

# DPP - Daily Practice Problems

## Chapter-wise Sheets

Date :  Start Time :  End Time :

# CHEMISTRY (CC01)

SYLLABUS : Some Basic Concepts of Chemistry

Max. Marks : 180

Marking Scheme : + 4 for correct & (-1) for incorrect

Time : 60 min.

**INSTRUCTIONS** : This Daily Practice Problem Sheet contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

- Given the numbers : 161 cm, 0.161 cm, 0.0161 cm. The number of significant figures for the three numbers are  
(a) 3, 4 and 5 respectively (b) 3, 3 and 4 respectively  
(c) 3, 3 and 3 respectively (d) 3, 4 and 4 respectively
- If the true value for an experimental result is 6.23 and the results reported by three students X, Y and Z are :  
X : 6.18 and 6.28  
Y : 6.20 and 6.023  
Z : 6.22 and 6.24  
Which of the following option is correct :  
(a) X precise, Y accurate, Z precise and accurate.  
(b) X precise and accurate, Y not precise, Z precise  
(c) Both X & Z precise & accurate, Y not precise.  
(d) Both X & Y neither precise nor accurate, Z both precise and accurate.
- Number of grams of oxygen in 32.2 g  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$  is  
(a) 20.8 (b) 2.24  
(c) 22.4 (d) 2.08
- 3 g of an oxide of a metal is converted to chloride completely and it yielded 5 g of chloride. The equivalent weight of the metal is  
(a) 3.325 (b) 33.25  
(c) 12 (d) 20
- 1 cc.  $\text{N}_2\text{O}$  at NTP contains :  
(a)  $\frac{1.8}{224} \times 10^{22}$  atoms (b)  $\frac{6.02}{22400} \times 10^{23}$  molecules  
(c)  $\frac{1.32}{224} \times 10^{23}$  electrons (d) All of the above

RESPONSE GRID

1. (a) (b) (c) (d) 2. (a) (b) (c) (d) 3. (a) (b) (c) (d) 4. (a) (b) (c) (d) 5. (a) (b) (c) (d)

