CHEMISTRY

BOOKS - NARENDRA AWASTHI

STOICHIOMETRY

Exercise

1. Calculate number of neutrons present in 12×10^{25} atoms of oxygen $\left(8O^{17}\right)$: (Given : $N_A = 6 \times 10^{23}$)

A. 1. 1800

B. 2. 1600

C. 3.1800 N_A

D. 4. 1600N_A

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2. If mass of one atom is $3.32 \times 10^{-23} g$, then calculate number of nucleons (neutrons and protons) present in 2 atoms of the element:

A. 1. 40

B. 2. 20

C. 3. 10

D. 4. $40 N_A$

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3. Calculate number of electron present in $9.5 \text{ g of} PO_4^{3-}$:

A. 1. 6 N_A

B. 2. 0. 1 N_A

C. 3. 4.7 N_A

D. $4.5N_A$

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4. What is the number of moles of O-atoms in 126 amu of HNO_3 ?

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5. What is the charge of 96 amu of s^{2-} ?

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6. A sample of sodium has a mass of $46g$. What is the mass of the same number of calcium atoms as sodium atoms present in given sample ?

A. 20gm

B. 40gm

C. 60gm

D. 80gm

Answer: D

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7. The total number of neutrons present in $54mLH_2O(l)$ are :

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8. Total number of electrons present in $48gMg^{2+}$ are :

A. 1. 24 N_A

B. 2. 2 N_A

C. 3. 20 N_A

D. 4. none of these

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9. The number of neutrons in $5g$ of $D_2O(D$ is $._1^2$ H) are:

A. 1. 0.25 N_A

B. 2. 2.2N_A

C. 3. 1.1 N_A

D. 4, none of these

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10. Cisplatin, an anticancer drug, has the molecular formula $Pt(NH_3)_2Cl_2$. What is the mass (in gram) of one molecule ? (Atomic masses : $Pt = 195, H = 14, Cl = 35.5$)

A. 1. $4.98\text{x}(10)^{-21}$

B. 2. $4.98\text{x}(10)^{-22}$

C. 3. $3.85x(10)^{-22}$

D. 4. $6.55x(10)^{-21}$

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11. Aspirin has the fromula $C_9H_8O_4$. How many atoms of oxygen are there in a tablet weighing $360mg$?

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12. $20g$ of ideal gas contains only atoms of S and O occupies $5.6L$ at 1 atm and $273K$. what is the molecular mass of gas ?

A. 20AMU

B. 40AMU

C. 80AMU

D. 120AMU

Answer: C

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13. A sample of ammonium phosphate, $(NH_4)_3PO_4$, contains 6 moles of hydrogen atoms. The number of moles of oxygen atoms in the sample is :

A. 1

B. 2

C. 4

D. 6

Answer: B

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14. Total number of moles of oxygen atoms in 3 litre $O_3(g)$ at $27^\circ C$ and 8.21 atm are :

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15. 3.011×10^{22} atoms of an element weighs 1.15 g. The atomic mass of the element is

A. 23AMU

B. 230AMU

C. 2.3AMU

D. 1.15AMU

Answer: A

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16. One atom of an element weigs 6.644×10^{-26}kg.How many gram atoms are present in 40kg of the element ?

A. 4

B. 40

C. 100

D. 500

Answer: D

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17. Mass of one atom of the element A is $3.9854 \times 10^{-23} g$. How many atoms are contained in 1g of the element A ?

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18. Which of the following contains the largest mass of hydrogen atoms ?

A. i. 0.5 moles $C_2H_2O_4$

B. ii. 1.1 moles $C_3H_8O_3$

C. iii. 1.5 moles $C_6H_8O_6$

D. iv. 4.0 moles $C_3H_8O_3$

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19. Which has minnimum number of oxygen atom ?

A. 10 ml H_2O [density of water= 1gml^{-1}

B. 0.1 mole V_2O_5

C. 12gm O_3 (g)

D. 12.044 * 10^{22} molecules of CO_2

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20. Arrange the following threads in the order of increasing strength :

Wool, Silk, Cotton, Nylon

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21. If the volume of a drop of water is $0.0018ml$ then the number of water molecules present in two drop of water at room temperature is :

A. $1.6.022 \text{x} 10^{23}$

B. $2.\ 6.022 \text{x} 10^{21}$

C. $3.\ 6.022 \text{x} 10^{19}$

D. $4.$ NONE OF THESE

Answer: D

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22. It is known that atom contain protons, neutrons and electrons. If the mass of neutron is assumed to half of its original value whereas that of proton is assumed to be twice of its original value then the atomic mass of 6_C^{14} will be :

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23. Common salt obtained from sea-water contains $8.775\,\%\,NaCl$ by mass. The number of formula units of $NaCl$ present in $25g$ of this salt is :

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24. The number of hydrogen atoms present in $25.6g$ of sucrose $(C_{12}H_{22}O_{11})$ which has a molar mass of $342.3g$ is :

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25. Caffiene has a molecular mass of 194. If it contains $28.9\,\%$ by mass of nitrogen, number of atoms of nitrogen in one molecule of caffeine is :

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26. The density of water is 1g/mL. Assuming that there are no intermolecular spaces between water molecules in liquid water, the volume of a water molecule is

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27. A $25.0mm \times 40.0mm$ piece of gold foil is $0.25mm$ thick. The density of gold is $19.32\frac{g}{c}m^3$. How many gold atoms are in the sheet ? (Atomic weight : $Au = 197.0$)

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28. If average molecular mass of air is 29, then assuming N_2 gas is there, which option are correct regarding composition of air?

(i)`75% "by mass of" Nitrogen" "(ii) 75% "by moles "Nitrogen"

A. only i) is correct

B. only ii) is correct

C. both i) and ii) are correct

D. both i) and ii) are incorrect

Answer: C

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29. Density of dry air containing ony N_2 and O_2 is $1.15\frac{g}{L}$ at $740mm$ of Hg and $300K$. What is % composition of N_2 by mass in the air ?

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30. A gaseous mixture of H_2 and CO_2 gases contains 66 mass % of CO_2. The vapour density of the mixture is :

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31. The vapour density of a mixture containing NO_2 and N_2O_4 is 27.6. The mole fraction of N_2O_4 in the mixture is :

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32. Density of ideal gas at 2 atm and 600K is 2g/L. Calculate relative density of this with respect to Ne(g) under similar conditions : (given : $R = \frac{1}{12} atm \frac{L}{m} ol.\ K$)

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33. Average atomic mass of magnesium is 24.31amu. This magnesium is composed of 79 mole % of $24mg$ and remaining 21 mole % of $25mg$ and $25mg$. Calculate mole % of $\hat{}\ 26mg$.

A. 10

B. 11

C. 15

D. 16

Answer: A

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34. Indium (atomic mass $= 114.82$) has two naturally occurring isotopes, the predominant one from has isotopic mass 114.9041 and abundance of $95.72\,\%$. Which of the following isotopic mass is the most likely for the other isotope ?

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35. Calculate density of a gaseous mixture which consist of 3.01×10^{24} molecules of N_2 and $32g$ of O_2 gas at 3 atm pressure and $860K$ temperature (Given : $R = \frac{1}{12}$ atm $\frac{L}{m}o \leq .K$)

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36. A mixture of O_2 and gas Y $(mol.\ wt.\ 80)$ in the mole ratio $a:b$ has a mean molecular weight 40. What would be mean molecular weight, if the gases are mixed in the ratio $b:a$ under identical conditions ? (gases are)

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37. If water sample are taken from sea, rivers or lake, they will be found to contain hydrogen and oxygen in the approximate ratio of $1:8$. This indicates the law of :

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38. Carbon and oxygen combine to form two oxides, carbon monoxide and carbond dioxide in which the ratioi of the weights of carbon and oxygen is respectively 12:16 and 12:32. these figures illustrate the

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39. A sample of calcium carbonate $(CaCO_3)$ has the following percentage composition : Ca = 40 % C = 12 % , O = 48 % . If the law of constant proportions is true , then the weight of calcium in 4 g of a sample of calcium carbonate from another source will be

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40. When 0.015 ampere current is passed in our body what will happen?

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41. One mole of element X has 0.444 times the mass of one mole of element Y. One atom of element ? X has 2.96 times the mass of one atom of $12C$. What is the atomic mass of ?X ?`

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42. A given sample of pure compound contains $9.81g$ of Zn, 1.8×10^{23} atoms of chromium, and 0.60 mol of oxygen atoms. What is the simplest formula?

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43. The formula of an acid is HXO_2. The mass of 0.0242 g of the acid is $1.657g$. What is the atomic mass of X ?

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44. What is the emprical formula of vanadium oxide , if $2.74g$ of the metal oxide contains $1.53g$ of metal ?

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45. Determine the empirical formula of kevlar, used in making bullet proof vests, is $70.6\,\%\,C$, $4.2\,\%\,H$, $11.8\,\%\,N$ and $13.4\,\%\,O$:

A. 1. $C_7H_5NO_2$

B. 2. $C_7H_5N_2O$

C. 3. C_7H_9NO

D. 4. C_7H_5NO

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46. The hydrate salt $Na_2CO_3.xH_2O$ undergoes $63\,\%$ loss in mass on heating and becomes anhydrous. The value of x is :

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47. A $6.85g$ sample of the hydrated $Sr(OH)_2.\ xH_2O$ is dried in an oven to given $3.13g$ of anhydrous $sr(OH)_2$. What is the value of x? (Atomic masses : $Sr = 87.60.\ O = 16.0,\ H = 1.0$)

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48. What percentage of oxygen is present in the compound $CaCO_3.3Ca_3(PO_4)_2$?

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49. Dieldrin, an insecticide, contains `C,H,Cl and O. What is the empirical formula of Dieldrin ?

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50. A gaseous compound is composed of 85.7% by mass carbon and 14.3% by mass hydrogen. Its density is 2.28 g/litre at $300K$ and 1.0 atm pressure. Determine the molecular formula of the compound.

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51. Complete combustion of 0.858 g of compound X given 2.64 g CO_2 and 1.26 g of H_2O. The lowest molecular mass X can have :

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52. 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

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53. In an organic compound of molar mass $108 g mmol^{-1} C, H$ and N atoms are presents in $9:1:3.5$ by mass. Molecular formula can be

A. $C_6H_8N_2$

B. $C_7H_{10}N$

C. $C_5H_6N_3$

D. $C_4H_{18}N_3$

Answer: A

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54. On analysis, a certain compound was found to contain iodine and oxygen in the ratio of 254:80. The formula of the compound is (At mass I = 127, O = 16)

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55. An element A is teravalent and another element B is divalent. The formula of the compound formed from these elements will be :

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56. A compound used in making nylon, contains 43.8% oxygen. There are four oxygen atoms per molecule. What is the molecular mass of compound ?

A. 36

B. 116

C. 292

D. 146

Answer: D

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57. Suppose the elements X and Y combine to form two compounds XY_2 and X_2Y_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

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58. $44g$ of a sample on complete combustion given $88gCO_2$ and $36g$ of H_2O. The molecular formula of the compound may be :

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59. 40 miligram diatomic volatile substance (X_2) is converted to vapour that displaced $4.92mL$ of air at 1atm and 300k. Atomic mass of element X is nearly :

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60. Two elements 'A' and 'B' (atomic weights 75 and 16 respectively) combine to give a compound having 75.8% of 'A'. The compound has the formula (St. John's)

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61. A sample of phosphorus that weighs $12.4g$ exerts a pressure 8 atm in a 0.821 litre closed vesel at $527^{\circ}C$. The molecular formula of the phosphorus vapour is :

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62. Manganese forms non-stoichiometric oxides having the general formula MnO_x. The value of x for the compound that analyzed 64% Mn. (At wt Mn=55)

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63. 1.44 gram if titanium (Ti) reacted with excess of O_2 and produce x gram of non $-$ stoichiometric compound $Ti_{1.44}O$. The value of x is :

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64. Write the Resistivity values of Silver,copper,gold?

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65. Write bond length and bond energy of H -H and F -F?

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66. 2.0 g of a sample contains mixture of SiO_2 and Fe_2O_3. On very strong heating , it leaves a residue weighing $1.96g$. The reaction responsible for loss of mass is given below .

$Fe_2O_3(s) \rightarrow Fe_3O_4(s) + O_2(g)$, (unbalance equation) It brgt What is the precentage by mass of SiO_2 in original sample ?

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67. What volume of air at 1 atm and 273 K containing 21% of oxygen by volume is required to completely burn sulphur (S_8) present in 200 g of sample , which contains 20% inert material which dones not brum . Sulphur burns according to the reaction

$$\frac{1}{8}S_8(s) + O_2(g) \rightarrow SO_2(g)$$

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68. For the reaction, $2Fe(NO_3) + 3Na_2CO_3 \rightarrow Fe_2(CO_3)_3 + 6NaNO_3$ initially 2.5 mole of $Fe(NO_3)_3$ and 3.6 mole of Na_2CO_3 are taken. If 6.3 mole of $NaNO_3$ is obtained then % yield of given reaction is :

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69. How many moles of P_4 can be produced by reaction of 0.1 mole $Ca_5(PO_4)_3F$, 0.36 mole SiO_2 and 0.90 mole C according to the

following reaction?

$$4Ca_5(PO_4)_3F + 18SiO_2 + 30C \rightarrow 3P_4 + 2CaF_2 + 18CaSiO_3 + 30CO$$

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70. Some older emergency oxygen masks contains potassium superoxide KO_2 which reacts with CO_2 and water present in exhaled air to produce oxygen according to the given equation. If a person exhales $0.667g$ of CO_2 per minute, how many gram of KO_2 are consumed in 5.0 minutes ?

$$4KO_2 + 2H_2O + 4CO_2 \rightarrow 4KHCO_3 + 3O_2$$

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71. The mass of N_2F_2 produced by the reaction of $2.0g$ of NH_3 and $8.0g$ of F_2 is $3.56g$. What is the per cent yield ?

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72. Calculate the mass of lime (CaO) obtained by heating $200kg$ of $95\,\%$ pure lime stone $(CaCo_3)$:

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73. Phospheric acid (H_3PO_4) perpared in two step process .

(1) $P_4 + 5O_2 \rightarrow P_4O_{10}$ $(2) P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$

Well allow 62 g of phosphrous to react with exces oxygen which from P_4O_{10} in $85\,\%$ yield . In the sep (2) reaction $90\,\%$ yield of H_3PO_4 is obtained . Mass of H_3PO_4 produced is :

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74. 9 mole of " D" and 14 moles of E are allowed to react in aclosed vessel according to given reactions. Calculate number of moles of formed in the end if reaction , if 4 moles of G are present in reaction vessel . (Precentage yield of reaction id mentioned in the reaction)

step -1 $3D + 4E \xrightarrow{80\%} 5C + A$

setp -2 $3D + 5G \xrightarrow{50\%} 6B + F.$

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75. The chief ore of Zn is the sulphide , ZnS. The are is concentrated by froth floation process and then heated in air to convert Zns to Zno.

$2ZnS + 30_2 \xrightarrow{80\%} 2ZnO + 2SO_2$

$ZnO + H_2SO_4 \xrightarrow{100\%} ZnSO_4 + H_2$

$2ZnSO_4 + 2H_2O \xrightarrow{80\%} 2Zn + 2H_2SO_4 + O_2$

The number of moles of ZnS required for producing 2 moles of Zn will be:

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76. 0.8 mole of a mixture of CO and CO_2 requires exactly 40 g of NaOH in solution for complete conversion of all the CO_2 into Na_2CO_3. How many more moles of NaOH would it require for conversion into Na_2CO_3. If the mixture is completely oxidised to CO_2?

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77. Silver oxide (Ag_2O) decomposes at temperture 300° yielding mentallic silver and oxgyen gas .What is the pre cent by mass of the silver oxide in the sample ?

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78. 342 g of $20\,\%$ by mass of $Ba(OH)_2$ solution (sp. Gr. 0.57) is reaction with 1200 mL of $2MHNO_3$. If the final density of solution is same as pure water then molarity of the ion in resulting solution which decides the nature of the above solution is:

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79. $100mL$ of H_2SO_4 solution having molarity $1M$ and density $1.5g/mL$ is mixed with $400mL$ of water. Calculate final molarity of H_2SO_4 solution, if final density is $1.25g/mL$?

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80. What volume of HCl solution of density $1.2gcm^{-3}$ and containing $36.5\,\%$ by mass HCl, must be allowed to react wtih zinc (Zn) in order to liberate $4.0g$ of hydrogen ?

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81. An ideal gaseous mixture of ethane (C_2H_6) and ethene (C_2H_4) occupies 28 litre at $1atm$ $0^\circ C$. The mixture reacts completely with $128gmO_2$ to produce CO_2 and H_2O. Mole of fraction at C_2H_6 in the mixtture is-

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82. Wood's metal contains $50.0\,\%$ bismuth, $25.0\,\%$ lead, $12.5\,\%$ tin and $12.5\,\%$ cadmium by mass. What is the mole fraction of tin ?(\ (Atomic mass : $Bi = 209$, $Pb = 207$, $Sn = 119$, $Cd = 112$)

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83. The density of a $56.0\,\%$ by mass aqueous solution of 1-propanol $(CH_3CH_2CH_2OH)$ is $0.8975 gcm^{-3}$. What is the mole fraction of the 1-propanol ?

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84. What is the molartiy of SO_4^{2-} ion in aqueous solution that contain 34.2 ppm of $Al_2(SO_4)_3$? (Assume complete dissociation and density of solution $1 gm per mL$)

A. 3x10^{-4}

B. 2x10^{-4}

C. 10^{-4}

D. None

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85. The correct relationship between molarity (M) and molality (m) is (d = density of the solution, in KgL^{-1} , M_2 = molar mass of the solute in kg mol^{-1})

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86. Molarity and molality of a solution of a liquid (mol.mass $= 50$) in aqueous solution is 9 and 10 respectively. What is the density of solution ? (Round of the answer to nearest whole number)

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87. An aqueous solution of ethanol has density 1.025 g/mL and it is 2 M. What is the molality of this solution ?

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88. 0.2 mole of HCI and 0.2 mole of barium chloride were dissolved in water to produce a $500mL$ solution. The molarity of the CI^- ions is :

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89. Calculate the mass of anhydrous HCI in $10mL$ of concentrated HCI (density $= 1.2gpermL$) solution having $37\,\%$ HCI by mass is :

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90. Calculate the molality of 1L solution of $80\,\%$ $H_2SO_4\left(\frac{w}{V}\right)$ given that the density of the solution is $1.80gmL^{-1}$. (round of the answer to nearest whole number)

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91. Fluoxymesterone, $C_{20}H_{29}FO_3$, is an anabolic steroid. A 500 mL solution is prepared by dissolving $10.0mg$ of the steoid in water. $10.0mL$ portion of this solution is diluted to a final volume of $1.00L$. what is the resulting molarity ?

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92. $100mL$ of $10\ \%\ NaOH\left(\frac{w}{V}\right)$ is added to $100mL$ of $10\ \%\ HCI\left(\frac{w}{V}\right)$. The nature of resultant solution is :

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93. How many millitries of $0.1MH_2SO_4$ must be added to $50mL of 0.1MNaOH$ to give a solution that has a concentration of $0.05M \in H_2SO_4$?

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94. $1MHCl$ and $2MHCl$ are mixed in volume ratio 4:1. What is the final molarity of HCl solution?

