CHEMISTRY

BOOKS - IIT-JEE PREVIOUS YEAR (CHEMISTRY)

SOME BASIC CONCEPTS OF CHEMISTRY

Jee Main And Advanced

1. The most abundant elements by mas in the body of a healthy human adult are Oxygen (61.4%), Carbon (22.9%). Hydrogen $(10.0)\%)$, and Nitrogen (2.6%). The weight which a $75kg$ person would gain if all $._{}^{1}H$ atoms are replaced by $._{}^{2}H$ atoms is

A. 15 kg

B. 37.5 kg

C. 7.5 kg

D. 10 kg

Answer: C

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2. $1g$ 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 $gmol^{-1}$ is

A. 1186

B. 84.3

C. 118.6

D. 11.86

Answer: D

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3. At $300K$ and $1atm$, $15mL$ of a gaseous hydrocarbon requires $375mL$ air containing $20\%\ O_2$ by volume for complete combustion. After combustion, the gases occupy $330mL$. Assuming that the water formed is in liquid form and the volumes were measured at the same temperature and pressure, the formula of the hydrocarbon is

A. C_3H_8

B. C_4H_8

C. C_4H_{10}

D. C_3H_6

Answer:

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4. 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?

A. $\frac{1}{103}$

B. $\frac{1}{206}$

C. $\frac{2}{309}$

D. $\frac{1}{412}$

Answer: D

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5. $3g$ of actived chacoal was added to 50mL of acetic acid solution $(0.06N)$ in a flask. After an hour it was filterred and the strength of the filtrate was found to be $0.042N$. The amount of acetic adsorbed (per gram of charcoal) is:

A. $18mg$

B. $36mg$

C. $42mg$

D. $54mg$

Answer: D

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6. A gases mixture contains oxygen and nitrogen in the ratio $1:4$ by weight. Therefore, the ratio of the number of molecules is:

A. $1:4$

B. $7:32$

C. $1:8$

D. $3:16$

Answer: B

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7. The molarity of a solution obtained by mixing 750 mL of 0.5 M HCl with 250 mL of 2 M HCl will be

A. $0.875M$

B. $1.00M$

C. $1.75M$

D. $0.0975M$

Answer: A

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8. Dissolving $120g$ of urea $(Mw = 60)$ in $1000g$ of water gave a solution of density $1.15gmL^{-1}$. The molarity of solution is:

A. $1.78m$

B. $2.00M$

C. $2.05M$

D. $2.22M$

Answer: C

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9. Given that the abundacne of isotopes $.^{54}Fe$, $.^{56}Fe$, and $.^{57}Fe$ is 5%, 90% and 5% respectively. The atomic mass of Fe is

A. 55.85

B. 55.95

C. 55.75

D. 56.05

Answer: B

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10. A mixture x containing 0.02 mol of $\left[Co(NH_3)_5SO_4\right]Br$ and 0.02 mol of $\left[Co(NH_3)_5Br\right]SO_4$ was prepared in $2L$ of solution.

$1L$ of mixture $X +$ excess $AgNO_3 \rightarrow Y$

$1L$ of mixture $X +$ excess $BaCl_2 \rightarrow Z$

The number of moles of Y and Z are

A. $0.01, 0.01$

B. $0.02, 0.01$

C. $0.01, 0.02$

D. $0.02, 0.02$

Answer: A

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11. Which of the following has the maximum number of atoms?

A. $24g$ of $C(12)$

B. $56g$ of $Fe(56)$

C. $27g$ of $Al(27)$

D. $108g$ of $Ag(108)$

Answer: A

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12. How many moles of electrons weigh $1kg$?

A. 6.023×10^{23}

B. $\frac{1}{9.108} \times 10^{31}$

C. $\frac{6.023}{9.108} \times 10^{54}$

D. $\frac{1}{9.108 \times 6.023} \times 10^{8}$

Answer: D

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13. The normality of $0.3M$ phosphorous acid (H_3PO_3) is

A. 0.1

B. 0.9

C. 0.3

D. 0.6

Answer: D

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14. In which mode of expression, the concentration of a solution remains independent of temperature?

A. Molarity

B. Normality

C. Formality

D. Molality

Answer: D

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15. A molal solution is one that contains one mole of a solute in:

A. $1000g$ of solvent

B. $1.0L$ of solvent

C. $1.0L$ of solution

D. $22.4L$ of solution

Answer: A

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16. If 0.50 mol of $BaCl_2$ is mixed with 0.20 mol of Na_3PO_4, the maximum number of moles of $Ba_3(PO_4)_2$ that can be formed is

A. 0.70

B. 0.50

C. 0.20

D. 0.10

Answer: D

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17. When $2.76g$ of silver carbonate is strongly heated, it yields a residue weighing

A. $2.16g$

B. $2.48g$

C. $2.32g$

D. $2.64g$

Answer: A

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18. When the same amount of zinc is treated separately with excess of sulphric acid and excess of sodium hydroxide, the ratio of volume of hydrogen evolved is

