant proportion

$$\begin{aligned} 2\text{g of CuO} &\rightarrow 17\text{g of Cu} \\ 25\text{g CuO} &\rightarrow \frac{10}{28} \times 25 = 8.9\text{g Cu} \\ 2\text{g} &\rightarrow \frac{28}{6.9} \times 2 = 6.9\text{g Cu} \end{aligned}$$

$$\begin{aligned} 25\text{g CuO} &= 3\text{g Cu} \\ 2\text{g CuO} &= \frac{3}{28} \times 2 = 0.21\text{g Cu} \end{aligned}$$

$$\begin{aligned} 25\text{g of CuO} &\rightarrow 17\text{g of Cu} \\ 2\text{g of CuO} &\rightarrow \frac{12}{28} \times 2 = 6.9\text{g Cu} \end{aligned}$$

Dalton's Atomic Theory

- (i) All matter is made of very tiny particles called atoms, which participate in chemical reactions.
- (ii) Atoms are indivisible particles, which cannot be created or destroyed in a chemical reaction.
- (iii) Atoms of a given element are identical in mass and chemical properties.
- (iv) Atoms of different elements have different masses and chemical properties.
- (v) Atoms combine in the ratio of small whole numbers to form compounds.
- (vi) The relative number and kinds of atoms are constant in a given compound.