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95. Three solutions X,Y,Z of HCl are mixed to produce 100mL of 0.1M solution . The milarities of X,Y and Z are 0.7M, 0.12M and 0.15M respectively. What respective volumes of X,Y and Z should be mixed?

A. 50 ml, 25 ml, 25ml

B. 20 ml, 60 ml, 20ml

C. 40 ml, 30 ml, 30 ml

D. 55 ml , 20 ml, 25 ml

Answer: d

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96. The impure 6g of $NaCl$ is dissolved in water and then treated with excess of silver nitrate solution. The mass of precipitate of silver chloride is found to be 14g. The % purity of $NaCl$ solution would be:

A. 95%

B. 85%

C. 75%

D. 65%

Answer: A

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97. Decreasing order (first having highest and then other following it) of mass of pure NaOH in each of the aqueous solution

(P) 50 gm of $40\ \%\ (w/w)$ NaOH

(Q) 50 gm of $50\ \%\ (w/w)$ NaOH $[d_{\text{soln.}} = 1.2gm/ml]$

(R) 50 gm of 20 M NaOH $[d_{\text{soln.}} = 1gm/ml]$

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98. $0.607g$ of silver salt of tribasic organic acid was quantitatively reduced to $0.37g$ of pure Ag. What is the mol. Wt. of the acid ?

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99. A sample of peanut oil weighing $1.5763g$ is added to $25mL$ of $0.4210MKOH$. After saponification is complete $8.5mL$ of $0.28MH_2SO_4$ is needed to neutralize excess KOH. The saponification number of peanut oil is:

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100. 20 Ml of a mixture of CO and H_2 were mixed with excess of O_2 and exploded and cooled. There was a volume contraction of 18mL. All volume measurements corresponds to room temperture $(27^\circ C)$ and one

atmospheric pressuer. Determine the volume ratio V_1, V_2 of CO and H_2 in the original mixture.

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101. In the reaction $2Al(s) + 6HCl(aq) \rightarrow 6Cl^-(aq) + 3H_2$

A. 6 L HCl (aq) is consumed for every 3 L H2 produced

B. 33.6 L H2 (g) is produced at STP for every mole of Al that reacts

C. 67.2 L H2 (g) at 1 atm , 273 K is produced for every mole Al that reacts

D. 11.2 L H2(g) at 1 atm 273 K is produced foe every mole HCl (aq) consumed

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102. Oxidation numbers of the two chlorine atom in $CaOCl_2$ is

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103. The oxidation number of sulphur in S_8, S_2F_2 and H_2S are

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104. Balance the following equations

$$K_2Cr_2O_7 + H_2SO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + H_2O + O_2$$

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105. Balance the following equation and choose the quantity which is the sum of the coefficients of reactants and products:

$$.....PtCl_4 + XeF_2 \rightarrow PtF_6 + ... CIF + ...Xe$$

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106. Hydrazine reacts with KIO_3 in presence of HCl as :

$$N_2H_4 + IO_3^- + 2H^+ + Cl^- \rightarrow ICl + N_2 + 3H_2O$$

The equivalent masses of N_2H_4 and KIO_3 respectively are :

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107. H_2O_2 is used as bleaching reagent because on dissociation it gives oxygen

$$\left(H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2\right)$$

"Chachi420" used H_2O_2 solution to bleach her hair and she required $2.24LO_2$ gas at 1atm and 273K. She has a H_2O_2 solution labelled '5.6V' then what volume of such solution must she required to bleach her hair?

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108. A sample of 1.0g of solid Fe_2O_3 of 80% purity is dissolved in a moderately concentrated HCl solution which is reduced by zinc dust. The

resulting solution required 16.7mL of a 0.1M solution of the oxidant. Calculate the number of electrons taken up by the oxidant.

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109. Stannous sulphate $(SnSO_4)$ and potassium permanganate are used as oxidising agents in acidic medium for oxidation of ferrrous ammnium sulphate to ferric sulphate. The ration of number of moles of stannous sulphate required per mole of ferrous ammonium sulphate to the number of moles of $KMnO_4$ required per mole of ferrous ammonium sulphate, is:

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110. 32g of a sample of $FeSO_4.7H_2O$ were dissolved in dilute sulphuric aid and water and its volue was made up to 1litre. 25mL of this solution required 20mL of $0.02MKMnO_4$ solution for complete oxidation. Calculate the mass% of $FeSO_4.7H_2O$ in the sample.

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111. In the mixture of $NaHCO_3$ and $NaCO_3$, volume of a given HCl required is x ml with phenolphathalein indicator and further y mL is required with methyl orange indicator. Hence volume of HCl for complete reaction of $NaHCO_3$ present in the original mixture is

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112. When 200mL solution of $NaOH$ and $NaCO_3$ was first titrated with N/10 HCl in presence of HPh, 17.5mL were usedtill end point is obtained. After this end point MeOH was added and 2.5mL of same HCl were required to attain new end point. The amount NaOH in mixture is:

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113. 1gram of a sample of $CaCO_3$ was strongly heated and the CO_2 liberated was absorbed in 100mL of 0.5 M NaOH solution. Assuming 90%

purity for the sample, how many mL of 0.5M HCl would be required to react with the resulting solution to reach the end point inpresence of phenolphthaein?

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114. Calculate the number of millilitre of NH_3(aq) solution (d=0.986g/ml) contain 2.5% by mass NH_3, which will be required to precipitate iron as $Fe(OH)_3$ in a 0.8 g sample that contains 50% Fe_2O_3.

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115. In the preparation of Iron from haematite (Fe_2O_3) by the reaction with carbon $Fe_2O_3 + C \rightarrow Fe + CO_2$ 94.5 kg of 10x% pure Iron could be produced from 120 kg of 90% pure Fe_2O_3? Find the value of x.

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116. A mineral consists of an equimolar mixture of the carbonates of two bivalent metals. One metal is present to the extent of 12.5% by mass.2.8 g of the mineral on heating lost 1.32g of CO_2. What is the % by mass of the other metal ?

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117. A 1.0g sample of a pure organic compound cotaining chlorine is fused with Na_2O_2 to convert chlorine to NaCl. The sample is then dissolved in water, and the chloride precipitated with $AgNO_3$, giving 1.96 g of AgCl. If the molecular mass of organic compound is 147, how many chlorine does each molecule contain ?

Watch Video Solution

118. A metal M forms the sulphate $M_2(SO_4)_3$. A 0.596 gram sample of the sulphate reacts with excess $BaCl_2$ to give 1.220 g $BaSO_4$. What is the atomic mass of M ?

Watch Video Solution

119. A silver coin weighing 11.34 g was dissolved in nitric acid When sodium chloride was added to the solution all the silver (present as $AgNO_3$) precipitated as silver chloride. The mass of the precipitated silver chloride was 14.35 g. Calculate the percentage of silver in the coin.

Watch Video Solution

120. $100cm^3$ of a solution of an acid (Molar mass =98) containing 29.4 g of the acid per litre were completely neutralized by $90.0cm^3$ of aq. NaOH cotanining 20 g of NaOH per$500cm^3$. The basicity of the acid is

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121. The concentration of oxalic acid is 'X' mol lit^{-1} . 40 ml of this solution reacts with 16 ml of 0.05 M acidified $KMnO_4$. What is the pH of

'X' M oxalic acid solution ? (Assume that oxalic acid dissociates completely

)

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Level 1 (Q.1 To Q.30)

1. Calculate number of neutrons present in 12×10^{25} atoms of oxygen $\left(8O^{17}\right)$: (Given : $N_A = 6 \times 10^{23}$)

A. 1800

B. 1600

C. $1800N_A$

D. $3200N_A$

Watch Video Solution

2. If mass of one atom is $3.32 \times 10^{-23} g$, then calculate number of nucleons (neutrons and protons) present in 2 atoms of the element:

A. 40

B. 20

C. 10

D. $40N_4$

Watch Video Solution

3. Calculate number of electrons present in $9.5g$ of PO_4^{-3}:

A. 6

B. $5N_A$

C. $0.1N_A$

D. $4.7N_A$

Watch Video Solution

4. What is the number of moles of O-atoms in 126 amu of HNO_3 ?

A. 2

B. $\frac{2}{N_A}$

C. $0.1N_A$

D. $\frac{6}{N_A}$

Watch Video Solution

5. What is the charge of 96 amu of s^{2-} ?

A. 2C

B. $3.2 \times 10^{-19}C$

C. $9.6 \times 10^{-19} C$

D. 6 C

Watch Video Solution

6. A sample of sodium has a mass of $46g$. What is the mass of the same number of calcium atoms as sodium atoms present in given sample ?

A. 46 g

B. 20 g

C. 40 g

D. 80 g

Watch Video Solution

7. The total number of neutrons present in $54mLH_2O(l)$ are :

A. $3N_A$

B. $30N_A$

C. $24N_A$

D. None of these

Watch Video Solution

8. Total number of electrons present in $48gMg^{2+}$ are :

A. $24N_A$

B. $2N_A$

C. $20N_A$

D. None of these

Watch Video Solution

9. The number of neutrons in $5g$ of $D_2O(D$ is $._1^2$ H) are:

A. $0.25N_A$

B. $2.5N_A$

C. $1.1N_A$

D. None of these

Watch Video Solution

10. Cisplatin, an anticancer drug, has the molecular formula $Pt(NH_3)_2Cl_2$. What is the mass (in gram) of one molecule ? (Atomic masses : $Pt = 195, H = 14, Cl = 35.5$)

A. 4.98×10^{23}

B. 1.08×10^{-22}

C. 6.55×10^{-21}

D. 3.85×10^{-22}

Watch Video Solution

11. Aspirin has the fromula $C_9H_8O_4$. How many atoms of oxygen are there in a tablet weighing $360mg$?

A. 1.204×10^{23}

B. 1.08×10^{22}

C. 1.204×10^{24}

D. 4.81×10^{24}

Watch Video Solution

12. $20g$ of ideal gas contains only atoms of S and O occupies $5.6L$ at 1 atm and $273K$. what is the molecular mass of gas ?

A. 64

B. 80

C. 96

D. None of these

Watch Video Solution

13. A sample of ammonium phosphate, $(NH_4)_3PO_4$, contains 6 moles of hydrogen atoms. The number of moles of oxygen atoms in the sample is :

A. 1

B. 2

C. 4

D. 6

Watch Video Solution

14. Total number of moles of oxygen atoms in 3 litre $O_3(g)$ at $27^\circ C$ and 8.21 atm are :

A. 3

B. 1

C. 1

D. None of these

Watch Video Solution

15. 3.011×10^{22} atoms of an element weighs 1.15 g. The atomic mass of the element is

A. $10a\mu$

B. $2.3a\mu$

C. $35.5a\mu$

D. $23a\mu$

Watch Video Solution

16. One atom of an element weigs 6.644×10^{-26}kg.How many gram atoms are present in 40kg of the element ?

A. 4

B. 40

C. 100

D. 500

Watch Video Solution

17. Mass of one atom of the element A is $3.9854 \times 10^{-23} g$. How many atoms are contained in 1g of the element A ?

A. 2.509×120^{23}

B. 6.022×10^{23}

C. 12.044×10^{23}

D. None of these

Watch Video Solution

18. Which of the following contains the largest mass of hydrogen atoms ?

A. 5.0 moles $C_2H_2O_4$

B. 1.1 moles $C_3H_8O_3$

C. 1.5 moles $C_6H_8O_6$

D. $4.0 \quad \text{moles} C_2H_4O_2$

Watch Video Solution

19. Which has minimum number of oxygen atoms ?

A. 10 mL $H_2O(l)$

B. 0.1 mole $V_2O_5(s)$

C. 12 gm $O_3(g)$

D. 12.044×10^{22} molecules of CO_2

Watch Video Solution

20. If the volume of a drop of water is $0.0018ml$ then the number of water molecules present in two drop of water at room temperature is :

A. 12.046×10^{19}

B. 1.084×10^{18}

C. 4.48×10^{17}

D. 6.023×10^{23}

Answer: A

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21. It is known that atom contain protons, neutrons and electrons. If the mass of neutron is assumed to half of its original value whereas that of proton is assumed to be twice of its original value then the atomic mass of 6_C^{14} will be :

A. same

B. $14.28\ \%$ less

C. $14.28\ \%$ more

D. $28.56\ \%$ less

Watch Video Solution

22. Common salt obtained from sea-water contains $8.775\,\%\,NaCl$ by mass. The number of formula units of $NaCl$ present in $25g$ of this salt is :

A. 3.367×10^{23} formula units

B. 2.258×10^{22} formula units

C. 3.176×10^{23} formula units

D. 4.73×10^{25} formula units

Watch Video Solution

23. The number of hydrogen atoms present in $25.6g$ of sucrose $(C_{12}H_{22}O_{11})$ which has a molar mass of $342.3g$ is :

A. 22×10^{23}

B. 9.91×10^{23}

C. 11×10^{23}

D. 44×10^{23}

Watch Video Solution

24. Caffiene has a molecular mass of 194. If it contains $28.9\ \%$ by mass of nitrogen, number of atoms of nitrogen in one molecule of caffeine is :

A. 4

B. 6

C. 2

D. 3

Watch Video Solution

25. A $25.0mm \times 40.0mm$ piece of gold foil is $0.25mm$ thick. The density of gold is $19.32\frac{g}{c}m^3$. How many gold atoms are in the sheet ? (Atomic weight : $Au = 197.0$)

A. 7.7×10^{23}

B. 1.5×10^{23}

C. 4.3×10^{21}

D. 1.47×10^{22}

Watch Video Solution

26. If average molecular mass of air is 29, then assuming N_2 gas is there, which option are correct regarding composition of air?

(i)`75% "by mass of" Nitrogen" "(ii) 75% "by moles "Nitrogen"

A. only (i) is are correct

B. Only (ii) is correct

C. both (ii) and (iii) are correct

D. both (i) and (ii) are correct

Watch Video Solution

27. Density of dry air containing ony N_2 and O_2 is $1.15\frac{g}{L}$ at $740mm$ of Hg and $300K$. What is % composition of N_2 by mass in the air ?

A. $78\ \%$

B. $85.5\ \%$

C. $70.02\ \%$

D. $62.75\ \%$

Watch Video Solution

28. A gaseous mixture of H_2 and CO_2 gases contains 66 mass % of CO_2. The vapour density of the mixture is :

A. 6.1

B. 5.4

C. 2.7

D. 10.8

Watch Video Solution

Level 1 (Q.31 To Q.60)

1. Density of ideal gas at 2 atm and 600K is 2g/L. Calculate relative density of this with respect to Ne(g) under similar conditions : (given : $R = \frac{1}{12} atm \frac{L}{m} ol.\ K$)

A. 2.5

B. 2

C. 3

D. 5

Watch Video Solution

2. Average atomic mass of magnesium is 24.31amu. This magnesium is composed of 79 mole % of $24mg$ and remaining 21 mole % of $25mg$ and $25mg$. Calculate mole % of $\hat{}$ $26mg$.

A. 10

B. 11

C. 15

D. 16

Watch Video Solution

3. Indium (atomic mass $= 114.82$) has two naturally occurring isotopes, the predominant one from has isotopic mass 114.9041 and abundance of $95.72\,\%$. Which of the following isotopic mass is the most likely for the other isotope ?

A. 112.94

B. 115.9

C. 113.9

D. 114.9

Watch Video Solution

4. Calculate density of a gaseous mixture which consist of 3.01×10^{24} molecules of N_2 and $32g$ of O_2 gas at 3 atm pressure and $860K$ temperature (Given : $R = \frac{1}{12}$ atm $\frac{L}{m}o \leq .K$)

A. $0.6g/L$

B. $1.2g/L$

C. $0.3g/L$

D. $12g/L$

Watch Video Solution

5. A mixture of O_2 and gas "y" (mol. mass 80) in the mole ratio $a:b$ has a mean molecular mass 40. what would be molecular mass, if the gases are mixed in the ratio $b:a$ under identical conditions ? (Assuming that gases are non-reacting) :

A. 40

B. 48

C. 62

D. 72

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Watch Video Solution

6. If water sample are taken from sea, rivers or lake, they will be found to contain hydrogen and oxygen in the approximate ratio of $1:8$. This indicates the law of :

A. law of conseravtion of mass

B. Definite proporation

C. Reciprocal propoertions

D. None of these

Watch Video Solution

7. Hydrogen and oxygen combine to form H_2O_2 and H_2O containing $5.93\,\%$ and $11.2\,\%$ hydrogen respectively. The data illustrates :

A. law of conseravtion of mass

B. law of constant proportion

C. law of reciparocal proporation

D. law of multiple proporetion

Answer: 4

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8. Carbon and oxygen combine to form two oxides, carbon monoxide and carbond dioxide in which the ratioi of the weights of carbon and oxygen is respectively 12:16 and 12:32. these figures illustrate the

A. law of multiple proportions

B. law of reciprocal proportions

C. law of conservation of mass

D. law of constant proportains

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9. A sample of calcium carbonate $(CaCO_3)$ has the following percentage composition : Ca = 40 % C = 12 % , O = 48 % . If the law of constant proportions is true , then the weight of calcium in 4 g of a sample of calcium carbonate from another source will be

A. $0.016g$

B. $0.16g$

C. $1.6g$

D. $16g$

Watch Video Solution

10. The law of multiple proportions is ilustrated by the two compounds

A. Sodium chlordie and sodium bromide

B. Ordinary water and heavy water

C. Caustic soda caustic potash

D. Sulphur dioxide and sulphur trixoide

Answer: 4

Watch Video Solution

11. All the substance listed below are fertilizers that contribute nitrogen to the soil. Which of these is the richest source of nitrogen on a percentage basis ?

A. Urea ,$(NH_2)_2CO$

B. Ammonium nitrate ,NH_4NO_3

C. Nitric oxide , NO

D. Ammonia , NH_3

Answer: D

Watch Video Solution

12. One mole of element X has 0.444 times the mass of one mole of element Y. One atom of element X has $2.96 \times$ the mass of one atom of C^{12}. What is the atomic mass of Y ?

A. 80

B. 15.77

C. 46.67

D. 40

Watch Video Solution

13. A given sample of pure compound contains $9.81g$ of Zn, 1.8×10^{23} atoms of chromium, and 0.60 mol of oxygen atoms. What is the simplest formula?

