doubtnut
India's Number 1 Education App

CHEMISTRY

BOOKS - NAGEEN CHEMISTRY (ENGLISH)

SOME BASIC CONCEPTS OF CHEMISTRY

Examples

1. Mention whetherthefollowing are elements, compounds or mixtures :

(i) glass, (ii) german silver

(iii) llimestone, (iv) pure gold

(v) diamond, (vi) glucose

(vii) salt solution, (viii) helium

(ix) oxygen, (x) water

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2. Mention whether the following mixtures are homogeneous or heterogeneous:

(i) sugar solution (ii) milk

(iii) brass (iv) glass

(v) mixture of sand and sulphur

(vi) coin (vii) LPG.

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3. State whether the following compounds are inorganic or organic :

(i) caustic soda (ii) sugar

(iii) nitric acid (iv) blue vitriol

(v) vegetable ghee (vi) mustard oil (vii) baking soda.

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4. (a) Classify the following as pure substances and mixtures.

(b)Separate the pure substances into elements and compounds and divide the mixtures into homogeneous and heterogeneous.

(i) air (ii) milk

(iii) graphite (iv) diamond

(v) gasoline (vi) tap water

(vii) distilled water (viii) oxygen

(ix) one rupee-coin (x) 22 carat gold

(xi) steel (xii) iron

(xiii) sodium chloride (xiv) iodised table salt

(xv) wood (xvi) cloud

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5. State the number of significant figures in each of the following numbers :

(i) 3.56 (ii) 35.6

(iii) 0.356 (iv) 0.0356.

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6. Find the number of significant figures in the following physical quantities:

(i) 5.506 cm (ii) 0.0509 kg (iii) 08.0075 s.

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7. Express the following quantities in scientific notation :

(i) 150000 g (ii) 0.0064 cm (iii) 0.059 m.

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8. State the number of significant figures in each of the following numbers :

(i) 2.653×10^4 ,(ii) 0.00368 (iii) 65.3 (iv) 0.368 (v) 0.0300.

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9. Find the number of significant figures in the following constants:

(i) 6.626×10^{-34} Js (Planck's constant)

(ii) 6.02×10^{23} (Avogadro's number)

(iii) $1.097 \times 10^5 cm^{-1}$ (Rydberg's constant).

(iv) 5.29×10^{-9} cm (First Bohr's radius in H)

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10. Express the following numbers to four significant figures :

(i) 5.607892 (ii) 32.392800 (iii) 1.78986×10^3 (iv) 0.007837.

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11. Calculate the following upto proper significant figures :

(i) 45.95×0.061, (ii) 312.6×14.68

(iii) $3.2 + 4.004$, (iv) $515.69 - 312.812$

(v) $\frac{6.7 \times 0.00421}{11.8}$, (vi) $\frac{5.4 \times 10^{-3} \times 0.0649}{3.11 \times 10^{-2}}$

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12. Express the results of the following calculations to the appropriate number of significant figures.

(i) $\frac{3.24 \times 0.08666}{5.006}$, (ii) $0.58 + 324.65$

(iii) $943 \times 0.00345 + 101$

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13. A piece of mass 36.81 kg is cut from a block of 4.0×10^2 kg. Calculate the mass of the remaining block upto proper significant figures.

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14. A liquid weighing 86.44 g occupies a volume of 76.3 mL. Calculate the density of the liquid to the proper number of significant figures.

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15. The mass of one atom of hydrogen is 1.008 amu. Calculate the mass of 26 atoms of hydrogen.

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16. Convert the following into specified units :

(a) 100 s into ns (c) 200 kg into mg

(d) 1000 cm^3 into m^3

(e) 1 pm into nm (f) 75 g into kg

(g) 50 urn into cm

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17. The velocity of light is 3×10^{10} cm/s. Express it in miles/hour.

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18. A steel box is 2.5 m in length, 1.8 m in breadth and 1.2 m in height. Find its volume in litres.

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19. The density of iron is $7.869 g / cm^3$. Express it in SI units.

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20. In an experiment 5.0 g of $CaCO_3$ on heating gave 2.8 g of CaO and 2.2 g of CO_2. Show that these results are in accordance to the law of conservation of mass.

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21. When 4.2 g of sodium bicarbonate are added to a solution of acetic acid weighing 10.0 g, it is observed that 2.2 g of carbon dioxide is released into the atmosphere. The residue left is found to weigh 12.0 g. Show that these observations are in agreement with the law of conservation of mass.

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22. The common salt was obtained from two different sources. In one sample, the percentage of chlorine was found to be 60.75 %. In the second sample, 3.888 g of chlorine were present in 6.4 g of the salt. Show that these data are in accordance to the law of constant proportion.

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23. $1.375g$ of cupric oxide was reduced by heating in a current of hydrogen and the weight of copper that remained was $1.098g$ In another experiment, $1.179g$ of copper was dissolved in nitric acid and the resulting copper nitrate converted into cupric oxide by ignition. The weight of cupric oxide formed was $1.476g$. Show that these result illustrate the law of constant composition.

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24. An element forms two oxides containing 50% and 40% of the element by mass. Prove that the results are in agreement with the law of multiple proportions.

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25. Carbon and oxygen form two compounds. Carbon content in one of them is 42.9% and in the others is 27.3%. The given data is in agreement with

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26. If 6.3 g of $NaHCO_3$ are added to 15.0 g of CH_3COOH solution, the residue is found to weigh 18.0 g. What is the mass of CO_2 released in the reaction ?

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27. The three elements A, B and C form three compounds AB, AC and BC. AB contains 75% of A, AC contains 57.14% of C while BC contains 11.11% of B. Prove that these results are in accordance to law of reciprocal proportions.

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28. 2 litres of nitrogen completely react with 6 litres of hydrogen under suitable conditions to form 4 litres of NH_3. If all the volumes are measured at the same temperature and pressure, show that the data given are in accordance to the Gay Lussac's law of combining volumes.

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29. The relative abundance of three isotopes of carbon C^{12}, C^{13} and C^{14} are 98.892%, 1.108% and 2×10^{-10}% respectively. If the relative atomic masses of these isotopes are 12.00, 13.00335 and 14.00317 amu respectively, find the average atomic mass of carbon.

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30. An atom of an element is 55.847 times as heavier as 1/12 mass of an atom of C^{12}. What is the atomic mass of the element in amu ?

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31. Calculate the number of gram atoms present in the following masses.

(i) 12.69 g of hydrogen, (ii) 40.089 g of calcium (Given, atomic mass of H = 1.008 amu and atomic mass of Ca = 40.08 amu)

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32. Calculate the number of gram molecules contained in the following masses.

(i) 4.4 g of CO_2 (ii) 36.0 g of H_2O (iii) 0.098 g of H_2SO_4

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33. Calculate the masses of

(i) 2.00 gram atoms of chlorine

(ii) 2.00 gram molecules of chlorine

(iii) 10.50 gram molecules of ammonia.

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34. Calculate the mass of the following :

(i) 1 atom of sodium

(ii) 10 molecules of argon

(iii) 1 molecule of CO_2

(iv) 1 molecule of H_2SO_4.

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35. Find the molecular mass of glucose ($C_6H_{12}O_6$) and calculate the mass of one molecule of it.

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36. Calculate the mass of 1 amu in grams.

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37. Calculate the number of moles and number of molecules in 4.4 g of CO_2 . Also find its volume at N.T.P

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38. Calculate the number of atoms in each of the following :

(i) 52 moles of He

(ii) 52 amu of He

(iii) 52 grams of He.

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39. KBr (potassium bromide) contains 32.9% by weight of potassium. If 6.40 g of bromine react with 3.60 g of potassium, calculate the number of moles of potassium which combine with bromine to form KBr.

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40. Calculate the total number of oxygen atoms present in 0.5 moles of H_2SO_4

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41. What volume at S.T.P is occupied by

(i) 3.50 g of nitrogen?

(ii) 6.022×10^{21} molecules of ammonia?

(iii) 0.350 moles of oxygen?

(iv) 39.9 g of argon?

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42. How many years would it take to spend Avogadro Number of rupees at the rate of 10 lakh rupees per second ?

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43. Calculate the number of gold atoms present in 0.450 g of a gold ring made from 22 carat gold. Given that the atomic mass of gold is 197 and pure gold is 24 carats.

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44. How many molecules of water of crystallisation are present in 1.648 g of copper sulphate $(CuSO_4.5H_2O)$?

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45. A sample of sucrose is found to contain 72.28×10^{21} atoms of carbon. Find the mass of the sample in grams.

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46. Calculate the number of molecules in a drop of water weighing 0.048 g.

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47. The volume occupied by 0.32 g of a gas at S.T.R is 224 mL. Calculate the molecular mass of the gas.

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48. The mass of 750 mL of a gas collected at 25°Cand 716.2 mm pressure is found to be equal to 0.809 g. Calculate the molecular mass of the gas.

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49. In a Regnault's experiment, the mass of a definite volume of a gas was found to be 4.6420 g, whereas the mass of the same volume of hydrogen at the same temperature and pressure was found to be 0.2902 g. Calculate the vapour density and molecular mass of the gas.

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50. A gas filled in a bulb of capacity 25.1 mL at 27°C and 750 mm pressure weighs 0.072 g. If 1 litre of hydrogen at S.T.R weighs 0.09 g, calculate the molecular mass of the gas.

