Each question carries **+4** marks for correct answer and **– 1** mark for wrong answer.

Useful Informations

Acceleration due to gravity g = 10 m/s2 Planck constant h = 6.6 1034 J-s
Charge of electron e = 1.6 1019 C Mass of electron me = 9.1 1031 kg Permittivity of free space = 8.85 1012 C 2 /N-m 2 Density of water water = 103 kg/m3 Atmospheric pressure Pa = 105 N/m2 Gas constant R = 8.314 J K1 mol1

1. Atomic No:H=1, He = 2, Li=3, Be=4, B=5, C=6, N=7, O=8, N=9, Na=11, Mg=12, Si=14, Al=13, P=15, S=16, Cl=17, Ar=18, K =19, Ca=20, Cr=24, Mn=25, Fe=26, Co=27, Ni=28, Cu = 29, Zn=30, As=33, Br=35, Ag=47, Sn=50, I=53, Xe=54, Ba=56, Pb=82, U=92.

2. Atomic masses: H=1, He=4, Li=7, Be=9, B=11, C=12, N=14, O=16, F=19, Na=23, Mg=24, Al = 27, Si=28, P=31, S=32, Cl=35.5, K=39, Ca=40, Cr=52, Mn=55, Fe=56, Co=59, Ni=58.7, Cu=63.5, Zn=65.4, As=75, Br=80, Ag=108, Sn=118.7, I=127, Xe=131, Ba=137, Pb=207, U=238.

For the reaction

$$2x + 3y + 4z \rightarrow 5w$$

Initially if 1 mole of x, 3 mole of y and 4 mole of z is taken. If 1.25 mole of w is obtained then % yield of this reaction is _____.

Ratio of masses of H_2SO_4 and $Al_2(SO_4)_3$ is grams each containing 32 grams of **S** is _____.

The vapour density of a mixture of gas A (Molecular mass = 40) and gas B (Molecular mass = 80) is 25. Then mole % of gas B in the mixture would be

_____

For the reaction

$$2A + 3B + 5C \rightarrow 3D$$

Initially if 2 mole of A, 4 mole of B and 6 mole of C is taken, With 25% yield, moles of D which can be produced are _____.

Equal volumes of 10% (v/v) of HCl is mixed with 10% (v/v) NaOH solution. If density of pure NaOH is 1.5 times that of pure HCl then the resultant solution be :

(A) basic

(B) neutral

(C) acidic

(D) can't be predicted.

A definite amount of gaseous hydrocarbon was burnt with just sufficient amount of O_2. The volume of all reactants was 600 ml, after the explosion the volume of the products [$CO_2(g)$ and $H_2O(g)$] was found to be 700 ml under the similar conditions. The molecular formula of the compound is :

(A) C_3H_8 (B) C_3H_6 (C) C_3H_4 (D) C_4H_{10}

One gram of the silver salt of an organic dibasic acid yields, on strong heating, 0.5934 g of silver. If the weight percentage of carbon in it 8 times the weight percentage of hydrogen and half the weight percentage of oxygen, determine the molecular formula of the acid. [Atomic weight of Ag = 108]

(A) $C_4H_6O_4$ (B) $C_4H_6O_6$ (C) $C_2H_6O_2$ (D) $C_5H_{10}O_5$

One mole mixture of CH_4 & 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) $X_{CH_4} = \frac{3}{8}, X_{O2} = \frac{1}{8}, X_{N_2} = \frac{1}{2}$

(C) $X_{CH_4} = \frac{1}{6}, X_{O2} = \frac{1}{6}, X_{N_2} = \frac{2}{3}$

(D) Data insufficient

$C_6H_5OH(g) + O_2(g) \rightarrow CO_2(g) + H_2O(l)$
Magnitude of volume change if 30 ml of C_6H_5OH (g) is burnt with excess amount of oxygen, is

(A) 30 ml (B) 60 ml (C) 20 ml (D) 10 ml

10 ml of a compound containing ‘N’ and ‘O’ is mixed with 30 ml of H_2 to produce H_2O (*l*) and 10 ml of N_2(g). Molecular formula of compound if both reactants reacts completely, is

(A) N_2O (B) NO_2(C) N_2O_3 (D) N_2O_5

Similar to the % labelling of oleum, a mixture of H_3PO_4 and P_4O_{10} is labelled as (100 + x) % where x is the maximum mass of water which can react with P_4O_{10} present in 100 gm mixture of H_3PO_4 and P_4O_{10}. If such a mixture is labelled as 127% Mass of P_4O_{10} is 100 gm of mixture, is