Space for Rough Work



6. One of the following combination which illustrates the law of reciprocal proportions ?  
 (a)  $N_2O_3, N_2O_4, N_2O_5$  (b)  $NaCl, NaBr, NaI$   
 (c)  $CS_2, CO_2, SO_2$  (d)  $PH_3, P_2O_3, P_2O_5$
7. An aqueous solution of oxalic acid dihydrate contains its 6.3g in 250 mL. The volume of 0.1 N NaOH required to completely neutralize 10 mL of this solution  
 (a) 4mL (b) 20mL (c) 2mL (d) 40mL
8. The density of 3M solution of sodium chloride is  $1.252 \text{ g mL}^{-1}$ . The molality of the solution will be :  
 (molar mass,  $NaCl = 58.5 \text{ g mol}^{-1}$ )  
 (a) 260m (b) 2.18m (c) 2.79m (d) 3.00m
9. The number of atoms in 0.1 mole of a triatomic gas is :  
 ( $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$ )  
 (a)  $6.026 \times 10^{22}$  (b)  $1.806 \times 10^{23}$   
 (c)  $3.600 \times 10^{23}$  (d)  $1.800 \times 10^{22}$
10. Match the columns.
- | Column-I                                      | Column-II                            |
|---|--------------------------------------|
| A. 88 g of $CO_2$                             | I. 0.25 mole                         |
| B. $6.022 \times 10^{23}$ molecules of $H_2O$ | II. 2 mole                           |
| C. 5.6 litres of $O_2$ at STP                 | III. 1 mole                          |
| D. 96 g of $O_2$                              | IV. $6.022 \times 10^{23}$ molecules |
| E. 1 mol of any gas                           | V. 3 mole                            |
- (a) A – II; B – III; C – I; D – V; E – VI  
 (b) A – III; B – II; C – I; D – V; E – IV  
 (c) A – II; B – I; C – III; D – V; E – IV  
 (d) A – II; B – III; C – I; D – IV; E – V
11. The simplest formula of a compound containing 50% of element X (atomic mass 10) and 50% of element Y (atomic mass 20) is  
 (a) XY (b)  $XY_3$  (c)  $X_2Y$  (d)  $X_2Y_3$
12. Which one of the following is the lightest?  
 (a) 0.2 mole of hydrogen gas  
 (b)  $6.023 \times 10^{22}$  molecules of nitrogen  
 (c) 0.1 g of silver  
 (d) 0.1 mole of oxygen gas
13. If  $N_A$  is Avogadro's number then number of valence electrons in 4.2 g of nitride ions ( $N^{3-}$ ) is  
 (a)  $4.2N_A$  (b)  $2.4N_A$   
 (c)  $1.6N_A$  (d)  $3.2N_A$
14. The set of numerical coefficients that balances the equation  
 $K_2Cr_2O_7 + HCl \longrightarrow K_2Cr_2O_7 + KCl + H_2O$  is  
 (a) 2, 2, 1, 2, 1 (b) 2, 2, 1, 1, 1  
 (c) 2, 1, 1, 2, 1 (d) 1, 1, 2, 2, 1
15. Match the columns
- | Column-I<br>(Number)   | Column-II<br>(Significant figures) |
|------------------------|------------------------------------|
| A. 29900.              | I. 2                               |
| B. 290                 | II. 1                              |
| C. $1.23 \times 1.331$ | III. 4                             |
| D. 20.00               | IV. 3                              |
| E. $2.783 - 1$         | V. 5                               |
- (a) A – III; B – II; C – V; D – I; E – IV  
 (b) A – V; B – I; C – IV; D – III; E – II  
 (c) A – I; B – V; C – IV; D – III; E – II  
 (d) A – V; B – IV; C – III; D – II; E – I
16. The maximum number of molecules are present in  
 (a) 15 L of  $H_2$  gas at STP (b) 5 L of  $N_2$  gas at STP  
 (c) 0.5 g of  $H_2$  gas (d) 10 g of  $O_2$  gas
17. The number of moles of oxygen in one litre of air containing 21% oxygen by volume, under standard conditions are  
 (a) 0.0093 mole (b) 0.21 mole  
 (c) 2.10 mole (d) 0.186 mole
18. Assuming fully decomposed, the volume of  $CO_2$  released at STP on heating 9.85 g of  $BaCO_3$  (Atomic mass, Ba = 137) will be  
 (a) 1.12 L (b) 2.24 L  
 (c) 4.06 L (d) 0.84 L

**RESPONSE  
GRID**

- |                  |                  |                  |                  |                  |
|------------------|------------------|------------------|------------------|------------------|
| 5. (a)(b)(c)(d)  | 6. (a)(b)(c)(d)  | 7. (a)(b)(c)(d)  | 8. (a)(b)(c)(d)  | 9. (a)(b)(c)(d)  |
| 10. (a)(b)(c)(d) | 11. (a)(b)(c)(d) | 12. (a)(b)(c)(d) | 13. (a)(b)(c)(d) | 14. (a)(b)(c)(d) |
| 15. (a)(b)(c)(d) | 16. (a)(b)(c)(d) | 17. (a)(b)(c)(d) | 18. (a)(b)(c)(d) | 19. (a)(b)(c)(d) |

