CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (HINGLISH)

SOME BASIC CONCEPTS AND MOLE CONCEPT

Solved Examples

1. Calculate the following

a. $\left(6.7 \times 10^{5}\right) \times \left(4.6 \times 10^{4}\right)$

b. $\left(7.6 \times 10^{7}\right) \times \left(3.8 \times 10^{-4}\right)$

c. $\left(6.8 \times 10^{-3}\right) \times \left(5.2 \times 10^{-4}\right)$

d. $\dfrac{6.7 \times 10^{5}}{4.6 \times 10^{4}}$

e. $\dfrac{7.6 \times 10^{7}}{3.8 \times 10^{-4}}$

f. $\dfrac{6.8 \times 10^{-3}}{3.8 \times 10^{-4}}$

g. $7.65 \times 10^2 + 2.72 \times 10^3$

h. $7.87 \times 10^{-4} - 2.61 \times 10^{-5}$

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2. How many significant figures are there in each of the following numbers?

a. π

b. The sum of $16.4 + 0.3254$

c. The product of 12×7.435

d. 0.0075

e. 5.033×10^{22}

f. 7.007

g. 6000

h. The subtractin of 19.3 - 0.4567

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3. What is the difference between $2.0m$ and $2.00m$.

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4. Express the result of the following data to the appropriate number of significant figures.

$$\frac{4.84 \times 0.0744}{0.016}$$

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5. The density of copper is $7.8gcm^{-3}$ and its weight is $5.642g$. Report the volume of copper to correct decimal point.

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6. What is the number of significant figures in Avogadro's number $\left(6.0 \times 10^{23}\right)$ and Planck's constant $\left(6.62 \times 10^{-34}Js\right)$.

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7. Express the following to four significant figure:

i. 6.58768×10^5 ii. 8.35783`

iii. 98.2350 iv. 0.003586

v. 90000

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8. Express the number 68000 in exponetial notation which shows

i. Two significant figures

ii. Three significant figures.

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9. An analytic balance has uncertainty in measurement equal to $\pm 1mg$.

Then report the result in terms of percentage if the weight of a

compound is

a. $1g$ b. $10g$ c. $100g$

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10. Convert the following :

a. $5L$ of a solution into m^3

b. 4 days into seconds

c. $200lb$ into kilogram

d. $2.00km$ into miles

$(1\text{mile} = 1760yd, 1yd = 3ft1\text{in} = 2.54cm)$

e. 0.800 carat intog grams and kilograms

e. $8.0km$ into inches $(1m = 1.094\text{yards}(yd), 1yd = 36\text{in})$

f. 40 Em (exa metre) (thickness of Milky way galaxy) into metre

g. $1.4Gm$ (gigmetre) diametre of sun) into metre

h. $41Pm$ (petametre) (distance of nearest star) into metre

i. $1fg$ (femotgram) (mass of human DNA molecule) into kilogram

j. $500Mg$ (megagram) (mass of a loaded jumbo jet) into kilogram

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11. Express the following in SI unit:

a. $6'10$ b. $200lb'$

c. $60\text{miles}h^{-1}$ d. $-20^{\circ}C$

e. $2.53mm$ f. $7.85mL$

g. 0.0528in h. $52\mu g$

i. 5days j. $5L$

k. $14lb\text{in}^{-2}$ (atmospheric pressure)

l. $6.86gcm^{-3}$ density of metal)

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12. Five grams of $KCIO_3$ yield $3.041g$ of KCI and $1.36L$ of oxygen at standard temperature and pressure. Show that these figures support the law of conservation of mass within limits of $\pm 0.4\,\%$ error.

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13. $0.22g$ of a hydrogen (i.e., a compound conatining carbon and hydrogen only) on complete combustion with oxygen gave $0.9g$ water and $0.44g$ carbon dioxide. Show that these results are in accordance with the law of conservation of mass (atomic mass of $C = 12, H = 1, O = 16$).

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14. $0.7g$ of iron reacts directly with $0.4g$ of sulphur to form ferrous sulphide. If $2.8g$ of iron is dissolved in dilute HCl and excess of sodium sulphide solution is added, $4.4g$ of iron sulphide is precipitated. Prove the law of constant composition.

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15. $1.375g$ 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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16. $112mL$ of hydrogen combines with $56mL$ of oxygen of form water. When $224mL$ of hydrogen is passes over hand cupric oxide, the cupric oxide loses. $0.160g$ of weight. All volumes are measured at STP. Show that the result agrees with the law of constant composition $(22.4L$ hydrogen and oxygen at STP weigh, respectively, $2g$ and $32g)$

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17. Element X and Y form two different compounds. In the first compound, $0.324gX$ is combined with $0.471gY$. In the second

compound, $0.117gX$ is combined with $0.509gY$. Show that these data illusttate the law of multiple proportions.