A. $ZnCr_2O_7$

B. $ZnCr_2O_4$

C. $ZnCrO_4$

D. $ZnCrO_6$

Watch Video Solution

14. The formula of an acid is HXO_2. The mass of 0.0242 g of the acid is $1.657g$. What is the atomic mass of X ?

A. 35.5

B. 28.1

C. 128

D. 19

Answer: A

Watch Video Solution

15. What is the empirical formula of vanadium oxide if $2.74g$ of the metal oxide contains $1.53g$ of metal ?

A. V_2O_3

B. VO

C. V_2O_5

D. V_2O_7

Watch Video Solution

16. Determine the empirical formula of kevlar, used in making bullet proof vests, is $70.6\,\%\,C$, $4.2\,\%\,H$, $11.8\,\%\,N$ and $13.4\,\%\,O$:

A. $C_7H_5NO_2$

B. $C_7H_5N_2O$

C. C_7H_9NO

D. C_7H_5NO

Answer: D

Watch Video Solution

17. The hydrate salt $Na_2CO_3.xH_2O$ undergoes 63% loss in mass on heating and becomes anhydrous. The value of x is :

A. 10

B. 12

C. 8

D. 18

Watch Video Solution

18. A $6.85g$ sample of the hydrated $Sr(OH)_2.\ xH_2O$ is dried in an oven to given $3.13g$ of anhydrous $sr(OH)_2$. What is the value of x? (Atomic masses : $Sr = 87.60.\ O = 16.0, H = 1.0$)

A. 8

B. 12

C. 10

D. 6

Watch Video Solution

19. What percentage of oxygen is present in the compound $CACO_{3.3}Ca_3(PO_4)_2$?

A. $23.3\ \%$

B. $45.36\ \%$

C. $41.94\ \%$

D. $17.08\ \%$

Watch Video Solution

20. Dieldrin, an insecticide, contains `C,H,Cl and O. What is the empirical formula of Dieldrin ?

A. $C_6H_4Cl_3O$

B. C_8H_8ClO

C. $C_{12}H_8Cl_6O$

D. $C_6H_4Cl_3O_2$

Answer: C

Watch Video Solution

21. A gaseous compound is composed of $85.7\,\%$ by mass carbon and $14.3\,\%$ by mass hydrogen. Its density is 2.25 g/litre at $300K$ and 1.0 atm pressure. Determine the molecular formula of the compound.

A. C_2H_2

B. C_2H_4

C. C_4H_6

D. C_4H_{10}

Watch Video Solution

22. Complete combustion of 0.858 g of compound X gives 2.63 g of CO_2 and 1.28 g of H_2O. The lowest molecular mass X can have

A. 47 g

B. 86 g

C. 129 g

D. 172 g

Watch Video Solution

23. The sulphate of a metal M contains 9.87% of M. This sulphate is isomorphous with $ZnSO_{4.7}H_2O$. The atomic mass of M is :

A. 40.3

B. 36.3

C. 24.3

D. 11.3

Watch Video Solution

24. In an organic compound of molar mass $108 g mmol^{-1} C, H$ and N atoms are presents in $9:1:3.5$ by mass. Molecular formula can be

A. $C_6H_8N_2$

B. $C_7H_{10}N$

C. $C_5H_6N_3$

D. $C_4H_{18}N_3$

Watch Video Solution

25. On analysis, a certain compound was found to contain iodine and oxygen in the ratio of 254:80. The formula of the compound is (At mass I = 127, O = 16)

A. IO

B. I_2O

C. I_5O_3

D. I_(2)O_(5)`

Watch Video Solution

26. An element A is teravalent and another element B is divalent. The formula of the compound formed from these elements will be :

A. A_2B

B. AB

C. AB_2

D. A_2B_3

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27. A compound used in making nylon, contains 43.8% oxygen. There are four oxygen atoms per molecule. What is the molecular mass of compound ?

A. 36

B. 116

C. 292

D. 146

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28. Suppose the elements X and Y combine to form two compounds XY_2 and X_2Y_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

A. 23,30

B. 30,40

C. 40,30

D. 80,60

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Level 1 (Q.61 To Q.90)

1. $44g$ of a sample on complete combustion given $88gCO_2$ and $36g$ of H_2O. The molecular formula of the compound may be :

A. C_4H_9

B. C_2H_6O

C. C_2H_4O

D. C_3H_6O

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2. 40 miligram diatomic volatile substance (X_2) is converted to vapour that displaced $4.92mL$ of air at 1atm and 300k. Atomic mass of element X is nearly :

A. 400

B. 240

C. 200

D. 100

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3. Two elements 'A' and 'B' (atomic weights 75 and 16 respectively) combine to give a compound having 75.8% of 'A'. The compound has the formula (St. John's)

A. XY

B. X_2Y

C. X_2Y_2

D. X_2Y_3

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4. A sample of phosphorus that weighs $12.4g$ exerts a pressure 8 atm in a 0.821 litre closed vesel at $527^\circ C$. The molecular formula of the phosphorus vapour is :

A. P_2

B. P_4

C. P_6

D. P_8

Watch Video Solution

5. Manganese forms non-stoichiometric oxides having the general formula MnO_x. The value of x for the compound that analyzed 64% Mn. (At wt Mn=55)

A. 1.16

B. 1.83

C. 2

D. 1.93

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6. 1.44 gram if titanium (Ti) reacted with excess of O_2 and produce x gram of non $-$ stoichiometric compound $Ti_{1.44}O$. The value of x is :

A. 2

B. 1.77

C. 1.44

D. None of these

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7. How many moles of OH^- are present in the balanced equation?

$$Cr(OH)_3 + H_2O_2 \xrightarrow{OH^-} H_2O + CrO_4^{-2}$$

A. One mole of CS_2 will produce one mole of CO_2

B. The reaction of 16 g of oxygen produces $7.33 g \text{of}\ \ CO_2$

C. The raction of one mole of O_2 will produce $2/3$ "mole of" SO_2

D. Six molecules of oxygen requires theree molecular of CS_2

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8. Which of the following statements is correct

A.

$0.150 \quad \text{moles} \quad Cl_2 \times 1\text{mole} \quad KClO_3 / 3\text{moles}Cl_2 \times 122.5g / 1$

B.

$0.150 \quad \text{moles} \quad Cl_2 \times 1\text{mole} \quad KClO_3 / 3\text{moles}Cl_2 \times 1\text{mole}$

C.

$0.150 \ \text{moles} \quad Cl_2 \times 3\text{moles} \quad Cl_2 / 1 \ \text{mole} \ KCLO_3 \times 122.5g / 1\text{m}$

D.

$0.150 \ \text{moles} \quad Cl_2 \times 3\text{moles} \quad Cl_2 / 1 \ \text{mole} \ KCLO_3 \times 1\text{mole} \quad K$

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9. 2.0 g of a sample contains mixture of SiO_2 and Fe_2O_3. On very strong heating , it leaves a residue weighing $1.96g$. The reaction responsible for loss of mass is given below .

$Fe_2O_3(s) \rightarrow Fe_3O_4(s) + O_2(g)$, (unbalance equation) It brgt What is the precentage by mass of SiO_2 in original sample ?

A. $10\ \%$

B. $20\ \%$

C. $40\ \%$

D. $60\ \%$

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10. What volume of air at 1 atm and $273K$ containing $21\ \%$ of oxygen by volume is required to completely burn sulphur (S_8) present in $200g$ of sample , which contains $20\ \%$ inert material which does not burn. Sulphur burns according to the reaction $\frac{1}{8}S_8(s) + O_2(g) \rightarrow SO_2(g)$

A. 23.52 litre

B. 320 litre

C. 112 litre

D. 533.33 litre

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11. What is the hybridization of phophorus in phosphorus tri chloride?

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12. How many moles of P_4 can be produced by reaction of 0.1 mole $Ca_5(PO_4)_3F$, 0.36 mole SiO_2 and 0.90 mole C according to the following reaction?

$$4Ca_5(PO_4)_3F + 18SiO_2 + 30C \rightarrow 3P_4 + 2CaF_2 + 18CaSiO_3 + 30CO$$

A. 0.060

B. 0.030

C. 0.045

D. 0.075

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13. Equal moles of hydrogen and oxygen gases are placed in a container with a pin-hole through which both can escape. What fraction of the oxygen escapes in the time required for one-half of the hydrogen to escape ?

A. 10.7

B. 0.0757

C. 1.07

D. 5.38

Watch Video Solution

14. The mass of N_2F_2 produced by the reaction of $2.0g$ of NH_3 and $8.0g$ of F_2 is $3.56g$. What is the per cent yield ?

A. 79

B. 71.2

C. 84.6

D. None of these

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15. Calculate the mass of lime (CaO) obtained by heating $200kg$ of $95\ \%$ pure lime stone $(CaCo_3)$:

A. $104.4kg$

B. $105.4kg$

C. $212.8kg$

D. $106.4kg$

Watch Video Solution

16. Phospheric acid (H_3PO_4) perpared in two step process .

(1) $P_4 + 5O_2 \rightarrow P_4O_{10}$ $(2) P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$

Well allow 62 g of phosphrous to react with exces oxygen which from P_4O_{10} in $85\,\%$ yield . In the sep (2) reaction $90\,\%$ yield of H_3PO_4 is obtained . Mass of H_3PO_4 produced is :

A. $37.485g$

B. $149.\ 949g$

C. $125.\ 47g$

D. $564.48g$

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17. 9 moles of "D" and 14 moles of E are allowed to react in a closed vessel according to given reactions. Calculate number of moles of B formed in the end of reaction, if 4 moles of G are present in reaction vessel.

(percentage yield of reaction is mentioned in the reaction) Step -1

$3D + 4E80\,\% \rightarrow 5C + A$ Step-2 $3C + 5G50\,\% \rightarrow 6B + F$

A. 2.4

B. 30

C. 4.8

D. 1

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18. The chief ore of Zn is the sulphide , ZnS. The are is concentrated by froth floation process and then heated in air to convert Zns to Zno.

$2ZnS + 3O_2 \xrightarrow{80\,\%} 2ZnO + 2SO_2$

$ZnO + H_2SO_4 \xrightarrow{100\,\%} ZnSO_4 + H_2$

$2ZnSO_4 + 2H_2O \xrightarrow{80\,\%} 2Zn + 2H_2SO_4 + O_2$

The number of moles of ZnS required for producing 2 moles of Zn will be:

A. 3.125

B. 2

C. 2.125

D. 4

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19. 0.8 mole of a mixture of CO and CO_2 requires exactly 40 g of NaOH in solution for complete conversion of all the CO_2 into Na_2CO_3. How many more moles of NaOH would it require for conversion into Na_2CO_3. If the mixture is completely oxidised to CO_2?

A. 0.2

B. 0.6

C. 1

D. 1.5

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20. Silver oxide (Ag_2O) decomposes at temperature $300^\circ C$ yielding matellic silver and oxygen gas. A $1.60g$ sample of impure silver oxide yields $0.104g$ of oxygen gas. What is the per cent by mass of the silver oxide in the sample ?

A. 5.9

B. 47.125

C. 94.25

D. 88.2

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21. 342 g of 20% by mass of ba$(OH)_2$ solution (sq.gr.0.57) is reacted with $1200mL$ of $2MHNO_3$. If the final density of solution is same as pure

water then molarity of the iron in resulting solution which decides the nature of the above solution is :

A. 0.25

B. $0.5M$

C. $0.888M$

D. None of these

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22. $100mL$ of H_2SO_4 solution having molarity $1M$ and density $1.5g/mL$ is mixed with $400mL$ of water. Calculate final molarity of H_2SO_4 solution, if final density is $1.25g/mL$?

A. $4.4M$

B. $0.145M$

C. $0.52M$

D. $0.227M$

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23. What volume of HCl solution of density $1.2gcm^{-3}$ and containing $36.5\,\%$ by mass HCl, must be allowed to react wtih zinc (Zn) in order to liberate $4.0g$ of hydrogen ?

A. $333.33mL$

B. $500mL$

C. $614.66mL$

D. None of these

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24. An ideal gaseous mixture of ethane (C_2H_6) and ethene (C_2H_4) occupies 28 litre at 1 atm and $273K$. The mixture reacts completely with $128gO_2$ to produce CO_2 and H_2O. Mole fraction at C_2H_6 in the mixture is :

A. 0.6

B. 0.4

C. 0.5

D. 0.8

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25. Wood's metal contains $50.0\,\%$ bismuth, $25.0\,\%$ lead, $12.5\,\%$ tin and $12.5\,\%$ cadmium by mass. What is the mole fraction of tin ?(\ (Atomic mass : $Bi = 209$, $Pb = 207$, $Sn = 119$, $Cd = 112$)

A. 0.202

B. 0.158

C. 0.176

D. 0.221

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26. The density of a $56.0\,\%$ by mass aqueous solution of 1-propanol $(CH_3CH_2CH_2OH)$ is $0.8975 gcm^{-3}$. What is the mole fraction of the 1-propanol ?

A. 0.292

B. 0227

C. 0.241

D. 0.276

Watch Video Solution

27. What is the molartiy of SO_4^{2-} ion in aqueous solution that contain 34.2 ppm of $Al_2(SO_4)_3$? (Assume complete dissociation and density of solution $1gmpermL$)

A. $3 \times 10^{-4}M$

B. 2×10^{-4}

C. $10^{-4}M$

D. None of these

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28. The correct relationship between molarity (M) and molality (m) is (d = density of the solution, in KgL^{-1} , M_2 = molar mass of the solute in kg mol^{-1})

A. $m = \dfrac{1000M}{1000\rho - M_1}$

B. $m = \dfrac{1000\rho M}{1000\rho - MM_1}$

C. $m = \frac{1000MM}{1000\rho - MM_1}$

D. $m = \frac{1000M}{1000\rho - MM_1}$

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29. Molarity and molality of a solution of a liquid (mol.mass $= 50$) in aqueous solution is 9 and 10 respectively. What is the density of solution ? (Round of the answer to nearest whole number)

A. $1g/\text{cc}$

B. $0.95g/\text{cc}$

C. $1.05g/\text{cc}$

D. $1.35g/\text{cc}$

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30. An aqueous solution of ethanol has density 1.025 g/mL and it is 2 M. What is the molality of this solution ?

A. 1.79

B. 2.143

C. 1.951

D. None of these

Watch Video Solution

Level 1 (Q.91 To Q.120)

1. 0.2 mole of HCI and 0.2 mole of barium chloride were dissolved in water to produce a $500mL$ solution. The molarity of the CI^- ions is :

A. $0.06M$

B. $0.09M$

C. $1.2M$

D. $0.80M$

Watch Video Solution

2. Calculate the mass of anhydrous HCI in $10mL$ of concentrated HCI (density $= 1.2gpermL$) solution having 37% HCI by mass is :

A. $4.44g$

B. $4.44mg$

C. 4.44×10^{-3}

D. $0.444\mu g$

Watch Video Solution

3. Calculate the molality of 1L solution of $80\,\%\ H_2SO_4\left(\frac{w}{V}\right)$ given that the density of the solution is $1.80gmL^{-1}$. (round of the answer to nearest whole number)

A. 8.16

B. 8.6

C. 1.02

D. 10.8

Watch Video Solution

4. Fluoxymesterone, $C_{20}H_{29}FO_3$, is an anabolic steroid. A 500 mL solution is prepared by dissolving $10.0mg$ of the steoid in water. $10.0mL$ portion of this solution is diluted to a final volume of $1.00L$. what is the resulting molarity ?

A. 1.19×10^{-10}

B. 1.19×10^{-7}

C. 5.95×10^{-8}

D. 2.38×10^{-11}

Watch Video Solution

5. 17.1 gms of $Al_2(SO_4)_3$ is present in 500 ml of aqueous solution. It.s concentration can be

A. $6.25 \times 10^{-2} M$

B. $2.421 \times 10^{-2} M$

C. $0.1875 M$

D. None of these

Watch Video Solution

6. Concentrated HNO_3 is 63% HNO_3 by mass and has a density of $1.4g/mL$. How many millilitres of this solution are required to prepare $250mL$ of a $1.20MHNO_3$ solution ?

A. 18.0

B. 21.42

C. 20.0

D. 14.21

Watch Video Solution

7. 100 ml of 1M HCl, 200 ml 2 M HCl and 300 ml 3M HCl are mixed. The Molarity of the resulting solution is

A. 0.333M

B. 0.666M

C. 0.1M

D. 1.33M

Answer: B

Watch Video Solution

8. $100mL$ of $10\,\%\,NaOH\left(\frac{w}{V}\right)$ is added to $100mL$ of $10\,\%\,HCI\left(\frac{w}{V}\right)$.

The nature of resultant solution is :

A. alkaline

B. strongly alkaline

C. acidic

D. neurtal

Answer: C

Watch Video Solution

9. What volume of 0.10 M H_2SO_4 must be added to 50 mL of a 0.10 NaOH solution to make a solution in which molarity of the H_2SO_4 is 0.050M?

A. 400mL

B. 200mL

C. 100mL

D. none of these

Answer: C

Watch Video Solution

10. $1MHCI$ and $2MHCI$ are mixed are mixed in volume ratio of $4:1$. What is the final molarity of HCI solutions ?

A. 1.5

B. 1

C. 1.2

D. 1.8

Answer: C

Watch Video Solution

11. Three solutions X,Y,Z of HCl are mixed to produce 100mL of 0.1M solution . The milarities of X,Y and Z are 0.7M, 0.12M and 0.15M respectively. What respective volumes of X,Y and Z should be mixed?

A. $50mL, 25mL, 25mL$

B. $20mL, 60mL, 20mL$

C. $40mL, 30mL, 30mL$

D. $55mL, 20mL, 25mL$

Answer: D

Watch Video Solution

12. A bottle of an aqueous H_2O_2 solution is labelled as '28V' H_2O_2 and the density of the solution $(\text{in} g/mL)$ is 1.25. Choose the correct

A. Molarity of H_2O_2 solution is 2

B. Molarity of H_2O_2 solution is 5

C. Molality of H_2O_2 solution is 2.15

D. none of these

Answer: C

Watch Video Solution

13. The impure 6g of $NaCl$ is dissolved in water and then treated with excess of silver nitrate solution. The mass of precipitate of silver chloride is found to be 14g. The % purity of $NaCl$ solution would be:

A. 0.95

B. 0.85

C. 0.75

D. 0.65

Answer: A

Watch Video Solution

14. $Al(SO)_4)_3$ solution of 1 molal concentration is present in 1 litre solution of density 2.684 g/cc. How many moles $BaSO_4$ would be precipated on adding excess $BaCl_2$ in it?

A. 2 moles

B. 3 moles

C. 6 moles

D. 12 moles

Answer: C

Watch Video Solution

15. A certain public water supply contains $0.10ppb$ (part per billion) of chloroform $(CHCl_3)$. How many molecules of $CHCl_3$ would be obtained in $0.478mL$ drop of this water ?(assumed $d = 1gpermL$)

A. $4 \times 10^{-13} \times N_A$

B. $10^{-3} \times N_A$

C. $4 \times 10^{-10} \times N_A$

D. None of these

Answer: A

Watch Video Solution

16. Decreasing order (first having highest and then others following it) of mass of pure $NaOH$ in each of the aqueous solution :

A. I,ii,iii

B. iii,ii,i

C. ii,iii,i

D. ii,I,iii

Answer: B

Watch Video Solution

17. What is the molar mass of diacidic organic Lewis base (B), if $12g$ of its chloroplatinate salt (BH_2PtCI_6) on ignition produced $5g$ residue of Pt ?

A. 52

B. 58

C. 88

D. none of these

Answer: B

Watch Video Solution

18. On strong heating, one gram of the silver salt of an organic dibasic acid yields 0.5934g of silver. If the mass percentage of carbon in it 8 times the mass percentage of hydrogen and one-half the mass percentage of oxygen, determine the molecular formula of the acid.

A. $C_4H_6O_4$

B. $C_4H_6O_6$

C. $C_4H_6O_2$

D. $C_5H_{10}O_5$

Answer: B

Watch Video Solution

19. $0.607g$ of a silver salt of tribasic organic acid was quantitatively reduced to $0.37g$ of pure Ag. What is the molecular mass of the acid ?