Space for Rough Work



19. The ratio of the molar amounts of  $H_2S$  needed to precipitate the metal ions from 20 mL each of 1 M  $Ca(NO_3)_2$  and 0.5M  $CuSO_4$  is  
 (a) 1:1 (b) 2:1 (c) 1:2 (d) indefinite
20. Consider the following statements.  
 (i) Atoms of H, O, N and C have identical properties but different mass.  
 (ii) Matter is divisible into atoms which are further indivisible.  
 (iii) The ratio of N: H in  $NH_3$  is 1 : 3 and N : O in nitric oxide is 2 : 1.  
 (iv) Dalton's atomic theory support law of conservation of mass.  
 Which of the following pairs of statements is true according to Dalton's atomic theory ?  
 (a) (i) and (ii) (b) (ii) and (iii)  
 (c) (ii) and (iv) (d) (i) and (iv)
21. How many moles of  $Al_2(SO_4)_3$  would be in 50 g of the substance ?  
 (a) 0.083 mole (b) 0.952 mole  
 (c) 0.481 mole (d) 0.140 mole
22. Experimentally it was found that a metal oxide has formula  $M_{0.98}O$ . Metal M, present as  $M^{2+}$  and  $M^{3+}$  in its oxide. Fraction of the metal which exists as  $M^{3+}$  would be :  
 (a) 7.01% (b) 4.08% (c) 6.05% (d) 5.08%
23. 20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample?  
 (a) 75 (b) 96 (c) 60 (d) 84
24. A sample of  $AlF_3$  contains  $3.0 \times 10^{24}$   $F^-$  ions. The number of formula unit of this sample are  
 (a)  $9 \times 10^{24}$  (b)  $3 \times 10^{24}$   
 (c)  $0.75 \times 10^{24}$  (d)  $1.0 \times 10^{24}$
25. Read the following and choose the incorrect statements.  
 (i) Both weight and mass are same quantities used for measurement of amount of matter present in a substance  
 (ii) Mass and weight of a substance vary from one place to another due to change in gravity.  
 (iii) SI unit of mass is kilogram and while SI unit of weight is gram.  
 (a) (i) and (iii) (b) (ii) and (iii)  
 (c) (i) and (ii) (d) All of these
26. Number of atoms in 558.5 grams of Fe (at. wt. of Fe = 55.85  $g\ mol^{-1}$ ) is  
 (a) twice that in 60 g carbon  
 (b)  $6.023 \times 10^{22}$   
 (c) half that in 8 g He  
 (d)  $558.5 \times 6.023 \times 10^{23}$
27. What is the mass of precipitate formed when 50 mL of 16.9% solution of  $AgNO_3$  is mixed with 50 mL of 5.8%  $NaCl$  solution ?  
 (Ag = 107.8, N = 14, O = 16, Na = 23, Cl = 35.5)  
 (a) 28 g (b) 3.5 g (c) 7 g (d) 14 g
28. Which of the following option represents correct limiting reagents in reactions (i), (ii) and (iii) respectively.  
 (i)  $C + O_2 \rightarrow CO_2$   
 (26g) (20g)  
 (ii)  $N_2 + 3H_2 \rightarrow 2NH_3$   
 (60g) (80g)  
 (iii)  $P_4 + 3O_2 \rightarrow P_4O_6$   
 (100g) (200g)  
 (a) C,  $N_2$ ,  $O_2$  (b) C,  $N_2$ ,  $P_4$   
 (c)  $O_2$ ,  $H_2$ ,  $P_4$  (d)  $O_2$ ,  $N_2$ ,  $P_4$
29. A compound made up of two elements A and B is found to contain 25% A (atomic mass = 12.5) and 75% B (atomic mass = 37.5). The simplest formula of the compound is  
 (a) AB (b)  $AB_2$  (c)  $AB_3$  (d)  $A_3B$
30. On analysis a certain compound was found to contain iodine and oxygen in the ratio of 254 g of iodine (atomic mass 127) and 80 g oxygen (at mass = 16). What is the formula of the compound.  
 (a) IO (b)  $I_2O$   
 (c)  $I_5O_3$  (d)  $I_2O_5$
31. The following equation is a completely balanced equation :  
 $3Sn + 12HCl + 4HNO_3 \longrightarrow 3SnCl_4 + 4NO + 8H_2O$   
 In the above reaction, the number of equivalent per formula weight of  $HNO_3$  is  
 (a) 3 (b) 4 (c) 1 (d) 2

