

CHEMISTRY-1

Some basic concepts of Chemistry

[Set-1]

SECTION-A

- A molal solution is one that contains one mole of solute in
 - 1000 g of solvent
 - 1.0 L of solvent
 - 1.0 L of solution
 - 1.0 kg of solution
- The mass of a gas that occupies a volume of 612.5 ml at 0°C and 1 atm pressure is 1.1 g, the molar mass of the gas is
 - 66.25 g/mol
 - 40.23 g/mol
 - 44.0 g/mol
 - 24.5 g/mol
- Which of the following contains maximum number of electrons?
 - 1 g N^{3-}
 - 1g C^{4-}
 - 1 g Na^{+}
 - All equal
- Calculate the number of protons present in 90 g of H_2O ?
 - $5 N_A$
 - $50 N_A$
 - $0.8 N_A$
 - $40 N_A$

5. Match the following:

Column-I
(Concentration method)

- A. Molality
B. Molarity
C. Volume percent
D. Mass percent

Column-II
(Units)

1. Mol/dm^3
2. Mol/kg
3. Unit less, changes with temperature
4. Unit less, does not change with temperature

- | | A | B | C | D |
|-------|---|---|---|---|
| (i) | 1 | 2 | 3 | 4 |
| (ii) | 2 | 4 | 2 | 3 |
| (iii) | 2 | 1 | 4 | 3 |
| (iv) | 2 | 1 | 3 | 4 |

Assertion-Reason type Questions:

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true and R is not the correct explanation of A
- (c) A is true but R is false
- (d) A is false but R is true
6. A: Atomic mass of aluminum is 27 u.
R: An atom of aluminium is 27 times heavier than an atom of hydrogen.
7. A: In a combustion reaction in the air, oxygen is the limiting reactant.
R: Oxygen is present in limited amount in the air as 21 %

Passage bases questions:**Read the following passage and answer the questions:**

The reactant which reacts completely in the reaction is called limiting reactant. The other reactant is called the reactant in excess. Limiting reactants helps in determining the amounts of other reactants reacted as well as the amount of products formed. N_2 gas and H_2 gas reacts with each other in the presence of catalyst, 200 bar pressure and 700 K to form ammonia NH_3 by Haber's process.

8. The number of moles of hydrogen required to produce 20 moles of ammonia through Haber's process is
- (i) 40 (ii) 10 (iii) 20 (iv) 30
9. 20 ml of hydrogen reacts using 50 mL of nitrogen. The volume of the gas left after the completion of the reaction is
- (i) 43 mL (ii) 14 mL (iii) 57 mL (iv) 29 mL
10. 6.02×10^{23} molecules of N_2 reacts with 6.0 g of H_2 to form ammonia. The number of molecules of NH_3 produced is
- (i) N_A (ii) $\frac{N_A}{2}$ (iii) $2 N_A$ (iv) $4 N_A$

SECTION-B

11. Calculate the empirical formula of an oxide of iron that contains 30% oxygen by mass. (At. Mass of Fe = 56)
12. Chlorophyll, a green plant pigment contains 18% by mass magnesium. Calculate the number of magnesium atoms present in 180 g of chlorophyll (at mass of Mg = 24)

OR

How many grams of sodium carbonate, Na_2CO_3 are required to prepare 0.5 dm^3 of 0.05 M solution?

13. If the density of methanol, CH_3OH is 0.793 kg/L , then what is its volume required for the preparation of 2.5 dm^3 of 0.25 M solution?
14. 2.0 g impure sample of sodium hydrogen carbonate on heating liberates 220 cm^3 of carbondioxide gas at STP. Find the percentage purity of the sample.

OR

An organic compound contains $24.24\% \text{ C}$, $4.04\% \text{ H}$ and the rest is chlorine. If the molecular mass of the organic compound is 98.9 then derive the empirical and the molecular formula of organic compound.

15. 50 kg of N_2 and 10 kg H_2 combined to form ammonia, NH_3
- (i) Identify the reactant completely used up in the reaction
 - (ii) Calculate the volume of NH_3 produced at STP
 - (iii) Calculate the molecules of the reactant left in excess

OR

- (i) State law of multiple proportions
- (ii) Define molarity of a solution. How does temperature affect the molarity?
- (iii) Calculate the mass of urea required to prepare 2.5 kg of 0.25 m solution (molar mass of urea = 60).