1. Some Basic Concepts of Chemistry – Multiple Choice Questions

1. Significant Figures, Units for Measurement, Importance and Scope of Chemistry

1. In the final answer of the expression $\dfrac{(29.2-20.2)\left(1.79\times10^5\right)}{1.37}$. The number of significant figures is

   (a) 1

   (b) 2

   (c) 3

   (d) 4

2. If the density of a solution is $3.12\,gmL^{-1}$ the mass of $1.5mL$ solution in significant figures is ......

   (a) 4.7 g

   (b) $4680X10^{-3}g$

   (c) 4.680 g

   (d) 46.80 g

3. Two students performed the same experiment separately and each one of them recorded two readings of mass which are given below. Correct reading of mass is 3.0 g. On the basis of given data, mark the correct option out of the following statements

Students	Readings	
	(i)	(ii)
A	3.01	2.99
B	3.05	2.95

   (a) Results of both the students are neither accurate nor precise

   (b) Results of student A are both precise and accurate

   (c) Results of student B are neither precise nor accurate

   (d) Results of student B are both precise and accurate

4. Three successive measurements in an experiment gave the values 10.9 ; 11.4042 and 11.42. The correct way of reporting the average value is

   (a) 11.2080

   (b) 11.21

   (c) 11.2

   (d) 11

2. Laws of Chemical Combination

1. In compound A, 1.00 g nitrogen unites with 0.57 g oxygen. In compound B, 2.00 g nitrogen combines with 2.24 g oxygen. In compound C, 3.00 g nitrogen combines with 5.11 g oxygen. These results obey the following law

   (a) Law of constant proportion

   (b) Law of multiple proportion

   (c) Law of reciprocal proportion

   (d) Dalton's law of partial pressure

2. Which one of the following sets of compounds correctly illustrate the law of reciprocal proportions?

   (a) P_2O_3, PH_3, H_2O

   (b) P_2O_5, PH_3, H_2O

   (c) N_2O_5, NH_3, H_2O

   (d) N_2O, NH_3, H_2O

   (e) NO_2, NH_3, H_2O

3. Which of the following statements about a compound is incorrect?

   (a) A molecule of a compound has atoms of different elements

   (b) A compound cannot be separated into its constituent elements by physical methods of separation

   (c) A compound retains the physical properties of its constituent elements

   (d) The ratio of atoms of different elements in a compound is fixed

4. Which of the following statements is correct about the reaction given below

   $$4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(g)$$
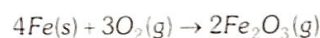
   (a) Total mass of iron and oxygen in reactants = total mass of iron and oxygen in product therefore it follows law of conservation of mass

   (b) Total mass of reactants = total mass of product, therefore, law of multiple proportions is followed

   (c) Amount of Fe_2O_3 can be increased by taking any one of the reactants (iron or oxygen) in excess

   (d) Amount of Fe_2O_3 produced will decrease if the amount of any one of the reactants (iron or oxygen) is taken in excess

5. Which of the following statements indicates that law of multiple proportion is being followed

   (a) Sample of carbon dioxide taken from any source will always have carbon and oxygen in the ratio 1 : 2

   (b) Carbon forms two oxides namely CO_2 and CO, where masses of oxygen which combine with fixed mass of carbon are in the sample ratio 2 : 1

   (c) When magnesium burns in oxygen, the amount of magnesium taken for the reaction is equal to the amount of magnesium in magnesium oxide formed

   (d) At constant temperature and pressure $200\,mL$ of hydrogen will combine with $100\,mL$ oxygen to produce $200\,mL$ of water vapour.

3. Atomic, Molecular and Equivalent Masses

1. The percentage of an element M is 53 in its oxide of molecular formula M_2O_3. Its atomic mass is about

   (a) 45

   (b) 9

   (c) 18

   (d) 36

   (e) 27

2. 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) 1×10^{-10} mole of oxygen

   (IV) 1×10^{-10} mole of copper

   (a) $II < I < III < IV$

   (b) $I < II < III < IV$

   (c) $III < II < IV < I$

   (d) $IV < II < III < I$

   (e) $II < IV < I < III$

3. On reduction with hydrogen, 3.6 g of an oxide of metal left 3.2 g of metal. If the vapour density of metal is 32, the simplest formula of the oxide would be