RESPONSE  
GRID

20. (a) (b) (c) (d) 21. (a) (b) (c) (d) 22. (a) (b) (c) (d) 23. (a) (b) (c) (d) 24. (a) (b) (c) (d)  
 25. (a) (b) (c) (d) 26. (a) (b) (c) (d) 27. (a) (b) (c) (d) 28. (a) (b) (c) (d) 29. (a) (b) (c) (d)  
 30. (a) (b) (c) (d) 31. (a) (b) (c) (d)

Space for Rough Work



32. In a compound C, H and N are present in 9 : 1 : 3.5 by weight. If molecular weight of the compound is 108, then the molecular formula of the compound is :  
 (a)  $C_2H_6N_2$  (b)  $C_3H_4N$  (c)  $C_6H_8N_2$  (d)  $C_9H_{12}N_3$
33. Arrange the numbers in increasing no. of significant figures. 0.002600, 2.6000, 2.6, 0.260  
 (a)  $2.6 < 0.260 < 0.002600 < 2.6000$   
 (b)  $2.6000 < 2.6 < 0.002600 < 0.260$   
 (c)  $0.260 < 2.6 < 0.002600 < 2.6000$   
 (d)  $0.002600 < 0.260 < 2.6 < 2.6000$
34. How many moles of lead (II) chloride will be formed from a reaction between 6.5 g of PbO and 3.2 g of HCl ?  
 (a) 0.044 (b) 0.333  
 (c) 0.011 (d) 0.029
35. Equal weights of NaCl and KCl are dissolved separately in equal volumes of solutions. Molarity of the two solutions will be:  
 (a) equal  
 (b) that of NaCl will be less than that of KCl  
 (c) that of NaCl will be more than that of KCl solution  
 (d) that of NaCl will be about half of that of KCl solution
36. Gastric juice contains 3.0 g of HCl per litre. If a person produces 2.5 litre of gastric juice per day. How many antacid tablets each containing 400 mg of  $Al(OH)_3$  are needed to neutralize all the HCl produced in one day ?  
 (a) 18 (b) 14 (c) 20 (d) 17
37. Which of the following is the correct empirical and molecular formulae of a compound, if the molecular mass of a compound is 80 and compound contains 60% of C, 5% of H and 35% of N ?  
 (a)  $C_2H_2N$  ;  $C_4H_4N_2$  (b)  $C_3H_4N_2$  ;  $C_6H_8N_4$   
 (c)  $C_2H_4N_2$  ;  $C_4H_8N_4$  (d)  $C_2H_2N$  ;  $C_2H_2N$
38. A gas mixture of 3 litres of propane ( $C_3H_8$ ) and butane ( $C_4H_{10}$ ) on complete combustion at  $25^\circ C$  produced 10 litre  $CO_2$ . Find out the composition of gas mixture (Propane : Butane)  
 (a) 2 : 1 (b) 1 : 2  
 (c) 1.5 : 1.5 (d) 0.5 : 2.5
39. Arrange the following in the order of increasing mass (atomic mass: O = 16, Cu = 63, N = 14)  
 I. one atom of oxygen  
 II. one atom of nitrogen  
 III.  $1 \times 10^{-10}$  mole of oxygen  
 IV.  $1 \times 10^{-10}$  mole of copper  
 (a) I < II < III < IV (b) I < II < III < IV  
 (c) III < II < IV < I (d) IV < II < III < I
40. When 30 litres of  $H_2$  and 30 litres of  $N_2$  are reacted  $NH_3$  is formed and the yield is only 50%. The composition of the gaseous mixture will be  
 (a) 5L of  $N_2$ , 5L of  $H_2$  and 5 L of  $NH_3$ .  
 (b) 5L of  $N_2$ , 10L of  $H_2$  and 10 L of  $NH_3$ .  
 (c) 10L of  $N_2$ , 15L of  $H_2$  and 5 L of  $NH_3$ .  
 (d) 5L of  $N_2$ , 15L of  $H_2$  and 10 L of  $NH_3$ .
41. How many moles of magnesium phosphate,  $Mg_3(PO_4)_2$  will contain 0.25 mole of oxygen atoms?  
 (a)  $1.25 \times 10^{-2}$  (b)  $2.5 \times 10^{-2}$   
 (c) 0.02 (d)  $3.125 \times 10^{-2}$
42. 1.12 ml of a gas is produced at S.T.P. by the action of 4.12 mg of alcohol ROH with methyl magnesium iodide. The molecular mass of alcohol is  
 (a) 16.0 (b) 41.2  
 (c) 82.4 (d) 156.0
43. If 224 mL of a triatomic gas has a mass of 1 g at 273K and 1 atmospheric pressure then the mass of one atom is  
 (a)  $8.30 \times 10^{-23}$  g (b)  $2.08 \times 10^{-23}$  g  
 (c)  $5.53 \times 10^{-23}$  g (d)  $6.24 \times 10^{-23}$  g
44. A compound contains atoms of three elements as A, B and C. If the oxidation number of A is +2, B is +5 and that of C is -2, the possible formula of the compound is  
 (a)  $A_3(B_4C)_2$  (b)  $A_3(BC_4)_2$   
 (c)  $ABC_2$  (d)  $A_2(BC_3)_2$
45. 5 moles of  $SO_2$  and 5 moles of  $O_2$  react to form  $SO_3$ . Number of moles left in total when only 60%  $SO_2$  is used is  
 (a) 6.5 (b) 10  
 (c) 8 (d) 8.5

