# CHEMISTRY

## CLASS-XI NEET

## EXPLANATIONS




Physics Wallah

# Answer Key

## Topic-wise Questions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| a | d | c | c | d | d | a | b | c | a | b | c | b | c | b | a | c | c |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| a | d | b | d | b | c | b | d | c | c | a | d | d | c | b | d | c | b |
| 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 |
| b | c | c | b | b | b | a | b | c | d | c | b | a | b | d | d | d | c |
| 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 |
| d | c | c | d | c | c | d | a | a | d | b | b | c | a | c | a | d | a |
| 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| c | a | b | d | b | b | a | b | a | a | b | d | b | c | c | b | a | d |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 |
| a | b | b | b | b | c | a | c | b | d | d | b | c | b | a | a | b | b |
| 109 | 110 | | | | | | | | | | | | | | | | |
| c | b | | | | | | | | | | | | | | | | |

## NCERT Based Questions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| b | d | d | b | c | c | b | a | a | a | b | d | c | d | b | a | a | a |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| c | d | a | b | a | b | b | a | b | d | b | d | c | c | c | c | a | c |
| 37 | 38 | 39 | 40 | | | | | | | | | | | | | | |
| c | d | a | b | | | | | | | | | | | | | | |

## Multi-Concept Questions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| a | b | a | b,c | a | b | d | b | a | a | c | a | d | c | b | b | a | c |
| 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | |
| a,c | d | b | d | a | c | | | | | | | | | | | | |

## NEET Past 10 Year Questions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| c | c | c | d | a | c | c | a | c | b | c | d | d | c | b | a | a | a |

# 1. Some Basic Concepts of Chemistry

Scan for Video Solution

## Topic-wise Questions

1. **(a)** The number of significant figures in 0.0045 are two because zeros to the left of the first non-zero digit are not significant.

2. **(d)** $d = s \times t$
$= (3 \times 10^8 \text{ m/s})(10^{-15} \text{ s})$
$= 3 \times 10^{-7}$ m
$= 3 \times 10^{-4}$ mm = 0.0003 mm

3. **(c)** 1 Barn = $10^{-28}$ m$^2$

4. **(c)** 7.00 is more accurate than 7.0 because the former has three significant figures while the later has two.

5. **(d)** $\pi$ is irrational number (please note that $\pi \neq 22/7$ as 22/7 is a rational number) and it means it has infinite number of significant figures.

6. **(d)** According to rule (2) zero between '5' and '4' is also significant

7. **(a)** 29.4406 + 3.2 + 2.25 = 34.8906. As 3.2 has least number of decimal places, i.e., one, therefore sum should contain one decimal place only. After round off, reported sum is 34.9, which has three significant figures.

8. **(b)** Area = length × width
$= (12.34\text{cm}) \times (1.23\text{cm}) = 15.1782 \text{ cm}^2$
$\simeq 15.19 \text{ cm}^2$

9. **(c)** 0.2876 g × 9 = 2.5884 g
= 2.588 g

10. **(a)** According to rule (1) all non zero digits are significant

11. **(b)** $N_2 + 3H_2 \rightarrow 2NH_3$

12. **(c)** Law of reciprocal proportion.

13. **(b)** Hint: Total mass of reactants = Mass of products.

14. **(c)** Law of reciprocal proportion

15. **(b)** Law of conservation of mass not applicable to nuclear reactions

16. **(a)** According to law of constant proportion

17. **(c)** 1g of X combines with Y = 35.5 g
$\therefore$ 2 g of X combines with Y = 2 × 35.5 g = 71 g

18. **(c)** **In First Oxide $N_2O$:** Mass of 2.24 L of nitrogen at STP = 2.8g
$\therefore$ Mass of Oxygen = 4.4 – 2.8 = 1.6 g
**In Second Oxide $N_2O_2$:** Mass of 22.4 L of nitrogen at STP = 28 g
$\therefore$ Mass of oxygen = 60 – 28 = 32 g
$\therefore$ In second oxide 2.8 g of nitrogen combines with 3.2 g of oxygen.
Keeping the mass of nitrogen same in both the oxides, the different masses of oxygen which combines with 2.8 g of nitrogen are 1.6 g : 3.2 g or 1 : 2, This is a simple whole number ratio. This illustrates the law of multiple proportions.

19. **(a)** Law of conservation of mass

20. **(d)** $SO_2$ , $SO_3$

21. **(b)** $H_3PO_4 + 3NaOH \rightarrow Na_3PO_4 + 3H_2O$
As 1 mole $H_3PO_4$ neutralize 3 mole of NaOH. 120 g of NaOH is 3 moles. So, 98 g of $H_3PO_4$ will neutralize 120 g of NaOH.

22. **(d)** $4Al + 3O_2 \rightarrow 2Al_2O_3$

23. **(b)** $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$
20.8 g  9.8 g  x  7.3 g
mass of $BaSO_4$ produced
x = 20.8 + 9.8 – 7.3 = 23.3 g

24. **(c)** In $CO_2$, 12 parts by mass of C combine with 32 parts by mass of oxygen while in $SO_2$, 32 parts by mas of S combine with 32 parts by mass of oxygen. The ratio of masses of carbon and sulphur which combine with a fixed mass of oxygen is 12 : 32 or 3 : 8. In $CS_2$, 12 parts of carbon combines with 64 parts by mass of sulphur therefore 12 : 64, i.e., 3 : 16.
$\therefore$ The ratios are $\frac{3}{8} : \frac{3}{16}$ or $2:1$

25. **(b)** $C_2H_5OH + Na \rightarrow C_2H_5ONa + \frac{1}{2}H_2$

26. **(d)**

| | |
|---|---|
| $H_2O$ | $H_2O_2$ |
| H : O | H : O |
| 5.93 : 94.07 | 11.2 : 88.8 or |
| | 5.93 : 47.0 |

Ratio of different masses of O which combines with fixed mass of H is 94.07 : 47.0 or 2 : 1

27. **(c)** In B, 32 parts of X combines with Y = 84 parts
$\therefore$ 16 parts of X combine with Y = 42 parts
Now, number of parts of X in both B and C is equal.
Different masses of Y which combine with same mass of X in B and C are in the ratio 3:5

$$\therefore \frac{\text{Mass of Y in B}}{\text{Mass of Y in C}} = \frac{3}{5}$$

$$\therefore \text{Mass of Y in C} = \frac{5}{3} \times 42$$

= 70 parts

**28. (c)** 3.4 amu S → 100 amu insulin

$$32\,\text{amu S} \rightarrow \frac{100}{3.4}\times 32 = 941\text{ amu}$$

**29. (a)** Mass of one mole of a substance remains same

**30. (d)** Average relative at Atm.wt

$$A.W = \frac{20\times10+80\times11}{100}$$

$$= \frac{200+880}{100}$$

$$= \frac{1080}{100} = 10.8g$$

**31. (d)** No. of molecules = $\frac{W}{M.w}\times N$

**32. (c)** Gram molecular weight of any substance contains Avagadro number of molecules.

**33. (b)** No. of atoms = $\frac{Wt}{MW}\times N\times atomicity$

**34. (d)** One amu = $1.66\times10^{-24}$g

**35. (c)** The number of molecules present in 1 ml of a gas at STP is known as loschmidt number.

**36. (b)** Verify options by calculating no. of moles

**37. (b)** Apply,

$$\text{weight} = \frac{\text{absolute at. wt.}}{1\,\text{amu}}$$

$$14 = \frac{\text{absolute at. wt.}}{\frac{1}{12}\times\frac{12}{N_A}\,g} \qquad .......(1)$$

$$x = \frac{\text{absolute at. wt.}}{\frac{1}{5}\times\frac{12}{N_A}\,g} \qquad ....... (2)$$

x = 5.83 amu

**38. (c)** 100 g Haemoglobin contains Fe = 0.34 g
1 mole haemoglobin contains Fe = 4 mole $Fe^{2+}$
= 4 × 56 = 224 g
0.34 g Fe is present in Haemoglobin = 100 g
224 g Fe is present in Haemoglobin $= \frac{100}{0.34}\times 224$
= 65882 g