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51. The volume of a gas X and chlorine diffusing during the same time are 35 mL and 29 mL respectively. If molecular mass of

chlorine is 71, calculate the molecular mass of gas X.

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52. 180 mL of a hydrocarbon diffuse through a porous membrane in 15 minutes, while 120 mL of SO_2 under identical conditions diffuse in 20 minutes. What is the molecular mass of the hydrocarbon ?

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53. 0.05 g of a gas at 750 mm pressure and 25°C occupy a volume of 46.5 mL. Calculate the molecular mass of the gas.

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54. 9.00 litres of a gas at 16 atm and 27°C weigh 93.6 g. What is the molecular mass of the gas ?

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55. In a Victor Meyer's determination of molecular mass, 0.1015 g of an organic substance displaced 27.96 mL of air at 15°C and 766 mm pressure. Calculate the molecular mass of the substance (Aqueous tension at 15°C = 16 mm).

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56. 10 g of sucrose are dissoled in 100 g of water. Find the mass percentage of sucrose in the solution.

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57. A sample of nitric acid is 55 per cent by mass. Calculate the mass of nitric acid present in $100cm^3$ of the sample if its density is $1.36gcm^{-3}$.

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58. One litre sample of sea water is found to contain 5.8×10^{-3} g of dissolved oxygen. Calculate the concentration of dissolved oxygen in sea water in ppm if the density of sea water is $1.03gcm^{-3}$.

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59. 4 g of NaOH are dissolved in $200cm^3$ of water. Find the molarity of the solution.

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60. Find the mass of H_2SO_4 present in $100cm^3$ of a decimolar solution.

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61. A solution is prepared by dissolving 0.63 g of oxalic acid in $100cm^3$ of water. Find the normality of the solution.

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62. Calculate the mass of H_2SO_4 present in 250 cm of a seminormal solution.

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63. Find the molarity and molality of a 15% solution of H2S04 (density of H_2SO_4 solution = $1.10gcm^{-3}$, Molecular mass of $H_2SO_4 = 98$).

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64. A solution of ethanol in water is 1.6 molal. How many grams of ethanol are present in 500 g of the solution ?

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65. A solution contains 25% water, 25% ethanol and 50% acetic acid by mass. Calculate the mole fraction of each component.

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66. A sugar syrup of weight 214.2 g contains 34.2 g of sugar $(C_{12}H_{22}O_{11})$. Calculate (i) molal concentration (ii) mole fraction of sugar in the syrup.

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67. What volume of 95% sulphuric acid (density = $1.85gcm^{-3}$) and what mass of water must be taken to prepare $100cm^3$ of 15% solution of sulphuric acid (density = $1.10gcm^{-3}$) ?

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68. Concentrated sulphuric acid has a density of 1.9 g/mL and is 99% H_2SO_4 by weight. Calculate the molarity of H_2SO_4 in this acid.

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69. How much water should be added to 500 mL of $\frac{N}{2}$ NaOH solution to obtain a decinormal solution?

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70. The mole fraction of water in a solution of HCI is 0.78. Calculate the molality of the solution.

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71. Calculate the molarity of pure water at room temperature if its density is $0.998 gcm^{-3}$

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72. 25 mL of $\frac{N}{10} NaOH$ solution exactly neutralise 20 mL of an acid solution. What is the normality of the acid solution ?

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73. 150 mL of $\frac{N}{10}$ HCI are required to react completely with 1.0 g of a sample of lime stone ($CaCO_3$). Calculate the percentage purity of the sample.

A. 70

B.

C.

D.

Answer:

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74. 10.875 g of a mixture of NaCI and Na_2CO_3 was dissolved in water and the volume was made up to 250 mL. 20.0 mL of this solution required 75.5 mL of $\frac{N}{10}H_2SO_4$. Find out the percentage composition of the mixture.

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75. 1.575 g of oxalic acid $(COOH)_2.xH_2O$ are dissolved in water and the volume made up to 250 mL. On titration 16.68 mL of this solution requires 25 mL of $\frac{N}{15}NaOH$ solution for complete neutralisation. Calculate the value of x.

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76. 20 mL of a solution of H_2SO_4 neutralises 21.2 mL of 30% solution (w/v) of Na_2CO_3. How much water should be added to each 100 mL of the solution to bring down its strength to decinormal ?

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77. A compound contains 40% carbon, 6.6% hydroaen and 53.33% oxy1en._Its vapour density is 30. Calculate its empirical and molecular formulae.

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78. A gaseous hydrocarbon on analysis gave the following data :

(i) It contains C = 82.7% and H = 17.3%

(ii) The mass of 132 mL (measured at S.T.R) of it is 0.342 g. Find the molecular formula of the hydrocarbon.

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79. An organic compound contains C = 16.27%, H = 0.677%, CI = 72.2% and O=10.8%. Its molecular mass is 147.5 amu. Find its molecular formula.

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80. A compound on analysis gave the following percentage composition :

Na= 14.31%, S = 9.97%, H = 6.22%, O = 69.50%.

Calculate the molecular formula of the compound on the assumption that all the hydrogen in the compound is present in

combination with oxygen as water of crystallisation. Molecular mass of the compound is 322.

(At. wt. of Na = 23, S = 32, H = 1, O = 16)

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81. It has been found that 0.290 g of an organic compound containing C, H and O on complete combustion yielded 0.66 g of CO_2 and 0.27 g of H_2O. The vapour density of the compound is found to be 29.0. Determine the molecular formula of the compound.

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82. Balance the following equation :

$KClO_3 \rightarrow KCl + O_2$

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83. Balance the following equation :

$Kl + H_2SO_4 + H_2O_2 \rightarrow K_2SO_4 + I_2 + H_2O$

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84. 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 ?

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85. Balance the following equations.

(i) $H_3PO_3 \rightarrow H_3PO_4 + PH_3$

(ii) $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$

(iii) $Fe_2(SO_4)_3 + NH_3 + H_2O \rightarrow Fe(OH)_3 + (NH_4)_2SO_4$

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86. How much zinc should be treated with excess of dilute hydrochloric acid to obtain 2.24 litres of hydrogen at S.T.P.

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87. A mixture of aluminium and zinc weighing 1.67 g was completely dissolved in acid and 1.69 litres of hydrogen measured at 0°C and 1 atmospheric pressure were evolved. What was the original weight of aluminium in the mixture?

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88. A 2.0 g sample containing Na_2CO_3 and $NaHCO_3$ loses 0.248 g when heated at 300° C, the temperature at which NaHC03 decomposes to Na_2CO_3, CO_2 and H_2O. What is the percentage of Na_2CO_3 in the mixture ?

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89. An hourly energy requirement of an astronaut can be satisfied by the energy released when 34 grams of sucrose ($C_{12}H_{22}O_{11}$) are burnt in his body. How many grams of oxygen would he need to be carried in space capsule to meet his requirement for one day ?

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90. What weight of zinc would be required to produce enough hydrogen to reduce completely 7.95 g of CuO.

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91. 1 g of Mg is burnt in a closed vessel containing 0.5 g of O_2. Which reactant is limiting reagent and how much of the excess reactant will be left?

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92. 6.54 g of zinc are treated with 11.5 g of H_2SO_4. Calculate the volume of hydrogen evolved at S.T.P. How much H_2SO_4 will be left in excess?

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93. Commercially available concentrated hydrochlorc acid contains 38% HCI by mass.

(i) What is the molarity of this solution? The density is $1.19 gcm^{-3}$.

(ii) What volume of concentrated HCI is required to make 1.00 L of 0.10 M HCI?

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94. 100 g of a pure sample of $CaCO_3$ is treated a with $500 cm^3$ of $\frac{M}{2}$ HCI solution. Calculate the of CO_2 that will be evolved at S.T.P.

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95. 0.32 g of metal gave on treatment with an acid 112 mL of hydrogen at NTP. Calculate the equivalent weight of the metal.

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96. When dissolved in dilute sulphuric acid, 0.275 g of a metal evolved 119.7 mL of hydrogen at 20°C and 763 mm pressure. What is the equivalent mass of the metal ?

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97. 1.40 g of a metal when heated in a current of oxygen gave 1.93 g of the metal oxide. Calculate the equivalent weight of the metal.

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98. 1.60 g of a metal were dissolved in HNO_3 to prepare its nitrate. The nitrate was strongly heated when 2.0 g of the metal oxide was obtained. Calculate the equivalent weight of the metal.

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99. 1.40 g of a metal when heated in a current of oxygen gave 1.93 g of the metal oxide. Calculate the equivalent weight of the metal.

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100. 0.9367 g of cadmium combine with chlorine to form 1.5276 g of $CdCl_2$- Find the equivalent mass of cadmium.

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101. 7.18 g iron displaces 2.04 g copper from copper sulphate solution. If the equivalent weight of copper is 31.7, calculate the equivalent weight of iron.

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102. An impure sample of sodium chloride which weighed 1.2 g gave on treatment with excess of silver nitrate solution 2.4g of silver chloride as precipitate.Calculate the percentage purity of the sample

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103. 0.452 g of a metal nitrate gave 0.4378 g of its metal sulphate. Calculate the equivalent weight of the metal.

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Review Exercises

1. A pencil has a length of 9.2 cm. It is broken into two pieces. If the smaller piece has a length of 4.46 cm, what is the length of the larger piece?

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2. State the number of significant figures in each of the following:

(i) 136.7 m (ii) 105.67 kg

(iii) $3.4 \times 10^6 s$ (iv) 0.0078 km

(v) $0.00650 \times 10^6 m$

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3. Radius of the earth is 6.40×10^6 m. Find the diameter of the earth.