A. $1:1$

B. $1:2$

C. $2:1$

D. $9:4$

Answer: A

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19. The largest number of molecules in

A. $36g$ of water

B. $28g$ of CO

C. $46g$ of ethyl alcohol

D. $54g$ of nitrogen pentaoxide (N_2O_5)

Answer: A

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20. The total number of electrons in one molecular of carbon dioxide is

A. 22

B. 44

C. 66

D. 88

Answer: A

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21. A gases mixture contains oxygen and nitrogen in the ratio $1:4$ by weight. Therefore, the ratio of the number of molecules is:

A. $1:4$

B. $1:8$

C. $7:32$

D. $3:16$

Answer: C

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22. The weight of 1×10^{22} molecules of $CuSO_4.5H_2O$ is

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23. Three grams of salt of molecular weight 30 is dissolved in $250g$ of water. The molality of the solution is....

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24. The total number of electrons present in $18mL$ of water is .....

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25. The modern atomic mass unit if based on the mass of .....

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26. The mole fraction of a solute in a solutions is 0.1. At $298K$ molarity of this solution is the same as its molality. Density of this solution at 298 K is $2.0gcm^{-3}$. The ratio of the molecular weights of the solute and solvent, $\frac{MW_{\text{solute}}}{MW_{\text{solvent}}}$ is

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27. A compound H_2X with molar mass of $80g$ is dissolved in a solvent having density of $0.4gmL^{-1}$. Assuming no change in volume upon dissolution, the molality of a 3.2 molar solution is

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28. $29.2\,\%\,(W/W)HCl$ stock solution has density of $1.25gmL^{-1}$. The molar mass of HCl is $36.5gmol^{-1}$. The volume (mL) of stock solution required to prepare a $200mL$ solution of $0.4MHCl$ is

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29. Around $20\,\%$ surface sites have adsorbed N_2. On heating N_2 gas evolved form sites and were collected at 0.001 atm and 298 K in a container of volume $2.46cm^3$ the density of surface sites is $6.023\times10^{14}cm^{-2}$ and surface area is $1000cm^2$ find out the number of surface sites occupied per molecule of N_2.

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30. $1g$ charcoal is placed in $100mL$ of $0.5MCH_3COOH$ to form an adsorbed mono-layer of acetic acid molecule and thereby the molarity of CH_3COOH reduces to 0.49. Calculate the surface area of charcoal adsorbed by each molecule of acetic acid. Surface are of charocal $= 3.01 \times 10^2 m^2/g$.

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31. Calculate the molarity of water if its density is $1000kgm^{-3}$

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32. A plant virus is found to consist of uniform cylindrical particle of $150Å$ in diameter 5000 Å long. The specific volume of the virus is 0.75 mLg^{-1}. If the virus is considered to be a single particle, find its molar mass.

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33. $8.0575 \times 10^{-2} kg$ of Glauber's slat is dissolved in water to obtain $1 dm^3$ of a solution of density $1077.2 kgm^{-3}$. Calculate the molarity, molality and mole fraction of Na_2SO_4 in solution.

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34. Upon mixing $50.0 mL$ of $0.1 M$ lead nitrate solution with $50.0 mL$ of $0.05 M$ chromic sulphate solution, precipitation of lead sulphate takes place. How many moles of lead sulphate are formed? Also, calculate the molar concentration of the species left behind in the final solution. Which is the limiting reagent?

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35. Calculate the molality of $1 L$ solution of $93\ \%\ H_2SO_4$ (Weight/volume) The density of the solution is $1.84 g$.

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36. A solid mixture $5g$ consists of lead nitrate and sodium nitrate was heated below $600^{\circ}C$ until weight of residue was constant. If the loss in weight is $28\,\%$ find the amount of lead nitrate and sodium nitrate in mixture.

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37. n-butane is produced by the monobromination of ethane followed by Wurtz reaction. Calculate the volume of ethane at NTP to produce $55g$ n-butane if the bromination takes place with $90\,\%$ yield and the Wurtz reaction with $85\,\%$ yield.

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38. A sugar syrup of weight $214.2g$ contains $34.2g$ of sugar $(C_{12}H_{22}O_{11})$. Calculate

a. the molal concentration.

b. the mole fraction of the sugar in the syrup.

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39. An organic compound contains 69.77% carbon, 11.63% hydrogen, and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollens reagent but forms an aditional compound with sodium hydrogensulphite and gives positive iodoform test. On vigorous oxidation, it gives ethanoic and propanoic acid. Write the possible structure of the compound.

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40. The density of $3M$ sodium of thiosulphate solution $(Na_2S_2O_3)$ is $1.25 gmL^{-1}$. Calculate

a. The precentage by weight of sodium thiosulphate.

b. The mole fraction of sodium thiosulphate.

c. The molalities of $Na^{\oplus}$ and $S_2O_3^{2-}$ ions.