**39. (c)** 1 g – atom of nitrogen = $6.02\times10^{23}$ N atoms
1 mol of N = 1/2 mole of $N_2$ = 11.2 L at S.T.P

**40. (b)** 10 g of $CaCO_3$ = 0.1 mol of $CaCO_3$
= 0.1 × 3 g – atom of Oxygen
= 0.3 g atoms of oxygen

**41. (b)** Magnesium bicarbonate is $Mg(HCO_3)_2$. So, 146 g of $Mg(HCO_3)_2$ contains O atom = 0.6 $N_A$

**42. (b)** Molecular mass of $CO_2$ = 44g $mol^{-1}$
∴ 4 mol of $CO_2$ = 44 × 4 = 176 g
(c) $6.02\times10^{23}$ atoms of hydrogen has mass = 1.008 g
= $12\times10^{24}$ atoms of hydrogen has mass = 20.1 g
(d) 22.4 L of helium at N.T.P. has mass = 4 g 11.2 L of helium at N.T.P. has mass = 2 g
Thus; 4 moles of $CO_2$ has maximum mass

**43. (a)** In 12 g of carbon, the amount of C – 14

$$=\frac{12\times2}{100} = 0.24$$

∴ C-14 atoms in 0.24 g $= \frac{0.24\times6.02\times10^{23}}{14}$

= $1.03\times10^{22}$ atoms

**44. (b)** Mass of 22.4 L gas at S.T.P. = $\frac{8\times22.4}{5.6}$ = 32 g (it is also equal to mol. mass)
Mol. mass = 32

∴ V.D. = $\frac{32\times1}{2}$ =16

**45. (c)** Mass of 1 atom = $1.8\times10^{-22}$ g
Mass of $6.022\times10^{23}$ atoms
= $6.02\times10^{23}\times1.8\times10^{-22}$
= 108.36 g
∴ Atomic mass of element = 108.36 g

**46. (d)** 1 M produces ions = 3 moles
∴ 0.1 M $H_2SO_4$ produce ions = 0.3 mol
Number of ions = $0.3\times6.02\times10^{23}$
= $1.8\times10^{23}$

**47. (c)** 0.1 Mol $CaCO_3$ = 0.1 × 100 = 10 g

$Ca^{2+} = \frac{1.51\times10^{23}}{6.023\times10^{23}}\times 40 = 10$ g

$CO_3^{2-}$ = 0.16 × 60 = 9.6 g

Br $= \frac{7.525\times10^{22}}{6.02\times10^{23}}\times 80 = 10$ g

**48. (b)** Equal volume under similar conditions of temperature and pressure have fixed number of molecules.

**49. (a)** Moles of sugar added = $\frac{1.71}{342} = 5\times10^{-3}$

Carbon atoms added = $12\times5\times10^{-3}\times6.02\times10^{23}$
= $3.61\times10^{22}$

**50. (b)** 0.1 mole $P_4$ contains = $4\times0.1\times6.02\times10^{23}$
0.05 mole of $S_8$ contains = $8\times0.05\times6.02\times10^{23}$ atoms

**51. (d)** 82 g of $N_2 = \frac{82}{28}$ g-molecule = 2.92 moles

**52. (d)** Since; mass of oxygen is fixed. Therefore, the number of g-atom and also the number of atoms will be fixed.

i.e, Atoms of Oxygen $=\frac{1\times2}{32}$ in $O_2$

$= \frac{1}{16}$ in atomic Oxygen

$= \frac{1\times3}{48}$ in $O_3$

**53. (d)** 12.8 g of $SO_2$ = 4.48 L
$6.02 \times 10^{22}$ molecules of $CH_4$ = 2.24 L
0.5 mol of $NO_2$ = 11.2 L
1 g molecule of $CO_2$ = 22.4 L

**54. (c)** G.M.M of $O_2$ = 32 g

$$\text{eq mass} = \frac{\text{At.mass of O}}{\text{valency}} = \frac{16}{2}$$

$$= 8 = \frac{1}{4} = \frac{N_A}{4}$$

**55. (d)** No of mol of triatomic gas

$$= \frac{224\,\text{ml}}{22400\,\text{ml mole}^{-1}} = 10^{-2}\text{ mol}$$

No. of molecules = $10^{-2}$ mol × ( $6.02 \times 10^{23}$ molecules $mol^{-1}$)
no. of atoms of gas = $6.02 \times 10^{21}$
$= 3 \times 6.02 \times 10^{21} = 18.06 \times 10^{21}$
$1.806 \times 10^{22}$ atoms has mass = 1 g

$$\text{1 atom has mass} = \frac{1}{1.806 \times 10^{22}\,g}$$

$$= \frac{10^{-22}\,g}{1.806}$$

$$= 0.554 \times 10^{-22}\text{ g}$$

$$= 5.54 \times 10^{-23}\text{ g}$$

**56. (c)** Mass of 1 mole of electrons
$= 9.11 \times 10^{-31}\text{ kg} \times 6.02 \times 10^{23}$
$= 5.5 \times 10^{-7}\text{ kg mol}^{-1}$

**57. (c)** If 3.18 mol of hydrogen atom are there, then number of moles of oxygen atoms

$$= \frac{3.18}{3}\text{ mol} = 1.06\text{ mol}$$

**58. (d)** Molar mass of $C_{10}H_{16}O$ = 120 + 16 +16
= 152 g $mol^{-1}$

$$25.0\,\text{mg} = 25.0\,\text{mg} \times \left(\frac{1\text{g}}{10^3\,\text{mg}}\right) \times \left(\frac{1\text{mol}}{152\text{g}}\right) \times \left(\frac{27 \times 6.02 \times 10^{23}\text{ atoms}}{1\,\text{mol}}\right)$$

$$= \frac{25 \times 27 \times 6.02}{152} \times 10^{20}\text{ atom}$$

$$= 2.67 \times 10^{21}\text{ atoms}$$

**59. (c)** Molar mass of $CO_2$ = 44 g $mol^{-1}$
44 g $CO_2$ = $3 \times 6.02 \times 10^{23}$ atoms

$$\therefore \text{ 1 g of } CO_2 = \frac{3 \times 6.02 \times 10^{23}}{44}\text{ atoms} = 0.410 \times 10^{23}$$

Similarly 1g of $C_8H_{18}$, $C_2H_6$ and LiF contains $0.18 \times 10^{23}$ atoms, $1.60 \times 10^{23}$ atoms and $0.46 \times 10^{23}$ atoms respectively.