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18. An element forms two oxides of $2.900g$ and $2.250g$ of these oxides each of found to contain $1.12L$ of O_2 at STP. Which law of chemical combination is illustrated by these data?

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19. Carbon combines with hydrogen to forom three compounds A, B and C. The percentage of hydrogen in A, B and C.is 25, 14.3, and 7.7, respectively. (a) Find the empirical formula of the compounds. (b) Which law of chemical combination does this example illustrate? How?

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20. 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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21. If the masses of Mn of O are in the ratio of $55:16$ in MnO, what is the ratio of O that combines with the same mass of Mn in MnO_2 and Mn_2O_7 ?

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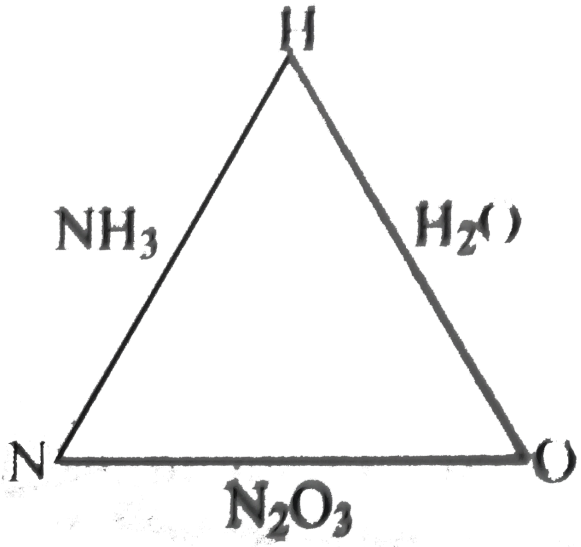
22. Ammonia contains $82.35\,\%$ of nitrogen and $17.65\,\%$ of hydrogen. Water contains $88.90\,\%$ of oxygen $63.15\,\%$ of oxygen and $36.85\,\%$ of nitrogen. Show by calculations from these data which law of chemicmal

combination is verified.



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23. Show that the results given below taken together illustrate a law of chemical action: (a) $0.46g$ og amgnesium produces $0.77g$. Of magnesium oxide, (b) $0.82g$ of magnesium liberates $760mL$ of hydrogen at STP from an acid (weight of $1mL$ of hydrogen at $STP = 0.00009g$), and (c) $1.25g$ results from the union of $1.11g$ of oxygen and hydrogen.

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24. Aluminium oxide contains 52.9% aluminium and carbon dioxide contains 27.27% carbon. Assuming the law of reciprocal proportions, calculalte the percentage of aluminium in aluminium carbide.

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25. Air contains 21% oxygen by volume. Calculate the theoretical volume of air which will be required for burning completely 500 cubic ft of acetylene gas (C_2H_2)All volumes are measured under the same conditions of temperature and pressure.

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26. One volume of a gaseous compound containing carbon, hydrogen, and oxygen was burnt in the presence of 2 volumes of oxygen. The

resultant gases contained 2 volumes of carbon dixoide and 2 volumes of steam. Find the molecular formula of the compound, if all the volume were measured under the same conditions of temperature and pressure.

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27. Calculate molecular mass of the following molecules:

a. Sulphuric acid (H_2SO_4)

b. Glucose $(C_6H_{12}O_6)$

c. Methane (CH_4)

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28. In $4g$ atoms of Ag. calculate

a. Amount of Ag.

b. Weight of one atom of Ag. (atoic weight of $Ag = 108$).

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29. How many g atoms are there in one atoms?

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30. How many years it would take to spend Avogadro's number of rupees at the rate of 10 lakh rupees per second?

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31. From $200mg$ of CO_2, 10^{21} molecules are removed. How many grams and moles of CO_2 are left.

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32. Calculate the number of Cl^- and Ca^{2+} ions in $222g$ anhydrous $CaCl_2$.

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33. 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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34. Calculate the residue obtained on strongly heating $2.76Ag_2CO_3$.

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35. By heating $10gCaCO_3$, $5.6gCaO$ is formed. What is the weight of CO_2 obtained in this reaction

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36. On heating $1.763g$ of hydrated $BaCl_2$ to dryness, $1.505g$ of anhyrous salt remained, What is the formula of hydrate?

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37. Calculate the weight of iron which will be converted into its oxide by the reaction of $18g$ of steam.

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38. Calculate the volume of O_2 and volume of air needed for combustion of $1kg$ carbon at STP.