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41. One litre of mixture of CO and CO_2 is passed through red hot charcoal in tube. The new volume becomes 1.4 litre. Find out % composition of mixture by volume. All measurements are made at same P and T

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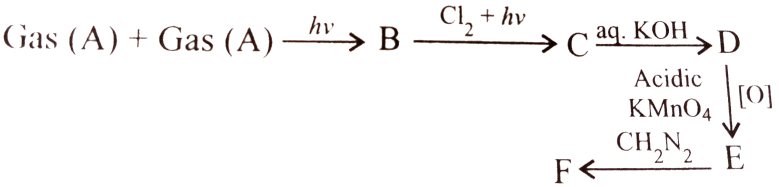
42. Five millilitires of a gas (A) containing only C and H was mixed with an excess of oxygen (30 ml) and the mixture was exploded by means of an electric spaek. After the explosion, the remaining volume of the mixed gasses was 25 ml. On adding a concentrated solution of KOH, the volume further diminished to 15 ml. The residual gas being pure oxyges.



The molecular formula of gas (A) is:

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43. IN the analysis of $0.5g$ sample of feldspar, a mixture of chlorides of sodium and potassium is obtained which weighs $0.1180g$. Subsequent treatment of the mixed chlorides with silver nitrate gives $0.2451g$ of silver chloride. What is the percentage of sodium oxide and potassium oxide in the sample ?

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44. The vapour density of a mixture consisting of NO_2 and N_2O_4 is 38.3 at $275K$. The number of moles of NO_2 in the mixture:

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45. Account for the following. limit your answer to two sentences: 'Atomic weight of most of the elements are fractional'.

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46. Naturally occurring boron consists of two isotopes whose atomic weight are $10.01 \text{ and } 11.01$. The atomic weight of the natural boron is 10.81. Calculate the percentage of each isotopes in natural boron.

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47. From the following statements regarding H_2O_2, choose the incorrect statements:

A. It can act only as an oxidising agent

B. It decomposed on exposure to light

C. It has to be stored in plastic or wax lined glass bottles in dark

D. It has to be kept away from dust

Answer: A

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48. Consider a titration of potassium dichromate solution with acidified Mohr's salt solution using diphenylamine as indicator. The number of moles of Mohr's salt required per mole of dichromate is:

A. 3

B. 4

C. 5

D. 6

Answer: D

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49. In the neutralization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by idometry, the equivalent weight of $K_2Cr_2O_7$ is

A. (molecular weight)/2

B. (molecular weight)/6

C. (molecular weight)/3

D. same as molecular weight

Answer: B

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50. The reaction

$3ClO^{\ominus}(aq) \rightarrow ClO_3(aq) + 2Cl^{\ominus}(aq)$

is an example of

A. oxidation reaction

B. reduction reaction

C. disproportionation reaction

D. decomposition reaction

Answer: C

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51. An aqueous solution of $6.3g$ oxalic acid dihydrate is made up to $250mL$. The volume of $0.1NNaOH$ required to completely neutralise $10mL$ of this solution is

A. $40mL$

B. $20mL$

C. $10mL$

D. $4mL$

Answer: A

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52. Among the following, identify the species with an atom in $+6$ oxidation state.

A. MnO_4^-

B. $Cr(CN)_6^{3-}$

C. NiF_6^{2-}

D. CrO_2Cl_2

Answer: D

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53. The oxidation number of S in S_8, S_2F_2, and H_2S, respectively, are

A. $0, +1$ and -2

B. $+2, +1$ and -2

C. $0, +1$ and +2

D. $-2, +1$ and -2

Answer: A

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54. The number of mole of $KMnO_4$ that will be needed to react completely with one mole of ferrous oxalate in acidic solution is:

A. $\frac{2}{5}$

B. $\frac{3}{5}$

C. $\frac{4}{5}$

D. 1

Answer: B

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55. The number of moles of $KMnO_4$ that will be needed to react with $1mol$ of sulphite ion in acidic solution is

A. $\frac{2}{5}$

B. $\frac{3}{5}$

C. $\frac{4}{5}$

D. 1

Answer: A

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56. For the redox reaction

$$MnO_4^{\ominus} + C_2O_4^{2-} + H^{\oplus} \rightarrow Mn^{2+} + CO_2 + H_2O$$

the correct coefficients of the reactions for the balanced reaction are

	MnO_4^-	$C_2O_4^{2-}$	H^+
A.	2	5	16
B.	16	5	2
C.	5	16	2
D.	2	16	5

Answer: A

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57. The volume strength of $1.5NH_2O_2$ solution is

A. 4.8

B. 8.4

C. 3.0

D. 8.0

Answer: B

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58. Oxidation number of P in $Ba(H_2PO_2)_2$ is

A. $+3$

B. $+2$

C. $+1$

D. -1

Answer: C

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59. The equivalent weight of $MnSO_4$ is half its molecular weight when it is converted to

A. Mn_2O_3

B. MnO_2

C. MnO_4^-

D. MnO_4^-

Answer: B

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60. For the reaction: $I^{\Theta} + ClO_3^{\Theta} + H_2SO_4 \rightarrow Cl^{\Theta} + HSO_4^{\Theta} + I_2$

The correct statement(s) in the balanced equation is/are

A. stoichiometric coefficient of HSO_4^- is 6

B. iodide is oxidised

C. sulphur is reduced

D. H_2O is one of the products

Answer: A::B::D

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61. Assertion: In the titration of Na_2CO_3 with HCl using methyl orange indicator, the volume of acid required is twice that of the acid required using phenolphthalein as indicaton.