(A) 71 gm (B) 47 gm (C) 83gm (D) 35 gm

Mass of sucrose $C_{12}H_{22}O_{11}$ produced by mixing 84 gm of carbon, 12 gm of hydrogen and 56 lit. O_2 at 1 atm & 273 K according to given reaction, is

$$C(s) + H_2(g) + O_2(g) \rightarrow C_{12}H_{22}O_{11}(s)$$

(A) 138.5 (B) 155.5 (C) 172.5 (D) 199.5

If 50 gm oleum sample rated as 118% is mixed with 18 gm water, then the correct option is

(A) The resulting solution contains 18 gm of water and 118 gm H_2SO_4
(B) The resulting solution contains 9 gm of water and 59 gm H_2SO_4
(C) The resulting solution contains only 118 gm pure H_2SO_4
(D) The resulting solution contains 68 gm of pure H_2SO_4

In the quantitative determination of nitrogen using Duma's method, N_2 gas liberated from 0.42 gm of a sample of organic compound was collected over water. If the volume of N_2 gas collected was $\frac{100}{11}$ ml at total pressure 860 mm Hg at 250 K, % by mass of nitrogen in the organic compound is

[Aq. tension at 250K is 24 mm Hg and R = 0.08 L atm mol^{-1} K^{-1}]

(A) $\frac{10}{3}\%$ (B) $\frac{5}{3}\%$ (C) $\frac{20}{3}\%$ (D) $\frac{100}{3}\%$

40 gm 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

The percentage by mole of NO_2 in a mixture $NO_2(g)$ and NO(g) having average molecular mass 34 is :

(A) 25% (B) 20% (C) 40% (D) 75%

The minimum mass of mixture of A_2 and B_4 required to produce at least 1 kg of each product is :

(Given At. mass of 'A' = 10; At mass of 'B' = 120)

$$5A_2 + 2B_4 \rightarrow 2AB_2 + 4A_2B$$

(A) 2120 gm (B) 1060 gm (C) 560 gm (D) 1660 gm

The mass of CO_2 produced from 620 gm mixture of $C_2H_4O_2$ & O_2, prepared to produce maximum energy is

(A) 413.33 gm (B) 593.04 gm (C) 440 gm (D) 320 gm

Assuming complete precipitation of AgCl, calculate the sum of the molar concentration of all the ions if 2 lit of 2M Ag_2SO_4 is mixed with 4 lit of 1 M NaCl solution is :

(A) 4M (B) 2M (C) 3M (D) 2.5 M

12.5 gm of fuming H_2SO_4 (labelled as 112%) is mixed with 100 lit water. Molar concentration of H^+ in resultant solution is :

[Note : Assume that H_2SO_4 dissociate completely and there is no change in volume on mixing]

(A) $\frac{2}{700}$ (B) $\frac{2}{350}$ (C) $\frac{3}{350}$ (D) $\frac{3}{700}$

74 gm of sample on complete combustion gives 132 gm CO_2 and 54 gm of H_2O. The molecular formula of the compound may be

(A) C_5H_{12} (B) $C_4H_{10}O$ (C) $C_3H_6O_2$ (D) $C_3H_7O_2$

The % by volume of C_4H_{10} in a gaseous mixture of C_4H_{10}, CH_4 and CO is 40. When 200 ml of the mixture is burnt in excess of O_2. Find volume (in ml) of CO_2 produced.

(A) 220 (B) 340 (C) 440 (D) 560

What volumes should you mix of 0.2 M NaCl arid 0.1 M $CaCl_2$ solution so that in resulting solution the concentration of positive ion is 40% lesser than concentration of negative ion. Assuming total volume of solution 1000 ml.

(A) 400 ml NaCl, 600 ml $CaCl_2$
(B) (B) 600 ml NaCl, 400 ml $CaCl_2$
(C) 800 ml NaCl, 200 ml $CaCl_2$
(D) None of these

An iodized salt contains 0.5% of NaI. A person consumes 3 gm of salt everyday. The number of iodide ions going into his body everyday is

(A) 10^{-4} (B) 6.02×10^{-4} (C) 6.02×10^{19} (D) 6.02×10^{23}

The pair of species having same percentage (mass) of carbon is :

(A) CH_3COOH and $C_6H_{12}O_6$

(B) CH_3COOH and C_2H_5OH

(C) $HCOOCH_3$ and $C_{12}H_{22}O_{11}$

(D) $C_6H_{12}O_6$ and $C_{12}H_{22}O_{11}$

200 ml of a gaseous mixture containing CO, CO_2 and N_2 on complete combustion in just sufficient amount of O_2 showed contraction of 40 ml. When the resulting gases were passed through KOH solution it reduces by 50 % then calculate the volume ratio of $V_{CO_2} : V_{CO} : V_{N_2}$ in original mixture.

(A) 4 : 1 : 5 (B) 2 : 3 : 5 (C) 1 : 4 : 5 (D) 1 : 3 : 5

Density of a gas relative to air is 1.17. Find the mol. mass of the gas. [M_{air} = 29 g/mol]

(A) 33.9 (B) 24.7 (C) 29 (D) 22.3