Problem based on mixtures

1. 3 litre of mixture of propane (C_3H_8) & butane (C_4H_{10}) on complete combustion gives10 litre CO_2. Find the composition of mixture.

(A)C_3H_8 2L and C_4H_{10} 1L (B) C_3H_8 3L and C_4H_{10} 0L(C)C_3H_8 1.5L and C_4H_{10} 1.5L(D) C_3H_8 0L and C_4H_{10} 3L

2. 0.01 mole of iodoform (CHI_3) reacts with Ag to produce a gas whose volume at NTP is

$2CHI_3 + 6Ag \longrightarrow 6AgI(s) + C_2H_2(g)$

(A) 224 ml (B) 112 ml (C) 336 ml (D) None of these

3. One mole mixture of CH_4 and air (containing 80% N_2 20% O_2 by volume) of a composition such that when underwent combustion gave maximum heat (assume combustion of only CH_4). Then which of the statements are correct, regarding composition of initial mixture. (X presents mole fraction).

(A) $X_{CH_4} = \frac{1}{11}, X_{O_2} = \frac{2}{11}, X_{N_2} = \frac{8}{11}$ (B) $X_{CH_4} = \frac{3}{8}, X_{O_2} = \frac{1}{8}, X_{N_2} = \frac{1}{2}$

(C) $X_{CH_4} = \frac{1}{6}, X_{O_2} = \frac{1}{6}, X_{N_2} = \frac{2}{3}$ (D) Data insufficient

4. A mixture of KBr and NaBr weighing 0.560 gm was treated with aqueous Ag^+ and all the bromide ion was recovered as 0.970 gm of pure AgBr. The fraction by weight of KBr in the sample is (approximately)

(A) 0.25 (B) 0.50 (C) 0.40 (D) 0.28

5. 40 gram of a carbonate of an alkali metal or alkaline earth metal containing some inert impurities was made to react with excess HCl solution. The liberated CO_2 occupied 12.315 lit. at 1 atm & 300 K. The correct option is

(A) Mass of impurity is 1 gm and metal is Be (B) Mass of impurity is 3 gm and metal is Li

(C) Mass of impurity is 5 gm and metal is Be (D) Mass of impurity is 2 gm and metal is Mg

Problem based on % yield and % purity

6. Calculate the weight of lime (CaO) obtained by heating 200 kg of 95% pure lime stone ($CaCO_3$).

(A) 104.4 kg (B) 105.4 kg (C) 212.8 kg (D) 106.4 kg

7. A silver coin weighing 11.34 g was dissolved in nitric acid. When sodium chloride was added to the solution all the silver (present as $AgNO_3$) was precipitated as silver chloride. The weight of the precipitated silver chloride was 14.35 g. Calculate the percentage of silver in the coin

(A) 4.8% (B) 95.2% (C) 90% (D) 80%

8. For the reaction

$2Fe(NO_3)_3 + 3Na_2CO_3 \rightarrow Fe_2(CO_3)_2 + 6NaNO_3$

initially 2.5 mol of $Fe(NO_3)_2$ and 3.6 mol of Na_2CO_3 is taken. If 6.3 mol of $NaNO_3$ is obtained then % yield of given reaction is

(A) 50% (B) 84% (C) 87.5% (D) 100%

9. For the reaction, $2x + 3y + 4z \longrightarrow 5w$ Initially if 1 mole of x, 3 mole of y and 4 mole of z is taken and 1.25 mole of w is obtained then % of this reaction is

(A) 25% (B) 50% (C) 75% (D) None of these

Problem based on sequential and parallel reaction

10. 120 g Mg was burnt in air to give a mixture of MgO and Mg_3N_2. The mixture is now dissolved in HCl to form $MgCl_2$ and NH_4Cl, if 107 gram NH_4Cl is produced. Then the moles of $MgCl_2$ formed is :

$$Mg + \frac{1}{2}O_2 \longrightarrow MgO \quad \text{.... (i)}$$

$$3Mg + N_2 \longrightarrow Mg_3N_2 \quad \text{.... (ii)}$$

$$MgO + 2HCl \longrightarrow MgCl_2 + H_2O \quad \text{.... (iii)}$$

$$Mg_3N_2 + 8HCl \longrightarrow 2NH_4Cl + 3MgCl_2 \quad \text{.... (iv)}$$

(A) 3 moles (B) 6 moles (C) 5 moles (D) 10 moles

Paragraph Question No. 11 to 13

NaBr, used to produced AgBr for use in photography can be self prepared as follows :

$Fe + Br_2 \longrightarrow FeBr_2$ ... (i)

$FeBr_2 + Br_2 \longrightarrow Fe_3Br_8$ ... (ii) (not balanced)

$Fe_3Br_8 + Na_2CO_3 \longrightarrow NaBr + CO_2 + Fe_3O_4$ ... (iii) (not balanced)

11. Mass of iron required to produce 4120 gm NaBr

(A) 420 gm (B) 840 kg (C) 840 gm (D) 420 kg

12. If the yield of (ii) is 50% and (iii) reaction is 60% then mass of iron required to produce 2060 gm NaBr

(A) 25 mol (B) 50 mol (C) 75 mol (D) 100 mol

13. If yield of (iii) reaction is 90% then mole of CO_2 formed when 1030 gm NaBr is formed

(A) 20 (B) 5 (C) 10 (D) 40

14. Two substance P_4 & O_2 are allowed to react completely to form mixture of P_4O_6 & P_4O_{10} leaving none of the reactants. Using this information calculate the composition of final mixture when mentioned amount of P_4 & O_2 are taken.

$$P_4 + 3O_2 \longrightarrow P_4O_{6,} \quad P_4 + 5O_2 \longrightarrow P_4O_{10}$$

(i) If 1 mole P_4 & 4 mole of O_2 (ii) If 3 mole P_4 & 11 mole of O_2

(iii) If 3 mole P_4 & 13 mole of O_2

15. Sulphur trioxide may be prepared by the following two reactions :

$S_8 + 8O_2(g) \rightarrow 8SO_2(g)$, $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

How many grams of SO_3 will be produced from 1 mol of S_8?

ANSWER KEY

RACE # 17

1. (A) **2.** (B) **3.** (A) **4.** (C) **5.** (B) **6.** (D) **7.** (B) **8.** (C) **9.** (B) **10.** (C)
11. (B) **12.** (A) **13.** (B)

14. (i) $P_4O_{6,}$= 0.5 mole,P_4O_{10}= 0.5 mole, (ii) $P_4O_{6,}$= 2 mole,P_4O_{10}= 1 mole, (iii) $P_4O_{6,}$= 1 mole,P_4O_{10}= 2 mole

15. 640 gram