**1.** Which of the following contain largest number of carbon atoms ?
(1) 15 gm ethane, $C_2H_6$
(2) 40.2 gm sodium oxalate, $Na_2C_2O_4$
(3) 72 gm glucose, $C_6H_{12}O_6$
(4) 35 gm pentene, $C_5H_{10}$

**2.** The percentage by mole of $NO_2$ in a mixture of $NO_2$(g) and NO(g) having average molecular mass 34 is :
(1) 25% (2) 20% (3) 40% (4) 75%

**3.** Volume of $O_2$ obtained at 2 atm & 546K, by the complete decomposition of 8.5 g $NaNO_3$ is
$2NaNO_3 \rightarrow 2NaNO_2 + O_2$
(1) 2.24 lit (2) 1.12 lit (3) 0.84 lit (4) 0.56 lit

**4.** A metal carbonate decomposes according to following reaction

$$M_2CO_3(s) \longrightarrow M_2O(s) + CO_2(g)$$

Percentage loss in mass on complete decomposition of $M_2CO_3$(s)
(Atomic mass of M = 102)
(1) $\frac{100}{3}$% (2) $\frac{50}{3}$% (3) $\frac{25}{3}$% (4) 15%

**5.** 25.4 gm of iodine and 14.2 gm of chlorine are made to react completely to yield a mixture of ICl and $ICl_3$. Ratio of moles of ICl & $ICl_3$ formed is (Atomic mass : I = 127, Cl = 35.5)
(1) 1 : 1 (2) 1 : 2 (3) 1 : 3 (4) 2 : 3

**6.** 100 ml of $PH_3$ decomposes according to given reaction.

$$PH_3(g) \longrightarrow P(s) + 3/2\ H_2(g)$$

The change in volume of the gas is :-
(1) 50 ml increase (2) 500 ml decrease
(3) 900 ml decrease (4) 150 ml increase

**7.** 44 g of a sample of organic compound on complete combustion gives 88 g $CO_2$ and 36 g of $H_2O$. The molecular formula of the compound may be :-
(1) $C_4H_6$ (2) $C_2H_6O$ (3) $C_2H_4O$ (4) $C_3H_6O$

**8.** A metal oxide has the fomula $X_2O_3$. It can be reduced by hydrogen to give free metal and water. 0.156 gm of metal oxide requires 6 mg of hydrogen for complete reduction. The atomic mass of metal in amu is :-
(1) 15.6 (2) 156 (3) 108 (4) 54

**9.** Two oxides of a metal contain 22.22% and 30% oxygen by mass respectively. If the formula of the first oxide is MO, then the formula of the second oxide is:-
(1) $MO_2$ (2) $M_2O_3$ (3) $M_2O$ (4) $M_2O_5$

**10.** In the reaction $4A + 2B + 3C \longrightarrow A_4B_2C_3$, what will be the number of moles of product formed, starting from 1 mol of A, 0.6 mol of B and 0.72 mol of C :-
(1) 2.32 (2) 0.24 (3) 0.3 (4) 0.25

**11.** Two isotopes of an element Q are $Q^{97}$ (23.4% abundance) and $Q^{94}$ (76.6% abundance). $Q^{97}$ is 8.082 times heavier than $C^{12}$ and $Q^{94}$ is 7.833 times heavier than $C^{12}$. What is the average atomic weight of the element Q ?
(1) 94.702 (2) 78.913 (3) 96.298 (4) 94.695

**12.** 12 g of Mg was burnt in a closed vessel containing 32 g oxygen. Remaining unreacted gm-molecules of $O_2$ will be :-
(1) 0.5 (2) 0.75 (3) 1 (4) 0.25

**13.** The total number of electrons present in 9 mL of water (density of water is 1 $gmL^{-1}$) :-
(1) $3.01 \times 10^{23}$ (2) $3.01 \times 10^{22}$
(3) $3.01 \times 10^{24}$ (4) $3.01 \times 10^{25}$

**14.** From 200 mg of $CO_2$, $10^{21}$ molecules are removed, How many moles of $CO_2$ are left ?
(1) $126.9 \times 10^{-1}$ (2) $2.88 \times 10^{-3}$
(3) $7.31 \times 10^{-3}$ (4) $4.4 \times 10^{-3}$

**15.** On heating 10 g of $CaCO_3$, 5.6 g CaO is formed. Moles of $CO_2$ obtained in this reaction will be :-
(1) 2.2 (2) 4.4 (3) 0.1 (4) 0.2

**16.** 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
(1) Mass of impurity is 1 gm and metal is Be
(2) Mass of impurity is 3 gm and metal is Li
(3) Mass of impurity is 5 gm and metal is Be
(4) Mass of impurity is 2 gm and metal is Mg

**17.** 1 mole of $H_2SO_4$ will not exactly neutralise :
(1) 2 mole of ammonia (2) 1 mole of $Ba(OH)_2$
(3) 0.5 mole of $Ca(OH)_2$ (4) 2 mole of KOH

**18.** 12 g of Mg was burnt in a closed vessel containing 32 g oxygen. Which of the following is incorrect.
(1) 2 gm of Mg will be left unburnt.
(2) 0.75 gm-molecule of $O_2$ will be left unreacted.
(3) 20 gm of MgO will be formed.
(4) The mixture at the end will weight 44 g.

