Chapter 01 Some Basic Concepts of Chemistry

JEE RANKER'S STUFF

SINGLE CORRECT QUESTION

Q.1 4.0 g of caustic soda (molar mass = 40) contains same number of sodium ions as are present in-
(1) 10.6 g of Na_2CO_3 (mol. mass 106)
(2) 58.5 g of NaCl (Formula mass 58.5)
(3) 7.1 g of Na_2SO_4 (Formula mass 142)
(4) 1 mol of $NaNO_3$ (mol. mass 85)

Q.2 A gaseous mixture contains $CO_2(g)$ and $N_2O(g)$ in 2 : 5 ratio by mass. The ratio of the number of molecules of $CO_2(g)$ and $N_2O(g)$ is :
(1) 5 :2 (2) 2 : 5 (3) 1 : 2 (4) 5 : 4

Q.3 Weight of oxygen in Fe_2O_3 and FeO is in the simple ratio for the same amount of iron is :
(1) 3 : 2 (2) 1 : 2 (3) 2 : 1 (4) 3 : 1

Q.4 The pair of species having same percentage (mass) of carbon is :
(1) CH_3COOH and $C_6H_{12}O_6$
(2) CH_3COOH and C_2H_5OH
(3) $HCOOCH_3$ and $C_{12}H_{22}O_{11}$
(4) $C_6H_{12}O_6$ and $C_{12}H_{22}O_{11}$

Q.5 Calculate the molecular formula of compound which contains 20% Ca and 80% Br (by wt.) if molecular weight of compound is 200. (Atomic wt. Ca = 40, Br = 80)
(1) $Ca_{1/2}Br$ (2) $CaBr_2$ (3) CaBr (4) Ca_2Br

Q.6 The minimum quantity in gram of H_2S needed to precipitate 63.5 g of Cu^{+2} will be nearly
$Cu^{+2} + H_2S \longrightarrow CuS + 2H^+$
(1) 63.5 g (2) 31.75 g (3) 34 g (4) 20 g

Q.7 Phosphine (PH_3) decomposes to produce vapours of phosphorus and H_2 gas. What will be the change in volume when 100 mL of phosphine is decomposed ?
$4PH_3(g) \longrightarrow P_4(g) + 6H_2(g)$
(1) + 50 mL (2) 500 mL
(3) + 75 mL (4) – 500 mL

Q.8 Calculate the amount of Ni needed in the Mond's process given below
$Ni + 4CO \longrightarrow Ni(CO)_4$
If CO used in this process is obtained through a process, in which 6 g of carbon is mixed with 44 g CO_2.
(1) 14.675 g (2) 29 g
(3) 58 g (4) 28 g

Q.9 $A + B \rightarrow A_3B_2$ (unbalanced)
$A_3B_2 + C \rightarrow A_3B_2C_2$ (unbalanced)
Above two reactions are carried out by taking 3 moles each of A and B and one mole of C. Then which option is/are correct ?
(1) 1 mole of $A_3B_2C_2$ is formed
(2) 1/3 mole of $A_3B_2C_2$ is formed
(3) 1/2 mole of A_3B_2 is formed
(4) 1/2 mole of A_3B_2 is left finally

Q.10 What is the molarity of H_2SO_4 solution that has a density of 1.84 g/cc and contains 98% by mass of H_2SO_4? (Given atomic mass of S = 32)
(1) 4.18 M (2) 8.14 M
(3) 18.4 M (4) 18 M

Q.11 125 mL of 8% w/w NaOH solution (specific gravity 1) is added to 125 mL of 10% w/v HCl solution.

The nature of resultant solution would be _____.

(1) Acidic (2) Basic
(3) Neutral (4) None

Q.12 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

Q.13 The density of a solution prepared by dissolving 120 g of urea (mol. mass = 60 u) in 1000 g of water is 1.15 g/mL. The molarity of this solution is:

(1) 2.05 M (2) 0.50 M (3) 1.78 M (4) 1.02 M

Q.14 A gaseous hydrocarbon gives upon combustion 0.72 g of water and 3.08 g of CO_2. The empirical formula of the hydrocarbon is

(1) C_2H_4 (2) C_3H_4 (3) C_6H_5 (4) C_7H_8

Q.15 A certain alkaloid has 70.8% carbon, 6.2% hydrogen, 4.1% nitrogen and the rest oxygen. What is its empirical formula?