   (a) MO

   (b) M_2O_3

   (c) M_2O

   (d) M_2O_5

4. An element, X has the following isotopic composition;

   $^{200}X : 90\%$

   $^{199}X : 8.0\%$

   $^{302}X : 2.0\%$

   The weighted average atomic mass of the naturally– occurring element X is closed to

   (a) 200 amu

   (b) 201 amu

   (c) 202 amu

   (d) 199 amu

5. The weight of silver (at. wt. $= 108$) displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be

   (a) 54.0 g

   (b) 108.0 g

   (c) 5.4 g

   (d) 10.8 g

6. The percentage of Se in peroxidase anhydrous enzyme is 0.5% by weight (atomic weight$=78.4$). Then minimum molecular weight of peroxidase anhydrous enzyme is

   (a) 1.568×10^4

   (b) 1.568×10^3

   (c) 15.68

   (d) 3.136×10^4

7. A metal M of equivalent mass E forms an oxide of molecular formula M_xO_y. The atomic mass of the metal is given by the correct equation

   (a) $2E(y/x)$

   (b) xyE

   (c) E/y

   (d) y/E

   (e) $E/2(x/y)$

8. What is the concentration of nitrate ions if equal volumes of 0.1 M $AgNO_3$ and 0.1 M $NaCl$ are mixed together?

   (a) 0.1 M

   (b) 0.2 M

   (c) 0.05 M

   (d) 0.25 M

9. The mass of a molecule of water is

   (a) 3×10^{-26} kg

   (b) 3×10^{-25} kg

   (c) 1.5×10^{-26} kg

   (d) 2.5×10^{-26} kg

10. What is the weight of oxygen required for the complete combustion of 2.8 kg of ethylene

    (a) 2.8 kg

    (b) 6.4 kg

    (c) 9.6 kg

    (d) 96 kg

11. In a mole of water vapour at STP, the volume actually occupied or taken by the molecules (i.e., Avogadro's No. $\times$ Volume of one molecule) is

    (a) Zero

    (b) Less than 1% of 22.4 liters

    (c) About 10% of the volume of container

    (d) 1% to 2% of 22.4 liters

    (e) Between 2% to 5% of 22.4 liters

12. Sulphur forms the chlorides S_2Cl_2 and SCl_2. The equivalent mass of sulphur in SCl_2 is

    (a) 8 g/mol

    (b) 16 g/mol

    (c) 64.8 g/mol

    (d) 32 g/mol

13. The equivalent weight of an element is 4. Its chloride has a V.D 59.25. Then the valency of the element is

    (a) 4

    (b) 3

    (c) 2

    (d) 1

14. Assuming fully decomposed, the volume of CO_2 released at STP on heating 9.85g of $BaCO_3$ (Atomic mass of $Ba=137$) will be

    (a) 0.84 L

    (b) 2.24 L

    (c) 4.06 L

    (d) 1.12 L

15. During the conversion of $NH_2OH \rightarrow N_2O$, the equivalent weight of NH_2OH (mol. wt. of NH_2OH is M) is

    (a) M

    (b) $M/2$

    (c) $M/4$

    (d) $M/5$

16. 0.32g of metal gave on treatment with an acid 112 mL of hydrogen at NTP. Calculate the equivalent weight of the metal

    (a) 58

    (b) 32

    (c) 11.2

    (d) 24

17. In the reaction of sodium thiosulphate with I_2 in aqueous medium the equivalent weight of sodium thiosulphate is equal to

(a) Molar mass of sodium thiosulphate

(b) The average of molar masses of $Na_2S_2O_3$ and I_2

(c) Half the molar mass of sodium thiosulphate

(d) Molar mass of sodium thiosulphate $\times 2$

18. M is the molecular weight of $KMnO_4$. The equivalent weight of $KMnO_4$ when it is converted into K_2MnO_4 is

(a) M
(b) $M/3$
(c) $M/5$
(d) $M/7$

19. 1.520 g of the hydroxide of a metal on ignition gave 0.995 g of oxide. The equivalent weight of metal is

(a) 1.520
(b) 0.995
(c) 19.00
(d) 9.00

20. The molar mass of $CaCO_3$ is 100 g. The maximum amount of carbon dioxide that can be liberated on heating 25 g of $CaCO_3$ is