**60. (c)** $\frac{4}{40} \times N_A = \frac{N_A}{10}$ atom

0.5 M $Na_2SO_4$

$$= \frac{0.5 \times 2}{100} \times N_A = \frac{N_A}{10}$$

**61. (d)** $SO_2 \rightarrow$ Contain 3 atom

$$n = \frac{\text{wt.}}{\text{M.wt.}} = \frac{64}{64} \times 3N_A$$

$$= 3 \times 6.02 \times 10^{23}$$

**62. (a)** Total $e^- + P + n^o = 18$
$18 \times N_A = 1.084 \times 10^{25}$

**63. (a)** 111 g anhydrous $CaCl_2$ = 1 mole $CaCl_2$
1 mole $CaCl_2$ contain 1 mole $Ca^{+2}$ and 2 mole $Cl^-$

**64. (d)** 1 g molecule of $CO_2$ = 1 mole $CO_2$
1 mole $CO_2$ occupy → 22.4 L

**65. (b)** 224 g contain 36 g of water
488 g contain 2 × 36 g of water
18 g of water = 1 mole
72 g of water = 4 mole

**66. (b)** 4.4 g $CO_2$ = 0.1 mole $CO_2$ molecule
2.24 L $H_2$ at STP = 0.1 mole $H_2$ molecule
= 0.2 mole molecules
$= 0.2 \times 6.023 \times 10^{23} = 1.20 \times 10^{23}$

**67. (c)** 22.4 L Vol. of gas at STP = 1 mole

**68. (a)** 1 mole of $P_4 = 4 \times N_A$
0.1 mole of $P_4 = 4 \times 0.1 \times N_A$
$= 4 \times 0.1 \times 6.022 \times 10^{23}$
$= 2.4088 \times 10^{23}$ atoms

**69. (c)** $C\% : H\% : N\% = \frac{40}{12} : \frac{13.3}{1} : \frac{46.7}{14}$

**70. (a)** Mass of chloride = $(B_2 - B_1)$ g
$(B_2 - B_1)$g combines with metal = $B_1$ g

$$\therefore \text{ 35.5 g combines with metal} = \frac{35.5 \times B_1}{B_2 - B_1}\text{ g}$$

**71. (d)**

| | Mass in "g" | % age | H. Ratio | S.R |
|---|---|---|---|---|
| C | 24 | 40 | 40/12 = 3.33 | 1 |
| H | 4 | 6.66 | 6.66/1=6.66 | 2 |
| O | 32 | 53.33 | 53.33/16=3.33 | 1 |

Empirical formula : $CH_2O$

**72. (a)**

| Element | % | At. mass | $\frac{\%}{\text{At.mass}}$ | Simplest ratio |
|---|---|---|---|---|
| A | 25 | 12.5 | 25/12.5 = 2 | 1 |
| B | 75 | 37.5 | 75/37.5 = 2 | 1 |

The formula of the compound is AB

**73. (c)** For minimum molecular mass, insulin must have at least one sulphur atom in its one molecule.

If it has 32 g S, then mol. mass = $\frac{100 \times 32}{3.4}$

= 941.176 g

**74. (a)** Mol. mass of Fe $(CHCOO)_2$ = 170 g

Fe in 100 gms of Fe $(CHCOO)_2$ = $\frac{56 \times 100}{170}$

= 32.9 mg

Total Fe in 400mg of capsule = 32.9 mg

percentage of Fe = $\frac{32.9 \times 100}{400}$ = 8.2%

**75. (b)**

| Element | % | At. mass | Mass Ratio | S.R |
|---|---|---|---|---|
| X | 50 | 10 | 5 | 2 |
| Y | 50 | 20 | 2.5 | 1 |

E.E. = $X_2Y$

**76. (d)** E.F. = $C_3H_4O$

E.F. Mass = 12 × 3+ 4 × 1 + 16 = 56

$n = \frac{170 \pm 5}{56} = 3$

$\therefore$ M.F. = $(C_3H_4O)_3 = C_9H_{12}O_3$

**77. (b)**

| | | Oxide (I) | Oxide (II) |
|---|---|---|---|
| Metal; | M | 50% | 40% |
| Oxygen; | O | 50% | 60% |

As first Oxide is $MO_2$

let atomic mass of M = x

$\therefore$ % of O = $\frac{32}{x+32} \times 100$

or $\frac{50}{100} = \frac{32}{x+32}$

x = 32

At. mass of metal M, x = 32

let formula of second Oxide $M_2O_n$

% of M = $\frac{2x}{2x+16n} \times 100 = \frac{64}{64+16n} \times 100$

$\frac{40}{100} = \frac{64}{64+16n}$

0.25 n = 2.5 – 1 = 1.5

$n = \frac{1.5}{0.25} = 6$

Now, formula of second oxide

= $M_2O_6$ or $MO_3$

**78. (b)** Molecular mass of B = M

V.D. of B = M/2

V.D. of A = 4 × V.D. of B

$4 \times \frac{M}{2} = 2M$

Molecular mass of A = 2 × 2 M = 4M

**79. (a)** Moles of N = $\frac{28}{14} = 2$

Moles of metal, M = $\frac{100-28}{a} = \frac{72}{a}$

Mole ratio, M:N = $\frac{72}{a}$ :2 = 3:2

$\frac{72}{a} = 3$

$a = \frac{72}{3} = 24$

**80. (b)** $\frac{M(G)}{M(N_2)} = \frac{0.44}{0.28}$ (Given)

$\therefore M_{(G)} = \frac{0.44}{0.28} \times 28 = 44$ g

**81. (a)** 44 $CO_2$ = 1 mol carbon

3.38 g $CO_2$ = 0.0768 moles carbon

18 g $H_2O$ = 2 mol of hydrogen atoms

0.690 g $H_2O$ = 0.0767 mol hydrogen atoms

Molar ratio of C : H = 1:1

$\therefore$ Empirical formula of hydrocarbon is CH

**82. (a)** $\%\text{ of C} = \frac{Wt}{M.Wt(CO_2)} \times 100 = \frac{12}{44} \times 100 = 27.27$

**83. (b)** 100 g haemoglobin has = 0.33 g Fe

67200 g haemoglobin has Fe

= $\frac{0.33}{100} \times 67200$

= 221.76 g

1 mole of haemoglobin

= $\frac{221.76}{56}$ g atom of Fe

= 3.96 g atom of Fe ≈ 4.0 g atoms

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

Moles of Oxygen $= \frac{80}{16} = 5$

formula : $I_2O_5$

**85. (b)** 0.5 mol of $K_4[Fe(CN)_6]$

has C $= \frac{1}{2} \times 6$ mol

= 3 mol or 3 ×12 = 36 g

**86. (c)** $X_2O$

X = 7

X = 7 × 2 = 14 g

**87. (c)** $100 \rightarrow 20$

$? \rightarrow 28$

**88. (b)** $CO + \frac{1}{2}O_2 \rightarrow CO_2$

**89. (a)** $CO + Cl_2 \xrightarrow{hv} COCl_2$

**90. (d)** The balanced equation is:

$4\,NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ ......(1)