**19.** 50 gm of $CaCO_3$ is allowed to react with 68.6 gm of $H_3PO_4$ then select the incorrect option-

$3CaCO_3 + 2H_3PO_4 \rightarrow Ca_3(PO_4)_2 + 3H_2O + 3CO_2$

(1) 51.67 gm salt is formed

(2) Amount of unreacted reagent = 35.93 gm

(3) $n_{CO_2}$ = 0.5 moles

(4) 0.7 mole $CO_2$ is evolved

**20.** Select the correct statement(s) for $(NH_4)_3PO_4$.

(1) Ratio of number of oxygen atoms to number of hydrogen atoms is 1 : 3

(2) Ratio of number of cations to number of anions is 3 : 2

(3) Ratio of number of gm-atoms of nitrogen to gm-atoms of oxygen is 3 : 2

(4) Total number of atoms in one mole of $(NH_4)_3PO_4$ is 20.

**21.** At STP, the order of root mean square speed of molecules $H_2$, $N_2$, $O_2$ and HBr is :

(1) $H_2 > N_2 > O_2 > HBr$ (2) $HBr > O_2 > N_2 > H_2$

(3) $HBr > H_2 > O_2 > N_2$ (4) $N_2 > O_2 > H_2 > HBr$

**22.** Most probable speed, average speed and RMS speed are related as :

(1) 1 : 1.128 : 1.224 (2) 1 : 1.128 : 1.424

(3) 1 : 2.128 : 1.224 (4) 1 : 1.428 : 1.442

**23.** If the average velocity of $N_2$ molecules is 0.3 m/sec. at 27°C, then the velocity of 0.6 m/sec will take place at:

(1) 273 K (2) 927 K (3) 1000 K (4) 1200 K

**24.** The total KE of an ideal monoatomic gas at 27°C is

(1) 900 cal (2) 1800 cal (3) 300 cal (4) None

**25.** The correct expression for the van der Waals' equation of state is :

(1) $\left(P + \frac{a}{n^2V^2}\right)(V - nb) = nRT$

(2) $\left(P + \frac{an^2}{V^2}\right)(V - nb) = \Delta nRT$

(3) $\left(P + \frac{an^2}{V^2}\right)(V - b) = nRT$

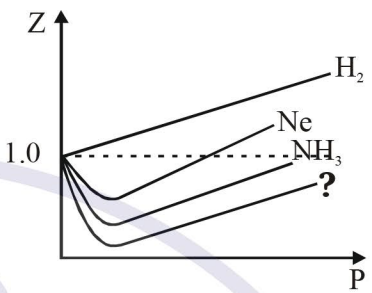
(4) $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$

**26.** At relatively high pressure, van der Waals' equation reduces to :

(1) $PV_m = RT$ (2) $PV_m = RT + \frac{a}{V_m}$

(3) $PV_m = RT + Pb$ (4) $PV_m = RT - \frac{a}{V_m^2}$

**27.** Observe the following Z vs P graph.




The missing gas in the above graph can be :

(1) He (2) Ar

(3) $C_5H_{12}$ (4) All are correct

**28.** The values of van der Waals' constant **'a'** for the gases $O_2$, $N_2$, $NH_3$ and $CH_4$ are 1.360, 1.390, 4.170 and 2.253 L atm $mol^{-2}$ respectively. The gas which can most easily be liquefied is :

(1) $O_2$ (2) $N_2$ (3) $NH_3$ (4) $CH_4$

**29.** A gas can be liquefied by :

(1) Cooling (2) Compressing

(3) Both (1) and (2) (4) None

**30.** Which set of conditions represents easiest way to liquefy a gas :

(1) Low temperature and high pressure

(2) High temperature and low pressure

(3) Low temperature and low pressure

(4) High temperature and high pressure

**ANSWER KEY** — Exercise-I

| Que. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Ans. | **4** | **1** | **2** | **2** | **1** | **1** | **3** | **4** | **2** | **2** |
| Que. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Ans. | **4** | **2** | **3** | **2** | **3** | **2** | **3** | **1** | **4** | **1** |
| Que. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Ans. | **1** | **1** | **4** | **1** | **4** | **3** | **3** | **3** | **3** | **1** |