(a) 11 g
(b) 55 g
(c) 22 g
(d) 2.2 g

21. The weight of calcium oxide formed by burning 20g of calcium in excess oxygen is

(a) 36g
(b) 56g
(c) 28g
(d) 72g

22. Consider the following statements

(I)   All isotopes of an elements have the same number of neutrons

(II) Only one isotope of an element can be stable and non–radioactive

(III) All elements have isotopes

(IV) All isotopes of carbon can form chemical compounds with oxygen–16

The correct option regarding an isotope is

(a) (III) and (IV) only

(b) (II),(III) and (IV) only

(c) (I),(II) and (III) only

(d) (I), (III) and (IV) only

23. The volume of oxygen at STP required to burn 2.4g of carbon completely is

(a) 1.12L
(b) 8.96L
(c) 2.24L
(d) 4.48L

24. Two elements, X and Y, have atomic numbers 33 and 17 respectively. The molecular formula of a stable compound formed between them is

(a) XY
(b) XY_2
(c) XY_3
(d) XY_4

4. The Mole Concept

1. The number of water molecules present in a drop of water (volume 0.0018 mL) at room temperature is

(a) 6.023×10^{19}
(b) 1.084×10^{18}
(c) 4.84×10^{17}
(d) 6.023×10^{23}

2. The total number of electrons in 18 mL of water (density $= 1g\, mL^{-1}$) is

(a) 6.02×10^{23}
(b) 6.02×10^{25}
(c) 6.02×10^{24}
(d) $6.02 \times 18 \times 10^{23}$

3. The number of water molecules in 1 liter of water is

(a) 18
(b) 18×1000
(c) N_A
(d) $55.55\, N_A$

4. How many moles of lead (II) chloride will be formed from a reaction between 6.5g of PbO and 3.2g of HCl

(a) 0.011
(b) 0.029
(c) 0.044
(d) 0.333

5. Which among the following is the heaviest?

(a) One mole of oxygen

(b) One molecule of sulphur trioxide

(c) 100 amu of uranium

(d) Ten moles of hydrogen

(e) 44 g of carbon dioxide

6. Volume occupied by one molecule of water (density $= 1gcm^{-3}$) is

(a) $3.0 \times 10^{-23} cm^3$
(b) $5.5 \times 10^{-23} cm^3$
(c) $9.0 \times 10^{-23} cm^3$
(d) $6.023 \times 10^{-23} cm$

7. The number of formula units of calcium fluoride CaF_2 present in 146.4 g of CaF_2 (The molar mass of CaF_2 is 78.08 g/mol) is

(a) $1.129 \times 10^{24} CaF_2$
(b) $1.146 \times 10^{24} CaF_2$
(c) $7.808 \times 10^{24} CaF_2$
(d) $1.877 \times 10^{24} CaF_2$

8. 100 mL O_2 and H_2 kept at same temperature and pressure. What is true about their number of molecules

(a) $N_{O_2} > N_{H_2}$

(b) $N_{O_2} < N_{H_2}$

(c) $N_{O_2} = N_{H_2}$

(d) $N_{O_2} + N_{H_2} = 1 mole$

9. Common salt obtained from sea-water contains 95% $NaCl$ by mass. The approximate number of molecules of $NaCl$ present in 10.0 g of the salt is

(a) 10^{21}

(b) 10^{22}

(c) 10^{23}

(d) 10^{24}

10. Which has the maximum number of molecules among the following

(a) $8g H_2$

(b) $64g SO_2$

(c) $44g CO_2$

(d) $48g O_3$

11. The number of atoms in 0.1 mole of a triatomic gas is $(N_A = 6.02 \times 10^{23} \, mol^{-1})$

(a) 1.800×10^{22}

(b) 6.026×10^{22}

(c) 1.806×10^{23}

(d) 3.600×10^{23}

12. In an experiment, 4g of M_2O_x oxide was reduced to 2.8g of the metal. If the atomic mass of the metal is $56g \, mol^{-1}$, the number of O atoms in the oxide is

(a) 1

(b) 2

(c) 3

(d) 4

13. When 22.4 liters of $H_2(g)$ is mixed with 11.2 liters of $Cl_2(g)$, each at STP, the moles of $HCl(g)$ formed is equal to

(a) 0.5 mole of $HCl(g)$

(b) 1.5 mole of $HCl(g)$

(c) 1 mole of $HCl(g)$

(d) 2 mole of $HCl(g)$

14. One mole of any substance contains 6.022×10^{23} atoms/molecules. Number of molecules of H_2SO_4 present in 100mL of 0.02M H_2SO_4 solution is ....