$4 \times 17$ g of $NH_3$ ($eq^{-1}$)

Required $O_2$ = 5 mol

6.8 of $NH_3$ require $O_2 = \frac{5 \times 6.8}{4 \times 17}$

= 0.5 mol

**91. (a)** $CaCl_2 + 2AgNO_3 \rightarrow Ca(NO_3)_2 + 2\,AgCl$

111 g  $2 \times 143.5$ g

$CaCl_2$ require to produce $2 \times 143.5$ of AgCl = 111 g

$CaCl_2$ required to produce 14.35 g of AgCl

$= \frac{111 \times 14.35}{2 \times 143.5} = 5.55$ g

**92. (b)** $NaOH + HCl \rightarrow NaCl + H_2O$

**93. (b)** $M = \frac{w}{GM.w} \times \frac{1000}{V\,in\,ml}$

**94. (b)** $w = \frac{N \times E.wt \times V(\text{in ml})}{1000}$

**95. (b)** $M = \frac{w}{Molar\ mass} \times \frac{1}{V\ in\,litres}$

**96. (c)** $2\,NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

Pure $H_2SO_4$ is required for 1 mole of

NaOH = 1/2 mole = 49 g

70% $H_2SO_4$ required for 1 mole of NaOH

$= \frac{49 \times 100}{70} = 70$

**97. (a)** $2KClO_3 \rightarrow 2\,KCl + 3O_2$

$2 \times 122.5$ g  $3 \times 32$ g

$3 \times 32$ g of $O_2$ is produced from $KClO_3$ = 245 g

48g of $O_2$ is produced from $KClO_3$ = 245 g

$\therefore$ 80% $KClO_3$ needed $= \frac{122.5 \times 100}{80}$

= 153.12 g

**98. (c)** $N = \frac{\text{percentage} \times d \times 10}{E.wt}$

**99. (b)** $Mass\,\%_{(s)} = \frac{n_s}{n_s + n_o}$

**100. (d)** $\text{No. gram equivalents} = \frac{N \times V(\text{in m}l)}{1000}$

**101. (d)** $N = \frac{w}{E.wt} \times \frac{1000}{V(\text{in ml})}$

**102. (b)** $m = \frac{w}{E.wt} \times \frac{1000}{b(\text{in gms})}$

**103. (c)** $MCl_x + x\,AgNO_3 \rightarrow M(NO_3)_x + xAgCl$

Molar ratio: 1  x  1  x

Molecules of $AgNO_3$ given $= \frac{0.6}{100} \times 500 = 3$

Moles of $MCl_x$ = 0.1

$\therefore$ The value of x = 3

**104. (b)** $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$

100 g  73 g  44 g

100 ml of 20% HCl solution = 20 g HCl

Here, $CaCO_3$ is a limiting reagent

Hence,

20 g of $CaCO_3 = \frac{44}{100} \times 20\,g$ of $CO_2$ = 8.8 g of $CO_2$

**105. (a)** $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$

25 ml of 0.75 molar HCl $= \frac{25}{1000} 1 \times 0.75$

= 0.01875 moles

Moles of $CaCO_3$ required $= \frac{\text{moles of HCl}}{2}$

$= \frac{0.01875}{2}$

$= 9.375 \times 10^{-3}$ moles

Mass of $CaCO_3$ required = $9.375 \times 10^{-3}$ moles × 100 g/moles

= 0.94 g

**106. (a)** 22.4 L of $SO_2$ at N.T.P = 1 moles

11.2 L of $SO_2$ at N.T.P = 1/2 moles

$SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

Here $SO_2$ is a limiting reactant

$\therefore$ moles of sulphur produced = 3 × moles of $SO_2$

= 1.5 moles

**107. (b)** $SO_2Cl_2 + 2H_2O \rightarrow H_2SO_4 + 2HCl$

$H_2SO_4 + Ca(OH)_2 \rightarrow CaSO_4$

$\therefore$ 1 mol of $SO_2Cl_2$ in aqueous solution required is 2 moles $Ca(OH)_2$

**108. (b)** Moles of Na $= \frac{1.15\,g}{23\,g\,mol^{-1}} = 0.05$ mol

Moles of C $= \frac{3.01 \times 10^{22}}{6.02 \times 10^{23}} = 0.05$ mol

Moles of O = 0.1

Moles ratio, Na : C: O = 1 : 1 :2

$\therefore$ Empirical formula – $NaCO_2$

**109. (c)** $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Here: HCl is a limiting reagent

$\therefore$ Moles of $H_2$ produced $= \dfrac{\text{moles of HCl}}{2}$

$= \dfrac{0.52}{2} = 0.26$

**110. (b)** $M = \dfrac{\text{Percentage} \times \text{specific gravity} \times 10}{\text{GMW}}$

$M_1V_1 = M_2V_2$

## NCERT Based Questions

**1. (b)** Volume term is absent

**2. (d)** 48 : 32

**3. (d)** $\dfrac{4.25}{17} \times 4 = 1$

**4. (b)** Average of readings of student,

$A = \dfrac{30.1 + 2.99}{2} = 3.00$

Average of readings of student,

$B = \dfrac{3.05 + 2.95}{2} = 3.00$

Correct reading = 3.00

For both the students, average value is close to the correct value. Hence, readings of both are accurate.

**5. (c)** Since, molarity (M) is calculated by following equation

$\text{Molarity} = \dfrac{\text{weight} \times 100}{\text{molecular weight} \times \text{volume (mL)}}$

$= \dfrac{5.85 \times 1000}{58.5 \times 500} = 0.2 \text{ molL}^{-1}$

***Note***: Molarity of solution depends upon temperature because volume of a solution depends upon temperature.

**6. (c)** No of atoms = $\dfrac{\textit{given weight}}{\textit{gram atomic weight}}$

Caluculate for *Fe* and *He*.

**7. (b)** Let W% of $Ne^{20}$ = x

W % of $Ne^{22}$ = 100 – x

$20.2 = \dfrac{x \times 20 + (100 - x)22}{100}$

w % of $Ne^{20}$ = 90 %

w% of $Ne^{22}$ = 100 – 90 = 10%

$Ne^{20} : Ne^{22} = 90 : 10 = 9 : 1$

**8. (a)** $6.023 \times 10^{23} \rightarrow$ M.Wt

$10^{22} \rightarrow ?$

**9. (a)** 111 g $CaCl_2$ has = N ions of $Ca^{2+}$

No. of molecules = $\dfrac{222}{111} \times N = 2N$ ions of $Ca^{2+}$

111 g $CaCl_2$ = 2 N ions of $Cl^-$

222 g of $CaCl_2$ = $\dfrac{2N \times 222}{111}$ ions of $Cl^-$

= 4 N ions of $Cl^-$

**10. (a)** E.F. Wt = 14 gm

MW = d × 22.4

M.F = E.F × $\dfrac{MW}{EF\ Wt.}$

**11. (b)** Given that,

$M_1 = 5$ M

$V_1 = 500$ mL

$V_2 = 1500$ mL

$M_2 = M$

For dilution, a general formula is

$M_1V_1 = M_2V_2$

(Before dilution) (After dilution)

500 × 5 M =1500 × M

$M = \dfrac{5}{3} = 1.66$ M

**12. (d)** For comparing number of atoms, first we calculate the moles as all are monoatomic and hence, moles × $N_A$ = number of atoms.