Reason: Two moles of HCl are required for the complete neutralisation of one mole of Na_2CO_3.

A. Statement I is true, Statement II is true, Statement II is the correct explanation of Statement I.

B. Statement I true, Statement II is true, Statement II is not the correct explanation of Statement I.

C. Statement I is true, Statement II is false

D. Statement I is false, Statement II is true.

Answer: B

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62. The compound $Yba_2Cu_3O_7$ which shows super conductivity has copper in oxidation state____. Assume that the rare earth element yttrium is in its usual $+3$ oxidation state.

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63. The difference in the oxidation numbers of two types of sulphul atoms in $Na_2S_4O_6$ is.....

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64. Among the following , the number of elements showing only one non-zero oxidation state is:

$O, C, F, N, P, Sn, Tl, Na, Ti$

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65. A student of performs a titration with different burettes and finds titre values of $25.2mL$, $25.25mL$, and $25.0mL$. The number of significant figures in the average titre value is .....

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66. Calculate the amount of calcium oxide required when it reacts with $852g$ of P_4O_{10}.

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67. Hydrogen peroxide solution $(20mL)$ reacts quantitatively with a solution of $KMnO_4(20mL)$ acidified with dilute of H_2SO_4. The same volume of the $KMnO_4$ solution is just decolourised by $10mL$ of $MnSO_4$ in neutral medium simultaneously forming a dark brown precipitate of hydrated MnO_2. The brown precipitate is dissolved in $10mL$ of $0.2M$ sodium oxalate under boiling condition in the presence of dilute H_2SO_4. Write the balanced equations involved in the reactions and calculate the molarity of H_2O_2.

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68. Calculate the volume of 0.5 M H_2SO_4 required to dissolve 0.5 g of copper (II) carbonate $(CuCO_3)$.

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69. An aqueous solution containing 0.10 g KIO_3 (formula weight $= 214.0$) was treated with an excess of KI solution the solution was acidified with

HCl. The liberated I_2 consumed 45.0 " mL of " thiosulphate solution to decolourise the blue starch-iodine complex. Calculate the molarity of the sodium thosulphate solution.

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70. To a 25 mL H_2O_2 solution excess of an acidified solution of potassium iodide was added. The iodine liberated required 20 " mL of " 0.3 N sodium thiosulphate solution Calculate the volume strength of H_2O_2 solution.

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71. A $3.0g$ sample containing Fe_3O_4, Fe_2O_3 and an inert impure substance is treated with excess of KI solution in presence of dilute H_2SO_4. The entire iron is converted to Fe^{2+} along with the liberation of iodine. The resulting solution is diluted to $100mL$. A $20mL$ of dilute solution requires $11.0mL$ of $0.5MNa_2S_2O_3$ solution to reduce the iodine present. A $50mL$ of the diluted solution, after complete extraction of iodine requires $12.80mL$ of $0.25MKMnO_4$ solution in dilute H_2SO_4

medium for the oxidation of Fe^{2+}. Calculate the percentage of Fe_2O_3 and Fe_3O_4 in the original sample.

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72. A 20 mL mixture of CO, CH_4, and Helium (He) gases is exploded by an electric discharge at room temperature with excess of oxygen. The volume contraction is found to be 13 mL. A further contraction of 14 mL occurs when the residual gas is treated wityh KOH solution. Find out the composition of the gaseous mixture in terms of volume percentage.

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73. A $5.0mL$ of solution of H_2O_2 liberates $0.508g$ of iodine from acidified KI solution. Calculate the strength of H_2O_2 solution in terms of volume strength at STP.

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74. $1g$ sample of $AgNO_3$ is dissolved in $50mL$ of water, It is titrated with $50mL$ of KI solution. The Aglpercipitated is filtered off. Excess of KI filtrate is titrated with $M/10KIO_3$ in presence of $6MHCl$ till all I^- converted into ICI. It requires $50mL$ of $M/10KIO_3$ solution. $20mL$ of the same stock solution of KI requires $30mL$ of $M/10KIO_3$ under similar conditions. Calculate $\%$ of $AgNO_3$ in sample. The reaction is

$KIO_3 + 2KI + 6HCl \rightarrow 3ICl + 3KCl + 3H_2O$

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75. A $2.0g$ sample of a mixture containing sodium carbonate, sodium bicarbonate and sodium sulphate is gently heated till the evolution of CO_2 ceases. The volume of CO_2 at $750mmHg$ pressure and at $298K$ is measured to be $123.9mL$. A $1.5g$ of the same sample requires $150mL$ of $(M/10)HCl$ for complete neutralisation. Calculate the percentage composition of the components of the mixture.