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39. One litre of CO_2 is passed over hot coke. The volume becomes $1.4L$. Find the composition of products, assuming measurement at NTP.

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40. $5mL$ of a gaseous hydrocarbon was exposed to $30mL$ of O_2. The resultant gas, on cooling, is formed to measure $25mL$ of which $10mL$ is absrobed by $NaOH$ and the remainder by pyrogallol. Determine the molecular formula of hydrocation. All measurements are made at constant pressure and temperature.

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41. When a mixture of 10 moles of SO_2 and 15 moles of O_2 was passed over catalyst, 8 moles of SO_3 was formed. How many moles of SO_2 and O_2 did not enter into combination?

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42. Calculate mass of sodium which contains same number of atoms as are present in $4g$ of calcium (Atomic weight $Na = 23$, atomic weight $Ca = 40$)

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43. Calculate the number of moles in each of the following :

a. $11gofCO_2$

b. 3.01×10^{22} molecules of CO_2

c. $1.12LofCO_2$ at STP

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44. Calculate the mass of the following

a. One atom of calcium

b. One molecules of SO_2

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45. Calculate number of atoms in each of the following"

i. 0.5 mol atom of nitorgen

ii. 0.2 mol molecules of hydrogen

iii. 3.2 g of sulphur

Calculate number of molecules in each of the following:

i. 14 g of nitrogen

ii. 3.4 g of H_2S

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46. How many moles of O are present in $4.9g$ of H_3PO_4? (Atomic weight of P, O and $H = 31, 16, 1$)

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47. What is the molecular mass of a compound X, if its 3.0115×10^{9} molucules weigh $1.0 \times 10^{-12} g$?

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48. What is the volume occupied by one CCl_4 molecule at $20^{\circ} C$? Density of CCl_4 is $1.6/$ at $20^{\circ} C$

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49. How many grams of $Cu(NO_3)_2$ would you need to take to get $1.00 g$ of copper? $Cu = 63.5, N = 14, O = 16.$

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50. Calculate the number of atoms of each type that are present in $3.42 g$ of sucrose $(C_{12}H_{22}O_{11})$.

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51. How many molecules of benzene (C_6H_6) are there in $1L$ of benzene ? Specific gravity of benzene is 0.88.

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52. The volume of a drop of water is $0.04mL$. How many H_2O molecules are there in a drop of a water? $d = 1.0gmL$.

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53. Find the volume of the following at STP.

a. $14g$ of mitrogen

b. 6.023×10^{22} molecules of NH_3

c. $0.1\text{mole of } SO_2$.

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54. What is the volume of one molecules of water (density of $H_2O = 1gcm^{-3}$)

b. What is the radius of the water molecule assuming it be spherical.

c. Calculate the radius of the oxygen atom, assuming the oxygen atom occupies half of the volume occupied by the water molecule.

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55. Calculate the mass of the carbon present in 0.1 mole of sodium ferricyanide $Na_3[Fe(CN)_6]$.

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56. Calculate the total number of electrons present in $3.2g$ of oxygen gas.

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57. Calculate the number of molecules present in one drop of H_2O whose mass is $0.01g$

b. Calculate the number of molecules leaving the liquid suface per second, if the same drop of water evaporates in one hour.

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58. Calculate the percentage compostion of various elements in the following compounds:

Blue vitriol $(CuSO_4.\ 5H_2O)$

b. Green vitriol $(FeSO_4.\ 7H_2O)$

c. White vitriol $(ZnSO_4.\ 5H_2O)$

d. Ethanol (C_2H_5OH)

e. Mohr's salt $\left[(NH_4)_2SO_4.\ FeSO_4.\ 6H_2O\right]$

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59. Calculate the percentage composition of:

Alumina $(Al_2O_3$, potassium oxide (K_2O), and silcia (SiO_2) in the sample of clay $(Al_2O_3.\ K_2O.\ 6SiO_2)$.

b. Potassium sulphate (K_2SO_4). Aluminium sulphate, and water of crystallisation in the simple of potash alum, $\left(K_2SO_4.\ Al_2(SO_4)_3.\ 24H_2O\right)$.

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60. A hydrocarbon contains $10.5g$ of carbon per gram of hydrogen. $1L$ of vapour of the hydrocarbon at $127^\circ C$ and 1 atm pressure weighs $2.8g$. Find the molecular formula of the hydrocarbon.

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61. Calcium carbide reacts with water to give ethyne or acetylene gas and calcium hydroxide. Write the balanced chemical equation for this

reaction.

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62. Magnesium carbide reacts with water to give propyne gas and magnesium hydroxide. Write the balanced chamical reaction.