Moles of 4 g He $= \dfrac{4}{4} = 1$ mol

46 g Na $= \dfrac{46}{23} = 2$ mol

0.40 g Ca $= \dfrac{0.04}{40} = 0.1$ mol

12 g He $= \dfrac{12}{4} = 3$ mol

Hence, 12 g He contains greatest number of atoms as it possesses maximum number of moles.

**13. (c)** E.F. Wt = 30 gm

MW = 2 × V.D

M.F = E.F × $\dfrac{MW}{EF\ Wt.}$

**14. (d)** W % of $N_2 = \dfrac{28}{22400} \times \dfrac{V\ of\ N_2\ at\ S.T.P}{Wt.\ of\ compound} \times 100$

**15. (b)** $K_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2KCl$

**16. (a)** $4Fe + 3O_2 \rightarrow 2Fe_2O_3$

**17. (a)** $w = \dfrac{N \times Eq.wt \times V(\text{in ml})}{1000} = \dfrac{0.1 \times 63 \times 250}{1000} = 1.575$ g

**18. (a)**

| | X | Y |
|---|---|---|
| A → | 1 | $\frac{60}{40}$ |
| B → | 1 | $\frac{75}{25}$ |

**19. (c)** In the given question, 0.9 g $L^{-1}$ means that 1000 mL (or 1 L) solution contains 0.9 g of glucose.

$$M = \frac{\text{conc in } L^{-1}}{\text{Molar mass}} = \frac{0.90}{180} = 0.005 \text{ M}$$

**20. (d)** $\text{Molality (m)} = \frac{\text{Moles of solute}}{\text{Mass of solvent (in kg)}}$ …..(i)

Given that, Mass of solvent ($H_2O$) = 500 g = 0.5 kg

Weight of HCl = 18.25 g

Molecular weight of HCl = 36.5 g

$$\text{Moles of HCl} = \frac{18.25}{36.5} = 0.5 = \frac{0.5}{0.5} = 1 \text{ m}$$

**21. (a)** No. of moles = $\frac{W}{MW}$

**22. (b)** 22400 cc of a gas at STP = $6.023 \times 10^{23}$ molecules

So, 1.12 $10^{-7}$cc of a gas at STP = ?

$$= \frac{1.12 \times 10^{-7} \times 6.023 \times 10^{23}}{22400}$$

$= 3.01 \times 10^{12}$ molecules

**23. (a)** No. of moles = $\frac{Wt}{M.\text{wt}}$ or $\frac{\text{No. of molecules}}{N}$

**24. (b)** The at. no. of N and O are 1/2 of their Mass no. So, one molecule of 92 g molecular weight will have 46 electrons so 1 gm of molecule contain 46 N $e^-$s.

**25. (b)** No. of moles = $\frac{W}{MW}$

1 mole contain 2 mole of water

**26. (a)** One mole of any substance contains $6.022 \times 10^{23}$ atoms/ molecules.

Hence, Number of millimoles of $H_2SO_4$

= molarity × volume in mL

= 0.02 × 100 = 2 millimoles

= $2 \times 10^{-3}$ mol

Number of molecules = number of moles × $6.022 \times 10^{23}$

= $2 \times 10^{-3} \times 6.022 \times 10^{23}$

= $12.044 \times 10^{20}$ molecules

**27. (b)** Molecular mass of $CO_2$ = 1 × 12 + 2 × 16 = 44 g

1 g molecule of $CO_2$ contains 1 g atoms of carbon

∵ 44 g of $CO_2$ contain C = 12 g atoms of carbon

$$\therefore \ \% \text{ of C in } CO_2 = \frac{12}{44} \times 100 = 27.27\%$$

Hence, the mass per cent of carbon in $CO_2$ is 27.27%.

**28. (d)** $\frac{Wt}{At.wt} = no. of\ gram\ atoms$

$$Mg : C : N = \frac{12}{24} : \frac{12}{12} : \frac{14}{14}$$

**29. (b)** Calculate relative No. of atoms of nitrogen and oxygen

$$N : O = \frac{36.8}{14} : \frac{100 - 36.8}{16}$$

**30. (d)** $C_xH_y + \left(x + \frac{y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$

$$x = \frac{160}{40} = 4 \quad and \quad x + y = \frac{26}{4}$$

$$\frac{Y}{4} = \frac{10}{4}$$

∴ Y = 10

**31. (c)** 2gm of $H_2$ → 16 gm of $O_2$

**32. (c)** $N = \frac{\text{No. of milli equivalents}}{V \text{ (in m}l)}$

**33. (c)** $M = \frac{\text{percentage} \times 10 \times d}{\text{GMW}}$

**34. (c)** Empirical formula mass = $CH_2O$

= 12 + 2 × 1+ 16 = 30

Molecular mass = 180

$$n = \frac{\text{Molecular mass}}{\text{Empirical formula mass}}$$

$$= \frac{180}{30} = 6$$

∴ Molecular formula = n × empirical formula

= 6 × $CH_2O$

= $C_6H_{12}O_6$

**35. (a)** Given that density of solution = 3.12 g $mL^{-1}$

Volume of solution = 1.5 mL

For a solution,

Mass = volume × density

= 1.5 mL × 3.12 gm $L^{-1}$ = 4.68 g

Hence, the answer is reported as 4.7 g.

**36. (c)** $M = \frac{w}{GMW} \times \frac{1000}{V\ in\ ml}$

N = M × Basicity of an acid

**37. (c)** $w = \frac{N \times GEW \times V \text{ (in ml)}}{1000}$

**38. (d)** W = N × G.Ew × V (In L)

$$\% \text{ Purity of NaOH} = \frac{40}{50} \times 100$$

= 80 %

**39. (a)** According to the law of conservation of mass,

Total mass of reactants = Total mass of products

Amount of $Fe_2O_3$ is decided by limiting reagent.

**40. (b)** The element, carbon, combines with oxygen to form two compounds, i.e., carbon dioxide and carbon monoxide in $CO_2$, 12 parts by mass of carbon combine with 32 parts by mass of oxygen while in CO, 12 parts by mass of carbon combine with 16 parts by mass of oxygen.

Therefore, the masses of oxygen combine with a fixed mass of carbon (12 parts) in $CO_2$ and CO are 32 and 16 respectively. These masses of oxygen have ratio of 32 : 16 or 2 : 1 to each other.

This is an example of law of multiple proportion.

## Multi-Concept Questions

**1. (a)** $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

1 L of $N_2$ reacts with 3 L of $H_2$ to form 2 L of $NH_3$.

So, $N_2$ is the limiting reagent here because when 30L of $H_2$ will be consumed, the volume of $N_2$ consumed will be $\frac{1}{3}^{rd}$ i.e., $\frac{1}{3}\times 30 = 10L$.

