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Questions:

Case Study Questions

1. Stoichiometry is a section of chemistry that involves calculation based on chemical equations. Chemical equations are governed by laws of chemical combination. Mass of reactants is equal to mass of products. Compound obtained from different methods contain the same elements in the fixed ratio by mass. Mole is a counting unit, equal to 6.022×10^{23} particles.
One mole is also equal to molar mass expressed in grams. One mole of every gas at STP has volume equal to 22.4 L. The reacting species which are consumed in the reaction completely is called limiting reagent which decides amount of products formed. Concentration of solution is expressed in terms of molarity, molality and mole fraction.
(a) Calculate number of moles of NH_3 formed by reaction of 2 moles of N_2 and 2 moles of H_2.
$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$
(b) Calculate number of electrons in 18 g of H_2O. [Atomic number of H = 1 ,O = 8]
(c) Calculate the molality of 1 M NaCI solution having density 1.10 g cm^{-3}. (Molar mass = 58.5 g mol^{-1})
(d) Define mole fraction.
(e) In aqueous solution of glucose $X_{glucose} = 0.1$, what is X_{H2O} = ?

3 Marks

2. Define molality. How does molality depend on temperature?

3. Calculate the number of moles in each of the following.
392 g of sulphuric acid

4. Balance the following equations:
(i) $H_3PO_3 \longrightarrow H_3PO_4 + PH_3$
(ii) $Ca + H_2O \longrightarrow Ca(OH)_2 + H_2$
(iii) $Fe_2(SO_4)_3 + NH_3 + H_2O \longrightarrow Fe(OH)_3$
(iv) $Cl_2 + NaOH \longrightarrow NaCl + NaClO_3 + H_2O$

5. A compound contains 21.6% sodium, 33.3% chlorine, 45.1 % oxygen. Derive its empirical formula.

6. Write balanced chemical equation for the following:
$KMnO_4 + C_2H_4 + H_2O \longrightarrow MnO_2 + KOH + (CH_2OH)_2$

7. What happens if the compound is heated? Write the balanced chemical equation.

8. 1.84 g of mixture of $CaCO_3$ and $MgCO_3$ is strongly heated till no further loss of mass takes place. The residue weighs 0.96 g. Calculate the percentage composition of the mixture.

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