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76. A $1g$ sample of Fe_2O_3 solid of $55.2\,\%$ purity is dissolved in acid and reduced by heating the solution with zinc dust. The resultant solution is cooled and made upto $100mL$. An aliquot of $25mL$ of this solution requires $17mL$ of $0.0167M$ solution of an oxidant for titration. Calculate no.of electrons taken up by oxidant in the above titration.

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77. A solution of $0.2g$ of a compound containing Cu^{2+} and $C_2O_4^{2-}$ ions on titration with $0.02MKMnO_4$ in presence of H_2SO_4 consumes $22.6mL$ oxidant. The resulting solution is neutralized by Na_2CO_3, acidified with dilute CH_3COOH and titrated with excess of KI. The liberated I_2 required $11.3mL\text{of}0.05MNa_2S_2O_3$ for complete reduction. Find out mole ratio of Cu^{2+} and $C_2O_4^{2+}$ in compound.

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78. A mixture of $H_2C_2O_4$ and $NaHC_2O_4$ weighing $2.02g$ was dissolved in water and the solution made uptp one litre. $10mL$ of this solution required $3.0mL$ of $0.1NNaOH$ solution for complete neutralization. In another experiment $10mL$ of same solution in hot dilute H_2SO_4 medium required $4mL$ of $0.1NKMnO_4KMnO_4$ for compltete neutralization. Calculate the amount of $H_2C_2O_4$ and $NaHC_2O_4$ in mixture.

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79. An equal volume of reducing agent is titrated separately with $1MKMnO_4$ in acid, neutral and alkaline medium. The volumes of $KMnO_4$ required are $20mL, 33.3mL$ and $100mL$ in acid, neutral and alkaline medium respectively. Find out oxidation state of Mn in each reaction product. Give balance equation. Find the volume of $1MK_2Cr_2O_7$ consumed if same volume of reductant is titrated in acid medium.

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80. A sample of hydrazine sulphate $(N_2H_6SO_4)$ was dissolved in $100mL$ water. $10mL$ of this solution was reacted with excess of $FeCl_3$ solution and warmed to complete the reaction. Ferrous ions formed were estimated and it required $20mL$ of $M/50KMnO_4$ solutions. Estimate the amount of hudrazine sulphate in one litre of solution.

Given $4Fe^{3+} + N_2H_4 \rightarrow N_2 + 4Fe^{2+} + 4H^+$

$MnO_4^- + 5Fe^{2+} + 8H^+ \rightarrow Mn^{2+} + 5Fe^{3+} + 4H_2O$

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81. $5mL$ of $8NHNO_3$, $4.8mL$ of $5NHCl$ and a certain volume of $17MH_2SO_4$ are mixed together and made upto 2litre. $30mL$ of this acid mixture exactly neutralizes $42.9mL$ of Na_2CO_3 solution containing $1gNa_2CO_3$. $10H_2O\text{in}100mL$ of water. Calculate the amount of sulphate ions in g present in solution.

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82. 2.68×10^{-3} moles of solution containing anion A^{n+} require 1.61×10^{-3} moles of MnO_4^- for oxidation of A^{n+} to AO_3^- in acidic medium. What is the value of n?

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83. $4.08g$ of a mixture of BaO and an unknown carbonate MCO_3 was heated strongly. The residue weighed $3.64g$. This was dissolved in $100mL$ of $1NHCl$. The excess of acid required of $16mL$ of $2.5NNaOH$ for complete neutralisation. Identify the metal M.

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84. In the titration of a certain H_2SO_4 solution, $60mL$ of $5.0MNaOH$ solution was used to completely neutralise $75mL$ of the acid. The molarity of the acid solution may be expressed as

A. $\frac{5M \times 60mL}{2 \times 75mL}$

B. $\frac{5M \times 75mL \times 2}{60mL}$

C. $\frac{75mL \times 2}{5.0 \times 60mL}$

D. $\frac{60mL \times 75mL \times 2}{5.0M}$

Answer: A

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85. $20mL$ of a solution containing equal moles of $Na_{\circ}CO_3$ and $NaHCO_3$ required $16mL$ of $0.16MHCl$ solution to reach the phenolphthalein end point. What volume of a $0.10MH_2SO_4$ solution would have been required had methyl orange been used as indicator?