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4. Express the following numbers upto three significant figures.

(i)0.006576 (ii) 5.467×10^4

(iii) 125.35 (iv) 64.72

(v) 3.769, (vi) 0.05431

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5. Express the following numbers in exponential notations upto three significant figures,

(i) 546200 (ii) 0.0000369 (iii) 124600000

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6. Express the results of the following calculations to proper number of significant figures,

(i) $45.67m + 3.1m$, (ii) $506.8 - 203.765$

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7. A thin wire has a length of 21.7 cm and radius 0.46 mm. Calculate the volume of the wire to correct significant figures.

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8. A gas is filled in a container whose mass is 916.4 g. The mass of the gas plus container is found to be 917.64g. If the container can

hold 1107 cm^3 of water, find the density of the gas.

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9. The length of a rectangle is 10.4 cm and the breadth is 5.661 cm. Find its area.

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10. The mass of a sample of metal is 8.3432 g. If the density of the metal is $19.3gcm^{-3}$, what is the volume of the sample?

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11. A train travels with a velocity of 100 miles/hour. Express its velocity in SI units.

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12. The wavelength of line of sodium is 589.6 nm. Express it in Angstrom unit.

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13. The density of gold is $19.32 g / cm^3$. Calculate its density in SI units.

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14. Convert the following into specified units.

(a) 10 years into hours

(b) 15 metric tonnes into milligrams.

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15. The length of a rectangle is 15 inches and the breadth 12 inches. Calculate its area in SI units.

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16. 1.5 g of ethane (C_2H_6) on complete combustion gave 4.4 g of CO_2 and 2.7 g of H_2O. Show that the results are in accordance to the law of conservation of mass.

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17. What weight of NaCI would be decomposed by 4.900 g of H_2SO_4, if 6 g of $NaHSO_4$ and 1.825 g of HCI are produced in the reaction ?

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18. 0.7 g of iron combine directly with 0.4 g of sulphur to form FeS. If 2.8 g of Fe are dissolved in dilute HCl and excess of Na_2S solution is added, 4.4 g of FeS are precipitated. Show that these data prove law of constant composition.

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19. 1.00 g of oxygen combine with 0.126 g of hydrogen to form H_2O .1.00 g of nitrogen combine with 0.216g of hydrogen to form NH_3. Predict the weight of oxygen required to combine with 1.00 g of nitrogen to form an oxide.

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20. Copper sulphate crystals contain 25.45% Cu and 36.07% H_2O. If the law of constant proportions is true, calculate the weight of Cu required to obtain 40g of crystalline copper sulphate.

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21. Aluminium oxide contains 52.90% aluminium and carbon dioxide contains 27.27% carbon. Calculate the percentage of aluminium in aluminium carbide assuming that the law of reciprocal proportions is true.

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22. Amongst the following which is not a postulate of Dalton's atomic theory

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23. Amongst the following which is not a postulate of Dalton's atomic theory

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24. State :

Avogadro's law

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25. Determine the molecular formula of water on the basis of Avogadro's hypothesis.

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26. Determine the atomicity of chlorine on the basis of Avogadro's hypothesis

Watch Video Solution

27. Determine the molecular formula of water on the basis of Avogadro's hypothesis.

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28. Define an atom.

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29. What do you understand by molecules and how are they classified on the basis of the type of elements ?

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30. What do you understand by relative atomic mass of an element ?

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31. Define an amu.

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32. What is meant by the isotopes ? Explain with an example.

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33. Give 4 uses of isotopes.

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34. What are isotones ? Explain with examples.

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35. Suggest a method by which chlorine atoms with whole number atomic weights may be obtained from ordinary chlorine (only principle of the method is required).

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36. Oxygen occurs in nature as a mixture of isotopes $^{16}O, ^{17}O$ and ^{18}O having masses of 15.995 u, 16.999 u and 17.999 u and relative abundance of 99.763%, 0.037% and 0.200% respectively. What is the average atomic mass of oxygen?

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37. Define equivalent weight. How would you calculate the equivalent weight of an oxidant ? Explain with an example.

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38. Describe the following methods for determination of equivalent weight of a metal :

(i) oxide formation method

(ii) chloride formation method

(iii) metal displacement method.

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39. State Faraday's laws of electrolysis. How would you determine the equivalent mass of a substance with the help of these laws ?

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40. Find the equivalent mass of H_3PO_4 in the following reaction :

$$Ca(OH)_2 + H_3PO_4 \rightarrow CaHPO_4 + 2H_2O$$

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41. 1.50 g of a metal on being heated in oxygen gives 2.15 g of its oxide. Calculate the equivalent mass of the metal.

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42. 4.215 g a metallic carbonate was heated in a hard glass tube and CO_2 evolved was found to measure 1336 mL at 27°C and 700 mm pressure. What is the equivalent mass of the metal ?

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43. A sample of zinc oxide contains 80.25% zinc. Calculate the equivalent mass of zinc.

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44. 0.05 g of magnesium when treated with dilute HCI gave 51 mL of hydrogen at 27°C and 780 mm pressure. Calculate the equivalent mass of magnesium.

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45. A chloride of a metal contains 47.23% of the metal. Find out the equivalent weight of the metal.

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46. Two oxides of copper contain respectively 88.8% and 79.91 % of copper. Calculate equivalent masses of copper in each of the oxide.

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47. In the reaction,

$I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$.

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48. A current of 3 amperes was passed through silver nitrate solution for 125 seconds. The amount of silver deposited at cathode was 0.42 g. Calculate the equivalent mass of silver.

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49. Calculate the number of coulombs required to deposit 5.4g of Al when the electrode reaction is :

$Al^{3+} + 3e^- \rightarrow Al$ [Atomic weight of Al = 27 g/mol]

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50. Two voltameters containing copper sulphate and acidulated water respectively are connected in series and the same current is passed for some time. If the amounts of copper and hydrogen obtained at cathode are 0.3177 g and 1.008×10^{-2} g respectively, calculate the of copper. (Eq. mass of hydrogen = 1.008).

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51. An electric current is passed through two voltameters connected in series and containing $CuSO_4$ and $AgNO_3$ solutions respectively. The masses of copper and silver deposited are 0.424 g and 1.44 g respectively. Find the equivalent mass of silver if that of copper is 31.75.

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52. Calculate the equivalent masses of the following substances:

(i) $CaCO_3$

(ii) HNO_3

(iii) $Ca(OH)_2$

(iv) Br

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53. In an experiment 2.65 g of zinc displaced 2.58 g of copper from copper sulphate solution. If equivalent weight of copper is 31.75, calculate that of zinc.

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54. Calculate the molecular masses of the given substances.

(i) HCl, (ii) HNO_3, (iii) H_3PO_4

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55. Calculate the number of moles and number of gram molecules contained in 56 g of N_2.

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56. Chlorine occurs in nature in the form of the isotopes CI^{35} (atomic mass = 34.969 amu) and CI^{37} (atomic mass = 36.966 amu) in the ratio 75.53% and 24.47%. Calculate the average atomic mass of chlorine.

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57. Which of the following does contain the maximum number of gram molecules ?

(i) 10 g of H_2, (ii) 34 of NH_3

(iii) 44g of CO_2, (iv) 100 g of H_2SO_4

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58. Which of the following does have minimum mass in grams ?

(i) 1 gram atom of oxygen

(ii) 4.2 gram molecules of H_2

(iii) 2 gram molecules of helium

(iv) 1.6 gram atoms of chlorine

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59. Calculate the actual mass of :

the atom of silver. Given mass (Ag = 108, N = 14, H = 1)

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60. The mass of 216.5 mL of a gas at S.T.P. is found to be 0.6862 g. Calculate the molecular mass of the gas. Also calculate its atomic mass if the gas is diatomic.

Watch Video Solution

61. Calculate

(i) the volume of one molecule of water.

(ii) the radius of a water molecule assuming the molecule to be spherical.

(Given that the density of water is $1\frac{g}{c}m^3$.

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62. If the value of Avogadro's number is changed to 1.0×10^{20}, what would be the molecular mass of nitrogen gas ?

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63. Chlorophyll, the green colouring matter of plants contains 2.68% of magnesium by mass. Calculate the number of magnesium atoms present in 2.5 g of chlorophyll.

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64. One lakh atoms of gold weigh 3.271×10^{-17} g. What is the atomic mass of gold?

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65. Calculate the mass of sodium which contains the same number of atoms as are present in 10 g of magnesium.

Watch Video Solution

66. A complex of iron contains 45.6% iron by mass. Calculate the number of iron atoms present in 15.0 g of this complex.

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67. Haemoglobin contains 0.25% iron by weight. If one molecule of haemoglobin contains 4 atoms of iron, find the molecular mass of haemoglobin

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68. The dot at the end of this sentence has a mass of about one microgram. Assuming that black stuff is carbon, calculate approximate atoms of carbon needed to make such a dot.

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69. Calculate the number of Ba^{2+} ions and Cl^{-} ions present in 104.1 g of anhydrous $BaCl_2$.

Watch Video Solution

70. How many grams of hydrogen are needed to produce 10 moles of phosphoric acid (H_3PO_4)?

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71. The mass of a silver coin is 10.0 g. A person can carry a load of 40 kg. How many persons will be required to carry one Avogadro number of such coins?

