

UNIT 1

SOME BASIC CONCEPTS OF CHEMISTRY

Answer the questions. (1 Score each)

1. A teacher wrote the following pairs to illustrate the law of multiple proportions. Identify the correct pair which shows Law of multiple proportions.

- a) Na₂S and Na₂O b) NH₃ and NO₂ c) N₂O and NO d) CH₄ and CO₂

Ans : c) N₂O and NO

2. One mole of any substance contain ----- particles.

Ans : Avogadro Number of Particles (N_A, 6.022 x 10²³)

3. The number of atoms present in 25 g of carbon is -----

Ans: Gram atomic mass of carbon = 12 g

12 g carbon contain Avogadro Number of Particles (6.022 x 10²³)

Number of atoms in 25 g of carbon is,

$$\frac{25 \times 6.022 \times 10^{23}}{12} = 12.54 \times 10^{23}$$

4. How to connect mole, gram-atom and gram-mole?

**Ans: 1 mole of element = 1 gram-atom of element
= 1 gram-mole of element**

5. Calculate weight of 3 moles of NH₃.

Ans: 3 mole of NH₃= 3 x (14 + 3) = 51 g

Answer the questions (2 Score each)

6. a) Calculate the mass of SO_{3(g)} produced, if 500 g SO_{2(g)} reacts with 200 g O_{2(g)} according to the equation 2SO_{2(g)} + O_{2(g)} \longrightarrow 2SO_{3(g)}.

b) Identify the limiting reagent in the above reaction.

Ans: 2SO₂ + O₂ \longrightarrow 2SO₃

128g 32g 160g

We have 500g SO₂ and 200g O₂

128g SO₂ needs 32 g of O₂

$$\text{So 1 g SO}_2 = \frac{32}{128} = 0.25 \text{ g of O}_2$$

500g SO₂ needs, 500 x 0.25 = 125 g O₂

For 500g SO₂ we need only 125g O₂ out of 200g.

Therefore SO₂ is the limiting reagent.

Amount of SO₃ produced is

$$\frac{160}{128} \times 500 = 625 \text{ g}$$

Answer the questions. (4 Score each)

7. Irrespective of the source, pure sample of H₂O always contain 88.89% by mass of oxygen and 11.11% by mass of hydrogen
- Which law is illustrated here?
 - Who proposed the law?
 - State the Law?

Ans. (a) Law of Definite Proportions

(b) Joseph Proust

(c) The same compound always contains the same elements combined together in the same fixed proportions by mass.

8. Hydrogen combine with oxygen to form water(H₂O) and hydrogen peroxide (H₂O₂)
- Which law is illustrated here?
 - Who proposed the law?
 - State the Law?

Ans. (a) Law of Multiple Proportions

(b) John Dalton

(c) When two elements combine to form more than one compound, the different masses of one of the elements which combine with a fixed mass of the other bear a simple whole number ratio to one another.

9. Match the following

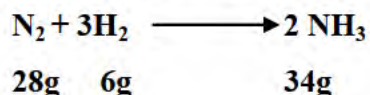
A	B
1) 1 amu	A) 1.0080 amu
2) Mass of 1 H atom	B) 1.66×10^{-24} g
3) Average atomic mass of chlorine	C) 16.04 u
4) Molecular mass of CH ₄	D) 35.5 u
5) Formula mass of NaCl	E) 18.02 gmol ⁻¹
6) Molar mass of H ₂ O	F) 58.5 u

Ans: 1- B, 2 - A, 3 - D, 4-C, 5 - F, 6 - E

10. Define limiting reagent. A reaction mixture for the production of NH₃ gas contains 250 g of N₂ and 50 g of H₂ under suitable conditions. Identify the limiting reagent and calculate the mass of NH₃ produced?

Ans. The reactant which is completely consumed in a reaction is called limiting reagent.

Nitrogen reacts with H₂ to form NH₃ according to the equation,



28g N₂ requires 6 g H₂

250g N₂ requires,

$$\frac{6}{28} \times 250 = 53.57 \text{ g H}_2$$

Here H₂ is completely consumed. So it is the limiting reagent.

But here is only 50g H₂, so we have to consider reverse case

6g H₂ require 28 g N₂

50g H₂ requires

$$\frac{28}{6} \times 50 = 233.33 \text{ g N}_2$$

Amount of NH₃ formed = 50+ 233.33

= 283.33 g