PROBLEM SOLVING TECHNIQUES OF PHYSICAL CHEMISTRY FOR NEET

BY

JITENDRA HIRWANI

MOLE CONCEPT

ETOOSINDIA
INDIA'S NO. 1 ONLINE COACHING

Plot No. 38, Near Union Bank of India, Rajeev Gandhi Nagar,
Kota, Rajasthan – 324005 Mob. : 9214233303

Basic Exercise

1. Question Based on Moles

1. The volume of a gas in discharge tube is 1.12×10^{-7} ml. at STP. Then the number of molecule of gas in the tube is -

(1) 3.01×10^{4} (2) 3.01×10^{15} (3) 3.01×10^{12} (4) 3.01×10^{16}

Ans. **(3)**

2. Vapour density of gas is 11.2 volume occupied by 2.4 gms of this at STP will be -

(1) 11.2 lt (2) 2.24 lt. (3) 22.4 lt. (4) 2.4 lt.

Ans. **(4)**

3. Which of the following contains the least number of molecules ?

(1) 4.4 gm CO_2 (2) 3.4 gm NH_3 (3) 1.6 gm CH_4 (4) 3.2 gm SO_2

Ans. **(4)**

4. Elements A and B form two compounds B_2A_3 and B_2A. 0.05 moles of B_2A_3 weight 9.0 gms and 0.10 mole of B_2A weight 10 gms atomic weight of A and B are-

(1) 20 and 30 (2) 30 and 40 (3) 40 and 30 (4) 30 and 20

Ans. **(3)**

5. The number of molecule in 4.25 gms of NH_3 is -

(1) 1.505×10^{23} (2) 3.01×10^{23} (3) 6.02×10^{23} (4) None of these

Ans. **(1)**

6. 4.4 gm of an unknown gas occupies 2.24 litres of volume at STP. The gas may be :-

(1) N_2O (2) CO (3) CO_2 (4) 1 & 3 both

Ans. **(4)**

7. Which contains least no. of molecules :–

(1) 1 gm. CO_2 (2) 1 gm. N_2 (3) 1 gm. O_2 (4) 1 gm. H_2

Ans. **(1)**

8. If 3.01×10^{20} molecules are removed from 98 mg. of H_2SO_4, then the number of moles of H_2SO_4 left are :–

(1) 0.1×10^{-3} (2) 0.5×10^{-3} (3) 1.66×10^{-3} (4) 9.95×10^{-2}

Ans. **(2)**

9. If V ml of the vapours of substance at NTP weight W g. Then molecular wt. of substance is:-

(1) (W/V)× 22400 (2) $\frac{V}{W} \times 22.4$ (3) (W - V)× 22400 (4) $\frac{W \times 1}{V \times 22400}$

Ans. **(1)**

10. Number of oxygen atoms in 8 gms of ozone is -

(1) 6.02×10^{23} (2) $\frac{6.02 \times 10^{23}}{2}$ (3) $\frac{6.02 \times 10^{23}}{3}$ (4) $\frac{6.02 \times 10^{23}}{6}$

Ans. **(2)**

11. 5.6 lt. of oxygen at STP contains -

(1) 6.02×10^{23} atoms (2) 3.01×10^{23} atoms (3) 1.505×10^{23} atoms (4) 0.7525×10^{23} atoms

Ans. **(2)**

12. Which of the following contains largest number of atoms ?

(1) 4 gm. of H_2 (2) 16 gm. of O_2 (3) 28 gm. of N_2 (4) 18 gm. of H_2O

Ans. **(1)**

13. The number of atoms present in 16 g of oxygen is

(1) $6.02 \times 10^{11.5}$ (2) 3.01×10^{23} (3) $3.01 \times 10^{11.5}$ (4) 6.02×10^{23}

Ans. **(4)**

14. Which of the following contains greatest number of oxygen atoms ?

(1) 1 g of O (2) 1 g of O_2

(3) 1 g of O_3 (4) all have the same number of atoms

Ans. **(4)**

15. The total number of ions persent in 1 ml of 0.1 M barium nitrate $Ba(NO_3)_2$ solution is -

(1) 6.02×10^{18} (2) 6.02×10^{19} (3) $3.0 \times 6.02 \times 10^{19}$ (4) $3.0 \times 6.02 \times 10^{18}$

Ans. **(3)**

16. A person adds 1.71 gram of sugar ($C_{12}H_{22}O_{11}$) in order to sweeten his tea. The number of carbon atoms added are (mol. mass of sugar = 342)

(1) 3.6×10^{22} (2) 7.2×10^{21} (3) 0.05 (4) 6.6×10^{22}

Ans. **(1)**

17. The number of atoms in n mole of gas can be given by :-

(1) n × Av. No. × atomicity (2) $\frac{n \times Av.No.}{Atomicity}$ (3) $\frac{Av.No. \times Atomicity}{n}$ (4) None

Ans. **(1)**

18. Sum of number of protons, electrons and neutrons in 12gm of $^{12}_{6}C$ is :-

(1) 1.8 (2) 12.044×10^{23} (3) 1.084×10^{25} (4) 10.84×10^{23}

Ans. **(3)**

19. The actual weight of a molecule of water is -

(1) 18 gm (2) 2.99×10^{-23} gm

(3) both (1) & (2) are correct (4) None of these

Ans. **(2)**

20. What is the mass of a molecule of CH_4 :–

(1) 16 g (2) 26.6×10^{22} g (3) 2.66×10^{-23} g (4) $16\ N_A$ g

Ans. **(3)**

21. Which of the following has the highest mass ?

(1) 1 g atom of C (2) ½ mole of CH_4 (3) 10 ml of water (4) 3.011×10^{23} atoms of oxygen