Watch Video Solution

72. What do you understand by the molecular mass of a substance ? Write the expression obtained in Regnault's method for the determination of molecular mass of a gas.

Watch Video Solution

73. What is Graham's law of diffusion and how is this law useful in the determination of molecular mass of a gas ?

Watch Video Solution

74. What do you understand by molar volume of a gas ?

Watch Video Solution

75. Describe molar volume method for the determination of molecular mass of a gas.

Watch Video Solution

76. 10 litres of a gas at S.T.P. weigh 19.64 g. Calculate the molecular mass of the gas.

Watch Video Solution

77. 240 mL of a dry gas measured at 27°C and 750 mm pressure weighed 0.64 g. What is the molecular mass of the gas ?

Watch Video Solution

78. 3.7 g of a gas at 25°C occupies the same volume as 0.184 g of hydrogen at 17°C and at the same pressure. What is the molecular mass of the gas ?

Watch Video Solution

79. 20 dm^3 of an unknown gas diffuse through a porous partition in 60 s, whereas $14.1dm^3$ of O_2 under similar conditions diffuse in 30 s. What is the molecular mass of the gas ?

Watch Video Solution

Watch Video Solution

80. 127 mL of a gas at 136°C and 758 mm pressure weigh 0.4524 g. If 1 mL of hydrogen at S.T.P. weighs 0.00009 g, calculate the vapour density and molecular mass of the gas.

Watch Video Solution

81. In a Regnault's experiment, the mass of a definite volume of a gas was found to be 4.6420 g, whereas the mass of the same volume of hydrogen at the same temperature and pressure was found to be 0.2902 g. Calculate the vapour density and molecular mass of the gas.

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82. In Victor Meyer's experiment, 0.6 g of a volatile substance displaced 112 mL of air at S.T.P. Find the molecular mass of the substance.

Watch Video Solution

83. In a Victor Meyer's determination of molecular mass, 0.15 g of a volatile substance displaced 31.64 mL of air at 25°C and 755 mm pressure. Calculate the molecular mass of the substance.

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84. Define the term molarity.

Watch Video Solution

85. Which of the following does not decrease with rise in temperature ?

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86. Calculate the normality and molarity of H_2SO_4 solution containing 4.9 g of H_2SO_4 per litre of the solution.

Watch Video Solution

87. 6g of NaOH are dissolved in $200cm^3$ of water. What is the relation between molarity and normality of the solution thus obtained ?

Watch Video Solution

88. Calculate the mass of the solute in the following solutions :

(i) $100cm^3$ of $\frac{N}{10}KOH$

(ii) $150cm^3$ of $\frac{M}{2}HCl$

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89. What is the molality of a semimolar NaCl solution if the density of the solution is $1.16gcm^{-3}$?

Watch Video Solution

90. What is the molality of ammonia in a solution containing 0.85 g of NH^3 in 100 cm of a liquid of density $0.85gcm^{-3}$?

Watch Video Solution

91. Calculate the molality of 1 litre solution of 93% H_2SO_4 (weight/volume). The density of the solution is $1.84 gml^{-1}$.

Watch Video Solution

92. 5.85 g of NaCl are dissolved in $500 cm^3$ of water. Calculate the formality of the solution.

Watch Video Solution

93. Calculate the mole fraction of water in a mixture of 12 g of water, 108 g of acetic acid and 92 g of ethyl alcohol.

Watch Video Solution

94. 2.46 g of sodium hydroxide (molar mass = 40) are dissolved in water and the solution is made to $100cm^3$ in a volumetric flask. Calculate the molarity of the solution.

Watch Video Solution

95. Concentrated nitric acid used as a laboratory reagent is usually 69% by mass of nitric acid. Calculate the volume of the solution which contained 23 g of HNO_3.Density of cone. HNO_3 solution is $1.41gcm^{-3}$?

Watch Video Solution

96. $100cm^3$ of a centimolar solution of an acid contain 0.098 g of the acid. Find the molecular mass of the acid.

Watch Video Solution

Watch Video Solution

97. Calculate the mole fraction of ethyl alcohol and water in a solution in which 46 g of ethyl alcohol and 180 g of water are mixed together.

Watch Video Solution

98. The density of 3 M aqueous solution of sodium thiosulphate is 1.25 g/mL. Calculate (i) mole fraction of sodium thiosulphate (ii) molalities of Na^+ and $S_2O_3^{2-}$ ions.

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99. 8.0575×10^{-12} kg of Glauber's salt are dissolved in water to obtain $1dm^3$ of a solution of density $1077.2kgm^{-3}$. Calculate the

molarity.

Watch Video Solution

100. The mole fraction of benzene in a solution in toluene is 0.40. Calculate the weight per cent of benzene in the solution.

Watch Video Solution

101. A solution contains 410.3 g of H_2SO_4 per litre of the solution at 20°C. If its density is $1.243 gcm^{-3}$, what will be its molality and molarity ?

Watch Video Solution

102. Calculate the molality of 90% H_2SO_4 (weight/volume). The density of solution is $1.80 gm L^{-1}$.

Watch Video Solution

103. Calculate the number of molecules of oxalic acid ($H_2C_2O_4$) in 100 mL of 0.2 N oxalic acid

Watch Video Solution

104. $150 cm^3$ of a decimolar NaOH solution is diluted to $750 cm^3$. Find the molarity of the diluted solution.

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105. One tonne of air contains 2×10^{-3} g of carbon as smoke. Calculate the concentration of carbon in ppm in air.

Watch Video Solution

106. What volume of 2 N HCI be taken to form 500 mL $\frac{N}{10}$ solution of HCl?

Watch Video Solution

107. A sample of $Na_2CO_3H_2O$ weighing 0.62 g is added to 100 mL of 0.1 N H_2SO_4. Will the resulting solution be acidic, basic or neutral ?

Watch Video Solution

108. 1.325 g of anhydrous sodium carbonate are dissolved in water and the solution made up to 250 mL. On titration, 25 mL of this solution neutralise 20 mL of a solution of sulphuric acid. How much water should be added to 450 mL of this acid solution to make it exactly N/12 ?

Watch Video Solution

109. 1.725 g of a metal carbonate is mixed with 300 mL of $\frac{N}{10}$ HCI. 10 mL of $\frac{N}{2}$ sodium hydroxide were required to neutralise excess of the acid. Calculate the equivalent mass of the metal carbonate.

Watch Video Solution

110. A sample of sodium carbonate contains impurity of sodium sulphate. 1.25 g of this sample are dissolved in water and volume made up to 250 mL. 25 mL of this solution neutralise 20 mL of $\frac{N}{10}$ sulphuric acid.

Calculate the percentage of sodium carbonate in the sample.

Watch Video Solution

111. 20 mL $\frac{N}{2}$ HCl, 60 mL $\frac{N}{10} H_2SO_4$ and 150 mL $\frac{N}{5} HNO_3$ are mixed. Calculate the normality of the mixture of acids in solution.

Watch Video Solution

112. 1.26 g of a dibasic acid were dissolved in water and the solution made up to 200 mL. 20 mL of this solution were

completely neutralised by 10 mL of $\frac{N}{5}$ NaOH solution. Calculate the equivalent mass and molecular mass of the acid.

Watch Video Solution

113. 3.0 g of a sample of impure ammonium chloride were boiled with excess of caustic soda solution. Ammonia gas so evolved was passed into 120 mL of $\frac{N}{2}H_2SO_4$ mL of $\frac{N}{2}NaOH$ were required to neutralise excess of the acid. Calculate the percent purity of the given sample of ammonium chloride.

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114. An inorganic compound on analysis was found to have following composition : Mg = 9.76%, S = 13.01%, O = 26.01%, H_2O = 51.22% Calculate the empirical formula of the compound.

Watch Video Solution

115. A hydrocarbon contains 85.7% carbon. If 42 mg of the compound contain 3.01×10^{20} molecules, find the molecular formula of the compound.

Watch Video Solution

116. An organic compound has 68.327% C, 6.406% H, 25.267% CI. Calculate the molecular formula of the compound if its vapour density is 70.25.

Watch Video Solution

117. An oxide of nitrogen contains 30.43% nitrogen. The molecular mass of the compound is 92 amu. Find the molecular

formula of the given oxide.

Watch Video Solution

118. 4 grams of copper chloride on analysis were found to contain 1.890 g of copper (Cu) and 2.110 g of chlorine (CI). What is the empirical formula of copper chloride?

Watch Video Solution

119. Butyric acid contains only C, H and O. A 4.24 mg sample of butyric acid is completely burnt. It gives 8.45 mg of carbon dioxide and 3.46 mg of water. What is the mass percentage of each element in butyric acid?

Watch Video Solution

120. Balance the following equations by hit and trial method.

$Fe + H_2O \rightarrow Fe_3O_4 + H_2$

Watch Video Solution

121. Balance the following equations by oxidation number method.

$Zn + HNO_3 \rightarrow Zn(NO_3)_2 + H_2O + NH_4NO_3$

Watch Video Solution

122. How many grams of chlorine are required to completely react with 0.650 g of hydrogen to yield hydrogen chloride ? Also calculate the amount of HCI formed.

Watch Video Solution

123. Calculate the mass of CaO required to remove the hardness of 1000,000 litres of water containing 1.62 g of calcium bicarbonate per litre.