**RESPONSE  
GRID**

- |                     |                     |                     |                     |                     |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| 32. (a) (b) (c) (d) | 33. (a) (b) (c) (d) | 34. (a) (b) (c) (d) | 35. (a) (b) (c) (d) | 36. (a) (b) (c) (d) |
| 37. (a) (b) (c) (d) | 38. (a) (b) (c) (d) | 39. (a) (b) (c) (d) | 40. (a) (b) (c) (d) | 41. (a) (b) (c) (d) |
| 42. (a) (b) (c) (d) | 43. (a) (b) (c) (d) | 44. (a) (b) (c) (d) | 45. (a) (b) (c) (d) |                     |

Space for Rough Work



$$\therefore 0.5 \text{ gm of H}_2 = \frac{0.5}{2} \times 6.023 \times 10^{23}$$

$$= 1.505 \times 10^{23} \text{ molecules of H}_2$$

(d) Similarly 10 g of O<sub>2</sub> gas

$$= \frac{10}{32} \times 6.023 \times 10^{23} \text{ molecules of O}_2$$

$$= 1.88 \times 10^{23} \text{ molecules of O}_2$$

Thus (a) will have maximum number of molecules.

17. (a) 21% of 1 litre is 0.21 litre.

22.4 litres = 1 mole at STP

$$\therefore 0.21 \text{ litre} = \frac{0.21}{22.4} = 0.0093 \text{ mole}$$

18. (a)  $\text{BaCO}_3 \longrightarrow \text{BaO} + \text{CO}_2$

192 g of BaCO<sub>3</sub> gives mole of CO<sub>2</sub> = 22.4 L

9.85 g of BaCO<sub>3</sub> will give 0.05 mole of CO<sub>2</sub> which is equal to 1.12 litre.

19. (b) Moles of Ca<sup>2+</sup> to be precipitated =  $\frac{20 \times 1}{1000} = 0.02$

$$\text{Moles of Cu}^{2+} \text{ to be precipitated} = \frac{20 \times 0.5}{1000} = 0.01$$

Hence molar amount of H<sub>2</sub>S will be in the ratio 2 : 1

$$\left( \text{Remember Moles} = \frac{\text{Molarity} \times \text{volume in ml}}{1000} \right)$$

20. (c) For statement (i) : H, O, C, N = All have different chemical properties.

For statement (ii) : It is true as per Dalton's postulate.

For statement (iii) : N : O = 1 : 1 (NO)

For statement (iv) : Dalton's postulates says, atoms can neither be created nor destroyed.