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63. Calculate the molarity of KOH in solution prepared by dissolving $5.6g$ in enough water to form $250mL$ of the solution.

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64. Calculate the molarity of KCl solution prepared by dissolving $7.45g$ of KCl in $500mL$ of the solution. $\left(d_{sol} = 1.2gmL^{-1}\right)$

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65. Calculate the molality (m) of $3M$ solution of $NaCl$ whose density is $1.25 gmL^{-1}$.

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66. Calculate the molarity (M) and normality (N) of a solution of oxalic acid $\left[(COOH)_2.\ 2H_2O\right]$ containing $12.6g$ of the acid in $500mL$ of the solution.

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67. $100mL$ of $0.1MHCl + 100mL$ of $0.2MH_2SO_4 + 100mL$ of $0.1MHNO_3$ are mixed togther.

a. What is the final conecntration of the solution.

b. What would be the final concentration of the solution. If the solution is made to $1L$ by adding H_2O?

c. What would be the final concentration of the solution if $700mL$ of H_2O is added to the solution?

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68. $1L$ of $0.1MNaOH$, $1L$ of $0.2MKOH$, and $2L$ of $0.05MBa(OH)_2$ are mixed together. What is the final concentration of the solution.

A. $0.120N$

B. $0.125N$

C. $0.130N$

D. $0.135N$

Answer: B

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69. $50mL$ of $0.2MHCl$, $50mL$ of $0.2NH_2SO_4$, and $200mL$ of $0.2MBa(OH)_2$ are mixed together and the volume was made to $1L$ by adding H_2O. What is the final concentration of the solution, and what is the nature of the final solution: acidic, basic or neutral?

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70. A solution contains $2.5mol$ of H_2O. Calculation the mole fraction of each component of the solution.

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71. The percentage composition by mass of a solution is 20% urea (NH_2CONH_2), 40% glucose $(C_6H_{12}O_6)$, and 40% water (H_2O). Calculate the mole fraction of each component of the solution.

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72. A solution is prepared by mixing ethanol and water. The mole fraction of ethanol in the mixture is 0.9.

What is the molality (m) of the solution.

b. Water is added to the above solution such that the mole fraction of water in the solution becomes 0.9. What is the molality (m) of the solution?

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73. Calculate the molarity (M) and molality (m) of 16% aqueous methanol (CH_3OH) solution by volume. Density of solution $= 0.9gmL^{-1}$.

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74. $20mg$ of $K^{\oplus}$ ions are present in $1L$ of aqueous solution. Density of the solution is $0.8mL^{-1}$. What is the concentration of $K^{\oplus}$ ions in

ppm?

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75. $10L$ of hard water requires $0.28g$ of line (CaO) for removing hardness. Calculate the temporary hardness in ppm of $CaCO_3$.

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76. Calculate the percent free SO_3 in an oleum which is labelled $'118\ \%\ H_2SO_4'$.

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77. If the percent free SO_3 in an oleum is 20% then label the sample of oleum in terms of percent H_2SO_4,

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78. $50.0kg$ of $N_2(g)$ and $10g$ of $H_2(g)$ are mixed to produce $NH_3(g)$. Calculate the $NH_3(g)$ formed. Identify the limiting reagent.

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79. If 0.5 mol of $CaBr_2$ is mixed with 0.2 mol of K_3PO_4, the maximum nubmer of moles of $Ca_3(PO_4)_2$ that can be formed is:

a. 0.1 b. 0.2 c. 0.5 d.0.7

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80. Upon mixming $100.0mL$ to $0.1M$ potassium solphate solution and $100.0mL$ of $0.05M$ barium chloride solution, precipitation of barium sulphate takes place. How many moles of barium sulphate are formed? Also, calculate the molar concentration of species left behind in the solution. Which is the limiting reagent?

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81. In one process of waterproofing, a fabric is expsoed to $(CH_3)_2SiCl$ vapour. The vapour reacts with (OH) groups on the surface of the fabric or with traces of H_2O to form waterproofing film of by the reaction

Where n is large integer. The waterproofing film is deposited on the fabric layer upon layer. Each layer is 10Å thich [the thickness of the $(CH_3)_2SiO$ group]. How much $(CH_3)_2SiCl_2$ is required to waterproof one side of a piece of a fabric, $1.0m$ by $3.0m$, with a film 1000 layers thick? The density of the film is $1.0gcm^{-3}$. (Atomic weight of $Si = 28$ and $Cl = 35.5$)

$$n(CH_3)_2SiCl_2 + 2n\,\overset{\ominus}{O}H \longrightarrow 2nCl^{\ominus} + nH_2O + +(CH_3)_2SiO\overline{\overline{+}}_n$$

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82. $1.62g$ of green algae absorbs 6×10^{-3} mol CO_2 per hour by photosynthesis. If the fixed C atoms are all stroed after photosynthesis as starch $(C_6H_{10}O_5)_n$, how long will it take for the alge to double their own weigth?