A. $38.40mL$

B. $24.60mL$

C. $19.20mL$

D. $0.30mL$

Answer: C

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86. When aqueous solution of Na_2S is titrated with dilute and acidified $KMnO_4$ solution, Na_2SO_3 is formed. In this reaction, moles of $KMnO_4$ reduced per mole of Na_2S is

A. 0.833

B. 1.2

C. 1.50

D. 1.8

Answer: B

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87. For the following metals A, B, C, D react with each other : (NR = No reaction)

$A + B^+ \rightarrow NR$ $\quad$ $B + C^+ \rightarrow NR$

$B + D^+ \rightarrow B^+ + D$ $\quad$ $C + D^+ \rightarrow C^+ + D$

$A^+ + C \rightarrow C^+ + A$ $\quad$ $D + A^+ \rightarrow D^+ + A$

Which is the order of the metals in increasing reducing strength?

A. $B < D < a < C$

B. $C < B < D < A$

C. $A < D < B < C$

D. $< C < A < B$

Answer: C

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88. $40mL0.05M$ solution of sodium sesquicarbonate dehydrate $(Na_2CO_3.\ NaHCO_3.2H_2O)$ is titrated against $0.05MHCl$ solution, xmL of acid is required to reach the phenolphthalein end point while mL

of same acid were required when methyl organe indicator was used in a separate titration. Which of the following is (are) correct statements?

A. $y - x = 80mL$

B. $y + x = 160mL$

C. If the titration is started with phenolphthalein indicator and methyl orange is added at the end point, $2xmL$ of HCl would be required further to reach the end point

D. If the same volume of same solution is titrated against $0.10MNaOH$, $x/2mL$ of base would be required

Answer: A::B::C::D

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89. Which of the following regarding oxalate compound is/are true?

A. Oxalic acid $(H_2C_2O_4)$ can be estimated by titratin against either KOH or $KMnO_4$ solution.

B. KHC_2O_4 can be extimated by titrating against either KOH or K_2CrO_4 and in both analyses equivalent weight of KHC_2O_4 is 64. $(MW \text{of} KHC_2O_4 = 128)$

C. $K_2C_2O_4$ can be estimated by titrating against either HCl or $KClO_3$ and in both analyses equivalent weight of $K_2C_2O_4$ is 83. $(MW \text{of} K_2C_2O_4 = 166)$

D. If $10mL$ of a $K_2C_2O_4$ solution required $8.0mL$ of a $0.12MHCl$ solution, $10mL$ of the same $K_2C_2O_4$ solution would require $9.60mL$ of a $0.02M$ acidified $KMnO_4$ solution.

Answer: A::C::D

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90. Assertion If certain volume of a basic solution require xmL of HCl, $2xmL$ of H_2SO_4 of same molarity would be required.

Reason HCl is a monobasic acid while H_2SO_4 is a diabasic acid.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion,

B. Both assertion and reason are correct but reason is not the correct explanation of assertion.

C. Assertion is correct but reason is incorrect.

D. Assertion is incorrect but reason is correct.

Answer: D

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91. Assertion If $10mL$ of a H_2O_2 solution required $8.00mL$ of $0.02M$ acidified $KMnO_4$ solution for complete oxidation, $12.50mL$ of same

H_2O_2 will oxidise completely to $5.00mL$ of $0.10MNa_2C_2O_4$ solution.

Reason H_2O_2 act as both oxidising as well as reducing agent.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion,

B. Both assertion and reason are correct but reason is not the correct explanation of assertion.

C. Assertion is correct but reason is incorrect.

D. Assertion is incorrect but reason is correct.

Answer: B

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92. The alkenes are compounds of carbon and hydrogen with the general formula C_nH_{2n}. If $0.561g$ of any alkene is burned in excess oxygen, what number of moles of H_2O is formed ?

A. $0.0400mol$

B. $0.0600mol$

C. $0.0800mol$

D. $0.400mol$

Answer: A

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93. The density $\left(\text{in}gmL^{-1}\right)$ of a $3.60M$ sulphuric acid solution that is $29\ \%\ H_2SO_4$ (Molar mass $= 98gmol^{-1}$) by mass will be:

A. 1.22

B. 1.45

C. 1.64

D. 1.88

Answer: A

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94. Magnetite, Fe_3O_4, can be converted into metallic iron by heating with carbon monoxide as represented by this equation:

$Fe_3O_4(s) + CO(g) \rightarrow Fe(s) + CO_2(g)$

The kilograms of Fe_3O_4 which must be processed in this way to obtain $5.00kg$ of iron, if the process is $85\,\%$ efficient is closest to? $[M: = Fe = 56]$

A. $6.92kg$

B. $8.15kg$

C. $20.8kg$

D. $24.4kg$

Answer: B

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95. How many H_2O molecules are there in a snowflake that weighs $4.0 \times 10^{-4} g$?

A. 1.3×10^{19}

B. 2.4×10^{20}

C. 2.2×10^{-5}

D. 6.02×10^{23}

Answer: A

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96. Atomic weight of an element X is 120 when one amu is defined as $1/18th$ part by weight of an element of C^{12}. On the same scale, atomic weight of another element Y is 72. Which of the following statement regarding X and is (are) correct?

