

QB365

Important Questions - Some Basic Concept of Chemistry

11th Standard CBSE

Chemistry

Reg.No. :

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Time : 01:00:00 Hrs

Total Marks : 50

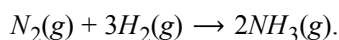
Section-A

- 1) Calculate the mass of a sample of iron metal that contains 0.250 moles of iron atoms. **1**
- 2) Describe the difference between the mass of mole of oxygen atom (O) and the mass of a mole of oxygen molecule (O)₂ **1**
- 3) What do you understand by stoichiometric coefficients in a chemical equation? **1**
- 4) A black dot used as a full stop at the end of a sentence has a mass of about one attogram. Assuming that the dot is made up of carbon, Calculate the approximate number of carbon atoms present in a dot? **1**
- 5) What is the mass in gram of one molecule of caffeine (C₈H₁₀N₄O₂)? **1**
- 6) Round up the following upto three significant figures **1**
38.216
- 7) Round up the following upto three significant figures **1**
10.4107
- 8) Convert the following into kg. **1**
 0.91×10^{-27} g (mass of electron)
- 9) Calculate the number of gram of oxygen in 0.10 mole of Na₂CO₃. 10H₂O. **1**
- 10) Calculate the percentage composition of the various elements in MgSO₄ **1**

Section-B

- 11) What will be the molality of the solution containing 18.25g of HCl gas in 500 g of water? **2**
- 12) The reactant which is entirely consumed in reaction is known as limiting reagent. In the reaction 2A+4B->3C+4D, when 5 moles of A react with 6 moles of B, then Which is the limiting reagent? **2**
- 13) How are 0.50 mole Na₂CO₃ and 0.50 M Na₂CO₃ different? **2**
- 14) How many gram of Na₂CO₃ should be dissolved to make 100cm³ of 0.15 M Na₂CO₃ solution? **2**
- 15) How many significant figures are present in the following? **2**
(iii) 5005
- 16) Describe what you need to do in the laboratory to test (i) the law of conservation of mass, (ii) the law of definite proportion and (iii) the law of multiple proportions **2**
- 17) Two oxides of a metal contain 27.6% and 30.0% of oxygen respectively. If the formula of the first oxide is M₃O, Find that of the second. **2**

- 18) Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation, 2

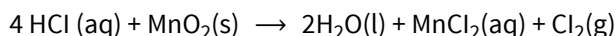


Calculate the mass of ammonia produced if 2.00×10^3 g dinitrogen reacts with 1.00×10^3 g of dihydrogen.

- 19) Commercially available concentrated hydrochloric acid contains 38% HCl by mass. 2

(ii) What volume of the above concentrated HCl is required to make 1.0L of 0.10 M HCl?

- 20) Chlorine is prepared in the laboratory by treating manganese dioxide (MnO_2) with aqueous hydrochloric acid according to the reaction, 2



How many gram of HCl reacts with 5.0 g of manganese dioxide?

Section-C

- 21) Express the following in the scientific notation 5

0.000968

- 22) (ii) Perform the following calculation to proper number of significant figures. 5

(b) $(1.6 \times 10^2)^2$

- 23) A Welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen gives 3.38g carbon dioxide, 0.690 g of water and no other products. A volume 10.0 L (measured at STP) of this welding gas is found to weigh 11.6 g. Calculate 5

(ii) Molar mass of the gas and

- 24) Arrange the following in order of their increasing masses in gram 5

(i) One atom of silver,

Section-A

- 1) 14 g 1

- 2) A=14g 1

- 3) 1

The coefficients of reactants and products involved in a chemical equation represented by the balanced form are known as stoichiometric coefficients. $N_2(g) + 3H_2 \rightarrow 2NH_3(g)$ The stoichiometric coefficients are 1,2 and 2 respectively.

- 4) 1

Mass of carbon in the dot = 1 attogram = 10^{-18} Gram atomic mass of carbon = 12 g, i.e 12 g of carbon contains 6.022×10^{23} atoms of carbon . $\therefore 10^{-18}$ g of carbon will contain carbon atoms

$$= \frac{6.022 \times 10^{23}}{12} \times 10^{-18} = 5.02 \times 10^4 \text{ atoms}$$

- 5) A= 3.22×10^{-22} g 1

- 6) 38.2 1

- 7) 10.4 1

- 8) 91×10^{-25} 1

- 9) 20.8g 1
- 10) Mg=20%: S=26.67; O=53.33 1

Section-B

- 11) Molality is defined as the number of moles of solute present in 1kg of solvent. It is denoted by m . 2

$$\text{Thus Molality (m)} = \frac{\text{moles of solute}}{\text{mass of solvent}}$$

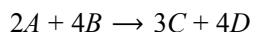
Given that, Mass of solvent(H_2O) = 500g = 0.5kg

Weight of HCl = $1 \times 1 + 1 \times 35.5 = 36.5\text{g}$

$$\text{Molar of HCl(solute)} = \frac{18.25}{36.5} = 0.5$$

$$m = \frac{0.5}{0.5} = 1m \quad [\text{from Eq.(i)}]$$

- 12) 2



According to the given reaction, 2 moles of A react with 4 moles of B.

