

Vidya bhawan Balika Vidyapith, Lakhisarai

Subject- chemistry

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Class IX A, B, C, D,E, F

Atom and molecules part – 3

1. In a reaction, 5.3g of sodium carbonate reacted with 6 g of acetic acid. The products were 2.2 g of carbon dioxide, 0.9 g water and 8.2 g of sodium acetate. Show that these observations are in agreement with the law of conservation of mass.

Sodium carbonate + acetic acid → Sodium acetate + carbon dioxide + water

Solution:

Sodium carbonate + acetic acid → Sodium acetate + carbon dioxide + water

5.3g 6g 8.2g 2.2g 0.9g

As per the law of conservation of mass, the total mass of reactants must be equal to the total mass of

products

As per the above reaction, LHS = RHS i.e., $5.3\text{g} + 6\text{g} = 2.2\text{g} + 0.9\text{g} + 8.2\text{g} = 11.3\text{g}$

Hence the observations are in agreement with the law of conservation of mass.

2. Hydrogen and oxygen combine in the ratio of 1:8 by mass to form water. What mass of oxygen gas would be required to react completely with 3 g of hydrogen gas?

Solution:

We know hydrogen and water mix in the ratio 1: 8.

For every 1g of hydrogen, it is 8g of oxygen.

Therefore, for 3g of hydrogen, the quantity of oxygen = $3 \times 8 = 24\text{g}$

Hence, 24g of oxygen would be required for the complete reaction with 3g of hydrogen gas.

3. Which postulate of Dalton's atomic theory is the result of the law of conservation of mass?

Solution:

The postulate of Dalton's Atomic theory which is a result of the law of conservation of mass is,

"Atoms can neither be created nor destroyed".

4. Which postulate of Dalton's atomic theory can explain the law of definite proportions?

Solution:

The postulate of Dalton's atomic theory that can explain the law of definite proportions is – the

relative number and kinds of atoms are equal in given compounds.

5. Define the atomic mass unit?

Solution:

An atomic mass unit is a unit of mass used to express weights of atoms and molecules where one

atomic mass is equal to $1/12$ th the mass of one carbon-12 atom.

6. Why is it not possible to see an atom with naked eyes?

Solution:

Firstly, atoms are miniscule in nature, measured in nanometers. Secondly, except for atoms of noble

gasses, they do not exist independently. Hence, an atom cannot be visible to the naked eyes.

7. Write down the formulae of

(i) sodium oxide

(ii) aluminium chloride

(iii) sodium sulphide

(iv) magnesium hydroxide

Solution:

The following are the formulae:

(i) sodium oxide – Na_2O

(ii) aluminium chloride – AlCl_3

(iii) sodium sulphide – Na_2S

(iv) magnesium hydroxide – $\text{Mg}(\text{OH})_2$

8. Write down the names of compounds represented by the following formulae:

(i) $\text{Al}_2(\text{SO}_4)_3$

(ii) CaCl_2

(iii) K_2SO_4

(iv) KNO_3

(v) CaCO_3

Solution:

Listed below are the names of the compounds for each of the following formulae

(i) $\text{Al}_2(\text{SO}_4)_3$ – Aluminium sulphate

(ii) CaCl_2 – Calcium chloride

(iii) K_2SO_4 – Potassium sulphate

(iv) KNO_3 – Potassium nitrate

(v) CaCO_3 – Calcium carbonate

9. What is meant by the term chemical formula?

Solution:

Chemical formula is the symbolic representation of a chemical compound. For example: The chemical formula of hydrochloric acid is HCl.

10. How many atoms are present in a

(i) H₂S molecule and

(ii) PO₄³⁻ ion?

Solution:

The number of atoms present are as follows:

(i) H₂S molecule has 2 atoms of hydrogen and 1 atom of sulphur hence 3 atoms in totality.

(ii) PO₄³⁻ ion has 1 atom of phosphorus and 4 atoms of oxygen hence 5 atoms in totality.

By soni kumari (chemistry)