Watch Video Solution

124. Gastric juice contains about 3.0 g HCI per litre. If a person produces about 2.5 L of gastric juice per day, how many antacid tablets each containing 400 mg of $Al(OH)_3$ are needed to neutralise all the HCI produced in one day.

Watch Video Solution

125. 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.

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126. What volume of air containing 21% oxygen (by volume) is required to completely burn 1 kg of carbon containing 100% combustible substances?

Watch Video Solution

127. A solution of HCI is prepared by dissolving 7.30 g of hydrogen chloride gas in 100 ml of water. Find the molarity of the solution. If $50.0cm^3$ of this solution is treated with 3.50 g of zinc, what volume of H_2 measured at S.T.P. will be evolved ?

Watch Video Solution

128. What volume of oxygen at S.T.P. is required to completely burn 65.0 g ethyl alcohol ?

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129. How much potassium chlorate is needed to get enough oxygen for completely burning 28 g of carbon monoxide ?

Watch Video Solution

Very Short Answer Type Questions

1. What for the abbreviation SI stands?

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2. What are the units of acceleration, density and pressure in SI system?

Watch Video Solution

3. How many significant figures the following numbers possess?

(i) 3.60, (ii) 0.005, (iii) 5.629,(iv) 3.75×10^9

Watch Video Solution

4. Express 6.022×10^{23} in the form of a number which contains only three significant figures.

Watch Video Solution

5. State Law of reciprocal proportions.

Watch Video Solution

6. What is the unit of rate of chemical reaction ?

Watch Video Solution

7. State Avogadro's hypothesis.

Watch Video Solution

8. Which of the following molecules are homoatomic ?

(i) H_2O, (ii) O_3, (iii) NH_3, (iv) Cl_2

Watch Video Solution

9. What is meant by amu ?

Watch Video Solution

10. Define the term mole.

Watch Video Solution

11. What is the relationship between the atomic mass and actual mass of one atom of an element ?

Watch Video Solution

12. An atom is 40.08 times as heavier as 1/12 mass of an atom of Cl_2. What is its atomic mass ?

Watch Video Solution

13. Name a compound whose empirical formula and molecular formula are equal.

Watch Video Solution

14. How many gram atoms and gram molecules are present in 64.0 g of oxygen ?

Watch Video Solution

15. How many Ca^{2+} and Cl^{-} ions are present in one mole of $CaCl_2$?

Watch Video Solution

16. Is the following equation balanced ?

$C_2H_5OH + 2O_2 \rightarrow 2CO_2 + 3H_2O$

Watch Video Solution

17. Define the term molarity.

Watch Video Solution

18. What is the value of Avogadro's Number ?

Watch Video Solution

19. What is the difference between the empirical formula and molecular formula of a compound ?

Watch Video Solution

20. Why are atomic masses regarded as relative masses?

Watch Video Solution

21. During the formation of HCI from H_2 and Cl_2, two moles of hydrogen and three moles of Cl_2 have been used. What is the limiting reagent ?

Watch Video Solution

22. Is the law of conservation of mass valid for nuclear reactions ?

Watch Video Solution

23. State :

Avogadro's law

Watch Video Solution

24. How much would one amu weigh in grams ?

Watch Video Solution

25. Can an element have variable equivalent masses ?

Watch Video Solution

26. Can a less electropositive metal displace more electropositive metal from its salt solution ?

Watch Video Solution

27. What do you understand by a double decomposition reaction?

Watch Video Solution

28. What is meant by electrochemical equivalent of a substance?

Watch Video Solution

29. How would you calculate the equivalent mass of a salt ?

Watch Video Solution

30. Define gram equivalent mass.

Watch Video Solution

31. Why is molality of a solution independent of temperature ?

Watch Video Solution

32. Define the terms:

(i) Molarity (ii) Molality (iii) Normality (iv) Mole fraction (v) ppm

Which out of these are affected by changes in temperature ?

Watch Video Solution

33. What is a limiting reagent and what is its significance in stoichiometric calculations ? Explain with examples.

Watch Video Solution

34. What are the limitations of a chemical equation ?

Watch Video Solution

Short Answer Type Questions

1. How would you round off a given figure? Explain with examples.

Watch Video Solution

2. What do you understand by the term 'significant figures'?

Watch Video Solution

3. Elaborate the term compound atoms as used by Dalton

Watch Video Solution

4. State and explain law of multiple proportions with a suitable example.

Watch Video Solution

5. State the main postulates of Dalton's atomic theory

Watch Video Solution

6. Why is the use of relative masses of atoms preferred over their actual masses ?

Watch Video Solution

7. What is the Avogadro's number ? What information does it provide ?

Watch Video Solution

8. What is the significance of the word average in the definition of atomic mass ?

Watch Video Solution

9. Why are the atomic masses of most of the elements not whole numbers ?

Watch Video Solution

10. What does the chemical formula of an ionic compound represent ?

Watch Video Solution

11. How is the mass of an element related to the number of atoms present in it ?

Watch Video Solution

12. Which does have more atoms, 1.0 g of hydrogen or 1.0 g of oxygen ?

Watch Video Solution

13. How is the molecular formula of a compound related to its empirical formula ?

Watch Video Solution

14. What do you understand by a balanced chemical equation ?

Watch Video Solution

15. What are the conditions which must be followed by a chemical equation ?

Watch Video Solution

16. What do you understand by stoichiometric coefficients ?

Watch Video Solution

17. What do you understand by the term semimolar solution ?

Watch Video Solution

18. How is mole related to the volume of a gaseous substance ?

Watch Video Solution

19. When is the law of constant proportions not obeyed ?

Watch Video Solution

20. Calculate the actual mass of a single molecule of benzene.

Watch Video Solution

21. What do the following symbols represent in a chemical equation ?

(i) s, (ii) g, (iii) aq, (iv) $\downarrow$, (v) $\uparrow$

Watch Video Solution

22. Describe the following methods for determination of equivalent weight of a metal :

(i) oxide formation method

(ii) chloride formation method

(iii) metal displacement method.

Watch Video Solution

23. Describe the principle involved in the determination of equivalent weight of a substance by double decomposition method.

Watch Video Solution

24. State Faraday's second law of electrolysis. How is the law helpful in determining the equivalent weight of a substance ?

Watch Video Solution

25. How would you calculate the equivalent weight of an acid and a base ? Explain with examples.

Watch Video Solution

26. Describe molar volume method for the determination of molecular mass of a gas.

Watch Video Solution

27. What is meant by primary and secondary standards in volumetric analysis ?

Watch Video Solution

Essay Long Answer Type Questions

1. What are the laws of chemical combination ? State each law and explain it with suitable examples.

Watch Video Solution

2. What are the limitations of Dalton's atomic theory ?

Watch Video Solution

3. (i) How would you define the terms atomic mass and molecular mass ?

(ii) Nitrogen occurs in nature in the form of two isotopes with atomic masses 14 and 15 respectively. If the average atomic mass

of nitrogen is 14.0067, what is the percent abundance of the two isotopes ?

Watch Video Solution

4. What is Avogadro's number and what is its significance ? How is the mole concept useful in calculations based on chemical equations ?

Watch Video Solution

5. What are the basic requirements of a chemical equation ? Discuss with examples the information conveyed by a chemical equation.

Watch Video Solution

6. (a) Explain the following terms :

(i) Weight percent (ii) Volume percent

(iii) Molarity (iv) Normality

(b) How much volume of $\frac{M}{2} HCI$ solution be diluted to obtain $100 cm^3$ of a decimolar solution ?

Watch Video Solution

7. Balance the following equations by oxidation number method.

$KMnO_4 + H_3AsO_3 + HCl \rightarrow KCl + MnCl_2 + H_3AsO_4 + H_2O$

Watch Video Solution

8. Complete the following:

$3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

(i) 3 moles.....

(ii) .....g .....g .....g ..... L at S.T.P.

(iii).....atoms..... molecules.....molecules.....molecules

Watch Video Solution

9. What is a limiting reagent and what is its significance in stoichiometric calculations ? Explain with examples.

Watch Video Solution

10. What is the amount of lime Ca(OH) 2 required to remove the hardness in 60 litres of pond water containing 1.62 mg of calcium bicarbonate per 100 mL of water?

Watch Video Solution

11. Define equivalent mass. Describe at least three methods for the determination of equivalent mass of a substance.

Watch Video Solution

12. State Faraday's laws of electrolysis. How would you determine the equivalent mass of a substance with the help of these laws ?

Watch Video Solution

13. Define molecular mass. Describe three methods for the determination of molecular masses of gases.

Watch Video Solution

14. Describe Victor Meyer's method for the determination of molecular mass of a volatile substance.

Watch Video Solution

15. What do you understand by the strength of a solution ? Define the terms molarity, molality, normality and formality used for expressing the strength of a solution.

Watch Video Solution

Objective Multiple Choice Type Questions Choose The Correct Option In The Following Questions

1. The law of multiple proportions was proposed by

A. Lavoisier

B. Dalton

C. Proust

D. Gay Lussac.

Answer: B

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2. Name a metal found abundantly in the earth's crust.