Since actual yield is 50% of the expected value, $NH_3$ formed = 10 L , $N_2$ reacted = 5 L and $H_2$ reacted 15 L.

So, the final mixture contains 10 L $NH_3$, 25 L $N_2$ and 15 L $H_2$.

**2. (b)** $3NaBH_4 + 4BF_3 \longrightarrow 3NaBF_4 + 2B_2H_6$

Since $BF_3$ is in excess, the limiting reagent is $NaBH_4$.

To obtain 2 mole $B_2H_6$ , $NaBH_4$ required = 3 mole

To obtain 0.200 mole $B_2H_6$ , $NaBH_4$ required $= \frac{3}{2}\times 0.200$

$= 0.300$ mole

Because, the yield is 70%, Hence

$$x \times \frac{70}{100} = 0.300$$

$$x = \frac{0.300}{1000}\times\frac{100}{70} = \frac{3}{7} = 0.429 \text{ moles}$$

**3. (a)** $Ag_2S \rightarrow 2Ag + S$

To obtain 2 mole Ag, mole of $Ag_2S$ required = 1

To obtain $\frac{1}{108}$ mole Ag, mole of $Ag_2S$ required

$$= \frac{1}{2}\times\frac{1}{108} = \frac{1}{216}\text{mole}$$

grams of $Ag_2S$ required $= \frac{1}{216}\times 248$ g

1.24 g $Ag_2S$ is obtained from ore = 100 g

$\frac{248}{216}$ g $Ag_2S$ is obtained from ore $= \frac{100}{1.24}\times\frac{248}{216}$

$$= \frac{24800}{267.84}$$

$= 92.6$ g

**4. (b,c)** $H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$

0.1 mol of NaOH give $= \frac{1}{2}\times 0.1 = 0.05$ mole

$$n = \frac{wt}{m.wt}$$

wt = 7.10 g

$$M = \frac{n}{\text{vol. of solution}} = \frac{0.05}{2}$$

aM = 0.025 mol

**5. (a)** C : H : N = 9 : 1 : 3.5

$\therefore$ mole ratio $= C:H:N = \frac{9}{12}:\frac{1}{1}:\frac{3.5}{14}$

= 3 : 4 : 1

$(C_3H_4N)_x \Rightarrow x = 2$ & $C_6H_8N_2$

**6. (b)** $[\text{urea}] = \frac{6.02\times 10^{20}}{6.02\times 10^{23}} = 10^{-3}$ mol

$\therefore \quad [\text{urea}] = \frac{10^{-3}}{0.1} = 0.01$ M

**7. (d)** Mn = x gm $= \frac{x}{55} = 0.018x$

O = x gm $= \frac{x}{16} = 0.0625\,x$

$$\frac{0.018\,x}{0.018\,x} = 1 \Rightarrow \frac{0.0625\,x}{0.018\,x} \approx 3.5$$

$Mn_1O_{3.5} \Rightarrow Mn_2O_7$

**8. (b)** $M + H_2SO_4 \rightarrow MSO_4 + H_2$

$$\frac{\text{Mole of M}}{1} = \frac{\text{Mole of } H_2SO_4}{1}$$

$$\frac{1}{a} = \frac{4.08}{98}$$

$$a = \frac{98}{4.08} = 24.01$$

Thus atomic weight of M = 24 g.

**9. (a)** Let molar mass of compound = y g

% by wt of C = 36

So, $\frac{24}{y}\times 100 = 36$

$$\frac{2400}{36} = y$$

y = 66.6 g

So, 66.6 g has moles = 1

10 g has moles $= \frac{1}{66.6} \times 10 = 0.15$

**10. (a)** $C_8H_{18} + \frac{25}{2}O_2 \rightarrow 8CO_2 + 9H_2O$

Moles of $CO_2$ formed $= \frac{7.04}{44}$ moles $= 0.16$

now, from equation

Moles of $H_2O$ formed when 8 moles of $CO_2$ react = 9

Moles of $H_2O$ formed when $\frac{7.04}{44}$ moles of $CO_2$ react

$= \frac{9}{8} \times \frac{7.04}{44}$

$= \frac{63.36}{8 \times 44} = 0.18$ moles

wt. of $H_2O$ formed = 0.18 × 18 = 3.24 g

**11. (c)** $2KHCO_3 \xrightarrow{\Delta} K_2CO_3 + H_2O + CO_2 \uparrow$

Loss of wt. will be because of $CO_2$ escaped

Total $KHCO_3$ chosen = 1.50 g

percentage purity = 80%

$\therefore$ Pure $KHCO_3 = 1.50 \times \frac{80}{100} = 1.2$ g

M. mass of $KHCO_3$ = 39 + 1 + 12 + 3 × 16 = 100 g

moles of pure $KHCO_3 = \frac{1.2}{100} = 0.012$ moles

From balanced equation-

2 moles of $KHCO_3$ yield moles of $CO_2$ = 1

0.012 moles of $KHCO_3$ yield moles of $CO_2 = \frac{1}{2} \times 0.012$

= 0.006 moles

wt. of $CO_2$ formed = 0.264 g

**12. (a)** $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$

From balanced equation,

71 gm $Cl_2$ is produced from HCl = 4 × 36.5 g

2.5 gm $Cl_2$ is produced from HCl $= \frac{4 \times 36.4 \times 2.5\text{g}}{71}$

= 5.14 g

Now, HCl is 36% by mass, which means-

36 g HCl is obtained from HCl solution = 100 g

5.14 g HCl is obtained from HCl solution $= \frac{100 \times 5.14}{36}$

= 14.27 g

**13. (d)** Density of solution = 1.25 g/mL

29.2% (w/w) means that 29.2 g of HCl is present in 100 gms of solution

So, $\rho(\text{density of solution}) = \frac{\text{wt. of soln.}}{\text{vol. of soln.}}$

$1.25 \text{ g/mL} = \frac{100}{\text{vol. of soln.}}$

$v = \frac{100}{1.25}$ mL

molarity of solution $= \frac{\text{no. of moles of solute}}{\text{vol. of solution (in ltrs)}}$

$M = \frac{29.2/36.5}{100/1.25} \times 1000 = 10$ M

Apply, $M_1V_1 = M_2V_2$

0.4 × 200 = 10 × V

V = 8 mL

**14. (c)** $2 Mg + O_2 \rightarrow 2 MgO$

2 × 24 g Mg reacts with $O_2$ = 32 g

30 g Mg reacts with $O_2 = \frac{32}{2 \times 24} \times 30 = 20$ g

So, 10 g $O_2$ will be left unreacted

Mg is the limiting reagent

2 × 24 g Mg forms MgO = 2 × 40 g

30 g Mg forms MgO $= \frac{2 \times 40}{2 \times 24} \times 30 = 50$ g

**15. (b)** $4K_2Cr_2O_7 \xrightarrow{\Delta} 4K_2CrO_4 + 2Cr_2O_3 + 3O_2$

mole 4 3 (100% yield)

= 1 (for 33.33%)