Ans. **(1)**

22. The weight of 1 mole of a gas of density 0.1784 g/l at NTP is -

(1) 0.1784 g (2) 1 g (3) 4 g (4) Can not be Calculate

Ans. **(3)**

23. Given that one mole of N_2 at NTP occupies 22.4 litre the density of N_2 is -

(1) 1.25 g/litre (2) 0.80 g/litre (3) 2.5 g/litre (4) 1.60 g/litre

Ans. **(1)**

24. The number of gm molecules of oxygen in 6.02×10^{23} CO molecules is:-

(1) 1 gm molecule (2) 0.5 gm molecule (3) 5 gm molecule (4) 10 gm molecule

Ans. **(2)**

2. Question based on Percentage, Empirical Formula & Molecular Formula

25. Caffine has a molecular weight of 194. It contains 28.9% by mass of nitrogen Number of atoms of nitrogen in one molecule of it -

(1) 2 (2) 3 (3) 4 (4) 5

Ans. **(3)**

26. A giant molecule contains 0.25% of a metal whose atomic weight is 59. Its molecule contains one atom of that metal. Its minimum molecular weight is -

(1) 5900 (2) 23600 (3) 11800 (4) $\frac{100 \times 59}{0.4}$

Ans. **(2)**

27. Insulin contains 3.4% sulphur. The minimum mol. wt. of insulin is –

(1) 941.176 (2) 944 (3) 945.27 (4) None

Ans. **(1)**

28. A compound of X and Y has equal mass of them. If their atomic weights are 30 and 20 respectively. Molecular formula of that compound

(its mol. wt. is 120) could be -

(1) X_2Y_2 (2) X_3Y_3 (3) X_2Y_3 (4) X_3Y_2

Ans. **(3)**

29. An oxide of sulphur contains 50% of sulphur in it. Its empirical formula is -

(1) SO_2 (2) SO_3 (3) SO (4) S_2O

Ans. **(1)**

30. A hydrocarbon contains 80% of carbon, then the hydrocarbon is -

(1) CH_4 (2) C_2H_4 (3) C_2H_6 (4) C_2H_2

Ans. **(3)**

31. Emperical formula of glucose is -

(1) $C_6H_{12}O_6$ (2) $C_3H_6O_3$ (3) $C_2H_4O_2$ (4) CH_2O

Ans. **(4)**

32. An oxide of metal M has 40% by mass of oxygen. Metal M has atomic mass of 24. The emperical formula of the oxide

(1) M_2O (2) M_2O_3 (3) MO (4) M_3O_4

Ans. **(3)**

33. The simplest formula of a compound containing 50% of element X(at wt. = 10) and 50% of element Y(at wt. = 20) is:-

(1) XY (2) X_2Y (3) XY_2 (4) X_3Y

Ans. **(2)**

34. Which of the following compounds has same empirical formula as that of glucose:-

(1) CH_3CHO (2) CH_3COOH (3) CH_3OH (4) C_2H_6

Ans. **(2)**

35. A gas is found to contain 2.34 gms of Nitrogen and 5.34 gms of oxygen. Simplest formula of the compound is -

(1) N_2O (2) NO (3) N_2O_3 (4) NO_2

Ans. **(4)**

36. 2.2 gm of a compound of phosphorous and sulphur has 1.24 gms of 'P' in it. Its empirical formula is -

(1) P_2S_3 (2) P_3S_2 (3) P_3S_4 (4) P_4S_3

Ans. **(4)**

37. On analysis, a certain compound was found to contain iodine and oxygen in the ratio of 254:80. The formula of the compound is :

(At mass I = 127, O = 16)

(1) IO (2) I_2O (3) I_5O_2 (4) I_2O_5

Ans. **(4)**

3. Question Based on Stoichiometry

38. In a gaseous reaction of the type

$aA + bB \longrightarrow cC + dD$,

which statement is wrong ?

(1) a litre of A combines with b litre of B to give C and D

(2) a mole of A combines with b moles of B to give C and D

(3) a gm of A combines with b gm of B to give C and D

(4) a molecules of A combines with b molecules of B to give C and D

Ans. **(3)**

39. Assuming that petrol is octane (C_8H_{18}) and has density 0.8 g/ml, 1.425 litre of petrol on complete combustion will consume.

(1) 50 mole of O_2 (2) 100 mole of O_2 (3) 125 mole of O_2 (4) 200 mole ofO_2

Ans. **(3)**

40. 9 gms of Al will react, with

$$2Al + \frac{3}{2} O_2 \rightarrow Al_2O_3$$

(1) 6 gms O_2 (2) 8 gms O_2 (3) 9 gms O_2 (4) 4 gms O_2

Ans. **(2)**

41. The equation :

$2Al(S) + \frac{3}{2} O_2(g) \rightarrow Al_2O_3(S)$ shows that :-

(1) 2 mole of Al reacts with $\frac{3}{2}$ mole of O_2 to produce $\frac{7}{2}$ mole of Al_2O_3

(2) 2gm of Al reacts with $\frac{3}{2}$ g of O_2 to produce one mole of Al_2O_3

(3) 2 gm mole of Al reacts with $\frac{3}{2}$ litre of O_2 to produce 1 mole of Al_2O_3

(4) 2 mole of Al reacts with $\frac{3}{2}$ mole of O_2 to produce 1 mole of Al_2O_3