A. Aluminium

B. Oxygen

C. Sulphur

D. Iron.

Answer: B

Watch Video Solution

3. Which of the following is a chemical change ?

A. A. Souring of milk

B. B. Stretching of rubber

C. C. Preparation of starch paste

D. D. Melting of wax.

Answer: A

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4. The isotopes of an element have

A. same atomic numbers

B. same atomic weights

C. different atomic numbers

D. different chemical properties.

Answer: A

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5. A compound with empirical formula C_2H_5O has a vapour density of 45. The molecular formula of the compound will be

A. C_2H_5O

B. $C_2H_2O_4$

C. $C_5H_{14}O_4$

D. $C_4H_{10}O_2$

Answer: D

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6. Water and hydrogen peroxide illustrate the law of

A. A. constant proportions

B. B.multiple proportions

C. C. isomorphism

D. D. reciprocal proportions

Answer: B

Watch Video Solution

7. The number of grams of H_2SO_4 required to dissolve 5 g of $CaCO_3$ is:

A. 10.24

B. 4.9

C. 5.12

D. 2.56

Answer: B

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8. The mass of a mole of electrons is: 0.008 g 0.184 g 0.55 mg 1.673

A. 0.008 g

B. 0.184 g

C. 0.55 mg

D. 1.673

Answer: C

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9. The number of atoms in 0.004 g of magnesium is close to

A. 24

B. 2×10^{20}

C. 10^{20}

D. 6.02×10^{23}

Answer: C

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10. Two samples of lead oxide were separately reduced to metallic lead by heating in a current of hydrogen. The weight of lead from one oxide was half the weight of lead obtained from the other oxide. The data illustrates

A. law of reciprocal proportions

B. law of constant proportions

C. law of multiple proportions

D. law of equivalent proportions.

Answer: C

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11. Chemical equation is balanced according to the law of multiple proportions reciprocal proportions conservation of mass definite proportions.

A. multiple proportions

B. reciprocal proportions

C. conservation of mass

D. definite proportions.

Answer: C

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12. The number of water molecules in one litre of water is:

A. 18

B. 18×1000

C. 6.022×10^{23}

D. 3.3×10^{25}

Answer: D

Watch Video Solution

13. The total number of electrons present in 18 mL of water (density of water is $1 gm L^{-1}$ is:

A. 6.02×10^{23}

B. 6.02×10^{22}

C. 6.02×10^{24}

D. 6.02×10^{25}

Answer: C

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14. 18 g of water contain:

A. 1 g atom of hydrogen

B. 2 g atoms of hydrogen

C. 3 g atoms of hydrogen

D. None of the above.

Answer: B

Watch Video Solution

15. An oxide of metal M has 40% by mass of oxygen. Metal M has relative atomic mass of 24. The empirical formula of the oxide is:

A. M_2O

B. M_2O_3

C. MO

D. M_3O_4

Answer: C

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16. The mass of an atom of oxygen is:

A. 16 amu

B. $\frac{16}{6.022 \times 10^{23}} g$

C. $\frac{32}{6.022 \times 10^{23}} g$

D. $\frac{1}{6.022 \times 10^{23}}$ g

Answer: B

Watch Video Solution

17. 1 mole of methane (CH_4) contains

A. 6.02×10^{23} atoms of H

B. 4 gram atoms of hydrogen

C. 1.81×10^{23} molecules of methane

D. 3.0 g of carbon.

Answer: B

Watch Video Solution

18. Two elements A (At. wt. 75) and B (At. wt. 16) combine to yield a compound. The % by weight of A in the compound was found to be 75.08. The formula of the compound is:

A. A_2B

B. A_2B_3

C. AB

D. AB_2

Answer: B

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19. The equivalent mass of $MnSO_4$ is half of its molecular mass when it is converted to

A. A) Mn_2O_3

B. $B)\, MnO_2$

C. C) MnO_4^-

D. D) MnO_4^{2-}

Answer: B

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20. 5 mL of N HCl, 20 mL of $\frac{N}{2}H_2SO_4$ and 30 mL of $\frac{N}{3}HNO_3$ are mixed together and the volume made to 1 litre. The normality of the resulting solution is:

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

B. $\frac{N}{10}$

C. $\frac{N}{20}$

D. $\frac{N}{40}$

Answer: D

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21. 100 g of a solution of hydrochloric acid (sp.gr. 1.18) contains 36.5 g of the acid. The normality of the solution is:

A. 1.18

B. $11, 8$

C. 118

D. 10

Answer: B

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22. A sample of $Na_2CO_3H_2O$ weighing 0.62 g is added to 100 mL of 0.1 N H_2SO_4. Will the resulting solution be acidic, basic or neutral ?

A. acidic

B. neutral

C. alkaline

D. strongly alkaline

Answer: B

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23. 2.76 g of Ag_2CO_3 on being heated yields a residue weighing

A. A)2.16 g

B. B)2.32 g

C. C)2.48 g

D. D)2.64 g

Answer: A

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24. The number of moles of $KMnO_4$ that are needed to react completely with one mole of ferrous oxalate in acidic solution is

A. $\frac{1}{5}$

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

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

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

Answer: C

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25. Normality of a '30 volume H_2O_2' solution is:

A. 1.6

B. 91.07

C. 10.72

D. 5.36

Answer: D

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26. Equal volumes of 1M $KMnO_4$ and 1M $K_2Cr_2O_7$ solution are allowed to oxidise Fe^{2+} ions to Fe^{3+} ions in acidic medium. The number of moles of Fe^{2+} ions oxidised in the two cases are in the ratio:

A. $1:1$

B. $3:1$

C. $5:6$

D. $6:5$

Answer: C

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

A. 0.1

B. 0.9

C. 0.3

D. 0.6

Answer: D

Watch Video Solution

28. What is the molarity of H_2SO_4 solution which contains 98% H_2SO_4 by weight and whose specific gravity is 1.84 ?

A. 1.84

B. 18.4

C. 9.2

D. 9.6

Answer: B

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29. Calculate the molality of 90% H_2SO_4 (weight/volume). The density of solution is $1.80gmL^{-1}$.

A. 91.8

B. 9.18

C. 46.6

D. 23.4

Answer: A

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30. A solution is prepared by dissolving 46 g of ethyl alcohol in 90 g of water. The mole fraction of ethyl alcohol in this solution is:

A. $\frac{46}{90}$

B. $\frac{90}{46}$

C. $\frac{46}{90+46}$

D. $\frac{1}{6}$

Answer: D

Watch Video Solution

31. One mole of calcium phosphide on reaction with excess of water gives

A. one mole of phosphine

B. two moles of phosphoric acid

C. two moles of phosphine

D. one mole of phosphorus pentoxide.

Answer: C

Watch Video Solution

32. At 100°C and 1 atm, if the density of liquid water is $1.0gcm^{-3}$ and that of water vapour is 0.0006 gcm-3 , then the volume occupied by water molecules in 1 litre of steam at that temperature is:

A. $6cm^3$

B. $60cm^3$

C. $0.6cm^3$

D. $0.06cm^3$

Answer: C

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33. 6.3 g of oxalic acid dihydrate have been dissolved in water to obtain a 250 ml solution. How much volume of 0.1 N NaOH would be required to neutralize 10 mL of this solution ?

A. 40 mL

B. 20 mL

C. 10 mL

D. 4 mL

Answer: A

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34. A solution of $Na_2S_2O_3$ is standardised iodometrically by using $K_2Cr_2O_7$. The equivalent weight of $K_2Cr_2O_7$ in this method is:

A. Mol. Wt/2

B. Mol. Wt/6

C. Mol. Wt/3

D. equal to mol wt.

Answer: B

Watch Video Solution

35. Which of the following is a redox reaction ?

A. $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$

B. $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$

C. $Ca(OH)_2 + 2NH_4Cl \rightarrow CaCl_2 + 2NH_3 + 2H_2O$

D. $2K\left[Ag(CN)_2\right] + Zn \rightarrow 2Ag + K_2\left[Zn(CN)_4\right]$

Answer: D

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

A. Molarity

B. Molality

C. Mole fraction

D. Weight fraction

Answer: A

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37. In an organic compound of molar mass $108 gmol^{-1}$, H and N atoms are present in $9:1:3.5$ by weight. Molecular formula can be: "1.C_(6)H_(8)N_(2)2. $C_7H_{10}N$ 3.C_(5)H_(6)N_(3)4. $C_4H_{18}N_3$

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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38. Find the oxidation number of Ni in $K_4\left[Ni(CN)_4\right]$

A. -1

B. 0

C. $+1$

D. $+2$

Answer: B

Watch Video Solution

39. 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of urea solution is:

A. 0.001 M

B. 0.01 M

C. 0.02 M

D. 0.1 M

Answer: B

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40. To neutralise completely 20 mL of 0.1M aqueous solution of phosphorus acid (H_3PO_3), the volume of 0.1 M aqueous KOH solution required will be ?

A. 10 mL

B. 20 mL

C. 40 mL

D. 60 mL

Answer: C

Watch Video Solution

41. If we consider that $\frac{1}{6}$, in place of $\frac{1}{12}$ mass of carbon atom is taken to be the relative atomic mass unit, the mass of one mole of a substance will:

a.be a function of the molecular mass of the substance

b.remain unchanged

c.increase two fold

d.decrease twice.