Volume of $O_2$ gas produced = 1 × 22.4 = 22.4 L

**16. (b)** $CO_2 + 2NaOH \rightarrow Na_2CO_3 + H_2O$

$n_{NaOH} = 1$

$\therefore$ $CO_2$ present in mixture = 0.5 and Co present = 0.3 mole

When more $CO_2$ produced = 0.3, more NaOH required

= 0.3 × 2 = 0.6 mole

**17. (a)** $CaCO_3 + MgCO_3 \xrightarrow{\Delta} CaO + MgO + 2CO_2$

Let the mass of $CaCO_3$ = x g

Then, mass of $MgCO_2$ = (3.68 – x)g

moles of $CaCO_3 = \frac{x}{100}$

moles of $MgCO_3 = \frac{3.68 - x}{84}$

Applying POAC for C-atoms

$\frac{x}{100} + \frac{3.68 - x}{84} = 0.04$

x = 2

$\therefore \quad n_{CaCO_3} = \frac{2}{100} = 0.02$ and $n_{MgCO_3} = \frac{1.68}{84} = 0.02$

mole% of $CaCO_3 = \frac{0.02}{0.04} \times 100 = 50\%$

mole% of $MgCO_3 = \frac{0.02}{0.04} \times 100 = 50\%$

**18. (c)** Let relative abundance of heavier isotope be x %

$$A = \frac{(100-x)(A-1)+x(A+3)}{100}$$

100 A = 100A – xA – 100 + x + 3x + xA

4x = 100

$\therefore$ x = 25.

**19. (a,c)** Using PV = nRT, $0.3 \times 125 = \frac{42}{M} \times R \times 300$

$\therefore$ M = 28 ($N_2$/CO)

**20. (d)** Only single solution have all these

Means 100 ml solution have 5.85 gm NaCl = 0.1 mole

and 5.55 gm $CaCl_2$ = 0.05 mole

$$[Cl^-] = \frac{(0.1+0.05\times 2)\times 1000}{100} = 2\,M$$

$$\Rightarrow [Na^+] = \frac{(0.1+0.15)\times 1000}{100} = 2.5\,M$$

$$[Ca^{2+}] = \frac{0.5}{100} \times 1000 = 0.5\,M \quad \Rightarrow [OH^-] = 1.5\,M$$

**21. (b)** Moles of Fe $= \frac{0.0056}{56} = 10^{-4}$

1 mol of alum = 2 mol of Fe

2 mol of Fe = 1 mol of alum

$10^{-4}$ mol of Fe $= \frac{1}{2} \times 10^{-4}$ mol of alum

= $0.5 \times 10^{-4}$ mol of alum

**22. (d)** (i) 14 g (ii) 40 g

(iii) $\frac{108}{6.022 \times 10^{23}} = 1.79 \times 10^{-22}$ g

(iv) 32 g (v) 1.99 g (vi) 1 g

Hence, the correct order of increasing masses is

(iii) < (vi) < (v) < (i) < (iv) < (ii)

**23. (a)** $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$

$112L = \frac{112}{22.4}$ moles $\quad 213g = \frac{213}{71}$

= 5 moles $\quad$ = 3 moles

Here, $Cl_{2(g)}$ is limiting reagent,

1 Mole $Cl_{2(g)}$ produces $HCl_{(g)}$

= $2 \times 6.022 \times 10^{23}$ molecules

3 Moles $Cl_{2(g)}$ produces $HCl_{(g)}$

= $3 \times 2 \times 6.022 \times 10^{23}$ molecules

= $3.61 \times 10^{24}$ molecules

**24. (c)** $MgO + CO_2 \rightarrow MgCO_3$

40 g 44 g

40g MgO needs $CO_2$ = 44 g

30g MgO needs $CO_2 = \frac{44 \times 30}{40} = 33g$

$CaCO_3 \rightarrow CaO + CO_2$

100 g 44 g

44 g $CO_2$ is obtained from $CaCO_3$ = 100 g

33 g $CO_2$ is obtained from $CaCO_3$

$$= \frac{100 \times 33}{44} = 75\,g$$

Percentage purity of $CaCO_3$ sample

$= \frac{75}{85} \times 100 = 88.24\%$

## NEET Past 10 Year Questions

**1. (c)** ***NCERT (XI) Ch - 1, Pg. 15***

(a) Number of Mg atoms $= \frac{1}{24} \times N_A$

$= \frac{1}{24} \times 6.022 \times 10^{23}$ atom

(b) Number of O atoms $= \frac{1}{32} \times N_A$

$= \frac{1}{32} \times 2 \times 6.022 \times 10^{23}$ atom

(c) Number of Li atoms $= \frac{1}{7} \times N_A$

$= \frac{1}{7} \times 6.022 \times 10^{23}$ atom

(d) Number of Ag atoms $= \frac{1}{108} \times N_A$

$= \frac{1}{108} \times 6.022 \times 10^{23}$ atom

Hence, 1g lithium has the largest number of atoms.

**2. (c)** ***NCERT (XI) Ch - 1, Pg. 15***

No of atom in 12 g carbon = 12 ÷ ($1.9926 \times 10^{-23}$)

= $6.022 \times 10^{23}$ atoms

Thus Number of atoms in 1 mole carbon = $6.022 \times 10^{23}$ atoms

**3. (c)** ***NCERT (XI) Ch - 1. Pg. 18***

Haber's process

$$N_2\ (g) + 3H_2\ (g) \rightleftharpoons 2NH_3\ (g)$$

20 moles need to be produced

2 moles of $NH_3 \rightarrow$ 3 moles of $H_2$

Hence 20 moles of $NH_3 \rightarrow \frac{3\times 20}{2}$ = 30 moles to $H_2$

**4. (d)** ***NCERT (XI) Ch - 1. Pg. 18***

$$HCOOH \xrightarrow{\text{Conc}\,H_2SO_4} CO(g) + H_2O(l)$$

$$2.3\text{g or}\left(\frac{1}{20}\text{mol}\right) \qquad \frac{1}{20}\text{mol}$$

$$\begin{array}{l} COOH \\ | \\ COOH \end{array} \xrightarrow{\text{Conc.}H_2SO_4} CO\ (g) + CO_2\ (g) + H_2O\ (l)$$

$$4.5 \text{ or}\left[\frac{1}{20}\text{mol}\right] \qquad \frac{1}{20}\text{mol} \qquad \frac{1}{20}\text{mol}$$

Gaseous mixture formed is CO and $CO_2$. When it is passed through KOH, only $CO_2$ is absorbed. So the remaining gas is CO.