(1) $C_{20}H_{21}NO_4$ (2) $C_{20}H_{20}NO_4$
(3) $C_{21}H_{20}NO_3$ (4) $C_{20}H_{19}NO_3$

Q.16 $CaCO_3$ is 90% pure. Volume of CO_2 collected at STP when 10 g of $CaCO_3$ is decomposed is -

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

Q.17 50 g $CaCO_3$ will react with ..... g of 20% HCl by weight.

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

Q.18 0.01 mole of iodoform (CHI_3) reacts with Ag to produce a gas whose volume at NTP is

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

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

Q.19 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

Q.20 2.76 g of silver carbonate on being strongly heated yields a residue weighing

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

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

Q.21 The volume of gas at NTP produced by 100 g 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

Q.22 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}

Q.23 A sample of ammonium phosphate $(NH_4)_3PO_4$ contains 3.18 mol of H atoms. The number of mol of O atoms in the sample is :

(1) 0.265 (2) 0.795
(3) 1.06 (4) 3.18

Q.24 1 g of HCl and 1gm of MnO_2 heated together the maximum weight of Cl_2 gas evolved will be

$[MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O]$

(1) 2g (2) 0.975 g
(3) 0.486g (4) 0.972 g

Q.25 Cortisone is a molecular substance containing 21 atoms of carbon per molecule. The mass percentage of carbon in cortisone is 69.98%. Its molar mass is :

(1) 176.5 (2) 252.2
(3) 287.6 (4) 360.1

Q.26 The empirical formula of a compound of molecular mass 120 is CH_2O. The molecular formula of the compound is :

(1) $C_2H_4O_2$ (2) $C_4H_8O_4$

(3) $C_3H_6O_3$ (4) all of these

Q.27 1 litre of a hydrocarbon weights as much as one litre of CO_2. Then the molecular formula of the hydrocarbon is :

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

Q.28 The volume of oxygen required for complete combustion of 20 ml of ethene is

(1) 30 ml (2) 60 ml (3) 40 ml (4) 50 ml

Q.29 When sodium bicarbonate is heated 3.6×10^{24} molecules of water are obtained. Find the moles of sodium bicarbonate heated.

$NaHCO_3 \longrightarrow Na_2CO_3 + CO_2 + H_2O$

(1) 6 (2) 12 (3) 9 (4) 8

Q.30 Equal moles of H_2O and NaCl are present in a solution. Hence, molality of NaCl solution is :

(1) 0.55 (2) 55.5

(3) 1.00 (4) 0.18

Q.31 Decreasing order of mass of pure NaOH in each of the aqueous solution.

(I) 50 g of 40% (W/W) NaOH

(II) 50 ml of 50% (W/V) NaOH (d_{sol} = 1.2 g/ml).

(III) 50 g of 15 M NaOH (d_{sol} = 1 g/ml).

(1) I, II, III (2) III, II, I

(3) II, III, I (4) III = II = I.

Q.32 The density (in g mL^{-1}) of a 3.60 M sulphuric acid solution that is 29% (H_2SO_4 molar mass = 98 g mol^{-1}) by mass will be :

(1) 1.22 (2) 1.45 (3) 1.64 (4) 1.88

Q.33 A 5.2 molal aqueous solution of methyl alcohol, (CH_3OH), is supplied. What is the mole fraction of methyl alcohol in the solution?

(1) 0.100 (2) 0.190

(3) 0.086 (4) 0.050

NUMERICAL VALUE TYPE QUESTIONS

Q.34 What volume of a liquid (in L) will contain 10 mole ? If molar mass of liquid is 280 and its density is 1.4g/mL.

Q.35 Calculate the total moles of atoms of each element present in 122.5 g of $KClO_3$.

Q.36 A sample of gaseous hydrocarbon occupying 1.12 litre at NTP. when completely burnt in air produced 2.2 g CO_2 and 1.8 g H_2O Calculate the weight of hydrocarbon taken.

Q.37 Chemical absorbers can be used to remove exhaled CO_2 of space travellers in short space flights. Li_2O is one of the most efficient in terms of absorbing capacity pre unit weight. If the reaction is $Li_2O + CO_2 \rightarrow LiCO_3$. What is the absorption efficiency of pure Li_2O in litre CO_2 (STP) per kg? [atomic weight of Li = 7]

Q.38 What volume of water is required to make 0.20 N solution from 1600 mL of 0.2050 N solution?

Q.39 Calculate normality of NH_4OH when 2 g is present in 800 mL solution.