A. 207

B. 210

C. 531

D. 324

Answer: B

Watch Video Solution

20. A sample of peanut oil weighing $1.5763g$ is added to $25mL$ of $0.4210MKOH$. After saponification is complete $8.5mL$ of $0.28MH_2SO_4$ is needed to neutralize excess KOH. The saponification number of peanut oil is:

A. 146.72

B. 223.44

C. 98.44

D. 98.9

Answer: A

Watch Video Solution

21. $20mL$ of a mixture of CO and H_2 were mixed excess of O_2 and exploded & cooled. There was a volume contraction of 23mL. All volume measurements corresponds to room temperature $(27^\circ C)$ and one atmospheric pressure. Determine the volume ratio $(V_1 : V_2 \text{of} Co$ anf H_2 in the original mixture .

A. $6.5 : 13.5$

B. $5 : 15$

C. $9 : 11$

D. $7 : 13$

Answer: D

Watch Video Solution

22. Write the atomic number and electronic configaration of Cesium?

Watch Video Solution

23. The percentage by volume of C_3H_8 in a gaseous mixture of C_3H_8, CH_4 and CO is 20. When 10 ml of the mixture is burnt in excess of O_2, the volume of CO_2 produced is $2xml$. Find the value of .x..

A. 90mL

B. 160mL

C. 140mL

D. none of these

Answer: C

Watch Video Solution

24. 40 ml gaseous mixture of CO, CH_4 and Ne was exploded with 10 ml of oxygen. On cooling, the gases occupied 36.5 ml. After treatment with KOH the volume reduced by 9 ml and again on treatment with alkaline pyrogallol, the volume further reduced, percentage of CH_4 in the original mixture is

A. 22.5

B. 77.5

C. 7.5

D. 15

Answer: D

Watch Video Solution

25. A gaseous mixture of propane and butane of volume 3 litre on complete combustion produces 11 lit CO_2 under standard condition of temp. and pressure. Find the ratio of volume of butane to propane.

A. $1:2$

B. $2:1$

C. $3:2$

D. $3:1$

Answer: B

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26. The oxy acid of phosphorus in which phosphorus has the lowest oxidation state is

A. Orthophosphoric acid

B. Phosphorous acid

C. Hypophosphoric acid

D. Metaphosphiric acid

Answer: C

Watch Video Solution

27. Oxidation numbers of the two chlorine atom in $CaOCl_2$ is

A. $+1 only$

B. $-1 only$

C. $+1 \text{ and } -1$

D. none of these

Answer: C

Watch Video Solution

28. The oxidation number of sulphur in S_8, S_2F_2 and H_2S are

A. $0, +1, -2 \text{ and } 6$

B. $+2, 0, +2 \text{ and } 6$

C. $0, +1, +2 \text{ and } 6$

D. $-2, 0, +2$ and 6

Answer: A

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29. Give example of one coordinate compound in which Fe show oxidation state of +1?

Watch Video Solution

30. When SO_2 is passed into an acidified potassium dichromate solution, the oxidation numbers of sulphur and chromium in the final products respectively are :

A. $+6, +6$

B. $+6, +3$

C. $+0, +3$

D. $+2, \ +3$

Answer: B

Watch Video Solution

Level 1 (Q.121 To Q.150)

1. What are the oxidation number of nitrogen in NH_4NO_3?

A. $+3, \ +3$

B. $+3, \ -3$

C. $-3, \ -5$

D. $-5, \ +3$

Answer: C

Watch Video Solution

2. The oxidation state of sulphur in Caro.s and Marshel.s acids are:

A. $+6, \ +6$

B. $+6, \ +4$

C. $+6, \ -6$

D. $+4, \ +6$

Answer: A

Watch Video Solution

3. In which fo the following has the oxidation number of oxygen been arragned in increasing order ?

A. $OF_2 < KO_2 < BaO_2 < O_3$

B. $BaO_2 < KO_2 < O_3 < OF_2$

C. $BaO_2 < KO_2 < OF_2 < KO_2$

D. $KO_2 < OF_2 < O_3 < BaO_2$

Answer: B

Watch Video Solution

4. The oxidation numbers of oxygen in KO_3, Na_2O_2 respectively are :

A. 3,2

B. 1,0

C. 0,1

D. $-0.33, \ -1$

Answer: D

Watch Video Solution

5. The oxidation state of Barium in $Ba(H_2PO_2)_2$ is

A. -1

B. $+1$

C. $+2$

D. $+3$

Answer: B

Watch Video Solution

6. If it is known that $Fe_{0.96}O$, Fe is present in $+2$ and $+3$ oxidation state, What is the mole fraction of Fe^{2+} in the compound ?

A. $\frac{12}{25}$

B. $\frac{25}{12}$

C. $\frac{1}{12}$

D. $\frac{11}{12}$

Answer: D

Watch Video Solution

7. Which ordering of compounds is according to the decreasing order of the oxidation state of nitrogen ?

A. HNO_3, NO, NH_4Cl, N_2

B. HNO_3, NO, N_2, NH_4Cl

C. HNO_3, NH_4Cl, NO, N_2

D. NO, HNO_3, NH_4Cl, N_2

Answer: B

Watch Video Solution

8. 2 moles of N_2H_4 loses 16 moles of electrons is being converted to a new compound x. Assuming that all of the N appears in the new compound, what is the oxidation state of N in x?

A. -1

B. -2

C. $+2$

D. $+4$

Answer: C

Watch Video Solution

9. When $K_2Cr_2O_7$ is converted to K_2CrO_4 then change in the oxidation state of chromium is :

A. 0

B. 6

C. 4

D. 3

Answer: A

Watch Video Solution

10. When a manganous salt is fused with a mixture of KNO_3 and solid $NaOH$, the oxidation number of Mn change from $+2$ to :

A. $+4$

B. $+3$

C. $+6$

D. $+7$

Answer: C

Watch Video Solution

11. In Fe(II) -MnO_4^- tirtrationHNO_3 is not used beacause:

A. it oxidisesMn^{2+}

B. it reducesMnO_4^-

C. it oxidiseFe^{2+}

D. it reduces Fe^{3+} formed

Answer: C

Watch Video Solution

12. Which species are oxidised and reduced in the reaction?

$$FeC_2O_4 + KMnO_4 \rightarrow Fe^{3+} + CO_2 + Mn^{2+}$$

A. Oxidised:Fe,C,Reduced:Mn

B. Oxidised:Fe,Reduced:Mn

C. Reduced:Fe,Mn,Oxidised:C

D. Reduced:C,Oxidised:Mn,Fe

Answer: A

Watch Video Solution

13. In which of the following reaction, H_2O_2 is acting as a reducing ageni

A. $SO_2 + H_2O_2 \rightarrow H_2SO_4$

B. $2KI + H_2O_2 \rightarrow 2KOH + I_2$

C. $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

D. $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$

Answer: D

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14. Following reaction describes the rusting of iron $4Fe + 3O_2 \rightarrow 4Fe^{3+} + 6O^{2-}$.

Which one of the following statement is incorrect

A. This is an example of a redox reaction

B. Metallic iron is reduced to Fe^{2+}

C. Fe^{3+} is an oxidising agent

D. Metallic iron is a redoxing agent

Answer: B

Watch Video Solution

15. Which of the following reactions does not represent the aldol condensation reaction ?

A. $Cl_2 + OH^- \rightarrow Cl^- + ClO_3^- + H_2O$

B. $2H_2O_2 \rightarrow H_2O_2$

C. $2Cu^+ \rightarrow Cu^{2+} + Cu$

D. $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$

Answer: D

Watch Video Solution

16. Which of the following is redox reaction

A. H_2SO_4 reach with NaOH

B. In atmoshere, O_3 is formed from O_2 by lightning

C. Evaporation of H_2O

D. Oxides of nitrogen are formed form nitrogen & oxygen by lightning

Answer: D

Watch Video Solution

17. Which of the following is redox reaction

A. $2Na\left[Ag(CN)_2\right] + Zn \rightarrow Na_2\left[Zn(CN)_4\right] + 2Ag$

B. $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$

C. $N_2O_5 + H_2O \rightarrow 2HNO_3$

D. $AgNO_3 + KI \rightarrow AgI + KNO_3$

Answer: A

Watch Video Solution

18. Balance the following chemcial reaction.

$MnO_4^- + SO_3^{2-} + H^+ \rightarrow Mn^{2+} + SO_4^{2-} + H_2O$. The coefficient of MnO_4^-, SO_3^- and H^+ in balanced reaction are ....., ... and ..... respectively.

A. 2,5,16

B. 16,3,12

C. 15,16,12

D. 2,16,5

Answer: A

Watch Video Solution

19. In the chemical reaction,

$$K_2Cr_2O_7 + xH_2SO_4 + ySO_2 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + zH_2O$$

$x, y,$ and z are

A. x=1,y=3,z-=1

B. x=4,y=1,z=4

C. x=3.y=2.z=1

D. x=2.y=2,z=1

Answer: A

Watch Video Solution

20. In $SOCl_2$ and SO_2Cl_2

A. 5

B. 3

C. 6

D. 2

Answer: D

Watch Video Solution

21. Balance the followings equations and choose the quantity which is the sum of the coefficients of reactants and products : $\ldots\ldots . PtCI_4 + \ldots . XeF_2 - > PtF_6 + \ldots\ldots CIF + \ldots . Xe$

A. 16

B. 13

C. 18

D. 12

Answer: A

Watch Video Solution

22. If 0.1 mole H_3PO_x is completely neutralised by 5.6g KOH then select the true statement.

A. x=3 and given acid is diabasic

B. x=4 and given acid has no P=H linkage

C. x=2 and given acid does not form acid salt

D. all of these

Answer: C

Watch Video Solution

23. When potassium permanganate is titrated against ferrous ammonium sulphate, the equivalent weight of potassium permanganent is

A. $\frac{\text{molecular mass}}{3}$

B. $\frac{\text{molecular mass}}{5}$

C. $\frac{\text{molecular mass}}{2}$

D. $\frac{\text{molecular mass}}{10}$

Answer: B

Watch Video Solution

24. Equivalent mass of FeS_2 in the half reaction, $FeS_2 + O_2 \rightarrow Fe_2O_3 + SO_2$ is :

A. $\frac{M}{10}$

B. $\frac{M}{11}$

C. $\frac{M}{6}$

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

Answer: B

Watch Video Solution

25. The equaivalent mass of HCl in the given reaction is :

$K_2Cr_2O_7 + 14HCl \rightarrow 2KCl + 2CrCl_3 + 3Cl_2 + 7H_2O$

A. 16.25

B. 36.5

C. 73

D. 85.1

Answer: D

Watch Video Solution

26. Equivalent weight of H_3PO_2 when it disproportionates into PH_3 and H_3PO_3 is (mol.wt. of $H_3PO_2 = M$)

A. M

B. $\frac{M}{2}$

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

D. $\frac{3M}{4}$

Answer: D

Watch Video Solution

27. The equivalent weights of oxidising and reducing agents can be calculated by the number of electrons gained or lost. The equivalent weight of an oxidising agent is the number of parts by weight of the substance which gains one electron. Thus, it is equal to the molecular weight of the substance divided by the number of electrons gained in the balanced chemical equation. Similarly, equivalent weight of a reducing agent is equal to the molecular weight divided by the number of electrons lost as represented in the balanced chemical equation

The equivalent weght of As_2, S_3 in the following reaction

$As_2S_3 + H^+ + NO_3^- \rightarrow NO + H_2O + AsO_4^{3-} + SO_4^{2-}$ is related to its molecular weight as

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

B. $\frac{M}{4}$

C. $\frac{M}{24}$

D. $\frac{M}{28}$

Answer: D

Watch Video Solution

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

A. 8g/mol

B. 16g/mol

C. 64.8g/mol

D. 3g/mol

Answer: B

Watch Video Solution

29. The equivalent mass of an element is 4. Its chloride has vapour density 59.25. Then the valency of the element is_____.

A. 4

B. 3

C. 2

D. 1

Answer: B

Watch Video Solution

30. 6×10^{-3} mole $K_2Cr_2O_7$ reacts completely with 9×10^{-3} mole X^{n+} to given XO_3^- and Cr^{3+}. The value of n is :

A. 1

B. 2

C. 3

D. none of these

Answer: A

Watch Video Solution

Level 1 (Q.151 To Q.180)

1. What mass of $H_2C_2O_4.\ 2H_2O$ (mol.mass $= 126$) should be dissolved in water to prepare $250mL$ of centinormal solution which act as a reducing agent ?

A. 0.63g

B. 0.1575g

C. 0.126g

D. 0.875g

Answer: B

Watch Video Solution

2. The equivalent weight of salt

$KHC_2O_4.\ H_2C_2O_4.4H_2O$ when used as reducing agent : $-$

A. $\frac{\text{Mol.mass}}{1}$

B. $\frac{\text{Mol.mass}}{2}$

C. $\frac{\text{Mol.mass}}{3}$

D. $\frac{\text{Mol.mass}}{4}$

Answer: D

Watch Video Solution

3. A bivalent metal has 37.2 equivalent weight. The molecular weight of its chloride is

A. W+35.6

B. W+72

C. 2W+72

D. 2W+35.6

Answer: C

Watch Video Solution

4. When BrO_3^- ion reacts with Br^- in acid medium, Br_2 is liberated. The equivalent mass of Br_2 in this reaction is :

A. $\frac{5M}{8}$

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

C. $\frac{3M}{5}$

D. $\frac{4M}{6}$

Answer: C

Watch Video Solution

5. If M_A gram of metal A displaces m_B gram of another metal B from its salt solution and if the equivalent mass are E_A and E_B respectively then equivalent mass of A can be expressed as :

A. $E_A = \frac{m_A}{m_B} \times E_B$

B. $E_A = \frac{m_A \times m_B}{E_B}$

C. $E_A = \frac{m_B}{E_A} \times E_B$

D. $E_A = \sqrt{\frac{m_A}{m_B} \times E_B}$

Answer: A

Watch Video Solution

6. Hydrazine reacts with KIO_3 in presence of HCl as :

$N_2H_4 + IO_3^- + 2H^+ + Cl^- \rightarrow ICl + N_2 + 3H_2O$

The equivalent masses of N_2H_4 and KIO_3 respectively are :

A. 8 and 53.5

B. 16 and 53.5

C. 8 and 35.6

D. 8 and 87

Answer: A

Watch Video Solution

7. What will be the normality of solution obtained by mixing $0.45N$ and $0.60NNaOH$ in the ratio $2:1$ by volume ?

A. 0.4N

B. 0.5N

C. 1.05N

D. 0.15N

Answer: B

Watch Video Solution

8. A solution containing 2.68×10^{-3} mol of A^{n+} ions requires 1.61×10^{-3} mol of MnO_4^- for the complete oxidation of A^{n+} to AO_3^- in acidic medium. What is the value of n ?

A. neutral

B. acidic

C. strong basic

D. none of these

Answer: B

Watch Video Solution

9. H_2O_2 is used as bleaching reagent because on dissociation it gives oxygen

$$\left(H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2\right)$$

"Chachi420" used H_2O_2 solution to bleach her hair and she required $2.24LO_2$ gas at 1atm and 273K. She has a H_2O_2 solution labelled '5.6V' then what volume of such solution must she required to bleach her hair?

A. 200mL

B. 300mL

C. 400mL

D. 500mL

Answer: C

Watch Video Solution

10. $1.25g$ of a solid dibasic acid is completely neutralised by $25mL$ of 0.25 molar Ba $(OH)_2$ solution. Molecular mass of the acid is :

A. 100

B. 150

C. 120

D. 200

Answer: D

Watch Video Solution

11. 5 ml of 1N HCl, 20 ml of N/2 H_2SO_4 and 30 ml of N/3 HNO_3 are mixed together and the volume made to one litre. The normality of the resulting solution is

A. 3N/100

B. N/10

C. N/20

D. N/40

Answer: A

Watch Video Solution

12. $0.45g$ of an acid of mol. Mass 90 was neutralised by $20mL$ of $0.54N$ caustic potash (KOH). The basicity of acid is :

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

13. .4 sample of H_2O_2 solution containing H_2O_2 by weight requires x ml of $KMnO_4$ solution for completed oxidation under acidic condition. The formality of $KMnO_4$ solution is

A. 1

B. 0.5

C. 0.4

D. 0.2

Answer: C

Watch Video Solution

14. Balance the equation :

$$SO_2 + Na_2CrO_4 + H_2SO_4 \rightarrow Na_2SO_4 + Cr_2(SO_4)_3 + H_2O$$

A. 0.12litre

B. 0.028 litre

C. 0.56 litre

D. 1.12 litre

Answer: C

Watch Video Solution

15. A sample of 1.0g of solid Fe_2O_3 of 80% purity is dissolved in a moderately concentrated HCl solution which is reduced by zinc dust. The resulting solution required 16.7mL of a 0.1M solution of the oxidant. Calculate the number of electrons taken up by the oxidant.

A. 2

B. 4

C. 6

D. 5

Answer: C

Watch Video Solution

16. Coefficients of MnO_4^-, $C_2O_4^{2-}$ and H^+ in the balanced reaction,

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

A. $120mL\ of\ 0.25M H_2C_2O_4$

B. $150mL\ of\ 0.10M H_2C_2O_4$

C. $25mL\ of\ 0.20M H_2C_2O_4$

D. $50mL\ of\ 0.20M H_2C_2O_4$

Answer: C

Watch Video Solution

17. Ratio of moles of Fe (II) oxidised by equal volumes of equimolar $KMnO_4$ and $K_2Cr_2O_7$ solutions in aidic medium will be :

A. $5:3$

B. $1:1$

C. $1:2$

D. $5:6$

Answer: D

Watch Video Solution

18. The mass of a mixture containing HCl and H_2SO_4 is $0.1g$ On treatment with an excess of an $AgNO_3$ solution , this acid mixture gives $0.1435g$ of $AgCl$. Mass % of the H_2SO_4 mixture is :

A. 36.5

B. 63.5

C. 50

D. none of these

Answer: B

Watch Video Solution

19. A solution of $Na_2S_2O_3$ is standardized iodometrically against 0.1262 g of $KBrO_3$. This process required 45 mL of the $Na_2S_2O_3$ solution. What is the strength of the $Na_2S_2O_3$? (K = 39, Br = 80)

A. 0.2N

B. 0.12N

C. 0.72N

D. 0.02N

Answer: B

Watch Video Solution

20. 0.80g of impure $(NH_4)_2SO_4$ was boiled with 100mL of a 0.2N NaOH solution was neutralized using 5mL of a $0.2NH_2SO_4$ solution. The percentage purity of the $(NH_4)_2SO_4$ sample is:

A. 82.5

B. 72.5

C. 62.5

D. 17.5

Answer: A

Watch Video Solution

21. The NH_3 evolved due to complete conversion of N from $1.12g$ sample of protien was absorbed in $45mL$ of $0.4NHNO_3$. The excess acid required $20mL$ of $0.1NaOH$. The % N in the sample is :

A. 8

B. 16

C. 20

D. 25

Answer: A::C

Watch Video Solution

22. Find out % of oxalate ion ina given sample of an alkali metal oxalate salt, 0.30g of it is dissolve in 100mL water and its required 90mL OF N /20 $KMnO_4$ solution

A. 66

B. 0.55

C. 0.44

D. 0.066

Answer: A

Watch Video Solution

23. 320mg of a sample of magnessium having a coating of its oxide required 20mL of 0.1M hydrochloric acid for the complete neutralisation of the latter. The composition of the sample is:

A. 87% Mg and 12.5%MgO

B. 12.5% Mg and 87.5 %MgO

C. 80% Mg and 20%MgO

D. 20% Mg and 80%MgO

Answer: C

Watch Video Solution

24. The concentration of bivalent lead ions in a sample of polluted of polluted water that aslo contains nitrate ions is determined by adding solid sodium sulphate (M=142) to exactly 500mL water. Calculate the molarity of lead ions if 0.355g is sodium sulphate was nedded for complete precipitation of lead ions as sulphate.