(a) 12.044×10^{20} molecules

(b) 6.022×10^{23} molecules

(c) 1×10^{23} molecules

(d) 12.044×10^{23} molecules

15. A bottle of cold drink contains 200 ml liquid in which CO_2 is 0.1 molar. Suppose CO_2 behaves like an ideal gas, the volume of the dissolved CO_2 at STP is

(a) 0.224 liter

(b) 0.448 liter

(c) 22.4 liter

(d) 2.24 liter

16. Sodium nitrate on reduction with Zn in presence of $NaOH$ solution produces NH_3. Mass of sodium nitrate absorbing 1 mole of electron will be

(a) 7.750

(b) 10.625

(c) 8.000

(d) 9.875

17. If Avogadro's number is A_0, the number of sulphur atoms present in 200 mL of 1N H_2SO_4 is

(a) $A_0 / 5$

(b) $A_0 / 2$

(c) $A_0 / 10$

(d) A_0

5. Percentage Composition & Molecular Formula

1. A compound contains atoms of three elements in 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) $A_3(BC_4)_2$

(b) $A_3(B_4C)_2$

(c) ABC_2

(d) $A_2(BC_3)_2$

2. An organic compound contains carbon, hydrogen and oxygen. Its elemental analysis gave C, 38.71% and H, 9.67% and O, 51.62%. The empirical formula of the compound would be

(a) CHO

(b) CH_4O

(c) CH_3O

(d) CH_2O

3. 0.1 mole of a carbohydrate with empirical formula CH_2O contains 1g of hydrogen. What is its molecular formula

(a) $C_5H_{10}O_5$

(b) $C_6H_{12}O_6$

(c) $C_4H_8O_4$

(d) $C_3H_6O_3$

(e) $C_2H_4O_2$

4. The value of 'x' in $KAl(SO_4)_x \cdot 12H_2O$ is

(a) 1

(b) 2

(c) 3

(d) 4

5. One mole of one of the sodium salts listed below, having carbon content close to 14.3% produces 1 mole of carbon dioxide upon heating (atomic mass $Na = 23, H = 1$, $C = 12, O = 16$). The salt is

(a) C_2H_5COONa

(b) $NaHCO_3$

(c) $HCOONa$

(d) CH_3COONa

6. 1.25g of a metal (M) reacts with oxygen completely to produce 1.68g of metal oxide. The empirical formula of the metal oxide is [Molar mass of M and O are $69.7g \, mol^{-1}$ and $16.0g \, mol^{-1}$, respectively]

(a) M_2O

(b) M_2O_3

(c) MO_2

(d) M_3O_4

6. Chemical Stoichiometry and Method of Concentration Expression

1. Haemoglobin contains 0.33% of iron by weight. The molecular weight of haemoglobin is approximately 67200. The number of iron atoms (At. wt. of $Fe = 56$) present in one molecule of haemoglobin is

   (a) 6　　　　　　　　　(b) 1

   (c) 4　　　　　　　　　(d) 2

2. Number of hydrogen ions present in 10 millionth part of $1.33\ cm^3$ of pure water at $25°C$ is

   (a) 6.023 million　　　　(b) 60 million

   (c) 8.01 million　　　　 (d) 80.23 million

3. The solution of sulphuric acid contains 80% by weight H_2SO_4. Specific gravity of this solution is 1.71. Its normality is about

   (a) 18.0　　　　　　　　(b) 27.9

   (c) 1.0　　　　　　　　 (d) 10.0

4. Air contains 20% O_2 by volume. How much volume of air will be required for the oxidation of 100 cc of acetylene

   (a) 500 cc　　　　　　　(b) 1064 cc

   (c) 212.8 cc　　　　　　(d) 1250 cc

5. What is the stoichiometric coefficient of Ca in the reaction $Ca + Al^{3+} \rightarrow Ca^{2+} + Al$

   (a) 2　　　　　　　　　(b) 1

   (c) 3　　　　　　　　　(d) 4

6. 5 litres of a solution contains 25 mg of $CaCO_3$. What is its concentration in ppm (mol. wt. of $CaCO_3$ is 100)?