A. On conventional scale, atomic weight of X is 80

B. On conventional scale, atomic weight of Y is 108

C. On a scale when an amu is defined to be $1/30th$ of the weight of an atom of C^{12}, atom of C^{12}, atomic weight of X 200

D. On a scale when an amu is defined to be $1/15th$ of the weight of an atom of C^{12}, atomic weight of Y is 90

Answer: B::C

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97. Which of the following statement regarding Avogadro number is(are) correct?

A. It is 6.023×10^{23}

B. It is the number of atoms present in exactly $12g$ of $C-12$ isotope

C. It is the number of atoms present in 1.0 mole on any substance

D. It is the number of atoms of deuterium present in its $2.0g$

Answer: A::B::D

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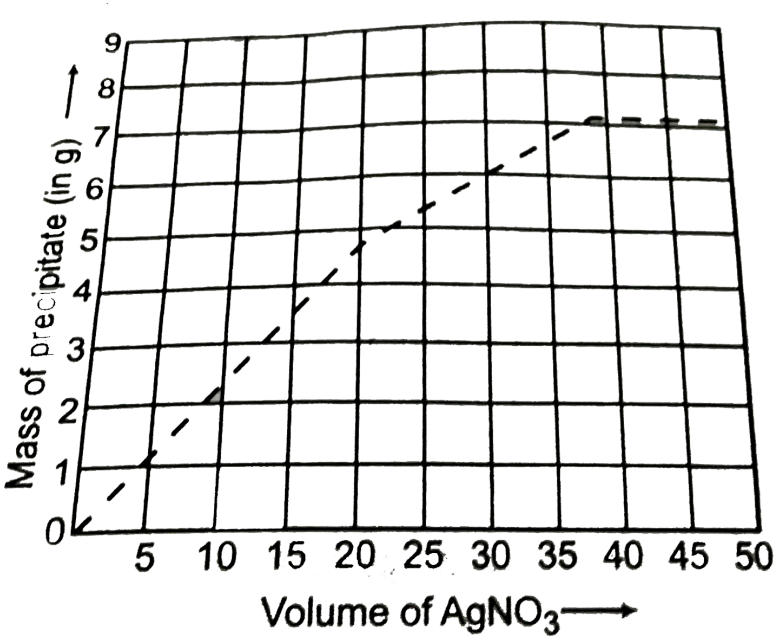
98. $4.0g$ of a mixture of $NaCl$ and an unknown metal iodide MI_2 was dissolved in water to form its aqueous solution. To this aqueous solution, aqueous solution of AgNO_(3) $wasadded\nabla uallysot\hat{s}ilverhalidesare \prec i\pi tated.\,The \prec i\pi tateswerewei$ AgNO_(3) $addedwasobta \in ed.\,Withtheknow \leq d \geq ofthefactt\widehat{h}alidesare \prec i\pi tat$ $\in thesolution, answerthefollow \in gquestions: (Molarmassof$

Ag = 108, I = 127, Na=23`).



What is the approximate mass percentage of Ml_2 ?

A. 25

B. 40

C. 60

D. 75

Answer: D

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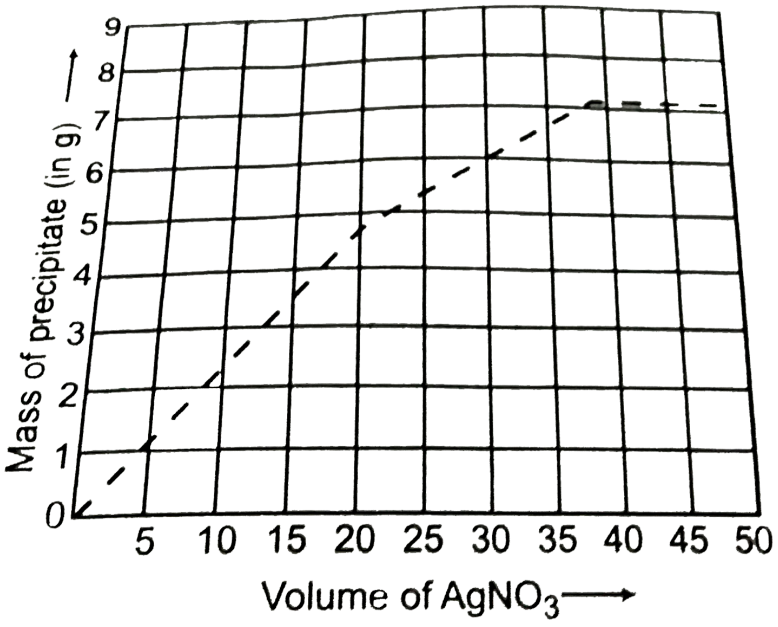
99. $4.0g$ of a mixture of $NaCl$ and an unknown metal iodide MI_2 was dissolved in water to form its aqueous solution. To this aqueous solution, aqueous solution of AgNO_(3) $wasadded\nabla uallysot\hat{s}ilverhalidesare \prec i\pi tated. The \prec i\pi tateswerewei$ AgNO_(3) $addedwasobta \in ed. Withtheknow \leq d \geq ofthefactt\widehat{h}alidesare \prec i\pi tat$ $\in thesolution, answerthefollow \in gquestions: (Molarmassof$ Ag = 108, I = 127, Na=23`).