$\left[Mwof(C_6H_{10}O_5)_n = 162n\right]$

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83. The empirical formula of a commercial ion-exchange resin is $C_8H_{70SO_3Na}$. The resin is used to soften water as follows:

$Ca^{2+} + 2C_8H_7SO_3Na \rightarrow (C_8H_7SO_3)_2Ca + Na^{\oplus}$ expressed in mol/g resin?

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84. The chemical formula of the chelating agent Versence is $C_2H_4N_2(C_2H_2O_2Na)$ If each mol of this compound could bind 1 mol

of Ca^{2+}, what would be the rating of pure Versene, expressed as $mgCaCO_3$ bound per g. Of chealting agent? Ca^{2+} is expressed in terms in terms of amount of $CaCO_3$ it could form.

$[Mw\text{of vesene} = 380, Mw\text{of}CaCO_3 = 100gmol^{-1}]$

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85. The plastic industry uses large amounts of phthalic anhydride $C_8H_4O_3$, made by the controlled

$$C_{10}H_8 + \frac{9}{2}O_2 \rightarrow C_8H_4O_3 + 2CO_2 + \frac{5}{2}H_2O$$

Since some of the naphthalene is oxidised to other products, 80% yield is obtained. What weight of phthalic anhydrid would be produced by the oxidation of $256g$ of $C_{10}H_8$.

$[Mw\text{of}C_{10}H_8 = 128, Mw\text{of}C_8H_4O_3 = 148]$

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86. Calculate the weight of CaO required to remove hardness of $10^6 L$ of water containing $1.62g$ of $Ca(HCO_3)_2$ in $1.0L$.

$\left(MwofCa(HCO_3)_2 = 162, mwofCaO = 56\right)$

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87. A mixture of $NaCl$ and Na_2CO is given On heating $12g$ of the mixture with dilute $HCl, 2.24g$ of CO_2 is removed. Calculate the amounts of each in the mixture.

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88. A mixture of FeO and Fe_3O_4 when heated in air to a constant weight, gains 5% of its weight. Find the composition of the intial mixutre.

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89. Igniting MnO_2 in air converts it quantitatively to Mn_3O_4. A sample of pyrolusite is of the following composition: $MnO_2 = 80\,\%$, SiO_2 and other inert constituents = 15%, and rest bearing H_2O. The sample is ignited to constant weight. What is the percent of Mn in the ingnited sample?

A. $50.96\,\%$

B. $60.48\,\%$

C. $59.36\,\%$

D. $65.63\,\%$

Answer: C

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90. A flash bulb used for taking photograph in poor light contains $30mL$ of O_2 at $780mm$ pressure at $27^\circ C$. Suppose that metal wire

flashed in the bulb is pure aluminium (Al) and it is oxidised to Al_2O_3 in the process of flashing, calculate the minimun weight of Al wire that is to be used for maximum efficiency.

A. $0.045g$

B. $0.05g$

C. $0.04g$

D. $0.055g$

Answer: A

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91. $1g$ of impure Na_2CO_3 is dissolved in water and the solution is made upto $250mL$. To $50mL$ of this solution, $50mL$ of $0.1NHCl$ is added and the mixture after shaking well required $10mL$ of $0.16NNaOH$ solution for complete neutralization. Calculation percent purity of the sample of Na_2CO_3.

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92. $5mL$ of $8NHNO_3$, $4.8mL$ of $5NHCl$, and a certain volume of $17mH_2SO_4$ are mixed together and made upto $2L$. $30mL$ of the acid mixture exactly neutralises $42.9mL$ of Na_{2CO_3} solution containing $0.1g$ of $Na_2CO_3.10H_2O$ in $10mL$ of water. Calculate:

a. The volume of H_2SO_4 added to the mixture.

b. The amount (in g) of the sulphate ions in the solution.

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93. $10.0L$ of air of STP was slowly bubbled through $50mL$ of $N/25Ba(OH)_2$ solution and the final solution rendered red with phenoophthalein. After filtering the solution from the precipitated $BaCO_3$, the filtrate requried $22.5mL$ of $N/12.5HCl$ to becomes just colourless. Calculate the % age by volume of CO_2 in the air.

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94. A mixture of $CaCO_3$ and $MgCO_3$ weighing $1.84g$ on heating left a residue weighing $0.96g$. Calculate the percentage of each in the mixture.