   (a) 25　　　　　　　　　(b) 1

   (c) 5　　　　　　　　　(d) 2500

7. 1 g of a mixture of $NaHCO_3$ and Na_2CO_3 is heated to $150°C$. The volume of the CO_2 produced at STP is 112.0 mL. Calculate the percentage of Na_2CO_3 in the mixture $(Na = 23, C = 12, O = 16)$

   (a) 20　　　　　　　　　(b) 46

   (c) 84　　　　　　　　　(d) 16

8. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reactant is left in excess and how much? (At. wt. $Mg = 24$; $O = 16$)

   (a) Mg, 0.44 g　　　　　(b) O₂, 0.28 g

   (c) Mg, 0.16 g　　　　　(d) O₂, 0.16 g

9. A mixture of ethane and ethene occupies 41 L at 1 atm and 500 K. The mixture reacts completely with $\dfrac{10}{3}$ mole of O_2 to produce CO_2 and H_2O. The mole fractions of ethane and ethene in the mixture are $(R = 0.082\ L\ atm\ K^{-1}\ mol^{-1})$ respectively

   (a) 0.50, 0.50　　　　　(b) 0.75, 0.25

   (c) 0.67, 0.33　　　　　(d) 0.25, 0.75

   (e) 0.33, 0.67

10. By dissolving 0.35 mole of sodium chloride in water, $1.30\ L$ of salt solution is obtained. The molarity of the resulting solution should be reported as

    (a) 0.3　　　　　　　　(b) 0.269

    (c) 0.27　　　　　　　 (d) 0.2692

11. $LiOH$ reacts with CO_2 to form Li_2CO_3 (atomic mass of $Li = 7$). The amount of CO_2 (in g) consumed by 1g of $LiOH$ is closest to

    (a) 0.916　　　　　　　(b) 1.832

    (c) 0.544　　　　　　　(d) 1.088

12. A solution $(5mL)$ of an acid X is completely neutralized by $Y\ mL$ of $1M\ NaOH$. The same volume $(Y\ mL)$ of $1M\ NaOH$ is required to neutralize $10\ mL$ of $0.6M$ of H_2SO_4 completely. The normality (N) of the acid X is

    (a) 1.2　　　　　　　　(b) 2.4

    (c) 4.8　　　　　　　　(d) 0.6

7. IIT-JEE/ AIEEE

1. The law of multiple proportions was proposed by **[1992]**

   (a) Lavoisier　　　　　　(b) Dalton

   (c) Proust　　　　　　　(d) Gay-Lussac

2. The sulphate of a metal M contains 9.87% of M. This sulphate is isomorphous with $ZnSO_4.7H_2O$. The atomic weight of M is **[1991]**

   (a) 40.3　　　　　　　　(b) 36.3

   (c) 24.3　　　　　　　　(d) 11.3

3. The weight of 1×10^{22} molecules of $CuSO_4.5H_2O$ is **[1991]**

   (a) 41.59 g　　　　　　(b) 415.9 g

   (c) 4.159 g　　　　　　(d) None of these

4. The equivalent weight of $MnSO_4$ is half its molecular weight when it is converted to **[1988]**

   (a) Mn_2O_3　　　　　　(b) MnO_2

   (c) MnO_4　　　　　　　(d) MnO_4^{2-}

5. In standardization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, the equivalent weight of $K_2Cr_2O_7$ is **[2000]**

   (a) $MW / 2$ (b) $MW / 3$

   (c) $MW / 6$ (d) $MW / 1$

6. One mole of calcium phosphide on reaction with excess of water gives **[1999]**

   (a) One mole of phosphine

   (b) Two moles of phosphoric acid

   (c) Two moles of phosphine

   (d) One mole of phosphorus pentaoxide

7. The molecular formula of a commercial resin used for exchanging ions in water softening is $C_8H_7SO_3Na$ (Mol. Wt. 206). What would be the maximum uptake of Ca^{2+} ions by the resin when expressed in mole per gram resin **[2015]**

   (a) $\dfrac{1}{103}$ (b) $\dfrac{1}{206}$

   (c) $\dfrac{2}{309}$ (d) $\dfrac{1}{412}$

8. If 10^{21} molecules are removed from $200 mg$ of CO_2, then the number of moles of CO_2 left are **[1983]**

   (a) 2.85×10^{-3} (b) 2.88×10^{-3}

   (c) 0.288×10^{-3} (d) 1.68×10^{-2}

9. $1.12 mL$ of a gas is produced at STP by the action of $4.12 mg$ of alcohol, with methyl magnesium iodide. The molecular mass of alcohol is **[1993]**