Hence, 5 moles of A will react with 10 moles of

$$b \left(\frac{5 \times 4}{2} = 10 \text{ moles} \right)$$

It indicates that reactant B is limiting reagent as it will consume first in the reaction because we have only 6 moles of B.

- 13) Molar mass of $\text{Na}_2\text{CO}_3 = (2 \times 22.99) + 12.01 + (3 \times 16)$ 2
 $= 105.99 \approx 106 \text{ gmol}^{-1}$

$$0.5 \text{ mole } \text{Na}_2\text{CO}_3 = 0.50 \times 106 = 53 \text{ gNa}_2\text{CO}_3$$

0.5 M Na_2CO_3 means 53g Na_2CO_3 is present in 1 L of the solution.

- 14) 1000 cm^3 of 0.15 M Na_2CO_3 contains Na_2CO_3 2
 $= 0.15 \text{ mol}$

100 cm^3 of 0.15 M Na_2CO_3 will contain Na_2CO_3

$$= \frac{0.15}{1000} \times 100 = 0.015 \text{ mol}$$

$$\text{Mass of } \text{Na}_2\text{CO}_3 = 0.015 \times 106 = 1.59 \text{ g}$$

- 15) 4 2

- 16) 2

(i) To test the law of conservation of mass, a reaction would have to be carried out in which the mass of the reactants and the mass of the products are weighed and shown to be the same.

(ii) The law of definite proportions could be shown by demonstrating that no matter how a compound is obtained, the reactant remains at the same proportions by mass. This can be done by decomposing a compound and showing that the masses of the elements present are always in the same ratio

(iii) To test the law of multiple proportions, two different compounds made up of the same elements would have to be decomposed. If the mass of one of the elements is kept constant the masses of other elements combining with that of the element in different samples would have to be in the small whole number ratio.

17)

2

In the first oxide, oxygen = 27.6

Metal = 100 - 27.6 = 72.4 parts by mass.

As the formula of the oxide is M_3O_4 , it means 72.4 parts by mass of metal = 3 atoms of metal and 4 atoms of oxygen = 27.6 parts by mass.

In the second oxide, oxygen = 30.0 parts by mass and metal = 100 - 30 = 70 parts by mass.

But 72.4 parts by mass of metal = 3 atoms of metal.

$$\therefore 70 \text{ parts by mass of metal} = \frac{3}{72.4} \times 70 \text{ atoms of metal}$$

$$= 2.90 \text{ atoms of metal}$$

Also, 27.6 parts by mass of oxygen = 4 atoms of oxygen.

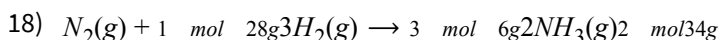
$$\therefore 30 \text{ parts by mass of oxygen} = \frac{4}{27.6} \times 30 \text{ atoms of oxygen}$$

$$= 4.35 \text{ atoms of oxygen}$$

Hence, ratio of M : O in the second oxide

$$= 2.90 : 4.35 = 1 : 1.5 \text{ or } 2 : 3$$

\therefore Formula of the other metal oxide is M_2O_3 .



2

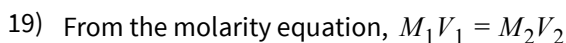
28 g N_2 reacts with 6 g H_2 .

$$\therefore 1 \text{ g } N_2 \text{ will react with } \frac{6}{28} g H_2$$

$$\therefore 2000 \text{ g } N_2 \text{ will react with } \frac{2000 \times 6}{28} = 428.57g H_2$$

Hence, N_2 is the limiting reagent and H_2 is in excess. N_2 limits the amount of ammonia produced.

28 g N_2 produces 34 g NH_3 and 1 g N_2 produces $\frac{34}{28}$ g NH_3



2

$$\overset{\text{acid}_1}{M_1} \overset{\text{acid}_2}{V_1} = M_2 V_2$$

$$12.38 \text{ M} \times V_1 = 0.10 \text{ M} \times 1.0 \text{ L}$$

$$\therefore V_1 = \frac{0.1 \times 1.0}{12.38} = 0.00808 \text{ L} = 8.08 \text{ cm}^3$$



2



According to the balanced chemical equation,

87g of MnO_2 react with 4×36.5 g HCl

5g of MnO_2 will react with $\frac{4 \times 36.5 \times 5}{87} = 8.39$ g HCl

Section-C

21) $0.000968 = 9.68 \times 10^{-4}$

5

22) 2.56×10^4

5

23) (ii) **Calculation for molar of the gas**

5

10.0 L of the given gas at STP weigh = 11.6 g

\therefore 22.4 L of the given gas at STP will weigh

$$\frac{11.6 \times 22.4}{10} = 25.984 \text{ g}$$

Molar mass = 25.984 = 26 mol^{-1}

24) (i) 1 mole of Ag atom = 108 g = 6.022×10^{23} atoms

Mass of 6.022×10^{23} atoms of Ag = 108 g.

$$\text{Mass of 1 atom of Ag} = \left(\frac{108}{6.022 \times 10^{23}} \right) = 1.793 \times 10^{-22} \text{ g}$$