A. be a function of the molecular mass of the substance

B. remain unchanged

C. increase two fold

D. decrease twice.

Answer: B

Watch Video Solution

42. How many moles of magnesium phosphate $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atoms ?

A. (a) 0.02

B. (b) 3.125×10^{-2}

C. (c) 1.25×10^{-2}

D. (d) 2.5×10^{-2}

Answer: B

Watch Video Solution

43. Density of a 2.05 M solution of acetic acid in water is 1.02 g/mL. The molality of the solution is:

A. $1.14 mol kg^{-1}$

B. $3.28 mol kg^{-1}$

C. $2.28 mol K^{-1}$

D. $0.44 mol kg^{-1}$

Answer: C

Watch Video Solution

44. In the reaction:

$$2Al(s) + 6HCl(aq) \rightarrow 2Al^{3+}(aq) + 6Cl^{-}(aq) + 3H_2(g)$$

A. 6L HCI (aq) is consumed for every 3L H_2 (g) produced

B. $33.6LH_2$ (g) is produced regardless of temperature and pressure for every mole of Al that reacts

C. $67.2LH_2$ (g) at S.T.P. is produced for every mole of Al that reacts

D. $11.2LH_2$ (g) at S.T.P. is produced for every mole of HCI (aq-) consumed.

Answer: D

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

A. 6.026×10^{22}

B. 1.806×10^{23}

C. 3.600×10^{23}

D. 1.800×10^{22}

Answer: B

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46. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reactant is left in excess and how much? (At.wt: Mg=24, O = 16)

A. Mg, 0.16 g

B. $O_2, 0.16g$

C. Mg, 0.44 g

D. $O_2, 0.28g$

Answer: A

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

A. $1:4$

B. $7:32$

C. $1:8$

D. $3:16$

Answer: B

Watch Video Solution

48. The molarity of a solution obtained by mixing 750 mL of 0.5 (M) HCl with 250 mL of 2(M)HCl will be:

A. 0.875 M

B. 1.00 M

C. 1.75 M

D. 0.0975 M

Answer: A

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

A. C_2H_4

B. C_3H_4

C. C_6H_5

D. C_7H_8

Answer: D

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

A. 0.50 M

B. 1.78 M

C. 1.02 M

D. 2.05 M

Answer: D

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51. The molality of a urea solution in which 0.0100 g of urea, $\left[(NH_2)_2CO\right]$ is added to $0.3000dm_3$ of water at S.T.P. is:

A. $5.55 \times 10^{-4}M$

B. 33.3 M

C. $3.33 \times 10^{-2}M$

D. 0.555 M

Answer: A

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52. 1 gram of a carbonate (M_2CO_3) o treatment with excess HCl produces 0.01186 mole of CO_2. The molar mass of M_2CO_3 in g mol^{-1} is:-

A. 118.6

B. 11.86

C. 1186

D. 84.3

Answer: D

Watch Video Solution

53. In which case is the number of molecules of water maximum?

A. 18 mL of water

B. 0.18 g of water

C. 0.00224 L of water vapours at 1 atm and 273 K

D. 10^{-3} mol of water

Answer: A

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54. Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations:

(i) $60mL\frac{M}{10}HCl + 40mL\frac{M}{10}NaOH$

(ii) $55mL\frac{M}{10}HCl + 45mL\frac{M}{10}NaOH,$

(iii) $75mL\frac{M}{5}HCl + 25mL\frac{M}{5}NaOH$

(iv) $100mL\frac{M}{10}HCl + 100mL\frac{M}{10}NaOH$

pH of which one of them will be equal to 1?

A. ii

B. i

C. iv

D. iii

Answer: D

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55. The ratio of mass percent of C and H of an organic compound ($C_xH_yO_z$) is 6 : 1. If one molecule of the above compound ($C_xH_yO_z$) contains half as much oxygen as required to burn one molecule of compound C_xH_y completely to CO_2 and H_2O. The empirical formula of compound $C_xH_yO_z$ is:

A. $C_3H_6O_3$

B. C_2H_4O

C. $C_3H_3O_2$

D. $C_2H_4O_3$

Answer: D

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56. What would be the molality of 20% (mass/mass) aqueous solution of KI? (molar mass of KI = $166gmol^{-1}$)

A. 1.51

B. 1.35

C. 1.08

D. 1.48

Answer: A

Watch Video Solution

57. For a reaction, $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$, identify dihydrogen (H_2) as a limiting reagent in the following reaction mixtures.

A. 14 g of $N_2 + 4g$ of H_2

B. 28 g of $N_2 + 6g$ of H_2

C. 56 g of $N_2 + 10g$ of H_2

D. 35 g of $N_2 + 8g$ of H_2

Answer: C

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58. For any given series of spectral lines of atomic hydrogen, let $\Delta\overrightarrow{v} = \Delta\overrightarrow{v}_{\max} - \overrightarrow{v}_{\min}$ be the difference in maximum and minimum frequencies in cm^{-1}. The ratio $\Delta\overrightarrow{v}_{\text{Lyman}} / \Delta\overrightarrow{v}_{\text{Balmer}}$ is:

A. $4:1$

B. $9:4$

C. $27:5$

D. $5:4$

Answer: B

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True Or False Type Questions

1. State Gay-Lussac.s Law of combining volumes.

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2. The atoms remain indestructible in a chemical reaction.

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3. Equal volumes of all gases under similar conditions of temperature and pressure contain equal number of atoms.

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4. State whether the given statement is true or false:

The atomic mass unit (amu) is defined as one-twelfth of the

actual mass of an atom of C^{12}.

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5. The formula mass of a compound is always the same as its molecular mass

Watch Video Solution

6. One mole of K_2SO_4 contains 5.02×10^{23} potassium ions.

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7. One gram mole of a monoatomic gas occupies 22.4 L at S.T.P

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8. A chemical equation tells the actual number of moles of reactants and products.

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9. The number of atoms present in 1 g of hydrogen is the same as that in 1 g of oxygen.

Watch Video Solution

10. Comment over the following statement

The ratio of atoms can vary in differently prepared samples of a compound.

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Fill In The Blanks Type Questions

1. Law of conservation of mass does not hold good when we talk of conversion of.....into.....

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2. Dalton's atomic theory fails to explain.....law of combining volumes

Watch Video Solution

3. Molecule is the smallest particle of a substance which is capable of.....

Watch Video Solution

4. Atomic masses of elements are usually fractional because

Watch Video Solution

5. One gram mole, one gram molecule, and one gram molecular mass have the.....meaning.

Watch Video Solution

6. A mole is defined as the amount of substance that contains as many specified elementary particles as the number of atoms in.....g of carbon 12 isotope.

Watch Video Solution

7. Total number of atoms in 90 g of water are.....

Watch Video Solution

8. A limiting reagent is the reactant which gets completely .....during the reaction.

Watch Video Solution

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

Watch Video Solution

10. The volume occupied by 64 g of SO_2 at S.T.P. is.....

Watch Video Solution

Assertion Reason Type Questions

1. How many Significant figures in each term?

a. 34.6209

b. 0.003048

Watch Video Solution

2. Assertion: The SI unit of force is kgm^2s^{-2}

Reason: Force = mass x acceleration. The SI unit of mass is kg and that of acceleration is ms^{-2}.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. If Assertion is CORRECT but Reason is INCORRECT

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: D

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3. Assertion: The atomic mass of helium is 4.003 amu.

Reason: The mass of an atom of helium is 4.003 g.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. If Assertion is CORRECT but Reason is INCORRECT

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: C

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4. Assertion: One mole of atoms consist of 6.022×10^{23} atoms.

Reason: In ordinary chemical reactions, atoms are and are always present in discrete number.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. If Assertion is CORRECT but Reason is INCORRECT

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: B

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5. Assertion: 65.38 g of Zn when treated with excess of dilute H_2SO_4, will always form 22.4 L of H_2 at S.T.P.

Reason: The yield of a product is always in accordance with the stoichiometry of the reaction.

A. If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

B. If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

C. If Assertion is CORRECT but Reason is INCORRECT

D. If Assertion is INCORRECT but Reason is CORRECT.

Answer: B

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Numerical Problems

1. Hydrogen and oxygen combine to form two compounds, water and hydrogen peroxide. If the percentage of oxygen is 88.89 in water and 94.12 in hydrogen peroxide, show that the data support law of multiple proportions.

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2. Nitrogen and oxygen combine to form many oxides. In some oxides, 14 g of nitrogen combine with either 16 g of oxygen or 32 g of oxygen. In some other oxides, 28 g of nitrogen combine with 16, 48, or 80 g of oxygen, (i) What are the formulae of the oxides ? (ii) What law of chemical combination does the formation of these compounds illustrate ?

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3. What is the total number of electrons present in 1.6 g of methane?

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4. A compound contains 28% of nitrogen and 72% of a metal by weight. 3 atoms of the metal combine with 2 atoms of nitrogen.

Find the atomic weight of the metal.

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5. How many moles of oxygen are contained in one litre at S.T.P. of air if its volume content is 21% in air

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6. How many moles of AgCI will be formed if 10 g each of KCI and NaCI react with excess of silver nitrate?

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7. 0.9031 g of a mixture of NaCI and KCI on treatment with H_2SO_4 yielded 1.0784 g of a mixture of Na_2SO_4 and K_2SO_4

.Calculate the percent composition of the mixture.

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8. A solid mixture(5.000 g) consisting of lead nitrate and sodium nitrate was heated below 600°C until the weight of the residue was constant. If the loss in weight is 28%, find the amount of lead nitrate and sodium nitrate in the mixture.

Watch Video Solution

9. 5.82 g of a silver coin were dissolved in strong nitric acid and excess of NaCI solution was added. The silver chloride precipitated was dried and weighed 7.20 g. Calculate the percentage of silver in the coin

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10. Excess of Kl and dil. H_2SO_4 were mixed in 50 mL H_2O_2. The liberated l_2 required 20 mL 0.1 N $Na_2S_2O_3$. Find out the strength of H_2O_2 in g litre^{-1}.