Ans. **(4)**

42. 26 CC of CO_2 are passed over red hot coke. The volume of CO evolved is :–

(1) 15 CC (2) 10 CC (3) 32 CC (4) None of these

Ans. **(4)**

43. If 1/2 moles of oxygen combine with Aluminum to form Al_2O_3 then weight of Aluminum metal used in the reaction is (Al= 27) –

(1) 27 gm (2) 18 gm (3) 54 gm (4) 40.5 gm

Ans. **(2)**

44. If 8 ml. of uncombined O_2 remain after exploding O_2 with 4 ml. of hydrogen, the number of ml. of O_2 originally were -

(1) 12 (2) 2 (3) 10 (4) 4

Ans. **(3)**

45. For the reaction $A + 2B \longrightarrow C$,

5 mole of A and 8 mole of B will produce

(1) 5 mole of C (2) 4 mole of C (3) 8 mole of C (4) 13 mole of C

Ans. **(2)**

46. If 1.6 gms of SO_2 1.5×10^{22} molecules of H_2S are mixed and allowed to remain in contact in a closed vessel until the reaction

$2H_2S + SO_2 \longrightarrow 3S + 2H_2O$,

proceeds to completion. Which of the following statement is true ?

(1) Only 'S' and 'H_2O' remain in the reaction vessel. (2) 'H_2S' will remain in excess

(3) 'SO_2' will remain in excess (4) None

Ans. **(2)**

47. If 0.5 mol of $BaCl_2$ is mixed with 0.1 mole of Na_3PO_4, the maximum number of mole of $Ba_3(PO_4)_2$ that can be formed is:-

(1) 0.7 (2) 0.05 (3) 0.30 (4) 0.10

Ans. **(2)**

48. 12 lit. of H_2 and 11.2 lit. of Cl_2 are mixed and exploded. The composition by volume of mixture is–

(1) 24 lit. of HCl (g) (2) 0.8 lit. Cl_2 and 20.8 lit. HCl (g)

(3) 0.8 lit. H_2 and 22.4 lit. HCl (g) (4) 22.4 lit. HCl (g)

Ans. **(3)**

49. 10 ml of gaseous hydrocarbon on combustion give 40 ml of CO_2(g) and 50 ml of H_2O (vap.). The hydrocarbon is -

(1) C_4H_5 (2) C_8H_{10} (3) C_4H_8 (4) C_4H_{10}

Ans. **(4)**

50. 500 ml. of a gaseous hydrocarbon when burnt in excess of O_2 gave 2.5 lt. of CO_2 and 3.0 lt. of water vapours under same conditions. Molecular formula of the hydrocarbon is -

(1) C_4H_8 (2) C_4H_{10} (3) C_5H_{10} (4) C_5H_{12}

Ans. **(4)**

4. **Question Based on Equivalent Weight**

51. Molecular weight of tribasic acid is W. Its equivalent weight will be :

(1) $\frac{W}{2}$ (2) $\frac{W}{3}$ (3) W (4) 3W

Ans. **(2)**

52. A, E, M and n are the atomic weight, equivalent weight, molecular weight and valency of an element. The correct relation is :

(1) $A = E \times n$ (2) $A = \frac{M}{E}$ (3) $A = \frac{M}{n}$ (4) $M = A \times n$

Ans. **(1)**

53. Sulphur forms two chlorides S_2Cl_2 and SCl_2. The equivalent mass of sulphur in SCl_2 is 16. The equivalent weight of sulphur in S_2Cl_2 is -

(1) 8 (2) 16 (3) 32 (4) 64

Ans. **(3)**

54. If equivalent weight of S in SO_2 is 8 then equivalent weight of S in SO_3 is -

(1) $\frac{8 \times 2}{3}$ (2) $\frac{8 \times 3}{2}$ (3) $8 \times 2 \times 3$ (4) $\frac{2 \times 3}{8}$

Ans. **(1)**

55. Which property of an element is not variable :

(1) Valency (2) Atomic Weight (3) Equivalent Weight (4) None

Ans. **(2)**

56. One gm equivalent of a substance is present in -

(1) 0.25 mole of O_2 (2) 0.5 mole of O_2 (3) 1.00 mole of O_2 (4) 8.00 mole of O_2

Ans. **(1)**

57. In a compound AxBy ,

(1) Mole of A = mole of B = mole of Ax By

(2) eq. of A = eq of B = eq. of AxBy

(3) yx mole of A = yx mole of B = (x + y) × mole of AxBy

(4) y × mole of A = y × mole of B

Ans. **(2)**

58. 0.45 gm of acid (molecular wt. = 90) was exactly neutralised by 20 ml. of 0.5 N NaOH. Basicity of the acid is -

(1) 1 (2) 2 (3) 3 (4) 4

Ans. **(2)**

59. 0.126 g of an acid requires 20 ml of 0.1 N NaOH for complete neutralisation. Eq. wt. of the acid is –

(1) 45 (2) 53 (3) 40 (4) 63

Ans. **(4)**

60. 2g of a base whose eq. wt. is 40 reacts with 3 g of an acid. The eq. wt. of the acid is

(1) 40 (2) 60 (3) 10 (4) 80

Ans. **(2)**

61. Equivalent weight of a divalent metal is 24. The volume of hydrogen liberated at STP by 12 gms of the same metal when added to excess of an acid solution is -

(1) 2.8 litres (2) 5.6 litres (3) 11.2 litres (4) 22.4 litres

Ans. **(2)**

62. 0.84 gm of a metal carbonate react's exactly with 40 ml of N/2 H_2SO_4. The equivalent weight of the metal carbonate is -