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95. A mixture contains equi-molar quantities of carbonates of two bivalent metals. One metal is present the extent of $13.5\ \%$ by weight in the mixture and $2.50g$ of the mixture on heating leaves a residue of $1.18g$. Calculate the percentage by weight of the other metal.

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96. $25mL$ of solution containing HCl and H_2SO_4 is required for neutralisation of $25mLN/2$ caustic soda solution. $50mL$ of the same solution on precipitation with $BaCl_2$ yielded $2.33g$ of $BaSO_4$. What

weight of each acid contained in $1L$ the solution? (Molecular mass of $BaSO_4 = 233$)

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97. A mixture containing only Na_2CO_3 and K_2CO_3 and weighing $1.22g$ was dissolved in water to form $100mL$ of solution: $20mL$ of this solution required $40mL$ of $0.1NHCl$ for neutralisation.

a. Calculate the weight of K_2CO_3 in the mixture.

b. If another $20mL$ of the same solution is treated with excess of $BaCl_2$, what will be the weight of precipitate thus obtained? (Molarcular of $Na_2CO_3 = 106$, $K_2CO_3 = 138$, $BaCO_3 = 197.4$)

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98. $2.36g$ of sample of dolomite containing only $CaCO_3$ and $MgCO_3$ were dissolved in $700mL$ of $0.1NHCl$. The solution was dilutied to

$2.05L$. $25mL$ of this solution required $20mL$ of $0.01NNaOH$ solution for complete neutralisation. Find the percent composition of ore.

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99. $4.08g$ of a mixture of BaO and an unknown carbonate MCO_3 was heated strongly. The residue weighed $3.64g$. This was dissolved in $100mL$ of $1NHCl$. The excess of acid required of $16mL$ of $2.5NNaOH$ for complete neutralisation. Identify the matal M.

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100. H_2SO_2 solution $(20mL)$ reacts quantitatively with a solution of $KMnO_4(20mL)$ acidified is just dilute H_2SO_4. The same volume of the $KMnO_4$ solution is just decolourised by $10mL$ of $MnSO_4$ in neutral medium. simulataneously forming a dark brown precipitate of hydrated MnO_2. The brown precipitate is dissolved in $10mL$ of $0.2M$ sodium oxalate under boiling condition in the presence of dilute

H_2SO_4. Write the balanced equations involved in the reactions and calculate the molarity of H_2O_2 solution.

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101. $3g$ of ethane C_2H_6 on complete combustion gave $8.8g$ of CO_2 and $5.4g$ of water. Show that the results are in accordance with the law of conservation of mass.

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102. Weight of copper oxide obtained by heating $2.16g$ of metallic copper with HNO_3 and subsequent ingnition was $2.70g$ In another experient, $1.15g$ of copper oxide on reduction yielded $0.92g$ of copper. Show that the results illustrance the law of definite proportions.

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103. In experiment on the effect of heating on oxides of lead in a current of hydrogen the following results were obtained. Show that they are in agreement with the law of multiple proportions.

a. $1.393g$ of litharge (PbO) gave $1.293g$ of lead

b. $2.173g$ of lead peroxide (PbO_2) gave $1.882g$ of lead

c. $1.712g$ of red lead (Pb_3O_4) gave $1.552g$ of lead

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104. Two oxides of metal were found to contain 31.6% and 48% of oxygen, respectively. If the formula of first is represented by M_2O_3, find that of the other

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105. A, B and C are three elements giving compounds AB, AC, and BC. AB contains 75% of A, AC contains 57.14% of C and BC

contains 11.11% of B. Show that the result illustrate the law of reciprocal proportions.

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106. A metal forms two oxides. The higher oxide contains 80% metal. $0.72g$ of the lower oxide gave $0.8g$ of higher oxide when oxidised. Calculate the weight of oxygen the combines with the fixed weight of metal in the two oxides, and show that the data supports the law of multiple proportines

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107. $500mL$ of $0.2MNaCl$ sol. Is added to $100mL$ of $0.5MAgNO_3$ solution resulting in the formation white precipitate of $AgCl$. How many moles and how many grams of $AgCl$ are formed? Which is the limiting reagent?

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

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109. What is the percentage of aluminium in Al_2O_3? $(Al = 27, O = 16)$

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110. What is the percentage composition of each element is zinc-phosphate $Zn_3(PO_4)_2$? $(Zn = 65.5, P = 31, O = 16)$

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111. An organic compound consists of 6.023×10^{23} carbon atoms, 1.8069×10^{24} hydrogen atoms, and 3.0115×10^{23} oxygen atoms. What is its simplest formula?