   (a) 16.0   (b) 41.2

   (c) 82.4   (d) 156.0

10. An aqueous solution of $6.3 g$ of oxalic acid dihydrate is made up of to $250 mL$. The volume of $0.1N$ $NaOH$ required to completely neutralise $10 mL$ of this solution is **[2001]**

    (a) $40 mL$ (b) $20 mL$

    (c) $10 mL$ (d) $4 mL$

11. 1 gram of a carbonate (M_2CO_3) on treatment with excess HCl produces 0.01186 mole of CO_2. The molar mass of M_2CO_3 in $g\,mol^{-1}$ is **[2017]**

    (a) 84.3   (b) 118.6

    (c) 11.86   (d) 1186

12. If we consider that 1/6, in place of 1/12, mass of carbon atom is taken to be the relative atomic mass unit, the mass of one mole of a substance will **[2005]**

    (a) Decrease twice

    (b) Increase two fold

    (c) Remain unchanged

    (d) Be a function of the molecular mass of the substance

13. How many moles of magnesium phosphate, $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atoms? **[2006]**

    (a) 0.02   (b) 3.125×10^{-2}

    (c) 1.25×10^{-2} (d) 2.5×10^{-2}

14. What volume of Hydrogen gas, at $273 K$ and 1 atm pressure will be consumed in obtaining $21.6 g$ of elemental boron (atomic mass = 10.8) from the reduction of boron trichloride by Hydrogen **[2003]**

    (a) $22.4 L$ (b) $89.6 L$

    (c) $67.2 L$ (d) $44.8 L$

15. In the reaction. $2Al_{(s)} + 6HCl_{(s)} \rightarrow 2Al^{3+}_{(aq)} + 6Cl^-_{(aq)} + 3H_{2(g)}$ **[2007]**

    (a) $6L\ HCl_{(aq)}$ is consumed for every $3L\ H_{2(g)}$ produced

    (b) $33.6L\ H_{2(g)}$ is produced regardless of temperature and pressure for every mole Al that reacts

    (c) $67.2L\ H_{2(g)}$ at STP is produced for every mole Al that reacts

    (d) $11.2L\ H_{2(g)}$ at STP is produced for every mole $HCl_{(aq)}$ consumed

8. NEET/ AIPMT/ CBSE-PMT

1. 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 $(Ag=107.8,\ N=14,\ O=16,\ Na=23,\ Cl=35.5.)$ **[2015]**

   (a) 28 g   (b) 3.5 g

   (c) 7 g   (d) 14 g

2. If Avogadro number N_A, is changed from $6.022 \times 10^{23}\ mol^{-1}$ to $6.022 \times 10^{20}\ mol^{-1}$ this would change **[2015]**

   (a) The definition of mass in units of grams

   (b) The mass of one mole of carbon

   (c) The ratio of chemical species to each other in a balanced equation

   (d) The ratio of elements to each other in a compound

3. Suppose the elements X and Y combine to form two compounds XY_2 and X_3Y_2. When 0.1 mole of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g, the atomic weights of X and Y are **[2016]**

   (a) 30, 20   (b) 40, 30

   (c) 60, 40   (d) 20, 30

4. In which case is the number of molecules of water maximum **[2018]**

   (a) $18 mL$ of water

   (b) $0.18g$ of water

   (c) $0.00224 L$ of water vapours at 1 atm and $273K$

   (d) 10^{-3} mol of water

5. 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? **[2015]**

(a) 75   (b) 96

(c) 60   (d) 84

6. An excess of $AgNO_3$ is added to $100\,mL$ of a $0.01\,M$ solution of dichlorotetraaquachromium (III) chloride. The number of moles of $AgCl$ precipitated would be **[2013]**

(a) 0.01   (b) 0.001

(c) 0.002   (d) 0.003

7. A mixture of 2.3 g formic acid and 4.5 g oxalic acid is treated with conc. H_2SO_4. The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be **[2018]**

(a) 1.4   (b) 3.0

(c) 2.8   (d) 4.4

9. AIIMS

1. A sample of pure carbon dioxide, irrespective of its source contains 27.27% carbon and 72.73% oxygen. The data support **[1992]**