21. (d) No. of moles =  $\frac{\text{weight}}{\text{mol. wt.}} = \frac{50}{342} = 0.14 \text{ mole}$

22. (b) For one mole of the oxide

Moles of M = 0.98

Moles of O<sup>2-</sup> = 1

Let moles of M<sup>3+</sup> = x

$\therefore$  Moles of M<sup>2+</sup> = 0.98 - x

on balancing charge

$$(0.98 - x) \times 2 + 3x - 2 = 0$$

$$x = 0.04$$

$$\therefore \% \text{ of M}^{3+} = \frac{0.04}{0.98} \cdot 100 = 4.08\%$$

23. (d)  $\text{MgCO}_3 \cdot \cdot \text{MgO} \cdot \text{CO}_2$

84 g of MgCO<sub>3</sub> form 40 g of MgO

$\therefore 20 \text{ g of MgCO}_3 \text{ form } \frac{40 \cdot 20}{84} \text{ g of MgO}$

= 9.52 g of MgO

Since 8.0 g of MgO is formed

$$\text{Purity of sample} \cdot \frac{8}{9.52} \cdot 100 = 84.0\%$$

24. (d) In, AlF<sub>3</sub> the number of F is 3, for one AlF<sub>3</sub> molecule  
3F<sup>-</sup>  $\equiv$  1 formula unit of AlF<sub>3</sub>

$$3.0 \times 10^{24} \text{ F}^- \equiv \frac{1}{3} \times 3.0 \times 10^{24} \text{ AlF}_3 \text{ units}$$

25. (d) Mass of a substance is the amount of matter present in it while weight is the force exerted by gravity on an object.

Mass is constant while weight may vary from one place to another due to gravity.

SI unit of both mass and weight is kilogram.

26. (a)  $n_{\text{C}} (\text{no. of moles}) = \frac{558.5}{55.85} = 10 \text{ moles} = 10 N_A \text{ atoms.}$

No. of moles in 60 g of C =  $60/12 = 5 \text{ moles} = 5 N_A \text{ atoms.}$

27. (c) 50 mL of 16.9% solution of AgNO<sub>3</sub>

$$\left( \frac{16.9}{100} \times 50 \right) = 8.45 \text{ g of AgNO}_3$$

$$n_{\text{mole}} = \frac{8.45 \text{ g}}{(107.8 + 14 + 16 \times 3) \text{ g/mol}}$$

$$= \left( \frac{8.45 \text{ g}}{169.8 \text{ g/mol}} \right) = 0.0497 \text{ moles}$$

50 mL of 5.8% solution of NaCl contain

$$\text{NaCl} = \left( \frac{5.8}{100} \times 50 \right) = 2.9 \text{ g}$$

$$n_{\text{NaCl}} = \frac{2.9 \text{ g}}{(23 + 35.5) \text{ g/mol}} = 0.0495 \text{ moles}$$



1 mole    1 mole    1 mole

$\therefore 0.049 \text{ mole } 0.049 \text{ mole } 0.049 \text{ mole of AgCl}$

$$n = \frac{w}{M} \Rightarrow w = (n_{\text{AgCl}}) \times \text{Molecular Mass}$$

$$= (0.049) \times (107.8 + 35.5)$$

$$= 7.02 \text{ g}$$

28. (d)  $n_{\text{C}} = \frac{26 \text{ g}}{12 \text{ g/mol}} = 2.16$

$$n_{\text{O}_2} = \frac{20 \text{ g}}{32 \text{ g/mol}} = 0.625$$



## DPP/CC01

s-3

O<sub>2</sub> will be a limiting reagent in reaction (i)

$$n_{\text{N}_2} = \frac{60\text{g}}{28\text{g/mol}} = 2.14$$

$$n_{\text{H}_2} = 40$$

According to balanced equation,

1 mole of N<sub>2</sub> requires 3 mole of H<sub>2</sub>

2.14 mole of N<sub>2</sub> require 6.42 mole of H<sub>2</sub>

N<sub>2</sub> will be a limiting reagent in reaction (ii)

$$n_{\text{P}_4} = \frac{100\text{g}}{4 \times 31} = 0.86 \quad n_{\text{O}_2} = 6.25$$