Q.40 Density of ozone relative to methane under the same temperature & pressure conditions is :

Q.41 Formation of polyethene from calcium carbide takes place as follows :

$CaC_2 + H_2O \rightarrow Ca(OH)_2 + C_2H_2 \rightarrow C_2H_4$; $n(C_2H_4) \rightarrow (-CH_2-CH_2-)n$.

The amount of polyethylene possibly obtainable from 64.0 kg CaC_2 can be

Q.42 21.6 g of silver coin is dissolved in HNO_3. When NaCl is added to this solution, all silver is precipitated as AgCl. The weight of AgCl is found to be 14.35 g then % of silver in coin is :

Q.43 The molality of a sulphuric acid solution is 0.2. Calculate the total weight of the solution having 1000 g of solvent.

STATEMENT TYPE QUESTIONS

Each question contains STATEMENT-1 (Assertion) and STATEMENT-2 (Reason.)

Examine the statements carefully and mark the correct answer according to the instructions given below:

(A) If both the statements are correct and STATEMENT-2 is the correct explanation of STATEMENT-1.

(B) If both the statements are correct but STATEMENT-2 is NOT the correct explanation of STATEMENT-1.

(C) If STATEMENT-1 is correct and STATEMENT-2 is incorrect.

(D) If STATEMENT-1 is incorrect and STATEMENT-2 is correct.

Q.44 **STATEMENT-1:** Specific gravity is dimensionless.
STATEMENT-2: Specific gravity is density of a substance measured w.r.t. density of water at 4°C
(1) A (2) B (3) C (4) D

Q.45 **STATEMENT-1:** Gram molecular mass of O_2 is 32g.
STATEMENT-2: Relative atomic mass of oxygen is 32 a.m.u.
(1) A (2) B (3) C (4) D

Q.46 **STATEMENT-1:** Molarity of pure water is 55.55 M at 298 K.
STATEMENT-2: Molarity is temperature dependent.
(1) A (2) B (3) C (4) D

Q.47 **STATEMENT-1:** The number of atoms in a given mass of dioxygen (oxygen) and trioxygen (ozone) gasses is same
STATEMENT-2: The number of atoms depends on atomic mass, not on molecular mass.
(1) A (2) B (3) C (4) D

MORE THAN ONE CORRECT TYPE QUESTIONS

Q.48 Which of the following statement regarding the compound A_xB_y is/are correct
(1) 1 mole of A_xB_y contains 1 mole of A and 1 mole B
(2) 1 equivalent of A_xB_y contains 1 equivalent of A and 1 equivalent of B
(3) 1 mole of A_xB_y contains x moles of A and Y moles of B
(4) equivalent mass of A_xB_y = equivalent mass of A + equivalent mass of B

Q.49 Solution containing 23 g HCOOH is /are :
(1) 46 g of 70% $\left(\frac{w}{V}\right)$ HCOOH ($d_{solution}$ = 1.40 g/mL)
(2) 50 g of 10 M HCOOH ($d_{solution}$ = 1 g/mL)
(3) 50 g of 25% $\left(\frac{w}{w}\right)$ HCOOH
(4) 46 g of M HCOOH ($d_{solution}$ = 1 g/mL)

Q.50 Which of the following statement(s) is/are correct for water?
(1) H and O are in 2 : 1 atomic ratio
(2) H and O are in 2 : 1 mass ratio
(3) H and O are in 1 : 8 mass ratio
(4) Hydrogen and oxygen gases are combined in 2 : 1 volume ratio

Q.51 The oxygen needed for complete combustion of 8g CH_4 may be obtained from complete decomposition of
(1) 2/3 mole $KClO_3$
(2) 1 mole of H_2O_2
(3) 2 mole of $NaNO_3$ (up to 300°C)
(4) 2 mole of BaO_2

Q.52 When hydrocarbons are burnt completely in excess of oxygen gas, then
(1) equal moles of CO_2 and H_2O are formed form alkenes.
(2) more moles of H_2O than CO_2 are formed from alkanes.

(3) more moles of CO_2 then H_2O are formed from alkynes

(4) more moles of CO_2 then H_2O are formed for any kind of hydrocarbon

COMPREHENSION TYPE QUESTIONS

Q.53 Oleum is considered as a solution of SO_3 in H_2SO_4. Which is obtained by passing SO_3 in solution of H_2SO_4. When 100 g sample of oleum is diluted with desired mass of H_2O then the total mass of H_2SO_4 obtained after dilution is known as % labelling in oleum.