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112. What is the simplest formula of acompound that contains $0.25g$ atom of sillicon per $0.50g$ atom of oxygen.

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113. $0.1653g$ aluminium reacts completely with $0.652g$ chlorine to form chloride of aluminium.

a. What is the empirical formula of the compound?

b. If molecular mass of the compound is 267 amu, calculate the molecular formula of the compound.

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114. A $0.2075g$ sample of an oxide of cobalt on analysis was found to contain $0.1475g$ cobalt. Calculate the empirical formula of the oxide. $(Co = 59\text{amu})$

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115. The molecular mass of iodide of tin (Sn) is 626.5 amu. What is the empirical formula of the substance?

$(I = 127, Sn = 118.5)$

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116. What is the empirical formula for a compound that contains $22\ \%\ S$ and $78\ \%\ F$? $(S = 32, F = 19)$

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117. A substance used as a water softener has the following mass percentage composition : $42.07\,\%\,Na$, $18.9\,\%\,P$, and $39.04\,\%$ of oxygen. Determine the empirical formula of the compound. $(Na = 23, P = 31, 0 = 16)$

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118. An orgainc compound contains $43.98\,\%\,C$, $2.09\,\%\,H$, and $37.2\,\%\,Cl$. Calculate its empirical formula.

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119. A $0.534g$ of a sample of haemoglobin on analysis was found to contain $0.34\,\%\,Fe$. If each haemoglobin molecule has four Fe^{2+} ions, what is the molecular mass of haemoglobin ? $(Fe = 56\text{amu})$

Watch Video Solution

120. How many g atoms and number of atoms are there n (a) $60g$ carbon, (b) $22.4gCu$, an (c) $72.52g$ lead. Given atomic masses of C, Cu and Pb are 12,63.6, and 207.2, respectively. (Avogadro's number $= 6.02 \times 10^{23}$).

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121. Find the number of g atoms and weight of an element having 2×10^{23} atoms. Atomic mass of element is 32.

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122. Calculate the number of atoms and volume of $1g$ helium gas at STP

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123. From $200mg$ of CO_2, 10^{21} molecules are removed. How many grams and moles of CO_2 are left?

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124. Weight of one atom an element is $6.44 \times 10^{23}g$. Calculate g atom of elements in $40kg$.

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125. How many g of S are required to produce 100 mol and $100g$ H_2SO_4 separately?

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126. Calculate the number of oxialic acid molecules in $100mL$ of $0.02N$ oxialic acid

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127. Hameoglobin contains 0.25% iron by weight. The molecular weight of hameglobin is 896000. Calculate the number of iron atom per molecules of haemoglobin.

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128. P and Q are two element that form P_2Q_3 and PQ_2. If 0.15 mole of P_2Q_3 weighs and 0.15 mole of PQ_2 weighs $9.3g$, what are the atomic weights of P and Q?

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129. A polystryrene, having formula $Br_3C_6H_2(C_8H_8)_n$, was perpared heating styrene with tribromobenzoyl peroxide in the absence of air. If it was found to contain 1.46% bromine by weight, find the value of n.

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

Watch Video Solution

131. 1.0 g of metal nitrate gave 0.86 g of metal sulphate. Calculate the equivalent weight of metal.

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132. $2g$ of a metal in H_2SO_4 gives $4.51g$ of the metal sulphate. The specific heat of metal is $0.057calg^{-1}$. Calculate the valency and atomic weight of metal.

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133. $1.878g$ of MBr_X when heated in a stream of HCl gas was comletely converted to chloride MCl_X which weighted $1.0g$ The specific heat of metal is $0.14calg^{-1}$. Calculate the molemular weight of the metal bromide.

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134. Find the milli equivalent of

a. $Ca(OH)_2 \text{in} 74g$

b. $NaOH \text{in} 20g$

c. $H_2SO_4 \text{in} 2.45g$

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135. Calculate the normality of $NaOH$ when $2g$ is present in $800mL$ solution.

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136. Calculate normality and molarity of the following:

a. $0.74g$ of $Ca(OH)_2$ in $5mL$ of solution ltbRgt b. $3.65g$ of HCl in $200mL$ of solution

c. $1/10$ mol of H_2SO_4 in $500mL$ of solution.

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137. Calculate the normality of the resultin solution made by adding 2 drops $(0.1mL)$ of $0.1NH_2SO_4$ in 1 litre of distilled water.

Watch Video Solution

138. What volume at STP at ammonia gas will be required to be passed into $30mL$ of NH_2SO_4 solution to bring down the acid normality to $0.2N$?