(1) 84 (2) 64 (3) 42 (4) 32

Ans. **(3)**

63. H_3PO_4 is a tribasic acid and one of its salt is NaH_2PO_4 What volume of 1M NaOH solution should be added to 12 g NaH_2PO_4 to convert it into Na_3PO_4 ? (at.wt of P=31)

(1) 100 ml (2) 200 ml (3) 80 ml (4) 300 ml

Ans. **(2)**

64. The ratio of amount of H_2S needed to precipitate all the metal ions from 100 ml of 1M $AgNO_3$ and 100 ml of 1 M $CuSO_4$ is

(1) 1 : 2 (2) 2 : 1 (3) Zero (4) Infinite

Ans. **(1)**

65. A_1 g of an element give A_2 g of its oxide. The equivalent mass of the element is –

(1) $\frac{A_2 - A_1}{A_1} \times 8$ (2) $\frac{A_2 - A_1}{A_2} \times 8$ (3) $\frac{A_1}{A_2 - A_1} \times 8$ (4) $(A_2 - A_1) \times 8$

Ans. **(3)**

66. When an element forms an oxide in which oxygen is 20% of the oxide by mass, the equivalent mass of the element will be –

(1) 32 (2) 40 (3) 60 (4) 128

Ans. **(1)**

67. If 1.2 g of a metal displaces 1.12 litre of hydrogen at NTP, equivalent mass of the metal would be –

(1) 1.2×11.2 (2) 12 (3) 24 (4) $1.2 + 11.2$

Ans. **(2)**

68. One gm of hydrogen is found to combine with 80 gm of bromine. One gm of calcium (valency = 2) combines with 4 gm of bromine. The equivalent weight of calcium is –

(1) 10 (2) 20 (3) 40 (4) 80

Ans. **(2)**

69. 2.8 gm of iron displaces 3.2 gm of copper from a solution of copper suphate solution. If the equivalent mass of iron is 28, then equivalent mass of copper will be –

(1) 16 (2) 32 (3) 48 (4) 64

Ans. **(2)**

70. A metal oxide is reduced by heating it in a stream of hydrogen. It is found that after compete reduction 3.15 gm of the oxide have yielded 1.05 gm of the metal. We may conclude that.

(1) Atomic weight of the metal is 4 (2) Equivalent weight of the metal is 8

(3) Equivalent weight of the metal is 4 (4) Atonic weight of the metal is 8

Ans. **(3)**

71. If m_1 gm of a metal A displaces m_2g of another metal B from its salt solution and if their equivalent weights are E_2 and E_1 respectively then the equivalent weight of A can be expressed by:-

(1) $\frac{m_1}{m_2} \times E_2$ (2) $\frac{m_2}{m_1} \times E_2$ (3) $\frac{m_1}{m_2} \times E_1$ (4) $\frac{m_2}{m_1} \times E_1$

Ans. **(3)**

72. 14 g of element X combines with 16 g of oxygen. On the basis of this information, which of the following is a correct statement:-

(1) The element X could have an atomic wt. of 7 and its oxide is XO

(2) The element X could have an atomic weight of 14 and its oxide is X_2O

(3) The element X could have an atomic weight of 7 and its oxide is X_2O

(4) The element X could have an atomic weight of 14 and its oxide is XO_2

Ans. **(3)**

73. 45 gm of acid of mol. wt. 90 neutralised by 200 mL of 5N caustic potash. The basicity of acid is:-

(1) 1 (2) 2 (3) 3 (4) None

Ans. **(2)**

74. 1.6 gm of Ca and 2.60 gm of Zn when treated with an acid in excess separately, produced the same amount of hydrogen. If the equivalent weight of Zn is 32.6, what is the equivalent weight of Ca:-

(1) 10 (2) 20 (3) 40 (4) 5

Ans. **(2)**

75. 74.5 g of a metallic chloride contains 35.5 g of chlorine. The equivalent mas of the metal is –

(1) 19.5 (2) 35.5 (3) 39.0 (4) 78.0

Ans. **(3)**

5. Question Based on Calculation of Atomic Weight and Molecular Weight

76. The equivalent weight of an element is 4. It's chloride has a V.D. 59.25. Then the valency of the element is –

(1) 4 (2) 3 (3) 2 (4) 1

Ans. **(2)**

77. The specific heat of an element is 0.214 cal/gm°C. The approximate atomic weight is -

(1) 0.6 (2) 12 (3) 30 (4) 65

Ans. **(3)**

78. A metal M forms a sulphate which is isomorphous with $MgSO_4$ $7H_2O$. If 0.6538 gm of metals M displaced 2.16 gm of silver from silver nitrate solution, then the atomic weight of the metal M is

(1) 32.61 (2) 56.82 (3) 65.38 (4) 74.58

Ans. **(3)**

79. The carbonate of a metal is isomorphous with $MgCO_3$ and contains 6.091% of carbon. Atomic weight of the metal is nearly -

(1) 48 (2) 68.5 (3) 137 (4) 120

Ans. **(3)**

80. 71 gm of chlorine combines with a metal giving 111 gm of its chloride. The chloride is isomorphous with $MgCl_2.6H_2O$. The atomic mass of the metal is:-

(1) 20 (2) 30 (3) 40 (4) 69

Ans. **(3)**

81. The atomic weight of a metal (M) is 27 and its equivalent weight is 9, the formula of its chloride will be:-

(1) MCl (2) MCl_2 (3) M_3Cl (4) None

Ans. **(4)**

82. The chloride of a metal contains 71% chlorine by weight and the vapour density of its is 50, the atomic weight of the metal will be:-