According to balanced equation

1 mole of P<sub>4</sub> require 3 mole of O<sub>2</sub>

0.86 mole of P<sub>4</sub> require 2.58 mole of O<sub>2</sub>

So P<sub>4</sub> is a limiting reagent in reaction (iii)

29. (a) Proceed as follows :

Element	%	At.wt.	RNA	Simplest ratio
A	25	12.5	$\frac{25}{12.5} = 2$	1
B	75	37.5	$\frac{75}{37.5} = 2$	1

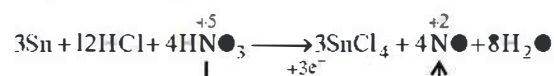
∴ The simplest formula of compound is AB

30. (d) Moles of Iodine present =  $\frac{254}{127} = 2$

$$\text{Moles of oxygen} = \frac{80}{16} = 5$$

∴ The molecular formula is I<sub>2</sub>O<sub>5</sub>

31. (a) Change in O.N. of N in HNO<sub>3</sub> is 3, hence one formula weight has 3 equivalents.



Since change in O.N. = 3

32. (c) Ratio of no. of atoms in the molecule

$$= \frac{9}{12} : \frac{1}{1} : \frac{3.5}{14} = 0.75 : 1 : 0.25 = 3 : 4 : 1$$

Empirical formula = C<sub>3</sub>H<sub>4</sub>N

$$\text{M.F.} = (\text{C}_3\text{H}_4\text{N})_n$$

n × Empirical formula mass = Molecular mass

$$n(3 \times 12 + 4 + 14) = 108$$

$$n \times 54 = 108$$

$$n = 2$$

$$\text{M.F.} = \text{C}_6\text{H}_8\text{N}_2$$

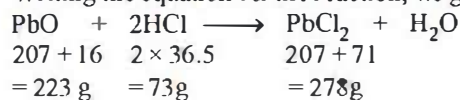
33. (a) 2.6 has two significant figures.

0.260 has three significant figures.

0.002600 has four significant figures.

2.6000 has five significant figures.

34. (d) Writing the equation for the reaction, we get



$$\text{No. of moles of PbO} = \frac{6.5}{223} = 0.029$$

$$\text{No. of moles of HCl} = \frac{3.2}{36.5} = 0.0877$$

Thus PbO is the limiting reactant 1 mole of PbO produce 1 mole PbCl<sub>2</sub>.

0.029 mole PbO produces 0.029 mole PbCl<sub>2</sub>.

35. (c) When the weight of different solutes are equal in equal volumes of solutions, the molarity is inversely related to molecular mass of the solute. Mol. mass of NaCl is less than KCl. Hence, molarity of NaCl solution will be more.

36. (b)  $\text{geq of HCl} = \frac{3}{36.5} \times 2.5 = 0.20548 = \text{geq of Al(OH)}_3$

$$\text{Weight of Al(OH)}_3 = \frac{0.20548 \times 78}{3}$$

$$= 5.342 \text{ g} = 5342 \text{ mg}$$

$$\therefore \text{No of tablets} = \frac{5342}{400} = 13.35 \approx 14$$

37. (a) Let 100 g of compound be there.

$$\text{Number of moles of Nitrogen} = \frac{35}{14} = 2.5$$

$$\text{Number of moles of Hydrogen} = \frac{5}{1.008} = 4.9$$

$$\text{Number of moles of Carbon} = \frac{60}{12.01} = 4.9$$

Since 2.5 is the smallest value division by it give ratio

N : H : C

$$1 : 1.96 : 1.96$$

$$= 1 : 2 : 2$$

Empirical formula = C<sub>2</sub>H<sub>2</sub>N

Empirical formula weight = 2 × 12 + 2 + 14 = 40

Molecular mass = 80

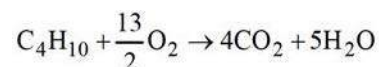
Molecular formulae = n (C<sub>2</sub>H<sub>2</sub>N)

$$\therefore = 2 (\text{C}_2\text{H}_2\text{N}) \left( n = \frac{80}{40} \right) = \text{C}_4\text{H}_4\text{N}_2$$