So, weight of remaining gaseous product CO is

$$\frac{2}{20}\times 28 = 2.8\text{g}$$

So, the correct option is (d)

**5. (a)** ***NCERT (XI) Ch - 1, Pg. 18***

(a) Mass of water = 18 × 1 = 18 g

Molecules of water = mole × $N_A = \frac{18}{18}N_A$

$= 1\ N_A$

(b) Molecules of water = mole × $N_A = \frac{0.18}{18}N_A$

$= 10^{-2}\ N_A$

(c) Molecules of water = mole × $N_A = 10^{-3}\ N_A$

(d) Moles of water $= \frac{0.00224}{22.4} = 10^{-4}$

Molecules of water = mole × $N_A = 10^{-4}\ N_A$

**6. (c)** ***NCERT (XI) Ch -1, Pg. 16***

| | % | Moles | Relative moles |
|---|---|---|---|
| C | 85.7 | $\frac{85.7}{12} = 7.14$ | 1 |
| H | 14.3 | $\frac{14.3}{1} = 14.3$ | 2 |

Hence, empirical formula = $CH_2$.
empirical weight = 14

$$\frac{3.01\times 10^{20}}{6.022\times 10^{23}} = \text{No. of moles} = \frac{42\times 10^{-3}}{M}$$

$$\frac{1}{2}\times 10^{-3} = \frac{42\times 10^{-3}}{M}$$

M = 84

$\therefore$ Atomicity $= \frac{84}{14} = 6$

Molecular formula = $C_6H_{12}$.

**7. (c)** ***NCERT (XI) Ch - 1, Pg. 20***

For $XY_2$, let atomic weight of X = Ax

and of Y = Ay

So, $n_{XY_2} = 0.1 = \frac{10}{Ax + 2Ay}$

Ax + 2Ay = 100 ---- (1)

Similarly for $X_3Y_2$,

3Ax + 2Ay = 180 -----(2)

On solving (1) and (2)

Ax = 40 and Ay = 30

**8. (a)** NCERT (XI) Ch - 1, Pg. 15

(a) 18 moles of water will contain

= 18 × 6.022 × $10^{23}$ molecules of $H_2O$

(b) 18 molecules

(c) $\frac{1.8}{18} = 0.1$ mole will contain

= 0.1 × 6.022 × $10^{23}$ molecules of $H_2O$

(d) $\frac{18}{18}\text{g} = 1\text{mole} = 1\times 6.022\times 10^{23}$ molecules of $H_2O$

So, maximum number of molecules is present in 18 moles of $H_2O$.

**9. (c)** Avogadro's number 6.022 × $10^{23}$ is ideally the mass of number of atoms present in 1 mole that is 12 grams of C. If we change the Avogadro's number it will directly change the mass of 1 mole that is 12 g of C.

**10. (b)** NCERT (XI) Ch - 1, Pg. 19

Molecular weight of $AgNO_3$ = 170

Molecular weight of NaCl = 58.5

1. 16.9% solution of $AgNO_3$ means 16.9 g of $AgNO_3$ in 100 mL of solution
   so, 8.45 g of $AgNO_3$ in 50 mL of solution.
2. 5.8% solution of NaCl means 5.8 g of NaCl is in 100 mL solution. So, in 50 mL = 2.9 g NaCl

$$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$$

| | $AgNO_3$ | NaCl | AgCl | $NaNO_3$ |
|---|---|---|---|---|
| Initial Mole: | $\frac{8.45}{170}$ | $\frac{2.9}{58.5}$ | 0 | 0 |
| | = 0.049 | = 0.049 | 0 | 0 |
| Final mole: | 0 | 0 | 0.049 | 0.049 |

Mass of AgCl precipitated = 0.049 mole

= 0.049 × 143.3

= 7.02 gm $\simeq 7$ gm

**11. (c)** ***NCERT (XI) Ch - 10, Pg. 301***

$$MgCO_3 \rightarrow MgO + CO_2(g)$$

$$\downarrow \qquad \downarrow$$

$Mw \rightarrow 84$ g $\quad$ 40 g

According to question

84 g $MgCO_3$ gives = 40 g MgO

1 g $MgCO_3$ gives = $\frac{40}{84}$

20 g $MgCO_3$ gives = $\frac{40}{84} \times 20$

= 9.52 g of MgO

But according to question

yield of MgO is = 8 g

% purity = $\frac{8}{9.52} \times 100 = 84\%$

**12. (d)** ***NCERT (XI) Ch - 1, Pg. 19***

1 mole = 22.4 litres at S.T.P.

$n_{H_2} = \frac{22.4}{22.4} = 1$ mol ; $n_{Cl_2} = \frac{11.2}{22.4} = 0.5$ mol

Reaction is as,

| | $H_2(g)$ | + $Cl_2(g)$ | $\rightarrow$ $2HCl(g)$ |
|---|---|---|---|
| Initial | 1 mol | 0.5 mol | 0 |
| Final | (1 – 0.5) = 0.5 mol | (0.5 – 0.5) = 0 mol | 2 × 0.5 1 mol |

Here, $Cl_2$ is limiting reagent. So, 1 mole of HCl (g) is formed.

**13. (d)** ***NCERT (XI) Ch - 1***

$n_{Mg} = \frac{1}{24} = 0.0416$ moles

$n_{O_2} = \frac{0.56}{32} = 0.0175$ moles

The balanced chemical equation:

| | Mg | + $\frac{1}{2}O_2$ | $\rightarrow$ MgO |
|---|---|---|---|
| Initial | 0.0416 moles | 0.0175 moles | 0 |
| Final | (0.0416 – 2 × 0.0175) | 0 | 2 × 0.0175 |

= 0.0066 moles ($O_2$ is limiting reagent)

$\therefore$ Mass of Mg left in excess = 0.0066 × 24

= 0.16 g

**14. (c)** ***NCERT (XI) Ch - 1, Pg. 15***

According to Avogadro's principle, ratio of volume of gases will be equal to the ratio of their number of moles

$$\text{mole} = \frac{w}{M_w}$$

$$n_{H_2} : n_{O_2} : n_{CH_4}$$

$$\frac{w}{2} : \frac{w}{32} : \frac{w}{16} \Rightarrow 16 : 1 : 2$$

**15. (b)** ***NCERT (XI) Ch - 1, Pg. 15 & 20***

$6.02 \times 10^{23}$ number of molecules = 1 mole

$6.02 \times 10^{20} = 0.001$ mole

$$\text{Concentration} = \frac{\text{mole}}{V(mL)} \times 1000$$

$$= \frac{0.001}{100} \times 1000$$

$$\Rightarrow 0.01\ M$$

**16. (a)** $AgNO_3$ (excess) + $[Cr(H_2O)_4]Cl_2$

Moles = M × V(lit)

$$0.01 \times \frac{100}{1000} = 0.001$$

**17. (a)** ***NCERT (XI) Ch , 1 Pg. 20***

$$\text{Molarity} = \frac{W \times 1000}{\text{Mol.wt.} \times V_{sol(mL)}} \Rightarrow 2 = \frac{W}{63} \times \frac{1000}{250}$$

$$W = \frac{63}{2} g$$

$$\text{Mass of acid} \times \frac{70}{100} = \frac{63}{2}$$

Mass of acid = 45 g

**18. (a)** ***NCERT (XI) Ch - 1, Pg. 15***

64 g of $SO_2$ = 1 mole = $N_A$ number of molecules

8 g of $H_2$ = 4 moles = 4 × $N_A$ number of molecules

48 g of $O_3$ = 1 mole = $N_A$ number of molecules

44 g of $CO_2$ = 1 mole = $N_A$ number of molecules

So, 8 g of $H_2$ has maximum number of molecules.