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11. 50 litres of water containing $Ca(HCO_3)_2$ when converted into soft water required 22.2 g of $Ca(OH)_2$. Calculate the amount of $Ca(HCO_3)_2$ per litre of hard water.

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12. 20 mL of a solution of H_2SO_4 neutralises 21.2 mL of 30% solution (w/v) of Na_2CO_3. How much water should be added to

each 100 mL of the solution to bring down its strength to decinormal ?

Watch Video Solution

13. What volume of water should be added to 50 mL $\frac{M}{5}$ HCl solution to make it decimolar?

Watch Video Solution

14. Which of the following has the highest molarity ?

(i) 4 g of NaOH per $100cm^3$ of water

(ii) 4 g of HCl per $100cm^3$ of water

(iii) 4 g of H_2SO_4 per $100cm^3$ water

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15. A 1.0 g sample of $KCIO_3$ was heated under such conditions that a part of it decomposed according to the equation:

(i) $2KCIO_3 \rightarrow 2KCI + 3O_2$ and the remaining underwent a change according to the equation

(ii) $4KCIO_3 \rightarrow 3KClO_4 + KCI.$

If the amount of oxygen evolved was 146.8 mL at S.T.R, calculate the percentage by weight of $KClO_4$ in the residue.

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16. What volume of nitrogen at S.T.R can be obtained from a mixture of 10 g each of NH_4CI and $NaNO_2$.

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17. How many grams of nitric acid can be prepared from 50.0 g of KNO_3 of 80% purity ?

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18. 448 mL of a hydrocarbon, having C = 87.8%, H = 12.19%, weigh 1.64 g at S.T.P Determine the molecular formula of the compound.

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19. Two oxides of a metal contain $27.6\,\%$ and $30.0\,\%$ of Oxygen, respecttively. If the formula of the first be M_3O_4. Find that of the second.

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20. A carbon compound containing only carbon and oxygen has an approximate molecular weight of 290. On analysis it is found to contain 50% by weight of each element. What is the molecular formula of the compound ?

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21. An organic compound contains C = 40%, H = 6.66%. If the V.D. of the compound is 15, find its molecular formula.

Watch Video Solution

22. Caffeine contains 49.5% C, 28.8% N, 16.5% 0 and 5.20% H. Calculate the molecular formula. Given that 0.2 moles of caffeine weigh 38.04 g.

Watch Video Solution

23. The following data were obtained from experiments to find the molecular formula of benzocaine, a local anaesthetic.

(i) 3.54 g of it gave 8.49 g of CO_2 and 2.14 g of H_2O on complete combustion.

(ii) 2.35 g of it was found to contain 0.199 g of nitrogen.

(iii) The molecular mass of benzocaine was found to be 165 amu.

Find the molecular formula of benzocaine.

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24. 2.746 g of a compound on analysis gave 1.94 g of silver, 0.268 g of sulphur and 0.538 g of oxygen. Find the empirical formula of the compound.

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25. 26.8 g of $Na_2SO_4.xH_2O$ gave 12.6 g of water on heating. Determine the value of x in the compound using mole concept.

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Ncert Text Book Exercises With Hings And Solutions

1. Calculate the molar mass of the following:

$(i)H_2O(ii)CO_2(iii)CH_4$

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2. Calculate the mass per cent of different elements present in sodium sulphate (Na_2SO_4)

Watch Video Solution

3. Determine the empirical formula of an oxide of iron, which has 69.9% iron and 30.1% dioxygen by mass.

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4. Calculate the amount of carbon dioxide that could be produced when

(i) 1 mole of carbon is burnt in air.

(ii) 1 mole of carbon is burnt in 16 g of dioxygen.

(iii) 2 moles of carbon are burnt in 16 g of dioxygen.

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5. Calculate the mass of sodium acetate (CH3COONa) required to make 500 mL of 0.375 molar aqueous solution. Molar mass of

sodium acetate is 82.0245 g mol^{-1}.

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6. Calculate the concentration of nitric acid in moles per litre in a sample which has a density, 1.41 g mL^{-1} and the mass per cent of nitric acid in it being 69%.

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7. How much copper can be obtained from 100 g of copper sulphate $(CuSO_4)$?

Watch Video Solution

8. Determine the molecular formula of an oxide of iron in which the mass per cent of iron and oxygen are 69.9 and 30.1 respectively. Given that the molar mass of the oxide is $159.8 gmol^{-1}$.

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9. Calculate the atomic mass (average) of chlorine using the following data :

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10. In three moles of ethane(C_2H_6), calculate the following:

(i) Number of moles of carbon atoms.

(ii) Number of moles of hydrogen atoms.`

(iii) Number of molecules of ethane.

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11. What is the concentration of sugar $(C_{12}H_{22}O_{11})$in molL^{-1} if its 20 g are dissolved in enough water to make a final volume up to 2L?

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12. If the density of methanol is 0.793 kgL^{-1}, what is its volume needed for making 2.5 L of its 0.25 M solution?

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13. Pressure is determined as force per unit area of the surface. The SI unit of pressure, pascal is as shown below : $1Pa = 1Nm^{-2}$. If mass of air at sea level is $1034gcm^{-2}$, calculate the pressure in pascal.

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14. What is the SI unit of mass? How is it defined?

Watch Video Solution

15. Match the following prefixes with their multiples:

Watch Video Solution

16. What do you mean by significant figures?

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17. A sample of drinking water was found to be severely contaminated with chloroform, $CHCl_3$, supposed to be carcinogenic in nature. The level of contamination was 15 ppm (by mass).

(i) Express this in per cent by mass.

(ii) Determine the molality of chloroform in the water sample.

Watch Video Solution

18. Express the following in the scientific notation:

(i) 0.0048

(ii) 234,000

(iii) 8008

(iv) 500.0

(v) 6.0012

Watch Video Solution

19. How many significant figures are present in the following?

(i) 0.0025

(ii) 208

(iii) 5005

(iv) 126,000

(v) 500.0

(vi) 2.0034

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20. Round up the following upto three significant figures:

(i) 34.216

(ii) 10.4107

(iii) 0.04597

(iv) 2808

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21. Fill in the blanks in the following conversions :

(i) 1 km =.....mm =.....pm

(ii) 1 mg =.....kg =.....ng .

(iii) 1 mL =.....L =.....dm^3

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22. If the speed of light is $3.0 \times 108 ms^{-1}$, calculate the distance covered by light in 2.00 ns.

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23. In a reaction

$A + B_2 \rightarrow AB_2$

Identify the limiting reagent, if any, in the following reaction mixtures.

a. $300 \text{atoms of } A + 200$ molecules of B

b. $2 molA + 3 molB$

c. $100 \text{atoms of } A + 100$ molecules of B

d. $5 molA + 2.5 molB$

e. $2.5 molA + 5 molB$

Watch Video Solution

24. Dinitrogen and dihydrogen react with each other to produce ammonia according to the following equation :

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

(i) Calculate the mass of ammonia produced if 2.00×10^3 g dinitrogen react with 1.00×10^3 g of dihydrogen.

(ii) Will any of the two reactants remain unreacted?

(iii) If yes, which one and what would be its mass?

A.

B.

C.

D.

Answer:

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25. How are 0.50 mol Na_2CO_3 and 0.50 M Na_2CO_3 different?

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26. If ten volumes of dihydrogen gas react with five volumes of dioxygen gas, how many volumes of water vapour would be produced?

Watch Video Solution

27. Convert the following into basic units:

(i) 28.7 pm

(ii) 15.15 pm

(iii) 25365 mg

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28. Which one of the following will have the largest number of atoms?

(i) 1 g Au (s)

(ii) 1 g Na (s)

(iii) 1 g Li (s)

(iv) 1 g of Cl2(g)

Watch Video Solution

29. Calculate the molarity of a solution of ethanol in water, in which the mole fraction of ethanol is 0.040 (assume the density of water to be one).

Watch Video Solution

30. What will be the mass of one ^{12}C atom in g?

Watch Video Solution

31. How many significant figures should be present in the answer of the following calculations?

(i) $\frac{0.02856 \times 298.15 \times 0.112}{0.5785}$, (ii) 5×5.364, (iii) $0.0125 + 0.7864 + 0.0215$

Watch Video Solution

32. Use the data given in the following table to calculate the molar mass of naturally occurring argon isotopes :

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33. Calculate the number of atoms in each of the following (i) 52 moles of Ar (ii) 52 u of He (iii) 52 g of He.

Watch Video Solution

34. A welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen gives 3.38 g carbon dioxide, 0.690 g of water and no other products. A volume of 10.0 L (measured at STP) of this welding gas is found to weigh 11.6 g. Calculate (i) empirical formula, (ii) molar mass of the gas, and (iii) molecular formula.

Watch Video Solution

35. Calcium carbonate reacts with aqueous HCl to give $CaCl_2$ and CO_2 according to the reaction,

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H2O(l)$

What mass of CaCO3 is required to react completely with 25 mL of 0.75 M HCl?

Watch Video Solution

36. Chlorine is prepared in the laboratory by treating manganese dioxide (MnO_2) with aqueous hydrochloric acid according to the reaction:

$4HCl(aq) + MnO_2(s) \rightarrow 2H_2O(l) + MnCl_2(aq) + Cl_2(g).$

How many grams of HCI react with 5.0g of manganese dioxide?

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