38. (a) C<sub>3</sub>H<sub>8</sub> + 5O<sub>2</sub> → 3CO<sub>2</sub> + 4H<sub>2</sub>O

a

3a



$$(3-a) \quad 4(3-a)$$

$$\text{But } 3a + 4(3-a) = 10$$

∴ a = 2 (Propane) and 3 - 2 = 1 (Butane)

39. (a) Mass of  $6.023 \times 10^{23}$  atoms of oxygen = 16 g

Mass of one atom of oxygen

$$= \frac{16}{6.023 \times 10^{23}} = 2.66 \times 10^{-23} \text{ g}$$

Mass of  $6.023 \times 10^{23}$  atoms of nitrogen = 14 g

Mass of one atom of nitrogen

$$= \frac{14}{6.023 \times 10^{23}} = 2.32 \times 10^{-23} \text{ g}$$

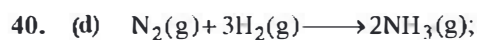
Mass of  $1 \times 10^{-10}$  mole of oxygen =  $16 \times 10^{-10}$  g

Mass of 1 mole of copper = 63 g

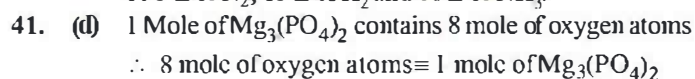
Mass of 1 mole of oxygen = 16 g

Mass of  $1 \times 10^{-10}$  mole of copper =  $63 \times 1 \times 10^{-10}$   
 $= 63 \times 10^{-10}$  g

So, the order of increasing mass is II < I < III < IV.



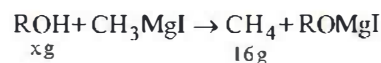
$\text{N}_2$  is the limiting reagent in this reaction. 10 L  $\text{N}_2$  will react with 30 L  $\text{H}_2$  to produce 20 L of  $\text{NH}_3$ . As the yield of reaction is 50% composition of resultant mixture will be 5 L of  $\text{N}_2$ , 15 L of  $\text{H}_2$  and 10 L of  $\text{NH}_3$ .



0.25 mole of oxygen atom  $\equiv \frac{1}{8} \times 0.25$  mole of

$\text{Mg}_3(\text{PO}_4)_2$

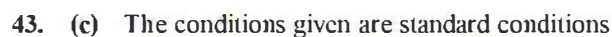
$= 3.125 \times 10^{-2}$  mole of  $\text{Mg}_3(\text{PO}_4)_2$



$\frac{4.12}{1000}$  g of alcohol will produce  $\frac{16}{x} \times \frac{4.12}{1000}$  g of methane

Methane actually obtained is  $= \frac{16 \times 1.12}{22400}$  g

$$\text{equal} = \frac{16 \times 4.12}{x \times 1000} = \frac{16 \times 1.12}{22400} \therefore x = 82.4$$

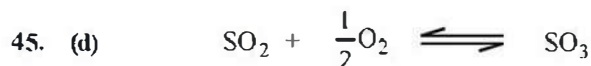
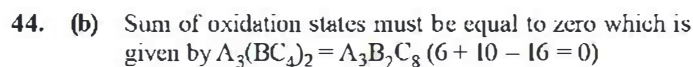


224 mL has mass = 1 g;

22400 mL will have mass = 100 g. This is mol. wt of gas  
 $6.023 \times 10^{23}$  molecules have  $3 \times 6.023 \times 10^{23}$  atoms  
 since gas is triatomic

$\therefore$  weight of one atom

$$= \frac{100}{3 \times 6.023 \times 10^{23}} = 5.5 \times 10^{-23} \text{ g}$$



Initial	5 mole	5 mole	0 mole
Final	5 - 3	5 - 1.5 mole	3 mole
	= 2 mole	= 3.5 mole	

Total number of moles = 2 + 3.5 + 3.0 = 8.5