Watch Video Solution

25. What volume of HNO_3 (sp. gravity $1.05 mL^{-1}$ containing $12.6 (w/W) of HNO_3$) that

reduce into NO is required to oxidise iron 1g $1g.\ FeSO_4.7H_2O$ in acid medium is:

A. 70mL

B. 0.57mL

C. 80mL

D. 0.65mL

Answer: C

Watch Video Solution

26. What volume of $0.01MK_2Cr_2O_7$ would be required to oxidize Fe(II) in 50 ml of 0.03 M solution of ferrous ammonium sulphate in acidic medium?

A. 1.096mL

B. 1.32mL

C. 5.48mL

D. none of these

Answer: A

Watch Video Solution

27. When 2.5g of a sample of Mohr's salt reacts completely with 50mL of $\frac{N}{10} KMnO_4$ solution. The % purity of the sample of Mohr's salt is:

A. 78.4

B. 70

C. 37

D. 40

Answer: A

Watch Video Solution

28. 4 mole of a mixture of Mohr's salt and $Fe_2(SO_4)_3$ requires 500mL of $1MK_2Cr_2O_7$ for complete oxidation in acidic medium. The mole % of the Mohr's salt in the mixture is:

A. 25

B. 50

C. 60

D. 75

Answer: D

Watch Video Solution

29. The equivalent mass of a metal is twice to that of oxygen. How many times is the equivalent mass of it's oxide than the equivalent mass of the metal ?

A. $1:5$

B. 2

C. 3

D. 4

Answer: A

Watch Video Solution

30. A metal oxide has the formula X_2O_3. It can be reduced by hydrogen to give free metal and water. 0.159g of metal oxide requires 6 mg of hydrogen for complete reduction. The atomic mass of metal is amu is

A. 15.58

B. 155.8

C. 5.58

D. 55.8

Answer: D

Watch Video Solution

Level 1 (Q.181 To Q.200)

1. Calculate the mass of anhydrous oxalic acid, which can be oxidised to $CO_2(g)$ by $100mL$ of an $MnO4^-$ solution, $10mL$ of which is capable of oxiding $50mL$ of $1NI^-$ to I_2.

A. 45g

B. 22.5g

C. 30g

D. 12.25g

Answer: B

Watch Video Solution

2. A mixture of $K_2C_2O_4$ and KHC_2O_4 required equal volumes of $0.1MK_2Cr_2O_7$ for oxidation and 0.1 M NOH for neutralisation is separate titratiosn. The molar ratio of K_2CrO_4 and KHC_2O_4 in the mixture is

A. $6:1$

B. $1:6$

C. $1:3$

D. $3:1$

Answer: D

Watch Video Solution

3. Stannous sulphate $(SnSO_4)$ and potassium permanganate are used as oxidising agents in acidic medium for oxidation of ferrrous ammnium sulphate to ferric sulphate. The ration of number of moles of stannous sulphate required per mole of ferrous ammonium sulphate to the

number of moles of $KMnO_4$ required per mole of ferrous ammonium sulphate, is:

A. 2.5

B. 0.2

C. 0.4

D. 2

Answer: A

Watch Video Solution

4. If x g is the mass of $NaHC_2O_4$ required to neutralize 100 ml of 0.2 M NaOH and y g that required to reduce 100 ml of 0.02 M $KMnO_4$ in acidic medium then

A. a=b

B. 2a=b

C. a=2b

D. none of these

Answer: D

Watch Video Solution

5. An equimolar mixture of $Na_2C_2O_4$ and $H_2C_2O_4$ required V_1L of $0.1MKMnO_4$ in acidic medium for complete oxidation. The same amount of the mixture required V_2L of 0.1 M NaOH for neutralization. The ratio of V_1 to V_2 is

A. $1:2$

B. $2:1$

C. $4:5$

D. $5:4$

Answer: C

Watch Video Solution

6. A mixture containing 0.05 mol of $K_2Cr_2O_7$ and 0.02 mol of $KMnO_4$ was treated with excess of KI in acidic medium.The liberated iodine required 2.0 L of Na_2SO_3 solution of titration. Concentration of $Na_2S_2O_3$ solution was

A. $0.4 molL^{-1}$

B. $0.20 molL^{-1}$

C. $0.25 molL^{-1}$

D. $0.30 molL^{-1}$

Answer: A

Watch Video Solution

7. 5 ml of 1N HCl, 20 ml of N/2 H_2SO_4 and 30 ml of N/3 HNO_3 are mixed together and the volume made to one litre. The normality of the resulting solution is

A. 250mL

B. 62.5mL

C. 100mL

D. none of these

Answer: B

Watch Video Solution

8. There are two types of iodine titrations (a) Iodometric & (b) Iodimetric, Iodometric method is indirect method of I_2 estimation. Any oxidant which liberates I_2 from KI solution, the liberated iodine is estimated by titrating it with $Na_2S_2O_3$ solution as :

$I_2 + 2Na_2S_2O_3 \rightarrow 2NaI + Na_2S_4O_6$

100 mL of .x. M $K_2Cr_2O_7$ solution is added to excess of KI solution in acidic medium. The liberated iodine required 50 mL of 0.1N $Na_2S_2O_3$ solution. The value of x is

A. 2

B. 0.2

C. 0.1

D. 1

Answer: D

Watch Video Solution

9. 1g mixture of equal number of mole of Li_2CO_3 and other metal carbonate (M_2CO_3) required 21.6mL of 0.5 N HCl for complete neutralisation reaction. What is the apoproximate atomic mass of the other metal?

A. 25

B. 23

C. 51

D. 118

Answer: D

Watch Video Solution

10. 32g of a sample of $FeSO_4.7H_2O$ were dissolvedin dilute sulphuric acid and water and its volume was made up to 1 litre. $25mL$ of this solution required $20mL$ of $0.02MKMnO_4$ solution for complete oxidation. Calculate the mass % of $FeSO_4.7H_2O$ in the sample.

A. 34.75

B. 69.5

C. 89.5

D. none of these

Answer: A

Watch Video Solution

11. In the mixture of $NaHCO_3$ and $NaCO_3$, volume of a given HCl required is x ml with phenolphathalein indicator and further y mL is required with methyl orange indicator. Hence volume of HCl for complete reaction of $NaHCO_3$ present in the original mixture is

A. 2x

B. y

C. x/2

D. (y-x)

Answer: D

Watch Video Solution

12. $0.1g$ of a solution containing Na_2CO_3 and $NaHCO_3$ requires $10mL$ of 0.01 N HCI for neutralization using phenolphthalein as an indicator. mass % of Na_2CO_3 in solution is :

A. 25

B. 32

C. 50

D. none of these

Answer: C

Watch Video Solution

13. In the mixture of $NaHCO_3$ and $NaCO_3$, volume of a given HCl required is x ml with phenolphathalein indicator and further y mL is required with methyl orange indicator. Hence volume of HCl for complete reaction of $NaHCO_3$ present in the original mixture is

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer: A

Watch Video Solution

14. When 200mL solution of $NaOH$ and $NaCO_3$ was first titrated with N/10 HCl in presence of HPh, 17.5mL were usedtill end point is obtained. After this end point MeOH was added and 2.5mL of same HCl were required to attain new end point. The amount NaOH in mixture is:

A. 0.06g per 100mL

B. 0.06g per 200mL

C. 0.05 g per 100mL

D. 0.012 g per 200mL

Answer: A

Watch Video Solution

15. 1gram of a sample of $CaCO_3$ was strongly heated and the CO_2 liberated was absorbed in 100mL of 0.5 M NaOH solution. Assuming 90% purity for the sample, how many mL of 0.5M HCl would be required to react with the resulting solution to reach the end point inpresence of phenolphthaein?

A. 73mL

B. 41mL

C. 82mL

D. 100mL

Answer: C

Watch Video Solution

16. A sample of pure sodium carbonate $0.318g$ is dissolved in water and litrated with HCl solution. A volume of $60mL$ is required to reach the methly orange end point. Calculate the molarity of the acid.

A. 0.1M

B. 0.2M

C. 0.4M

D. none of these

Answer: A

Watch Video Solution

17. $10L$ of hard water required $5.6g$ of lime for removing haardness. Hence temporary hardness in ppm of $CaCO_3$ is :

A. 1000

B. 2000

C. 100

D. 1

Answer: A

Watch Video Solution

18. $1L$ of pond water contains $20mg$ of Ca^{2+} and $12mg$ of mg^{2+} ions. What is the volume of a $2NNa_2CO_3$ solution required to soften $5000L$ of pond water ?

A. 500L

B. 50L

C. 5L

D. none of these

Answer: C

Watch Video Solution

19. One litre of a sample of hard water contain $4.44mgCaCl_2$ and $1.9mgofMgCl_2$. What is the total hardness in terms of ppm of $CaCO_3$?

A. 2ppm

B. 3ppm

C. 4ppm

D. 6ppm

Answer: D

Watch Video Solution

20. If hardness of water sample is 200ppm, then select the incorrect statement:

A. Mass ratio of $CaCO_3$ to H_2O is $\frac{0.02}{100}$

B. Mole ratio of $CaCO_3$ to H_2O is 3.6×10^{-5}

C. Mass of $CaCO_3$ present in hard water is $0.2 g / L$

D. 1 miliequivalent of $CaCO_3$ present in 1kg of hard water

Answer: D

Watch Video Solution

Level 2 (Q.1 To Q.30)

1. A mixture of NH_4NO_3 and $(NH_4)_2HPO_4$ coitain 30.40% mass per cent of nitrogen. What is the mass ratio of the two components in the mixture ?

A. $2:1$

B. $1:2$

C. $3:4$

D. $4:1$

Answer: A

Watch Video Solution

2. What volume of 75% alcohol by weight $\left(d - 0.80g/cm^3\right)$ must be used to prepare 150 cm^3 of 30 % alcohal by mass $\left(d = 0.90g/cm^3\right)$?

A. 67.5 mL

B. 56.25 mL

C. 44.44 mL

D. None of these

Answer: A

Watch Video Solution

3. Calculate the number of millilitre of NH_3(aq) solution (d=0.986g/ml) contain 2.5% by mass NH_3, which will be required to precipitate iron as $Fe(OH)_3$ in a 0.8 g sample that contains 50% Fe_2O_3.

A. 0.344 mL

B. 3.44 mL

C. 17.24 mL

D. 10.34 mL

Answer: D

Watch Video Solution

4. In the preparation of Iron from haematite (Fe_2O_3) by the reaction with carbon $Fe_2O_3 + C \rightarrow Fe + CO_2$ 94.5 kg of 10x% pure Iron could be produced from 120 kg of 90% pure Fe_2O_3? Find the value of x.

A. 94.5 kg

B. 60.48 kg

C. 116.66 kg

D. 120 kg

Answer: A

Watch Video Solution

5. A mineral consists of an equimolar mixture of the carbonates of two bivalent metals. One metal is present to the extent of 12.5% by mass.2.8 g of the mineral on heating lost 1.32g of CO_2. What is the % by mass of the other metal ?

A. 87.5

B. 35.71

C. 65.11

D. 23.21

Answer: D

Watch Video Solution

6. 6.2 g of a sample containing $NaHCO_3$, $NaHCO_3$ and non -volatiale inert impurity on gentle heating loses 5% of its mass due to reaction $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$. Residue is dissolved in water

and formed 100 mL solution and its 10 mL portion requires 7.5 mL of 0.2 M aqueous solution of $BaCl_2$ for complete precipitation of carbonates. Determine mass (in gram) of Na_2CO_3 in the original sample .

A. 1.59

B. 1.06

C. 0.53

D. None of these

Answer: B

Watch Video Solution

7. Nitric acid can be produced from NH_3 in three step process

I) $4NH_{3(g)} + 5O_{2(g)} \rightarrow 4NO_{(g)} + 6H_2O_{(g)}$ II)

$2NO_{(g)} + O_{2(g)} \rightarrow 2NO_{2(g)}$

III) $3NO_{2(g)} + H_2O_{(l)} \rightarrow 2HNO_{3(aq)} + NO_{(g)}$

% yield of I, II, III reaction are respectively 50%, 60% and 80%. Then how much volume of $NH_{3(g)}$ at STP is required to produce 2.25 gm of HNO_3.

A. 156.25

B. 350 L

C. 3500 L

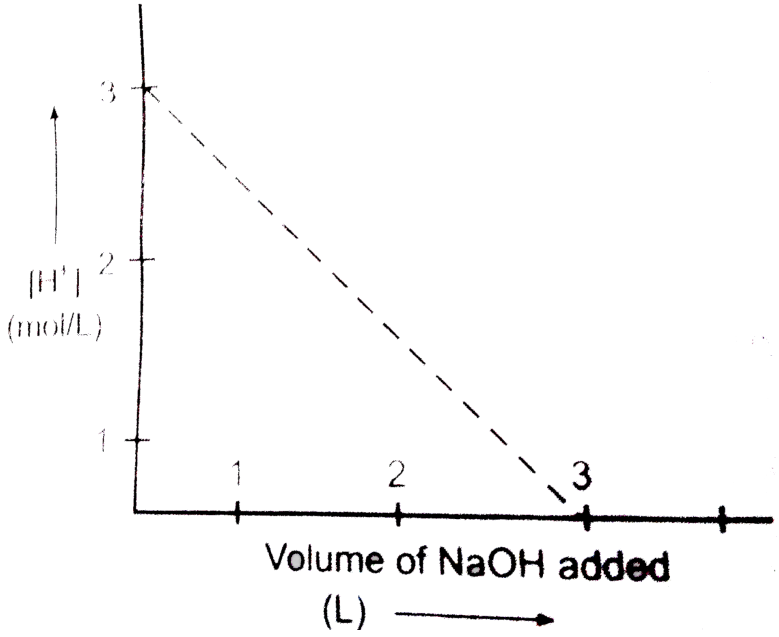
D. None of these

Answer: C

Watch Video Solution

8. 1 M NaOH solution was slowly added in to 1000 mL of 183.75 g impure H_2SO_4 solution and the following plot was obtained. The percentage

purity of H_2SO_4 sample and slope of the curve respectively are:



A. 75%, $-\frac{1}{3}$

B. 80%, $-\frac{1}{2}$

C. 80%, -1

D. None of these

Answer: C

Watch Video Solution

9. Inniting MnO_2 in air converts it quantitctively to Mn_3O_4. A sample of pyrolusite is of the following composition. $MnO_2 = 80\,\%$ and othe inert constituents =15% and rest bearing H_2O. The sample is ignited to constant weight. What is the % of Mn is the igrited sample.

A. 0.246

B. 0.37

C. 0.5524

D. 0.7405

Answer: C

Watch Video Solution

10. A 1.0g sample of a pure organic compound cotaining chlorine is fused with Na_2O_2 to convert chlorine to NaCl. The sample is then dissolved in water, and the chloride precipitated with $AgNO_3$, giving 1.96 g of AgCl. If

the molecular mass of organic compound is 147, how many chlorine does each molecule contain ?

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

11. A 0.6gm sample consisting of only CaC_2O_4 and MgC_2O_4 is heated at $500^\circ C$gets converted into $CaCO_3$ and $MgCO_3$. The sample then weighed 0.465gm. If the sample had been heated to $900^\circ C$ where the products are CaO and MgO, then what would the mixture of oxides weigh?

A. 0.12 g

B. 0.21 g

C. 0.252 g

D. 0.3 g

Answer: C

Watch Video Solution

12. A metal M forms the sulphate $M_2(SO_4)_3$. A 0.596 gram sample of the sulphate reacts with excess $BaCl_2$ to give 1.220 g $BaSO_4$. What is the atomic mass of M ?

A. 26.9

B. 69.7

C. 55.8

D. 23

Answer: A

Watch Video Solution

13. Urea(H_2NCONH_2) is manufactured by passing CO_2(g) through ammonia solution followed by crystallization. For the above reaction is prepared by combustion of hydrocarbons. If combustion of 236 kg of a saturated hydrocarbon (C_nH_{2n+2}) produces as much CO_2 as required for production of 999.6 kg urea then molecular formula of hydrocarbon is:

A. $C_{10}H_{22}$

B. $C_{12}H_{26}$

C. $C_{13}H_{28}$

D. C_8H_{18}

Answer: B

Watch Video Solution

14. 11.6 g of an organic compound having formula (C_nH_{2n+2}) is burnt in excess of $O_2(g)$ initially taken in a 22.41 litre steel vessel. Reaction the gaseous mixture was at 273 K with pressure reading 2 atm. After complete complete combustion and loss of considerable amount of heat, the mixture of product and excess of O_2 had a temperature of 546 K and 4.6 atm pressure. The formula of organic compound is :

A. C_6H_6

B. C_3H_8

C. C_5H_{12}

D. C_4H_{10}

Answer: D

Watch Video Solution

15. $H_2O_2 + 2KI \xrightarrow{40\% \text{ yield}} I_2 + 2KOH$

$H_2O_2 + 2KMnO_4 + 3H_2SO_4 \xrightarrow{50\% \text{ yield}} K_2SO_4 + 2MnSO_4 + 3O_2 + 4H_2O$

150 ml of H_2O_2 sample was divided into two parts. First part was treated with KI and Formed KOH required 200 ml. of $M/2H_2SO_4$ for neutralisation.Other part was trated with $KMnO_4$ yielding 6.74 litre of O_2 at STP.Using % yield indicated find volume stregth of H_2O_2 sample used.

A. 5.04

B. 10.08

C. 3.36

D. 33.6

Answer: D

Watch Video Solution

16. SO_2Cl_2 (sulphuryl chloride) reacts with water to given a mixture of H_2SO_4 and HCL. What volume of 0.2 M $Ba(OH)_2$ is needed to completely neutralize 25 mL of 0.2 MSO_2Cl_2 solution:

A. 25 mL

B. 50 mL

C. 100 mL

D. 200 mL

Answer: B

Watch Video Solution

17. 5 g sample contain only Na_2CO_3 and Na_2SO_4 . This sample is dissolved and the volume made up to 250 mL. 25 mL of this solution neutralizes 20 mL of 0.1 M H_2SO_4.

Calcalute the % of Na_2SO_4 in the sample .

A. 42.4

B. 57.6

C. 36.2

D. None of these

Answer: B

Watch Video Solution

18. 20 mL of 0.2 M NaOH(aq) solution is mixed with 35 mL of this 0.1 ML NaOH (aq) solution and the resultant solution is diluted to 100 mL. 40 mL of this diluted solution reacted with 10% impure sample of oxalic acid $(H_2C_2O_4)$ The mass of impure is:

A. 0.15 gram

B. 0.135 gram

C. 0.59 gram

D. None of these

Answer: A

Watch Video Solution

19. A silver coin weighing 11.34 g was dissolved in nitric acid When sodium chloride was added to the solution all the silver (present as $AgNO_3$) precipitated as silver chloride. The mass of the precipitated silver chloride was 14.35 g. Calculate the percentage of silver in the coin.