(a) Law of constant composition

(b) Law of conservation of mass

(c) Law of reciprocal proportions

(d) Law of multiple proportions

2. The weight of a molecule of the compound $C_{60}H_{122}$ is **[2000]**

(a) $1.4 \times 10^{-21}\,g$ (b) $1.09 \times 10^{-21}\,g$

(c) $5.025 \times 10^{23}\,g$ (d) $16.023 \times 10^{23}\,g$

3. A compound possesses 8% sulphur by mass. The least molecular mass is **[2002, 15]**

(a) 200   (b) 400

(c) 155   (d) 355

4. The equivalent weight of phosphoric acid (H_3PO_4) in the reaction, $NaOH + H_3PO_4 \rightarrow NaH_2PO_4 + H_2O$ is **[1999]**

(a) 25   (b) 49

(c) 59   (d) 98

5. How many molecules are present in one gram of hydrogen? **[1982]**

(a) 6.02×10^{23} (b) 3.01×10^{23}

(c) 2.5×10^{23} (d) 1.5×10^{23}

6. The maximum amount of $BaSO_4$ precipitated on mixing equal volumes of $BaCl_2$ (0.5 M) with H_2SO_4 (1M) will correspond to **[1997]**

(a) 0.5 M   (b) 1.0 M

(c) 1.5 M   (d) 2.0 M

7. During electrolysis of water the volume of O_2 liberated is $2.24\,dm^3$. The volume of hydrogen liberated, under same conditions will be **[2008]**

(a) $2.24\,dm^3$ (b) $1.12\,dm^3$

(c) $4.48\,dm^3$ (d) $0.56\,dm^3$

8. If 30 mL of H_2 and 20 mL of O_2 react to form water, what is left at the end of the reaction **[2015]**

(a) 10 mL of H_2 (b) 5 mL of H_2

(c) 10 mL of O_2 (d) 5 mL of O_2

10. Assertion & Reason

Read the assertion and reason carefully to mark the correct option out of the options given below:

(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) If assertion is true but reason is false.

(d) If the assertion and reason both are false.

(e) If assertion is false but reason is true.

1. Assertion : Volume of a gas is inversely proportional to the number of moles of a gas.

Reason : The ratio by volume of gaseous reactants and products is in agreement with their mole ratio.

2. Assertion : Molecular weight of oxygen is 16.

Reason : Atomic weight of oxygen is 16.

3. Assertion : Atoms can neither be created nor destroyed.

Reason : Under similar condition of temperature and pressure, equal volume of gases does not contain equal number of atoms.

4. Assertion : A certain element X, forms three binary compounds with chlorine containing 59.68%, 68.95% and 74.75% chlorine respectively. These data illustrate the law of multiple proportions.

Reason : According to law of multiple proportions, the relative amounts of an element combining with some fixed amount of a second element in a series of compounds are the ratios of small whole numbers.

5. Assertion : Equivalent weight of a base $= \dfrac{\text{Molecular weight}}{\text{Acidity}}$

Reason : Acidity is the number of replaceable hydrogen atoms in one molecule of the base.

1. Some Basic Concepts of Chemistry – Answer Keys

1. Significant Figures, Units for Measurement, Importance and Scope of Chemistry

1	b	2	a	3	b	4	c

2. Laws of Chemical Combination

1	b	2	a	3	c	4	a	5	b

3. Atomic, Molecular and Equivalent Masses

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

4. The Mole Concept

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

5. Percentage Composition & Molecular Formula

1	a	2	c	3	a	4	b	5	b
6	b								

6. Chemical Stoichiometry and Method of Concentration Expression

1	c	2	c	3	b	4	d	5	c
6	c	7	d	8	c	9	c	10	b
11	a	12	b						

7. IIT-JEE/ AIEEE

1	b	2	c	3	c	4	b	5	c
6	c	7	d	8	a	9	c	10	a
11	a	12	c	13	b	14	c	15	d

8. NEET/ AIPMT/ CBSE-PMT

1	c	2	b	3	b	4	a	5	d
6	b	7	c						

9. AIIMS

1	a	2	a	3	b	4	d	5	b
6	a	7	c	8	d				

10. Assertion & Reason

1	e	2	e	3	c	4	a	5	c