(1) 29 (2) 58 (3) 35.5 (4) 71

Ans. **(1)**

83. The specific heat of a metal M is 0.25. Its eq. wt. is 12. What is it's correct at wt. :–

(1) 25.6 (2) 36 (3) 24 (4) 12

Ans. **(3)**

84. Vapour density of a gas is 16. The ratio of specific heat at constant pressure to specific heat at constant volume is 1.4, then its atomic weight is -

(1) 8 (2) 16 (3) 24 (4) 32

Ans. **(2)**

85. The weight of substance that displace 22.4 litre air at NTP is :

(1) Molecular Weight (2) Atomic Weight (3) Equivalent Weight (4) All

Ans. **(1)**

86. 0.39 gm of a liquid on vapourisation gave 112 ml. of vapour at STP. Its molecular weight is -

(1) 39 (2) 18.5 (3) 78 (4) 112

Ans. **(3)**

87. In Victor Mayer's method 0.2 gms of a volatile compound on volatilisation gave 56 ml. of vapour at STP. Its molecular weight is -

(1) 40 (2) 60 (3) 80 (4) 120

Ans. **(3)**

88. 510 mg of a liquid on vapourisation in Victor Mayer's apparatus displaces 67.2 CCs of dry air (at NTP). The molecular weight of liquid is -

(1) 130 (2) 17 (3) 1700 (4) 170

Ans. **(4)**

89. 0.44 gms of a colourless oxide of nitrogen occupies 224 ml. at STP. The compound is -

(1) N_2O (2) NO (3) N_2O_4 (4) NO_2

Ans. **(1)**

90. One litre of a certain gas weighs 1.16 gm at STP. The gas may posibly be -

(1) C_2H_2 (2) CO (3) O_2 (4) NH_3

Ans. **(1)**

91. The oxide of an element possess the molecular formula M_2O_3. If the equivalent mass of the metal is 9, the molecular mass of the oxide will be –

(1) 27 (2) 75 (3) 102 (4) 18

Ans. **(3)**

6. Question Based on Law of Chemical Combination

92. Which one of the following pairs of compounds illustrate the law of multiple proportions ?

(1) H_2O, Na_2O (2) MgO, Na_2O (3) Na_2O, BaO (4) $SnCl_2$, $SnCl_4$

Ans. **(4)**

93. In the reaction $N_2 + 3H_2 \longrightarrow 2\,NH_3$, ratio by volume of N_2, H_2 and NH_3 is 1 : 3 : 2. This illustrates law of -

(1) Definite proportion (2) Multiple proportion (3) Reciprocal proportion (4) Gaseous volumes

Ans. **(4)**

94. Different proportions of oxygen in the various oxides of nitrogen prove the law of -

(1) Equivalent proportion (2) Multiple proportion (3) Constant proportion (4) Conservation of matter

Ans. **(2)**

95. Oxygen combines with two isotopes of carbon ^{12}C and ^{14}C to form two sample of carbon dioxide. The data illustrates-

(1) Law of conservation of mass (2) Law of multiple proportions

(3) Law of reciprocal proportions (4) None of these

Ans. **(4)**

96. The law of conservation of mass holds good for all of the following except -

(1) All chemical reactions (2) Nuclear reactions

(3) Endothermic reactions (4) Exothermic reactions

Ans. **(2)**

97. Number of molecules in 100 ml of each of O_2, NH_3 and CO_2 at STP are –

(1) in the order $CO_2 < O_2 < NH_3$ (2) in the order $NH_3 < O_2 < CO_2$

(3) the same (4) $NH_3 = CO_2 < O_2$

Ans. **(3)**

98. The empirical formula of an organic compound containing carbon and hydrogen is CH_2. The mass of one litre of this organic gas is exactly equal to that of one litre of N_2 at same temperature and pressure. Therefore, the molecular formula of the organic gas is –

(1) C_2H_4 (2) C_3H_6 (3) C_6H_{12} (4) C_4H_8

Ans. **(1)**

99. Four one litre flasks are seperately filled with the gases hydrogen, helium oxygen and ozone at same room temp. and pressure. The ratio of total number of atoms of these gases present in the different flasks would be -

(1) 1 : 1 : 1 : 1 (2) 1 : 2 : 2 : 3 (3) 2 : 1 : 2 : 3 (4) 2 : 1 : 3 : 2

Ans. **(3)**

100. A container of volume V, contains 0.28 gm of N_2 gas. If same volume of an unknown gas under similar condition of temperature and pressure weighs, 0.44 gm, the molecular mass of the gas is

(1) 22 (2) 44 (3) 66 (4) 88

Ans. **(2)**

101. A and B are two identical vessels. A contains 15 gm ethane at 1 atm and 298 K. The vessel B contains 75 gm of a gas X_2 at same tamperature and pressure. The vapour density of X_2 is –

(1) 75 (2) 150 (3) 37.5 (4) 45

Ans. **(1)**

102. Hydrogen combines with chlorine to form HCl. It also combines with sodium to form NaH. If sodium and chlorine also combine with each other, they will do so in the ratio of their masses as:-

(1) 23 : 35.5 (2) 35.5 : 23 (3) 1: 1 (4) 23 : 1

Ans. **(1)**

103. When 100 g of ethylene polymerizes to polythylene according to equation

$nCH_2 = CH_2 \rightarrow -(- CH_2 - CH_2 -)_n -$. The weight of polyethylene produced will be:-

(1) $\frac{n}{2}$ gm (2) 100 gm (3) $\frac{100}{n}$ gm (4) 100ngm

Ans. **(2)**

104. If law of conservation of mass was to hold true, then 20.8 gm. of $BaCl_2$ on reaction with 9.8 gm. of H_2SO_4 will produce 7.3 gm. of HCl and $BaSO_4$ equal to :–

(1) 11.65 gm. (2) 23.3 gm. (3) 25.5 gm. (4) 30.6 gm.