A. 0.048

B. 95.2

C. 0.9

D. 0.8

Answer: B

Watch Video Solution

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

A. 14 parts by mass of Y

B. 42 parts by mass of Y

C. 70 parts by mass of Y

D. 84 parts by mass of Y

Answer: C

Watch Video Solution

21. The conversion of oxygen to ozone occurs to the extent of 15% only. The mass of ozone that can be prepared from 67.2 L of oxygen at 1 atm and 273 K will be :

A. 14.4 g

B. 96 g

C. 640 g

D. 64 g

Answer: A

Watch Video Solution

22. RH_2 (ion exchange resin) can replace Ca^{2+} ions in hard water as $RH_2 + Ca^{2+} \rightarrow RCa + 2H^+$. If 1L of hard water after passing through RH_2 has pH=3 then hardness in parts per million of Ca^{2+} is :

A. 20

B. 10

C. 40

D. 100

Answer: A

Watch Video Solution

23. $100cm^3$ of a solution of an acid (Molar mass =98) containing 29.4 g of the acid per litre were completely neutralized by $90.0cm^3$ of aq. NaOH cotanining 20 g of NaOH per$500cm^3$. The basicity of the acid is

A. 3

B. 2

C. 1

D. data insufficient

Answer: A

Watch Video Solution

24. 20 mL of 0.1 M solution of compound $NaCO_3.NaHCO_3.2H_2O$ is titrated against 0.05 M HCL. X mL of HCL is used when phenolphthalein is used as an indicator and y mL of HCL is used when methly orange is the indicator in two separate titrations. Hence (y-x) is:

A. 40 mL

B. 80 mL

C. 120 mL

D. None of these

Answer: B

Watch Video Solution

25. A sample containing $HAsO_2$ (mol. Mass=108) and weighing 3.78 g is dissolved and diluted to 250 mL in a volumetric flask. A 50 mL sample (aliquot) is withdrawn with a pipet and titrated with 35 mL of 0.05 M solution of I_2. Calculate the percentage $HAsO_2$ in the sample :

A. 25

B. 20

C. 0.1

D. None of these

Answer: A

Watch Video Solution

26. A mixture of FeO and Fe_2O_3 is completely reacted with 100 mL of 0.25 M acidified $KMnO_4$ solution. The resultant solution was then treated with Zn dust which converted Fe^{3+} of the solution to Fe^{2+}.The Fe^{2+} required 1000 mL of 0.10 $MK_2Cr_2O_7$ solution. Find out the weight % Fe_2O_3 in the mixture.

A. 80.85

B. 19.15

C. 50

D. 89.41

Answer: A

Watch Video Solution

27. To a 10mL, 1M aqueous solution of Br_2, excess of NaOH is added so that all Br_2 is disproportionated to Br^- and BrO_3^-. The resulting solution is free from Br^-, by extraction and excess of OH^- neutralised by acidifying the solution. The resulting solution is suffcient to react with 2 g of impure CaC_2O_4(M= 128g/mol) sample. The % purity of oxalate sample is :

A. 0.853

B. 0.125

C. 0.9

D. 0.64

Answer: B

Watch Video Solution

28. $0.10g$ of a sample containing $CuCo_3$ and some inert impurity was dissolved in dilute sulphuric acid and volume made up to $50mL$. This

solution was added into $50mL$ of $0.04MKI$ solution where copper precipitates as CuI and I^- is oxidized into I_3^- . A $10mL$ portion of this solution is taken for analysis, filtered and made up free I_3^- and then treated with excess of acidic permanganate solution. Liberated iodine required $20mL$ of $2.5mM$ sodium thiosulphate solution to reach the end point . Determine mass percentage of $CuCO_3$ in the original sample.

A. 7.41

B. 74.1

C. 61.75

D. None of these

Answer: B

Watch Video Solution

29. 1 mol of equimolar mixture of ferric oxalate and ferrous oxalate will require x mol of $KMnO_4$ in acidic medium for complete oxidation. X is

A. 0.5 mole

B. 0.9 mole

C. 1.2 mole

D. 4.5 mole

Answer: B

Watch Video Solution

30. An impure sample of sodium oxalate $(Na_2C_2O_4$ weighing 0.20 g is dissolved in aqueous solution of $H_2SO_4)$ and solution is titrated at $70^\circ C$,requiring 45 mL of 0.02 M $KMnO_4$ solution. The end point is overrun, and back titration in carried out with 10 mL of 0.1 M oxalic acid solution.Find the purity of $Na_2C_2O_4$ in sample:

A. 75

B. 83.75

C. 90.25

D. None of these

Answer: B

Watch Video Solution

Level 2 (Q.31 To Q.35)

1. A mixture containing 0.05 mol of $K_2Cr_2O_7$ and 0.02 mol of $KMnO_4$ was treated with excess of KI in acidic medium.The liberated iodine required 2.0 L of Na_2SO_3 solution of titration. Concentration of $Na_2S_2O_3$ solution was

A. 14.64

B. 34.2

C. 65.69

D. 50

Answer: A

Watch Video Solution

2. A 150 mL of solution of I_2 is divided into two unequal parts. I part reacts with hypo solution solution in acidic medium. 15 mL of 0.4 M hypo was consumed. II part was added with 100 mL of 0.3 MNaOH solution. What was the initial concentration of I_2 ?

A. 0.08 M

B. 0.1 M

C. 0.2 M

D. None of these

Answer: B

Watch Video Solution

3. A mixture of H_2SO_4 and $H_2C_2O_4$ (oxalic acid) and some inert impurity weighing 3.185 g was dissolved in water and the solution made up to

1litre. 10 mL of this solution required 3 mL of 0.1 N NaOH for complete neutralization. In another experiment 100 mL of the same solution in hot condition required 4 mL of 0.02 M $KMnO_4$ solution for complete reaction. The mass % of H_2SO_4 in the mixture was:

A. 40

B. 50

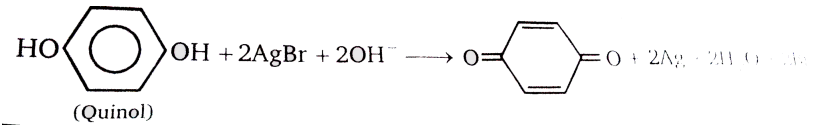
C. 60

D. 80

Answer: A

Watch Video Solution

4. During developing of an exposed camera film, one step involves in the following reaction :



(Quinol)

A. It acts as an acid

B. It acts as reducing agent

C. It acts as oxidant

D. It acts as a base

Answer: B

Watch Video Solution

5. The concentration of oxalic acid is 'X' mol lit^{-1} . 40 ml of this solution reacts with 16 ml of 0.05 M acidified $KMnO_4$. What is the pH of 'X' M oxalic acid solution ? (Assume that oxalic acid dissociates completely)

A. 1.3

B. 1.699

C. 1

D. 2

Answer: C

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Level 3 - Passage

1. 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 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 $SO_3 + H_2O \rightarrow H_2SO_4$

What is the % of free SO_3 in an oleum that is labelled as '$104.5\,\%\ H_2SO_4$' ?

A. 10

B. 20

C. 40

D. None of these

Answer: B

Watch Video Solution

2. 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 is known as % labelling in oleum.

For example, a oleum bottle labelled as '$019\ \%\ H_2SO_4$' 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 $SO_3 + H_2O \rightarrow H_2SO_4$

9.0 g water is added into oleum sample lablled as "112%" H_2SO_4 then the amount of free SO_3remaining in the solution is : (STP=1 atm and 273 K)

A. 14.93 Lat STP

B. 7.46 L at STP

C. 3.73 L at STP

D. 11.2 L at STP

Answer: C

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3. 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 is known as % labelling in oleum.

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If excess water is added into a bottle sample labelled as "$112\%H_2SO_4$"

and is reacted with 5.3 g $NaCO_3$ then find the volume of CO_2 evolved at 1 atm pressure and 300 K temperature after the completion of the reaction :

A. 2.46 L

B. 24.6 L

C. 1.23 L

D. 12.3 L

Answer: C

Watch Video Solution

4. 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 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 $SO_3 + H_2O \rightarrow H_2SO_4$

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

A. 74

B. 26

C. 20

D. None of these

Answer: B

Watch Video Solution

5. The strength of H_2O_2 is expressed in several ways like molarity, normality,% (w/V), volume strength, etc. The strength of "10 V" means 1 volume of H_2O_2 on decomposition gives 10 volumes of oxygen at 1 atm and 273 K or 1 litre of H_2O_2gives 10 litre of O_2 at 1 atm and 273 K The decomposition of H_2O_2 is shown as under :

$H_2O_2(aq) \rightarrow H_2O(l) + \frac{1}{2}O_2(g)$

H_2O_2 can acts as oxidising as well as reducing agent. As oxidizing agent H_2O_2 is converted into H_2O and as reducing agent H_2O_2 is converted into O_2. For both cases its n-factor is 2. $\therefore \text{Normality of} H_2O_2$ " solution " $= 2 \times$ molarity of H_2O_2 solution

What is the molarity of "11.2 V" H_2O_2 ?

A. 1 M

B. 2 M

C. 5.6 M

D. 11.2 M

Answer: A

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6. The strength of H_2O_2 is expressed in several ways like molarity, normality,% (w/V), volume strength, etc. The strength of "10 V" means 1 volume of H_2O_2 on decomposition gives 10 volumes of oxygen at 1 atm

and 273 K or 1 litre of H_2O_2gives 10 litre of O_2 at 1 atm and 273 K The decomposition of H_2O_2 is shown as under :

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What is thepercentage strength (%w/V) of "11.2 V" H_2O_2

A. 1.7

B. 3.4

C. 34

D. None of these

Answer: B

Watch Video Solution

7. The strength of H_2O_2 is expressed in several ways like molarity, normality,% (w/V), volume strength, etc. The strength of "10 V" means 1 volume of H_2O_2 on decomposition gives 10 volumes of oxygen at 1 atm and 273 K or 1 litre of H_2O_2gives 10 litre of O_2 at 1 atm and 273 K The decomposition of H_2O_2 is shown as under :

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20mL of H_2O_2 solution is reacted with 80 mL of 0.05 $MKMnO_4$ "in acidic medium then what is the volume strength of" H_2O_2 ?

A. 2.8

B. 5.6

C. 11.2

D. None of these

Answer: B

Watch Video Solution

8. The strength of H_2O_2 is expressed in several ways like molarity, normality,% (w/V), volume strength, etc. The strength of "10 V" means 1 volume of H_2O_2 on decomposition gives 10 volumes of oxygen at 1 atm and 273 K or 1 litre of H_2O_2gives 10 litre of O_2 at 1 atm and 273 K The decomposition of H_2O_2 is shown as under :

$$H_2O_2(aq) \rightarrow H_2O(l) + \frac{1}{2}O_2(g)$$

H_2O_2 can acts as oxidising as well as reducing agent. As oxidizing agent H_2O_2 is converted into H_2O and as reducing agent H_2O_2 is converted into O_2. For both cases its n-factor is 2. $\therefore \text{Normality of} H_2O_2$ " solution " $= 2 \times \text{molarity of} H_2O_2$ solution

40 g $Ba(MnO_4)_2$ (mol.mass=375) sample containing some inert impurities in acidic medium completely reacts with 125 mL of "33.6 V" of H_2O_2. What is the percentage purity of the sample ?

A. 0.2812

B. 0.7031

C. 0.85

D. None of these

Answer: B

Watch Video Solution

9. A water is said to be soft water if it produces sufficient foam with the soap and water that does not produce foam with soap is known as hard water. Hardness has been classified into two types (i)Temporary hardness (ii) Permanent hardness.

Temporary hardness is due to presence of calcium and magnesium bicarbonate. It is simply removed by boiling as

$$Ca(HCO_3)_2 \xrightarrow{\Delta} CaCO_3 \downarrow + CO_2 \uparrow + H_2O$$

$$Mg(HCO_3)_2 \xrightarrow{\Delta} MgCO_3 \downarrow + CO_2 \uparrow + H_2O$$

temporary hardness can also be removed by addition of slaked lime, $Ca(OH)_2$

$Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow 2CaCO_3 \downarrow + 2H_2O$

permanent hardsness is due to presencce of sulphates and chlorides of Ca,Mg,etc. It is removed by washing soda as

$CaCl_2 + Na_2CO_3 \rightarrow CaCO_3 \downarrow + 2NaCl$

$CaSO(4) + Na_2CO_3 \rightarrow CaCO_3 \downarrow + Na_2SO_4$

Permanent hardness also removed by ion exchange resin process as

$2RH + Ca^{2+} \rightarrow R_2Ca + 2H^+$

$2ROH + SO_4^{2-} \rightarrow R_2SO_4 + 2OH^-$

The degree of hardness of water is measured in terms of PPm of $CaCO_3$ 100 PPm means 100 g of $CaCO_3$ is present in 10^6 g of H_2O. If any other water sample which contain 120 PPm of $MgSO_4$, hardness in terms of $CaCO_3$ is equal to =100 PPm.

What is the mass of $Ca(OH)_2$ required for 10 litre of water remove temporary hardness of 100 PPm due to $Ca(HCO_3)_2$?

A. 100 ppm

B. 200 ppm

C. 300 ppm

D. None of these

Answer: C

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10. (A) : Temporary hardness can be removed by boiling hard water

(R) : On boiling hard water bicarbonates of calcium and magnesium are converted to insoluble carbonates

A. 1.62 g

B. 0.74 g

C. 7.4 g

D. None of these

Answer: B

Watch Video Solution

11. A water is said to be soft water if it produces sufficient foam with the soap and water that does not produce foam with soap is known as hard water. Hardness has been classified into two types (i)Temporary hardness (ii) Permanent hardness.

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What is the mass of $Ca(OH)_2$ required for 10 litre of water remove temporary hardness of 100 PPm due to $Ca(HCO_3)_2$?

A. 250 ppm

B. 500 ppm

C. 750 ppm

D. 1000 ppm

Answer: B

Watch Video Solution

12. "Equivalent mass" =("Molecular mass/Atomic mass")/("n-factor")

n-factor is very important in redox as well as non-redox reactions. With the help of n-factor we can predict the molar ratio of the reactant species

taking part in reactions. The reciprocal of n-factor's ratio of the reactions is the molar ratio of the reactants.

In general n-factor of acid/base is number of moles of H^+/OH^- furnished per mole of acid/base n-factor of a reactant is number of moles electrons lost or gained per mole of reactant.

Example 1:

(1)In acidic medium : $KMnO_4(n=5) \rightarrow Mn^{2+}$

(2) In neutral medium : $KMnO_4(n=3) \rightarrow Mn^{2+}$

(3) In basic medium : $KMnO_4(n=1) \rightarrow Mn^{6+}$

Example 2 : $FeC_2O_4 \rightarrow Fe^{3+} + 2CO_2$

Total number of moles e^- lost by 1 mole of FeC_2O_4

$= 1 + 1 \times 2 \Rightarrow 3$

n-factor of $Ba(MNO_4)_2$ in acidic medium is :

A. 2

B. 6

C. 10

D. None of these

Answer: C

Watch Video Solution

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Example 2 : $FeC_2O_4 \rightarrow Fe^{3+} + 2CO_2$

Total number of moles e^- lost by 1 mole of FeC_2O_4

$= 1 + 1 \times 2 \Rightarrow 3$

Consider the following reaction.

$H_3PO_2 + NaOH \rightarrow NaH_2PO_2 + H_2O$

What is the equivalent mass of H_3PO_2 ?(mol.Wt.is M)

A. M

B. `M/2

C. M/3

D. None of these

Answer: A

Watch Video Solution

14. "Equivalent mass" =("Molecular mass/Atomic mass")/("n-factor")

n-factor is very important in redox as well as non-redox reactions.With the help of n-factor we can predict the molar ratio of the reactant species taking part in reactions. The reciprocal of n-factor's ratio of the reactions is the molar ratio of the reactants.

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Example 2 : $FeC_2O_4 \rightarrow Fe^{3+} + 2CO_2$

Total number of moles e^- lost by 1 mole of FeC_2O_4

$= 1 + 1 \times 2 \Rightarrow 3$

For the reaction, $O(\text{molar mass=M}) \rightarrow Fe_2O_3$ what is the eq. mass of $fe_{0.95}$O ?

A. $\frac{M}{0.85}$

B. $\frac{M}{0.95}$

C. $\frac{M}{0.8075}$

D. None of these

Answer: A

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15. "Equivalent mass" =("Molecular mass/Atomic mass")/("n-factor")

n-factor is very important in redox as well as non-redox reactions.With the help of n-factor we can predict the molar ratio of the reactant species specis taking part in reactions. The reciprocal of n-factor's ratio of the reactions is the molar ratio of the reactants.

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Example 2 : $FeC_2O_4 \rightarrow Fe^{3+} + 2CO_2$

Total number of moles e^- lost by 1 mole of FeC_2O_4

$= 1 + 1 \times 2 \Rightarrow 3$

In the reaction, $xVO + yFe_2O_3 \rightarrow FeO + V_2O_5$ what is the value of x and y respectively?

A. 1,1

B. 2,3

C. 3,2

D. None of these

Answer: B

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16. Consider the following series of reactions :

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

$3NaClO \rightarrow 2NaCl + NaClO_3$

$4NaClO_3 \rightarrow 3NaClO_4 + NaCl$

How much Cl_2 is reqired to prepare 122.5 g of $NaClO_4$ by above sequencial reactions ?

A. 284 g

B. 213 g

C. 142 g

D. 71 g

Answer: A

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17. Consider the following series of reactions :

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

$3NaClO \rightarrow 2NaCl + NaClO_3$

$4NaClO_3 \rightarrow 3NaClO_4 + NaCl$

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

A. $\frac{1}{12}$ mole

B. 1.67 mole

C. 1.75 mole

D. 0.75 mole

Answer: C

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18. Consider the following series of reactions :

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

$3NaClO \rightarrow 2NaCl + NaClO_3$

$4NaClO_3 \rightarrow 3NaClO_4 + NaCl$

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

A. $\frac{1}{3}$ mole

B. Zero

C. $\frac{1}{4}$ mole

D. 1 mole

Answer: B

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Level 3 - One Or More Answers Are Correct

1. 1 g of nitrogen represents :

A. $6.02 \times 10^{23} N_2$ molecules

B. 22.4 litre of N_2 at 1 atm and 273 K

C. 11.2 litre of N_2 at 1 atm and 273 K

D. 14 g of nitrogen

Answer: C::D

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2. 1 g molecule of V_2O_5 contains :

A. 5 mole of oxygen atom

B. 2 mole of V atom

C. 1 mole of oxygen atom

D. 2.5 mole of oxygen atom

Answer: A::B

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3. Select the dimensionless quantity (ies) :

A. vapour density

B. molality

C. specific gravity

D. mass fraction

Answer: A::C::D

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4. Which of the following concentration terms is/are affected by a change in temperature ?

A. Molarity

B. Molality

C. Normality

D. Specific gravity

Answer: A::C::D

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5. Which of the following statements regarding the compound A_xB_y is /are correct?