For example, A oleum bottle labelled as '109% H_2SO_4' means the 109 g total mass of pure H_2SO_4 will be formed when 100 g of oleum is diluted by 9 g of H_2O which combines with all the free SO_3 present in oleum to form H_2SO_4 as $SO_3 + H_2O \rightarrow H_2SO_4$.

(i) What is the % of free SO_3 in an oleum that is labelled as '104.5% H_2SO_4'?

(1) 10 (2) 20 (3) 40 (4) None

(ii) 9.0 g water is added into oleum into sample labelled as "112%" H_2SO_4 then the amount of free SO_3 remaining in the solution is : (STP = 1 atm and 273 K)

(1) 14.93 L at STP (2) 7.46 L at STP

(3) 3.73 L at STP (4) 11.2 L at STP

(iii) If excess water is added into bottle sample labelled as "112% H_2SO_4" and is reacted with 5.3 & Na_2CO_3, then find the volume of CO_2 evolved at 1 atm pressure and 300 K temperature after the completion of the reaction:

(1) 2.46 L (2) 24.6 L (3) 1.23 L (4) 12.3 L

(iv) 1 g of oleum sample is diluted with water. The solution required 54 mL of 0.4 N NaOH for complete neutralization. The % of free SO_3 in the sample is :

(1) 74 (2) 26

(3) 20 (4) None of these

Q.54 Consider the following series of reactions

$Cl_2 + 2NaOH \rightarrow NaCl + NaClO + H_2O$

$3NaClO \rightarrow 2NaCl + NaClO_3$

$4NaClO_3 \rightarrow 3NaClO_4 + NaCl$

(i) How much Cl_2 is required prepare 122.5 g of $NaClO_4$ by above sequential reaction?

(1) 284 g (2) 213 g (3) 142 g (4) 71 g

(ii) How many moles of NaCl will be formed by using 1 mole Cl_2 and other reagents in excess?

(1) $\frac{1}{12}$mole (2) 1.67 mole

(3) 1.75 mole (4) 0.75 mole

(iii) How many moles of $NaClO_3$ obtained after the complection of reaction by taking 1 mole Cl_2 and other reagents in excess?

(1) $\frac{1}{3}$mole (2) Zero

(3) $\frac{1}{4}$mole (4) 1 mole

MATCH THE COLUMN TYPE QUESTIONS

Q.55 Match the column.

Column-I	Column-II
(A) 44 g CO_2 gas	(P) 1 g molecule
(B) 35.2 g of CH_4	(Q) N_A molecule
(C) 48 g of O_3 gas	(R) 22 N_A electrons
(D) 44 g of N_2O gas	(S) 49.28 L at 1 atm and 273 K
	(T) N_A atoms of oxygen

(1) A → R, P, Q; B → R, S; C → P, Q; D → P, Q, R, T

(2) A → P, Q, R; B → R, S; C → P, Q; D → P, R, Q, T

(3) A → P, Q, R; B → R, S; C → P, Q; D → P, Q, R, T

(4) A → P, Q, R; B → S, R; C → P, Q; D → P, Q, R, T

Q.56 Match the column.

Column-I	Column-II
(A) 0.5 mole of SO_2 (g)	(P) Occupy 11.2 L at 1 atm and 273 K
(B) 1 g of H_2 (g)	(Q) Weighs 24 g
(C) 0.5 mole of O_3 (g)	(R) Total no. of atoms = 1.5 × N_A
(D) 1 g molecule of O_2 (g)	(S) Weighs 32 g

(1) A → P, R, S; B → P; C → Q, R, P; D → S

(2) A → P, S, R; B → P; C → P, Q, R; D → S

(3) A → S, R, P; B → R; C → P, R, Q; D → P

(4) A → P, R, S; B → P; C → P, Q, R; D → S

ANSWER KEY

JEE RANKER'S STUFF

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	2	1	1	2	3	3	1	4	3	1	1	1	4	1
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	1	4	2	3	1	2	3	3	3	4	2	1	2	2	2
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	2	1	3	0.8	0	2	746.7	40	0.07	3	28	50	1020	1	3
Que.	46	47	48	49	50	51	52	53 (i)	53 (ii)	53 (iii)	53 (iv)	54 (i)	54 (ii)	54 (iii)	55
Ans.	2	1	2,3,4	1,2	1,3,4	1,3,4	1,2,3	2	3	3	2	1	3	2	3
Que.	56														
Ans.	4														