Ans. **(2)**

105. A chemical equation is balanced according to the law of –

(1) Multiple proportions (2) Constant proportions

(3) Reciprocal proportions (4) Conservation of mass

Ans. **(4)**

106. Two flask A & B of equal capacity of volume contain NH_3 and SO_2 gas respectively under similar conditions which flask has more no. of moles –

(1) A (2) B

(3) Both have same moles (4) None

Ans. **(3)**

Analytical Exercise

1. An organic compound having molecular mass 60 is found to contain C=20% , H=6.67% and N=46.67% while rest is oxygen. On heating it gives NH_3 along with a solid residue. The solid residue give violet colour with alkaline copper sulphate solution. The compound is -

(1) $(NH_2)_2CO$ (2) $CH_3CH_2CONH_2$ (3) CH_3NCO (4) CH_3CONH_2

Ans. **(1)**

2. How many moles of magnesium phosphate, $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atoms?

(1) 2.5×10^{-2} (2) 0.02 (3) 3.125×10^{-2} (4) 1.25×10^{-2}

Ans. **(3)**

3. Percentage composition of an organic compound is as follows :

C=10.06, H=0.84 , Cl=89.10

Which of the following corresponds to its molecular formula if the vapour density is 60.0

(1) CH_2Cl_2 (2) $CHCl_3$ (3) CH_3Cl (4) None

Ans. **(2)**

4. A litre of air containing 1% Ar is repetedly passed over hot Cu and hot Mg till no reduction of volume takes place. The final volume of Ar shall be :

(1) 0 ml (2) 230 ml (3) 770 ml (4) 10 ml

Ans. **(4)**

5. The total number of electrons in 4.2 g of N^{3-} ion is (N_A is the Avogadro's number)

(1) 2.1 N_A (2) 4.2 N_A (3) 3 N_A (4) 3.2 N_A

Ans. **(3)**

6. The number of mole of nitrogen in one litre of air containing 10% nitrogen by volume, under standard conditions, is

(1) 0.03 mole (2) 2.10 mole (3) 0.186 mole (4) 4.46×10^{-3} mole

Ans. **(4)**

7. Liquid benzene (C_6H_6) burns in oxygen according to $2C_2H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(g)$

How many litres of O_2 at STP are needed to complete the combustion of 39 g of liquid benzene ?

(1) 74 L (2) 11.2 L (3) 22.4 L (4) 84 L

Ans. **(4)**

8. 1 mol of $KClO_3$ is thermally decomposed and excess of aluminum is burnt in the gaseous product. How many moles of Al_2O_3 are formed ?

(1) 1 (2) 2 (3) 1.5 (4) 3

Ans. **(1)**

9. The amount of zinc required to produce 1.12 ml of H_2 at STP on treatment with dilute HCl will be :

(1) 65 g (2) 0.065 g (3) 32.5×10^{-4} g (4) 6.5 g

Ans. **(3)**

10. Volume of CO_2 obtained at STP by the complete decomposition of 9.85 g Na_2CO_3 is

(1) 2.24 litre (2) Zero (3) 0.85 litre (4) 0.56 litre

Ans. **(2)**

11. One litre of CO_2 is passed through red hot coke. The volume becomes 1.4 litres at same temperature and pressure. The composition of products is

(1) 0.8 litre of CO_2 and 0.6 litre of CO (2) 0.7 litre of CO_2 and 0.7 litre of CO

(3) 0.6 litre of CO_2 and 0.8 litre of CO (4) 0.4 litre of CO_2 and 1.0 litre of CO

Ans. **(3)**

12. When 100 ml of $\frac{M}{10}$ H_2SO_4 is mixed with 500 ml of $\frac{M}{10}$ NaOH then nature of resulting solution and normality of excess of reactant left is

(1) Acidic, $\frac{N}{5}$ (2) Basic, $\frac{N}{5}$ (3) Basic, $\frac{N}{20}$ (4) Acidic, $\frac{N}{10}$

Ans. **(3)**

13. Mole fraction of solvent in aqueous solution of NaOH having molality of 3 is

(1) 0.3 (2) 0.05 (3) 0.7 (4) 0.95

Ans. **(4)**

14. Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 gmL^{-1}. Volume of acid required to make one litre of 0.1 M H_2SO_4 solution is

(1) 16.65 mL (2) 22.20 mL (3) 5.55 mL (4) 11.10 mL

Ans. **(3)**

15. Number of significant figures in 6.62×10^{-34}.

(1) Two (2) Three (3) Four (4) One

Ans. **(2)**

16. Ammonia gas is passed into water, yielding a solution of density 0.93 g/cm^3 and containing 18.6% NH_3 by weight. The mass of NH_3 per cc of the solution is

(1) 0.17 g/cm^3 (2) 0.34 g/cm^3 (3) 0.51 g/cm^3 (4) 0.68 g/cm^3

Ans. **(1)**

17. A certain amount of a metal whose equivalent mass is 28 displaces 0.7 L of H_2 at S.T.P. from an acid hence mass of the element is