A. 1 mole of A_xB_y contains 1 mole of A and 1 mole B

B. 1 equivalent of A_xB_y contains 1 equivalent of A and 1 equivalent of B

C. 1 mole of A_xB_y contains x moles of A and y moles of B

D. equivalent mass of A_xB_y=equivalent mass of A +equivalent mass of B

Answer: B::C::D

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6. 1 mole $Ba(OH)_2$ will exactly neutralize

A. 0.5 mole HCL

B. 1 mole of H_2SO_4

C. 1 mole of H_3PO_3

D. 2 mole of H_3PO_2

Answer: B::C::D

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7. The pair of species having different percentage (mass) of carbon is :

A. CH_3COOH and $C_6H_{12}O_6$

B. CH_3COOH and C_2H_5OH

C. $HCOOCH_3$ and $HCOOH$

D. C_2H_5OH and CH_3OCH_3

Answer: B::D

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8. $30mL$ of $CH_3OH\left(d = 0.8g/cm^3\right)$ is mixed with $60mL$ of $C_2H_5OH\left(d = 0.92g/cm^2\right)$ at $25^\circ C$ to form a solution of density $0.88g/cm^3$. Select the correct option(s) :

A. Molarity and molality of resulting solution are 6.33 and 13.59 respectively

B. The mole fraction of solute and molality are 0.385 and 13.59 respectively

C. Molarity and % change in volume are 0.615 and zero respectively

D. Mole fraction of solvent and molality are 0.615 and 13.59 respectively

Answer: B::C

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9. Which of the following is/are incorrect for 17 g/L of H_2O_2 solution ?

A. Volume strengths is 5.6 at 273 K and 1 atm

B. Molarity of solution is 0.5 M

C. 1 mL of this solution gives 2.8 mL O_2 at 273 K and 2 atm

D. The normality of solution is 2 N

Answer: A::B::C

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10. Solutions containing 23 g HCOOH is/are :

A. $46g$ of $70\,\%\left(\frac{w}{V}\right)HCOOH(d_{\text{solution}}=1.40g/mL)$

B. $50g$ of $10\ \text{M}\ \ HCOOH(d_{\text{solution}}=1g/mL)$

C. $50g$ of $25\,\%\left(\frac{w}{w}\right)HCOOH$

D. 46 g " of 5 M " HCOOH$(d_{solution}=1g/mL)$

Answer: A::B

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11. A sample of H_2O_2 solution labelled as "28 volume" has density of 265 g/L. Mark the correct option(s) representing concentration of same solution in other units :

A. $M_{H_2O_2}=2.5$

B. $\% \frac{w}{V} = 17$

C. Mole fraction of H_2O_2 = 0.2

D. $m_{H_2O_2} = 13.88$

Answer: A::C::D

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12. A mixture of $100ml$ of CO, CO_2 and O_2 was sparked. When the resulting gaseous mixture was passed through KOH solution, contraction in volume was found to be $80ml$, the composition of initial mixture may be (in the same order)

A. 30 mL,60mL,10mL

B. 30 mL,50mL, 20mL

C. 50 mL,30mL,20mL

D. 20 mL,70 mL, 10 mL

Answer: A::B

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13. If 1 mole of H_3PO_4 reacts with 1 mole of $X(OH)_2$ as shown below :

$H_3PO_4 + X(OH)_2 \rightarrow XHPO_4 + 2H_2O$ then

A. the equivalent mass of base is $\frac{mol.\ mass}{2}$

B. the eq. mass of H_3PO_4 is $\frac{98}{3}$

C. the resulting solution requires 1 mole NaOH for complete neutralization

D. minimum 1 mole of $X(OH)_2$ is required for complete neutralization of $XHPO_4$

Answer: A::C

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14. In acidic medium dichromate ion oxidizes stannous ion as :

$$xSn^{2+} + yCr_2O_7^{2-} + zH^+ \rightarrow aSn^{4+} + bCr^{3+} cH_2O$$

A. "the value of x:y is 1:3

B. the value of x+y+z is 18

C. a:b " is 3:2

D. the value of z:c is 7

Answer: B::C::D

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15. When a equimolar mixture of Cu_2S and CuS is tirated with $Ba(MnO_4)_2$ in acidic medium, the final products cintain Cu^{2+}, SO_2 and Mn^{2+}. If the mol. Mass of Cu_2S, and $Ba(MnO_4)_2$are M_1, M_2 and M_3 respectively then :

A. eq. mass of Cu_2S is $\frac{M_1}{8}$

B. eq. mass of CuS is $\frac{M_2}{6}$

C. eq. mass of $Ba(MnO_4)_2$ is $\frac{M_3}{5}$

D. Cu_2 and CuS both have same equivalents in mixture

Answer: A::B

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16. Which is the incorrect statement?

A. Equivalent mass of $H_2PO_3^-$ is 40.5.

B. Eq. mass of $H_2PO_4^-$ may be equal to molar mass or less than molar mass because it depends on the reaction.

C. $KMnO_4$ has maximum eq. mass in acidic medium.

D. Oxidation state of H in MgH_2 is greater than in H_2O_2.

Answer: A::C::D

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Level 3 - Match The Column

1.

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 $1.5 \times N_A$
(D) 1 g molecule of $O_2(g)$	(S) Weighs 32 g

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2.

Column-I	Column-II
(A) 44 g CO_2 gas	(P) 1g 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

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Column-I	Column-II
(A) Eq. mass $= \frac{\text{Molecular mass}}{33}$	(P) When CrI_3 oxidises into $Cr_2O_7^{2-}$ and IO_4^-
(B) Eq. mass $= \frac{\text{Molecular mass}}{27}$	(Q) When $Fe(SCN)_2$ oxidises into Fe^{3+}, SO_4^{2-}, CO_3^{2-} and NO_3^-
(C) Eq. mass $= \frac{\text{Molecular mass}}{28}$	(R) When NH_4SCN oxidizes into SO_4^{2-}, CO_3^{2-} and NO_3^-
(D) Eq. mass $= \frac{\text{Molecular mass}}{24}$	(S) When As_2S_3 oxidises into AsO_3^- and SO_4^{2-}

3.

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4. A sample of raw material contain $NaNO_3$. It contains some $NaIO_3$ also. The $NaIO_3$ can be used as a source of iodine, produced in the following reactions:

$IO_3^- + HSO_3^- \rightarrow I^- + SO_4^-$ .....(1)

$I^- + IO_3^- \rightarrow I_2 + H_2O$.....(2)

One litre of sample solution containing 396 g $NaIO_3$ is treated with stoichiometric quantity of $NaHSO_3$. Now a substantial amount of

solution is added to reaction mixture to bring about the reaction (2).

Column-I	Column-II
(A) n-factor of IO_3^- in reaction (2)	(P) 6
(B) Number of moles of HSO_3^- used in reaction (1)	(Q) 1.2
(C) Moles of I_2 produced	(R) 2
(D) Equivalents of IO_3^- used in reaction (2)	(S) 5

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5.

Column-I	Column-II (Type of Redox Reaction)
(A) $Br_2 + OH^- \rightarrow BrO_3^- + Br^-$	(P) Intermolecular
(B) $FeCl_2 + KMnO_4 + HCl \longrightarrow MnCl_2 + FeCl_3$	(Q) Intramolecular
(C) $Ag_2O \longrightarrow Ag + \frac{1}{2}O_2$	(R) Disproportion
(D) $NH_4NO_3 \longrightarrow N_2O + H_2O$	(S) Comproportion

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Match the Colum-II

Column-I [Atomic masses (M)]			Column-II (% composition of heavier isotope)
Isotope-I	Isotope-II	Average	
(A) $(z-1)$	$(z+3)$	z	(P) 25% by moles
(B) $(z+1)$	$(z+3)$	$(z+2)$	(Q) 50% by moles
(C) z	$3z$	$2z$	(R) % by mass dependent on z
(D) $(z-1)$	$(z+1)$	z	(S) 75% by mass

1.

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Column-I	Column-II
(A) When Bi_2S_3 converted into Bi^{5+} and S	(P) 18
(B) When $Al_2(Cr_2O_7)_3$ reduced into Cr^{3+} in acidic medium	(Q) 11
(C) When FeS_2 converted into Fe_2O_3 and SO_2	(R) 2
(D) When $Mn(NO_3)_2$ converted into MnO_4^{2-} and NO	(S) 10

2.

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Column-I	Column-II
(A) $P_4H_2 \longrightarrow PH_3 + P_4H_2$	(P) $E = \frac{3M}{4}$
(B) $I_2 \longrightarrow I^- + IO_3^-$	(Q) $E = \frac{3M}{5}$
(C) $MnO_4^- + Mn^{2+} + H_2O \longrightarrow Mn_3O_4 + H^+$	(R) $E = \frac{15M}{26}$
(D) $H_3PO_2 \longrightarrow PH_3 + H_3PO_3$	(S) $E = \frac{5M}{6}$

3.

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Level 3 - Assertion - Reason Type Questions

1. STATEMENTS-1 : Specific gravity is dimensionless.

STATEMENTS-2 : Specific gravity is density of a substance measured w.r.t. density of water at $4^\circ C$.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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2. STATEMENT-1: Molarity of pure water is 55.55 M at 298K.

STATEMENT-2 : Molarity is temperature dependent.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

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3. STATEMENT-1: Gram molecular mass of O_2 is 32.

STATEMENT-2: Relative atomic mass of oxygen is 32 a.m.u.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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4. STATEMENT-1: The oxidation state of S in $H_2S_2O_8$ is 6.

STATEMENT-2: Maximum oxidation state of A is 6 because the maximum oxidation state of an element is equal to number of its valence electrons in it.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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5. STATEMENT-1: $0.1MH_3PO_3$(aq) solution has normality equal to 0.3 N when completely reacted with NaOH.

STATEMENT-2 : H_3PO_3 is a dibasic acid.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: D

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6. STATEMENT-1 : MnO_2 can act as an oxidizing agent as well as reducing agent.

STATEMENT-2 : Oxidation state of MnO_2 lies between highest and lowest oxidation state.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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7. STATEMENT-1 : Equivalent volume of H_2 is 11.2 L at 1 atm and 273 K.

STATEMENT-2 : $1/2$mole H_2 has produced when 1 mole of H^+ (aq) accepted 1 mole of e^-.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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8. During the titration of a mixture of Na_2CO_3 and $NaHCO_3$ against HCl

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: C

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9. STATEMENT-1 : $\left[Fe(CN)_6\right]^{4-} \rightarrow Fe^{3+} + CO_2 + NO_3^-$, the equivalent mass of reactant is 3.74.

STATEMENT-2 : "Equivalent mass of reactant" = (Mol.mass)/(61)`.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: D

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10. STATEMENT-1 : In the balanced redox reaction,

$xAs_2S_3 + yNO_3^- + 4H_2O \rightarrow aAsO_4^{3-} + bNO + cSO_4^{2-} + 8H^+$ the n-factor of As_2S_3 and NO_3^- is 28 and 3 respectively.

Statement-2 : Molar ratio is reciprocal of n-factor's ratio so $x : t$ is $3 : 28$.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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11. STATEMENT-1 : In the given reaction, $NaOH + H_3PO_4 \rightarrow NaH_2PO_4 + H_2O$ equivalent mass of H_3PO_4 is $M/3$

STATEMENT-2 : H_3PO_4 is tribasic acid.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: D

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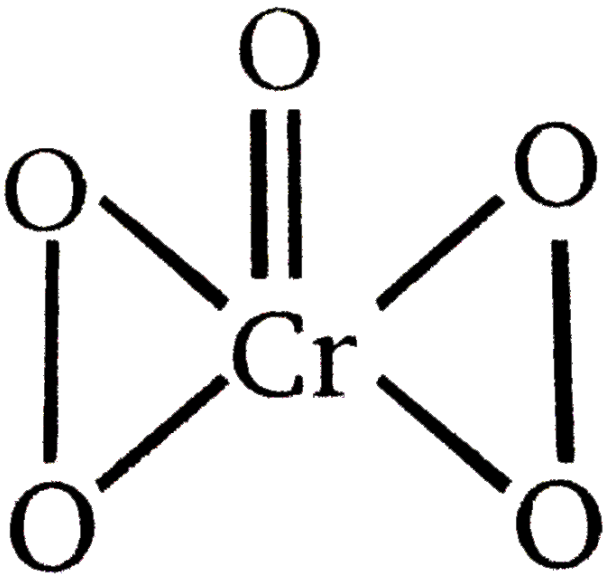
12. STATEMENT-1: In CrO_5 oxidation number of Cr is +6.

STATEMENT-2 : CrO_5 has butterfly structure in which peroxide peroxide bonds are present.



A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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13. STATEMENT-1 : $I_2 \rightarrow IO_3^- + I^-$, is example of a disproportionation reaction.

STATEMENT-2 : Oxidation number of I can vary from -1 to $+7$.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

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14. Fluorine exhibits only - 1 oxidation state in its compounds. Why?

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: B

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15. STATEMENT-1 : H_2SO_4 can not act as reducing agent.

STATEMENT-2 : Sulphur can not increase its oxidation number beyond $+6$.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT-1

B. If both the statement are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT-1

C. If STATEMENT- is 1 TRUE and STATEMENT-2 is FALSE

D. If STATEMENT-1 is FALSE and STATEMENT-2 is TRUE

Answer: A

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Level 3 - Subjective Problems

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

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2. 16 g of SO_x gas occupies 5.6 L at 1 atm and 273 K.What will be the value of x ?

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3. 200 mL of 1M HCl, is mixed with 300 mL of 6 M and the final solution is diluted to 1000 mL.calculate molar concentration of $[H^+]$ ion .

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4. N_2(g) reacts with H_2(g) in either of the following ways depending upon supply of H_2(g) :

$N_2(g) + H_2(g) \rightarrow N_2H_2(l)$

$N_2(g) + 2H_2(g) \rightarrow N_2H_4$(g)

If 5 L N_2(g) and 3 L H_2(g) are taken initially (at same temperature and pressure), calculate the contraction in volume after the reaction (in L).

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5. One commercial system removes SO_2 emission from smoke at $95(\circ)C$ by the following set of reaction :

$SO_2(g) + Cl_2(g) \rightarrow SO_2Cl_2$(g)

$SO_2Cl_2(g) + H_2O(l) \rightarrow H_2SO_4 + HCl$

$H_2SO_4 + Ca(OH)_2 \rightarrow CaSO_4 + H_2O$

How many grams of $CaSO_4$ may be produced from 3.78 g of SO_2 ?

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6. W is the mass of iron (in g) which will be converted into Fe_3O_4 by the action of 18 g of steam on it . What is the value of W?

$Fe + H_2O \rightarrow Fe_3O_4 + H_2$

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

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8. On dissolving 2.0 g of metal in sulphuric acid ,4.51 g of the metal sulphate was formed . The specific heat of the metal is 0.057 cal $g^{-1}.^{\circ} C^{-1}$. What is the valency of metal ?

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9. One gram of a metallic chloride was found to contain 0.835 g of chlorine. Its vapour density is 85.5.If its moleculars formula is M_xCl_y,then what is value of (x+y) ?

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10. 0.7875 g of crystalline barium hydroxide is dissolved in water .For the neutralization of this solution 20 mL of N/4 HNO_3 is required. How many moles of water of crystallization are present in one mole of this base ? (Given : Atomic mass Ba=137,O=16, N=14, H=1)

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11. 2.0 g of polybasic organic acid (Molecular mass =600) required 100 mL of a $\frac{M}{6}$ NaOH solution for complete neutralisation. Find the basicity of acid .

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12. A mixture contains 1.0 mole each of NaOH,Na_2CO_3 and $NaHCO_3$. When half of mixture is titrated with HCl ,it required x mole of HCl in presence of phenolphthalein. In another experiment ,half of mixture

required y mole of same HCl in presence of methyl orange. Find the value of (x+y).

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13. When BrO_3^- ion reacts with Br^- ion in acidic medium, Br_2 is liberated. Calculate the ratio of molecular mass and equivalent mass of $KBrO_3$

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14. A volume of 12.5 mL of 0.05 M SeO_2 reacts with 25 mL of 0.1 M $CrSO_4$ which is oxidised to Cr^{3+}. To what oxidation state was the selenium converted by the reaction ?

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15. A 0.276 g impure sample of copper ore is dissolved and Cu^{2+} is titrated with KI solution. I_2 liberated required 40 mL of 0.1 M $Na_2\ S_2\ O_3$ solution for titration. What is the % of impurities in the ore ?

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16. A sample of 28 mL of $H_2\ O_2$ (aq) solution required 10 mL of 0.1 M $KMnO_4$ (aq) solution for complete reaction in acidic medium. What is the volume strength of H_2O_2 ? X

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17. For the redox reaction given, what is the value of $\frac{x}{z}$?

$xNO_3^- + yAs_2S_3 + zH_2O \rightarrow - - - - - AsO_4^{3-} \pm - - - - NO \pm$

.

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18. On heating 0.220 g of a metallic oxide in presence of hydrogen,0.045 g of water is formed. If the equivalent mass of the metal is E,then what is the value of E/9

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19. 10 g mixture of $K_2Cr_2O_7$ and $KMnO_4$ was treated with excess of KI in acidic medium. Iodine liberated $100cm^3$ of 2.2 N sodium thiosulphate solution for titration. If the mass percent of $KMnO_4$in the mixture Z, then what is the value of 2Z/5 ?

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20. In an ore, the only oxidizable material is Sn^{2+}. This ore is titrated with a dichromate solution containing $2.5g$ of $K_2Cr_2O_7$ in 0.5litre. A $0.40g$ sample of the ore required $10.0cm^3$ of titrant to reach equivalence point. Calculate the percentage of tin in ore.

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Others

1. Hydrogen and oxygen combine to form H_2O_2 and H_2O containing $5.93\,\%$ and $11.2\,\%$ hydrogen respectively. The data illustrates :

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2. Write the structure for 1,2 dibromo cyclo butane?

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3. The law of multiple proportions is ilustrated by the two compounds

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4. A bottle of an aqueous H_2O_2 solution is labelled as '28V' H_2O_2 and the density of the solution $(\text{in} g/mL)$ is 1.25. Choose the correct

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5. $Al(SO)_4)_3$ solution of 1 molal concentration is present in 1 litre solution of density 2.684 g/cc. How many moles $BaSO_4$ would be precipated on adding excess $BaCl_2$ in it?

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6. A certain public water supply contains $0.10ppb$ (part per billion) of chloroform $(CHCl_3)$. How many molecules of $CHCl_3$ would be obtained in $0.478mL$ drop of this water ?(assumed $d = 1gpermL$)

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7. What is the molar mass of diacidic organic Lewis base (B), if $12g$ of its chloroplatinate salt (BH_2PtCI_6) on ignition produced $5g$ residue of Pt ?

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8. On strong heating, one gram of the silver salt of an organic dibasic acid yields 0.5934g of silver. If the mass percentage of carbon in it 8 times the mass percentage of hydrogen and one-half the mass percentage of oxygen, determine the molecular formula of the acid.

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9. A gaseous mixture of propane and butane of volume 3 litre on complete combustion produces 11 lit CO_2 under standard condition of temp. and pressure. Find the ratio of volume of butane to propane.

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10. 40 ml gaseous mixture of CO, CH_4 and Ne was exploded with 10 ml of oxygen. On cooling, the gases occupied 36.5 ml. After treatment with KOH the volume reduced by 9 ml and again on treatment with alkaline pyrogallol, the volume further reduced, percentage of CH_4 in the original mixture is

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11. When SO_2 is passed into an acidified potassium dichromate solution, the oxidation numbers of sulphur and chromium in the final products respectively are :

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12. The oxidation state of sulphur in Caro.s and Marshel.s acids are:

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13. In which of the following the oxidation number of oxygen has been arranged in increasing order:

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14. The oxidation numbers of oxygen in KO_3, Na_2O_2 respectively are :

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15. The oxidation state of phosphorus in $Ba(H_2PO_2)_2$ is

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16. If it is known that $Fe_{0.96}O$, Fe is present in $+2$ and $+3$ oxidation state, What is the mole fraction of Fe^{2+} in the compound ?