What is the approximate molarity of $AgNO_3$ solution?

A. 0.1

B. 0.5

C. 1.0

D. 1.5

Answer: C

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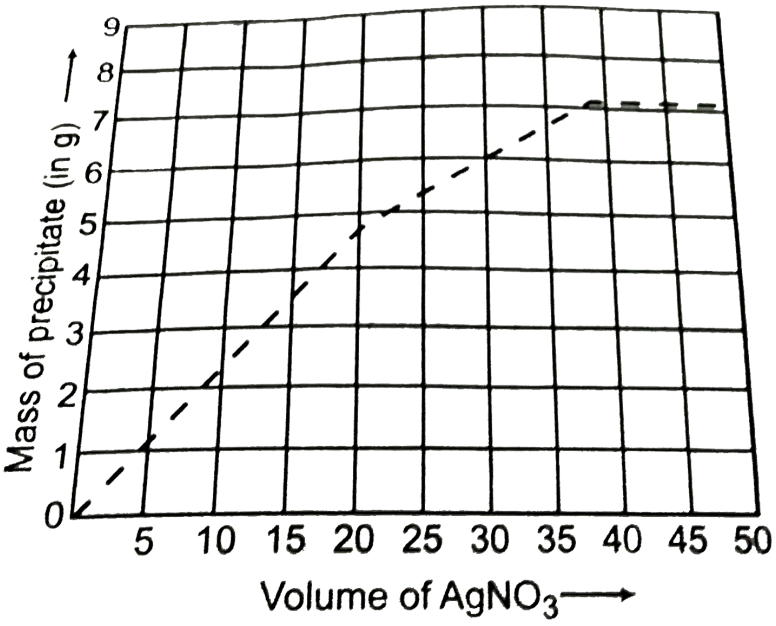
100. $4.0g$ of a mixture of $NaCl$ and an unknown metal iodide MI_2 was dissolved in water to form its aqueous solution. To this aqueous solution, aqueous solution of AgNO_(3) $wasadded\nabla uallysot\hat{s}ilverhalidesare \prec i\pi tated.The \prec i\pi tateswerewei$ AgNO_(3) $addedwasobta \in ed.Withtheknow \leq d \geq ofthefactt\widehat{h}alidesare \prec i\pi tat$ $\in thesolution, answerthefollow \in gquestions: (Molarmassof$

Ag = 108, I = 127, Na=23`).



What is the approximate molar mass of unknown metal M?

A. 20

B. 40

C. 56

D. 60

Answer: B

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101. Assertion: The average mass of one Mg atom is $24.305a\mu$, which is not actual mass of one Mg atom.

Reason: Three isotopes, $24Mg, 25Mg$ and $26Mg$, of Mg are found in nature.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. Both assertion and reason are correct but reason is not the correct explanation of assertion.

C. Assertion is correct but reason is incorrect.

D. Assertion is incorrect but reason is correct.

Answer: A

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102. Assertion A $8.0gN_2H_4(M = 32)$ has more atoms than $6.0gH_2O$.

Reason : N_2H_4 has more atoms per molecule than water.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. Both assertion and reason are correct but reason is not the correct explanation of assertion.

C. Assertion is correct but reason is incorrect.

D. Assertion is incorrect but reason is correct.

Answer: B

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103. Match the statements of column I with values of Column II

	Column I		Column II
$A.$	Different number of atoms	$p.$	$4.25gNH_3$ an
$B.$	Same number of molecules	$q.$	$2.20gCO_2$ and
$C.$	Same numbers of atoms as well as molecules	$r.$	$4.0gCH_3Cl$ a
$D.$	Different numbers of atoms as well as molecules	$s.$	$4.80gO_2$ and

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104. On a conventional scale, atomic weight of sulphur is 32. If on a new scale, an amu is defined as one atom of C-12 isotope, what would be the atomic weight of sulphur on this new scale?

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105. If equal volumes of $3.5MCaCl_2$ and $3.0MNaCl$ are mixed, what would be the molarity of chloride ion in the final soluton?

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Subjective Questions

1. A is a binary compound of a univalent metal. $1.422g$ of A reacts completely with $0.321g$ of sulphur in an evacuated and sealed tube to give $1.743g$ of a white crystalline solid B, that forms a bydrated double salt, C with $Al_2(SO_4)_3$. Identify A, B and C.

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2. An organic compound X on analysis gives $2.90g$ silver choride with acidified silver nitrate solution. The compound X may be represented by two isomeric structures Y and Z. Y on treatment with aqueous potassium hydroxide solution gives a dihydroxy compound while Z on similar treatment gives ethanal. Find out the molecular formula of Z and gives the structure of `Y and Z.

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