(1) 1.75 g (2) 0.875 g (3) 3.50 g (4) 7.00 g

Ans. **(1)**

18. Number of Fe atoms in 100 g Haemoglobin if it contains 0.33% Fe. (Atomic mass of Fe = 56)

(1) 0.035×10^{23} (2) 35 (3) 3.5×10^{23} (4) 7×10^{8}

Ans. **(1)**

19. An organic compound containing C and H gave the following analysis C = 40%, H = 6.7%. Its empirical formula would be

(1) CH_4 (2) CH_2O (3) $C_2H_4O_2$ (4) C_2H_4

Ans. **(2)**

20. The number of electrons in 1.6 g of CH_4 is approximately

(1) 25×10^{24} (2) 1.5×10^{24} (3) 6×10^{23} (4) 3.0×10^{24}

Ans. **(3)**

21. 6.025×10^{20} molecules of acetic acid are present in 500 ml of its solution. The concentration of solution is

(1) 0.002 M (2) 10.2 M (3) 0.012 M (4) 0.001 M

Ans. **(1)**

22. How many litre of oxygen at STP is required to burn 60 g C_2H_6

(1) 22.4 L (2) 11.2 L (3) 22.4×7 L (4) 8.5 L

Ans. **(3)**

23. For the formation of 3.65 g of HCl gas, what volume of hydrogen gas and chlorine gas are required at NTP conditions?

(1) 1 L, 1 L (2) 1.12 L, 2.24 L (3) 3.65 L, 1.83 L (4) 1.12 L, 1.12 L

Ans. **(4)**

24. Specific volume of cylindrical virus particle is 6.02×10^{-2} cc/gm whose radius and length are 7 Å and 10 Å respectively. If $N_A = 6.02 \times 10^{23}$, find molecular weight of virus.

(1) 15.4 kg/mol (2) 1.54×10^4 kg/mol (3) 3.08×10^4 kg/mol (4) 3.08×10^3 kg/mol

Ans. **(1)**

25. The crystalline salt $Na_2SO_4.xH_2O$ on hearting loses 55.9% of its mass and becomes anhydrous. The formula of crystalline salt is

(1) $Na_2SO_4.5H_2O$ (2) $Na_2SO_4.7H_2O$ (3) $Na_2SO_4.2H_2O$ (4) $Na_2SO_4.10H_2O$

Ans. **(4)**

26. The atomic mass of an element is 27. If valency is 3, the vapour density of the volatile chloride will be:-

(1) 66.75 (2) 6.675 (3) 667.5 (4) 81

Ans. **(1)**

27. Two elements X (at-mass 16) and Y (at-mass 14) combine to form compounds A, B and C. The ratio of different masses of Y which combines with a fixed mass of X in A, B and C is 1 : 3 : 5. If 32 parts by mass of X combines with 84 parts by mass of Y in B, then in C 16 parts by mass of X will combine with :

(1) 14 parts by mass of Y (2) 42 parts by mass of Y

(3) 70 parts by mass of Y (4) 84 parts by mass of Y

Ans. **(3)**

28. 1 L of a hydrocarbon weighs as much as one litre of CO_2 Under similar conditions. Then the molecular formula of the hydrocarbon is -

(1) C_3H_8 (2) C_2H_6 (3) C_2H_4 (4) C_3H_6

Ans. **(1)**

29. There are two oxides of sulphur. They contain 50% and 60% of oxygen respectively by weights. The weights of sulphur which combine with 1 gm of oxygen in the ratio of -

(1) 1 : 1 (2) 2 : 1 (3) 2 : 3 (4) 3 : 2

Ans. **(4)**

30. Number of HCl molecules present in 10 ml of 0.1 M solution is :

(1) 6.022×10^{23} (2) 6.023×10^{22} (3) 6.022×10^{21} (4) 6.022×10^{20}

Ans. **(4)**

31. The volume of a gas at 0^0C and 700 mm pressure is 760 CC. The no. of molecules present in this volume is

(1) 1.88×10^{22} (2) 6.022×10^{23} (3) 18.8×10^{23} (4) 18.8×10^{22}

Ans. **(1)**

32. Rearrange the following (I to IV) in the order of increasing masses and choose the correct answer. (Atomic masses : N = 14, O = 16, Cu = 63)

I 1 molecule of oxygen II 1 atom of Nitrogen III $1 \times 10^{-10} \times$ (gm molecular weight of oxygen)

IV $1 \times 10^{-10} \times$ (gm atomic weight of copper)

(1) II < I < III < IV (2) IV < III < II < I (3) II < III < I < IV (4) III < IV < I < II

Ans. **(1)**

33. The number of moles of carbon dioxide which contain 8 gm of oxygen is –

(1) 0.5 moles (2) 0.20 moles (3) 0.40 moles (4) 0.25 moles

Ans. **(4)**

34. If 224 ml of a triatomic gas has a mass of 1g at 273 K and 1 atm pressure, then the mass of one atom is –

(1) 8.30×10^{-23} gm (2) 2.08×10^{-23} gm (3) 5.53×10^{-23} gm (4) 6.24×10^{-23} gm

Ans. **(3)**

35. 22.4 litre of water vapour at NTP, When condensed to water occupies an approximate volume of -