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17. Which of the following sequence of compounds is according to the decreasing order of the oxidation state of nitrogen?

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18. 2 moles of N_2H_4 loses 16 moles of electrons is being converted to a new compound x. Assuming that all of the N appears in the new compound, what is the oxidation state of N in x?

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19. When $K_2Cr_2O_7$ is converted to K_2CrO_4 then change in the oxidation state of chromium is :

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20. When a manganous salt is fused with a mixture of KNO_3 and solid $NaOH$, the oxidation number of Mn change from $+2$ to :

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21. What are the oxidation number of nitrogen in NH_4NO_3?

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22. In Fe(II) -MnO_4^- $\text{tirtration}HNO_3$ is not used beacause:

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23. Which species are oxidised and reduced in the reaction?

$$FeC_2O_4 + KMnO_4 \rightarrow Fe^{3+} + CO_2 + Mn^{2+}$$

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24. In which of the following reaction, H_2O_2 is acting as a reducing ageni

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25. Which one of the following statement is incorrect?

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26. Which of the following reactions does not represent the aldol condensation reaction ?

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27. Which of the following is redox reaction

Watch Video Solution

28. Which of the following is a redox reaction?

Watch Video Solution

29. In the reaction ,

$\left(C_2O_4^2 + MnO_4^{-+}H^+\right) \rightarrow \left(H_2O + Mn^2 + \right) + Co_2$, the reductant is

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30. If 0.1 mole H_3PO_x is completely neutralised by 5.6g KOH then select the true statement.

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31. When potassium permanganate is titrated against ferrous ammonium sulphate, the equivalent weight of potassium permanganent is

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32. Equivalent mass of FeS_2 in the half reaction, $FeS_2 + O_2 \rightarrow Fe_2O_3 + SO_2$ is :

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Watch Video Solution

33. The equaivalent mass of HCl in the given reaction is :

$K_2Cr_2O_7 + 14HCl \rightarrow 2KCl + 2CrCl_3 + 3Cl_2 + 7H_2O$

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34. n-factor of H_3PO_2 during its diproportionation is

$3H_3PO_2 \rightarrow PH_3 + 2H_3PO_3$

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35. The equivalent weights of oxidising and reducing agents can be calculated by the number of electrons gained or lost. The equivalent weight of an oxidising agent is the number of parts by weight of the substance which gains one electron. Thus, it is equal to the molecular weight of the substance divided by the number of electrons gained in the balanced chemical equation. Similarly, equivalent weight of a reducing

agent is equal to the molecular weight divided by the number of electrons lost as represented in the balanced chemical equation

The equivalent weght of As_2, S_3 in the following reaction

$As_2S_3 + H^+ + NO_3^- \rightarrow NO + H_2O + AsO_4^{3-} + SO_4^{2-}$ is related to its molecular weight as

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

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37. The equivalent mass of an element is 4. Its chloride has vapour density 59.25. Then the valency of the element is_____.

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38. 6×10^{-3} mole $K_2Cr_2O_7$ reacts completely with 9×10^{-3} mole X^{n+} to given XO_3^- and Cr^{3+}. The value of n is :

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39. What mass of $H_2C_2O_4.2H_2O$ (mol.mass $= 126$) should be dissolved in water to prepare $250mL$ of centinormal solution which act as a reducing agent ?

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40. The equivalent mass of salt, $KHC_2O_4.H_2C_2O_4.4H_2O$ when it act as reducing agent is:

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41. A bivalent metal has 37.2 equivalent weight. The molecular weight of its chloride is

Watch Video Solution

42. When BrO_3^- ion reacts with Br^- in acid medium, Br_2 is liberated. The equivalent mass of Br_2 in this reaction is :

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43. If M_A gram of metal A displaces m_B gram of another metal B from its salt solution and if the equivalent mass are E_A and E_B respectively then equivalent mass of A can be expressed as :

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44. What will be the normality of solution obtained by mixing $0.45N$ and $0.60NNaOH$ in the ratio $2:1$ by volume ?

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45. A solution containing 2.68×10^{-3} mol of A^{n+} ions requires 1.61×10^{-3} mol of MnO_4^- for the complete oxidation of A^{n+} to AO_3^- in acidic medium. What is the value of n ?

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46. $1.25g$ of a solid dibasic acid is completely neutralised by $25mL$ of 0.25 molar Ba $(OH)_2$ solution. Molecular mass of the acid is :

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47. 5 ml of 1N HCl, 20 ml of N/2 H_2SO_4 and 30 ml of N/3 HNO_3 are mixed together and the volume made to one litre. The normality of the resulting solution is

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48. $0.45g$ of an acid of mol. Mass 90 was neutralised by $20mL$ of $0.54N$ caustic potash (KOH). The basicity of acid is :

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49. .4 sample of H_2O_2 solution containing H_2O_2 by weight requires x ml of $KMnO_4$ solution for completed oxidation under acidic condition. The formality of $KMnO_4$ solution is

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50. Ratio of moles of Fe (II) oxidised by equal volumes of equimolar $KMnO_4$ and $K_2Cr_2O_7$ solutions in aidic medium will be :

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51. The mass of a mixture containing HCl and H_2SO_4 is $0.1g$ On treatment with an excess of an $AgNO_3$ solution , this acid mixture gives $0.1435g$ of $AgCl$. Mass % of the H_2SO_4 mixture is :

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52. A solution of $Na_2S_2O_3$ is standardized iodometrically against 0.1262 g of $KBrO_3$. This process required 45 mL of the $Na_2S_2O_3$ solution. What is the strength of the $Na_2S_2O_3$? (K = 39, Br = 80)

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53. 0.80g of impure $(NH_4)_2SO_4$ was boiled with 100mL of a 0.2N NaOH solution was neutralized using 5mL of a $0.2NH_2SO_4$ solution. The percentage purity of the $(NH_4)_2SO_4$ sample is:

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54. The NH_3 evolved due to complete conversion of N from $1.12g$ sample of protien was absorbed in $45mL$ of $0.4NHNO_3$. The excess acid required $20mL$ of $0.1NaOH$. The % N in the sample is :

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55. Find out % of oxalate ion ina given sample of an alkali metal oxalate salt, 0.30g of it is dissolve in 100mL water and its required 90mL OF N /20 $KMnO_4$ solution

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56. 320mg of a sample of magnessium having a coating of its oxide required 20mL of 0.1M hydrochloric acid for the complete neutralisation of the latter. The composition of the sample is:

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57. The concentration of bivalent lead ions in a sample of polluted of polluted water that aslo contains nitrate ions is determined by adding solid sodium sulphate (M=142) to exactly 500mL water. Calculate the molarity of lead ions if 0.355g is sodium sulphate was nedded for complete precipitation of lead ions as sulphate.

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58. What volume of $HNO_3\left(\text{sp. gravity} 1.05 mL^{-1} \text{containing } 12.6(w/W) of HNO_3\right)$ that reduce into NO is required to oxidise iron 1g $1g.\ FeSO_4.7H_2O$ in acid medium is:

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59. When 2.5g of a sample of Mohr's salt reacts completely with 50mL of $\frac{N}{10} KMnO_4$ solution. The % purity of the sample of Mohr's salt is:

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60. 4 mole of a mixture of Mohr's salt and $Fe_2(SO_4)_3$ requires 500mL of $1M K_2Cr_2O_7$ for complete oxidation in acidic medium. The mole % of the Mohr's salt in the mixture is:

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61. The equivalent mass of a metal is twice to that of oxygen. How many times is the equivalent mass of it's oxide than the equivalent mass of the metal ?

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62. A metal oxide has the formula X_2O_3. It can be reduced by hydrogen to give free metal and water. 0.159g of metal oxide requires 6 mg of hydrogen for complete reduction. The atomic mass of metal is amu is

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63. Calculate the mass of anhydrous oxalic acid, which can be oxidised to $CO_2(g)$ by $100mL$ of an $MnO4^-$ solution, $10mL$ of which is capable of oxiding $50mL$ of $1NI^-$ to I_2.

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64. If x g is the mass of $NaHC_2O_4$ required to neutralize 100 ml of 0.2 M NaOH and y g that required to reduce 100 ml of 0.02 M $KMnO_4$ in acidic medium then

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65. 2 mole, equimolar mixture of $Na_2C_2O_4$ and $H_2C_2O_4$ required V_1L of 0.1 M $KMnO_4$ in acidic medium for complete oxidatiion. The same amount of the mixture required V_2L of 0.1 M NaOH for neutralization. The ratio of V_1 to V_2 is x:y, then the value of x + y is (x and y are integers)

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66. A mixture containing 0.05 mol of $K_2Cr_2O_7$ and 0.02 mol of $KMnO_4$ was treated with excess of KI in acidic medium.The liberated iodine required 2.0 L of Na_2SO_3 solution of titration. Concentration of $Na_2S_2O_3$ solution was

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67. 1g mixture of equal number of mole of Li_2CO_3 and other metal carbonate (M_2CO_3) required 21.6mL of 0.5 N HCl for complete neutralisation reaction. What is the apoproximate atomic mass of the other metal?

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68. In the mixture of $NaHCO_3$ and $NaCO_3$, volume of a given HCl required is x ml with phenolphathalein indicator and further y mL is required with methyl orange indicator. Hence volume of HCl for complete reaction of $NaHCO_3$ present in the original mixture is

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69. $0.1g$ of a solution containing Na_2CO_3 and $NaHCO_3$ requires $10mL$ of 0.01 N HCI for neutralization using phenolphthalein as an indicator. mass % of Na_2CO_3 in solution is :

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70. A sample of pure sodium carbonate $0.318g$ is dissolved in water and litrated with HCl solution. A volume of $60mL$ is required to reach the methly orange end point. Calculate the molarity of the acid.

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71. $10L$ of hard water required $5.6g$ of lime for removing haardness. Hence temporary hardness in ppm of $CaCO_3$ is :

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72. $1L$ of pond water contains $20mg$ of Ca^{2+} and $12mg$ of mg^{2+} ions. What is the volume of a $2NNa_2CO_3$ solution required to soften $5000L$ of pond water ?

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73. One litre of a sample of hard water contain $4.44mgCaCl_2$ and $1.9mg\text{of}MgCl_2$. What is the total hardness in terms of ppm of $CaCO_3$?

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74. If hardness of water sample is 200ppm, then select the incorrect statement:

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75. A mixture of NH_4NO_3 and $(NH_4)_2HPO_4$ coitain 30.40% mass per cent of nitrogen. What is the mass ratio of the two components in the mixture ?

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76. What volume of 75% alcohol by weight $\left(d - 0.80g/cm^3\right)$ must be used to prepare 150 cm^3 of 30 % alcohal by mass $\left(d = 0.90g/cm^3\right)$?

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77. 6.2 g of a sample containing $NaHCO_3$, $NaHCO_3$ and non -volatiale inert impurity on gentle heating loses 5% of its mass due to reaction $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$. Residue is dissolved in water and formed 100 mL solution and its 10 mL portion requires 7.5 mL of 0.2 M aqueous solution of $BaCl_2$ for complete precipitation of carbonates. Determine mass (in gram) of Na_2CO_3 in the original sample .

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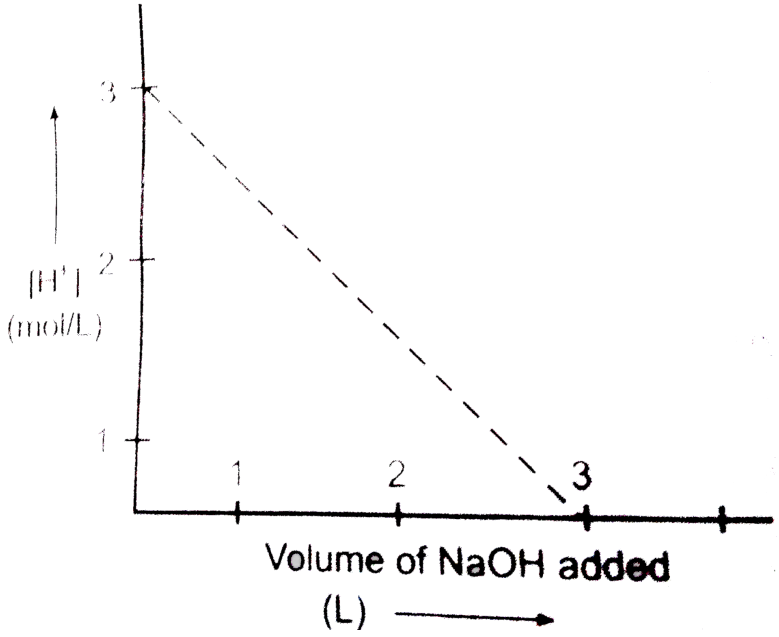
78. 1 M NaOH solution was slowly added in to 1000 mL of 183.75 g impure H_2SO_4 solution and the following plot was obtained. The percentage

purity of H_2SO_4 sample and slope of the curve respectively are:



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79. A 0.60 g sample consisting of only CaC_2O_4 and MgC_2O_4 is heated at $500^\circ C$, converting the two salts of $CaCO_3$ and $MgCO_3$. The then weighs 0.465 g. If the sample had been heated to $900^\circ C$, where the products are CaO and MgO. What would the mixtures of oxides have weighed ?

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80. Urea(H_2NCONH_2) is manufactured by passing CO_2(g) through ammonia solution followed by crystallization. For the above reaction is prepared by combustion of hydrocarbons. If combustion of 236 kg of a saturated hydrocarbon (C_nH_{2n+2}) produces as much CO_2 as required for production of 999.6 kg urea then molecular formula of hydrocarbon is:

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81. 11.6 g of an organic compound having formula (C_nH_{2n+2}) is burnt in excess of $O_2(g)$ initially taken in a 22.41 litre steel vessel. Reaction the gaseous mixture was at 273 K with pressure reading 2 atm. After complete complete combustion and loss of considerable amount of heat, the mixture of product and excess of O_2 had a temperature of 546 K and 4.6 atm pressure. The formula of organic compound is :

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82. $H_2O_2 + 2KI \xrightarrow{40\% \text{ yield}} I_2 + 2KOH$

$H_2O_2 + 2KMnO_4 + 3H_2SO_4 \xrightarrow{50\% \text{ yield}} K_2SO_4 + 2MnSO_4 + 3O_2 + 4H_2O$

150 ml of H_2O_2 sample was divided into two parts. First part was treated with KI and Formed KOH required 200 ml. of $M/2H_2SO_4$ for neutralisation.Other part was trated with $KMnO_4$ yielding 6.74 litre of O_2 at STP.Using % yield indicated find volume stregth of H_2O_2 sample used.

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83. SO_2Cl_2 (sulphuryl chloride) reacts with water to given a mixture of H_2SO_4 and HCL. What volume of 0.2 M $Ba(OH)_2$ is needed to completely neutralize 25 mL of 0.2 MSO_2Cl_2 solution:

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84. 5 g sample contain only Na_2CO_3 and Na_2SO_4 . This sample is dissolved and the volume made up to 250 mL. 25 mL of this solution

neutralizes 20 mL of 0.1 M H_2SO_4.

Calcalute the % of Na_2SO_4 in the sample .

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85. 20 mL of 0.2 M NaOH(aq) solution is mixed with 35 mL of this 0.1 ML NaOH (aq) solution and the resultant solution is diluted to 100 mL. 40 mL of this diluted solution reacted with 10% impure sample of oxalic acid $(H_2C_2O_4)$ The mass of impure is:

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

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87. The conversion of oxygen to ozone occurs to the extent of 15% only. The mass of ozone that can be prepared from 67.2 L of oxygen at 1 atm and 273 K will be :

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88. RH_2 (ion exchange resin) can replace Ca^{2+} ions in hard water as $RH_2 + Ca^{2+} \rightarrow RCa + 2H^+$. If 1L of hard water after passing through RH_2 has pH=3 then hardness in parts per million of Ca^{2+} is :

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89. 20 mL of 0.1 M solution of compound $NaCO_3.NaHCO_3.2H_2O$ is titrated against 0.05 M HCL. X mL of HCL is used when phenolphthalein is used as an indicator and y mL of HCL is used when methly orange is the indicator in two separate titrations. Hence (y-x) is:

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90. A sample containing $HAsO_2$ (mol. Mass=108) and weighing 3.78 g is dissolved and diluted to 250 mL in a volumetric flask. A 50 mL sample (aliquot) is withdrawn with a pipet and titrated with 35 mL of 0.05 M solution of I_2. Calculate the percentage $HAsO_2$ in the sample :

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91. A mixture of FeO and Fe_2O_3 is completely reacted with 100 mL of 0.25 M acidified $KMnO_4$ solution. The resultant solution was then treated with Zn dust which converted Fe^{3+} of the solution to Fe^{2+}.The Fe^{2+} required 1000 mL of 0.10 $MK_2Cr_2O_7$ solution. Find out the weight % Fe_2O_3 in the mixture.

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92. To a 10mL, 1M aqueous solution of Br_2, excess of NaOH is added so that all Br_2 is disproportionated to Br^- and BrO_3^-. The resulting solution is free from Br^-, by extraction and excess of OH^- neutralised

by acidifying the solution. The resulting solution is suffcient to react with 2 g of impure CaC_2O_4(M= 128g/mol) sample. The % purity of oxalate sample is :

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93. $0.10g$ of a sample containing $CuCo_3$ and some inert impurity was dissolved in dilute sulphuric acid and volume made up to $50mL$. This solution was added into $50mL$ of $0.04MKI$ solution where copper precipitates as CuI and I^- is oxidized into I_3^- . A $10mL$ portion of this solution is taken for analysis, filtered and made up free I_3^- and then treated with excess of acidic permanganate solution. Liberated iodine required $20mL$ of $2.5mM$ sodium thiosulphate solution to reach the end point . Determine mass percentage of $CuCO_3$ in the original sample.

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94. 1 mol of equimolar mixture of ferric oxalate and ferrous oxalate will require x mol of $KMnO_4$ in acidic medium for complete oxidation. X is

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95. An impure sample of sodium oxalate $(Na_2C_2O_4$ weighing 0.20 g is dissolved in aqueous solution of $H_2SO_4)$ and solution is titrated at $70^\circ C$,requiring 45 mL of 0.02 M $KMnO_4$ solution. The end point is overrun, and back titration in carried out with 10 mL of 0.1 M oxalic acid solution.Find the purity of $Na_2C_2O_4$ in sample:

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96. A 150 mL of solution of I_2 is divided into two unequal parts. I part reacts with hypo solution solution in acidic medium. 15 mL of 0.4 M hypo was consumed. II part was added with 100 mL of 0.3 MNaOH solution. What was the initial concentration of I_2 ?

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97. A mixture of H_2SO_4 and $H_2C_2O_4$ (oxalic acid) and some inert impurity weighing 3.185 g was dissolved in water and the solution made up to 1litre. 10 mL of this solution required 3 mL of 0.1 N NaOH for complete neutralization. In another experiment 100 mL of the same solution in hot condition required 4 mL of 0.02 M $KMnO_4$ solution for complete reaction. The mass % of H_2SO_4 in the mixture was:

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