(1) 18 litre (2) 1 litre (3) 1 ml (4) 18 ml

Ans. **(4)**

36. 0.01 mole of iodoform (CHI_3) reacts with Ag to produce a gas whose volume at NTP is

$$2CHI_3 + 6Ag \rightarrow C_2H_2 + 6Ag\,I(s)$$

(1) 224 ml (2) 112 ml (3) 336 ml (4) None of these

Ans. **(2)**

37. The minimum quantity in grams of H_2S needed to precipitate 63.5 g of Cu^{2+} will be nearly :

$$Cu^{+2} + H_2S \rightarrow CuS + H_2$$

(1) 63.5 g (2) 31.75 g (3) 34 g (4) 20 g

Ans. **(3)**

38. 2.76 g of silver carbonate on being strongly heated yields a residue weighing –

$$Ag_2CO_3 \rightarrow 2Ag + CO_2 + \tfrac{1}{2}\,O_2$$

(1) 2.16 g (2) 2.48 g (3) 2.32 g (4) 2.64 g

Ans. **(1)**

39. The volume of gas at NTP produced by 100 gm of CaC_2 with water:-

$$CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2$$

(1) 70 litre (2) 35 litre (3) 17.5 litre (4) 22.4 litre

Ans. **(2)**

40. 90 ml. of pure dry O_2 is subjected to silent electric discharge. If only 10% of it is converted to O_3, volume of the mixture of gases (O_2 and O_3) after the reaction will be ------ and after passing through turpentine oil will be .....

(1) 84 ml and 78 ml (2) 81 ml and 87 ml (3) 78 ml and 84 ml (4) 87 ml and 81 ml

Ans. **(4)**

41. Element 'A' reacts with oxygen to form a compound A_2O_3. If 0.359 gram of 'A' react to give 0.559 gram of the compound, atomic weight of 'A' will be :–

(1) 51 (2) 43.08 (3) 49.7 (4) 47.9

Ans. **(2)**

42. 1.12 mL of a gas is produced at STP by the action of 4.12 mg of alcohol ROH with methyl magnesium iodide. The molecular mass of alcohol is –

$$R - OH + CH_3MgI \rightarrow CH_4 + Mg(OR)I$$

(1) 16 (2) 41.2 (3) 82.4 (4) 156.0

Ans. **(3)**

43. $CaCO_3$ is 90% pure. Volume of CO_2 collected at STP when 10 gms of $CaCO_3$ is decomposed is -

(1) 2.016 litres (2) 1.008 litres (3) 10.08 litres (4) 20.16 litres

Ans. **(1)**

44. 50 gm $CaCO_3$ will react with ..... gms of 20% HCl by weight .

(1) 36.5 gm (2) 73 gm (3) 109.5 gm (4) 182.5 gm

Ans. **(4)**

ASSERTION & REASON EXERCISE

These questions consist of two statements each, printed as *Assertion* and *Reason*. While answering these Questions you are required to choose any one of the following four responses.

A. **If both *Assertion* & *Reason* are True & the *Reason* is a correct explanation of the *Assertion*.**

B. **If both *Assertion* & *Reason* are True but *Reason* is not a correct explanation of the Assertion.**

C. **If *Assertion* is True but the *Reason* is False.**

D. **If both *Assertion* & *Reason* are False.**

1. ***Assertion* :–** 16 gm each of O_2 and O_3 contains $\frac{N_A}{2}$ and $\frac{N_A}{3}$ atoms respectively

***Reason* :–** 16 gm O_2 and O_3 contains same no. of molecules.

Ans. **(D)**

2. ***Assertion* :–** Carbon and oxygen combined together only in one fixed ratio.

***Reason* :–** In a chemical compound the elements are combined together in a fixed ratio.

Ans. **(D)**

3. ***Assertion* :–** The mass of the products formed in a reaction depends upon the limiting reactant.

***Reason* :–** Limiting reactant reacts completely in the reaction.

Ans. **(A)**

4. ***Assertion* :–** Volume occupied by 1mol $H_2O_{(l)}$ is equals to 22400 cc. at NTP.

***Reason* :–** 1 mol of any substance occupies 22.4 lit volume at N.T.P.

Ans. **(D)**

5. ***Assertion* :–** At same temp & pressure 1lit O_2 and 1lit SO_2 contains equal no. of molecules.

***Reason* :–** Acc. to avogadros hypothesis equal volume of all gases under similar condition of temp and pressure contains equal no. of molecules.

Ans. **(A)**

6. ***Assertion* :–** 44 gm of CO_2 28 gm of CO have same volume at STP.

***Reason* :–** Both CO_2 and CO are formed by C and oxygen.

Ans. **(B)**

7. ***Assertion* :–** Equivalent wt. of Cu in both CuO and Cu_2O is 31.75

***Reason* :–** Equivalent wt. of an element is constant.

Ans. **(D)**

8. ***Assertion* :–** On compressing a gas to half the volume, the number of moles is halved.

***Reason* :–** Number of moles present decreases with decrease is volume.

Ans. **(D)**

9. ***Assertion* :–** Law of conservation of mass hold good for nuclear reaction.

***Reason* :–** Law states that mass can be neither created nor destroyed in a chemical reaction.

Ans. **(D)**

10. ***Assertion* :–** The balancing of chemical equations is based on law of conservation of mass.

***Reason* :–** Total mass of reactants is equal to total mass of products.

Ans. **(A)**

11. ***Assertion* :–** Pure water obtained from different sources such as, river, well, spring, sea etc. always contains hydrogen and oxygen combined in the ratio 1 : 8 by mass

***Reason* :–** A chemical compound always contains elements combined together in same proportion by mass, it was discovered by French chemist, Joseph Proust (1799).

Ans. **(A)**