Watch Video Solution

139. Calculate the normality of mixture obtained by mixing

a. $100mLof0.1NHCl + 50mLof0.25NNaOH$

b. $100mLof0.2MH_2SO_4 + 200mLof0.2MHCl$

c. $100mLof0.2MH_2SO_4 + 100mLof0.2MNaOH$

d. $1g$ equivalent of $NaOH + 100mLof0.1NHCl$

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140. In what ratio should you mix $0.2MNaNO_3$ and $0.1MCa(NO_3)_2$ solution so that in resulting solution the concentration of -ve ion is 50 % greater than the concentration of + ve ions?

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141. What volume at water is requried to make $0.20N$ solution from $1600mL$ of $0.2050N$ solution?

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142. $20mLof0.2MAl_2(SO_4)_3$ mixed with $20mL$ of $0.6MBaCl_2$. Calculate the concentration of each ion in solution.

Watch Video Solution

143. How much $BaCl_2$ would be needed to make $250mL$ of a solution having same eoncentration of $Cl^{\oplus}$ as the one containing $3.78g$ of $NaCl$ per $100mL$.

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144. What is the normarlity and nature of a mixutre obtained by mixing $0.62g$ of $Na_2CO_3.\ H_2O$ to $100mL$ of $0.1NH_2SO_4$?

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145. A sample of H_2SO_4 (density $1.787gmL^{-1}$) si labelled as 86% by weight. What is the molarity of acid? What volume of acid has to be used to make $1L$ of $0.2MH_2SO_4$?

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146. Mole fraction of I_2 in C_6H_6 is 0.2. Calculate molality of I_2 in C_6H_6. $\left(MwofC_6H_6 = 78gmol^{-1}\right)$

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147. Calculate molality of 1 litre solution of 93% H_2SO_4 by volume. The density of solution is $1.84gmL^{-1}$.

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148. What is would be the molality of a solution obtained by mixing equal volumes of 30% by weight $H_2SO_4\left(d = 1.218gmL^{-1}\right)$ and 70% by weight $H_2SO_4\left(d = 1.610gmL^{-1}\right)$? If the resulting solution has density $1.425gmL^{-1}$, calculate its molality.

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149. To $50L$ of $0.2NNaOH$, $5L$ of $1NHCl$ and $15L$ of $0.1NFeCl_3$ solution are added. What weight of Fe_2O_3 can be obtained from the precipitate? Also report the nomality of $NaOH$ left in the resultant solution.

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150. The molecular mass of an organic acid was determind by the study of its barium salt. $4.290g$ of salt was converted to free acid by the reaction with $21.64mL$ of water of hydration per Ba^{2+} ion and the acid is monobasic. What is molecular weight of anhydrous acidgt

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151. $4.0g$ of $NaOH$ is contained in one decilitre of aqueous solution. Calculate the following in the solution (d of $NaOH$ solution $= 1.038gmL^{-1}$)

a. Mole fraction of $NaOH$

b. Molartiy of $NaOH$

c. Molality of $NaOH$

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152. Calculate the mass fraction and mole fraction of ethyl alcohol and H_2O in a solution containing $9.2g$ of alcohol in $18.0g$ of H_2O.

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153. A solution contains $410.3g$ H_2SO_4 per litre of the solution at $20^\circ C$. If the density $= 1.243gmL^{-1}$, what will be its molality and molarity?

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154. Concentrated HNO_3 is 69% by mass of nitric acid. Calculate the volume of the solution which contains $23g$ of HNO_3. (Density of concentrated HNO_3 solution is $1.41gml^{-1}$)

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155. Calculate the molality of a solution obtained by dissolving $15.87g$ ehtyl alcohol (C_2H_5OH) in $168g$ of H_2O.

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156. What volume of 95% H_2SO_4 by weight $\left(d = 1.85gmL^{-1}\right)$ and what mass of water must be taken to prepare $100mL$ of 15% solution of H_2SO_4 $\left(d = 1.10gmL^{-1}\right)$

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157. Calculated the molality of a sulphuric acid solution in which the mole fraction of water is 0.85.

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158. A bottle of commercial sulphuric acid $\left(d = 1.787 gmL^{-1}\right)$ is 86% by weight.

a. Whatis molarity of the acid?

b. What volume of the acid has to be used to make $1L$ of $0.2MH_2SO_4$?

c. What is the molality of the acid?

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159. A $6.90M$ solution of KOH contains 30% by weight of KOH. Calculate the density of the solution.

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160. 3.5 litre of $0.01MNaCl$ is mixed with 1.5 litre of $0.05MNaCl$. What is the concentration of the final solution?

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161. The density of 5% aqueous $MgCl_2$ solution is $1.043 gmL^{-1}$. What is the molarity and molaltiy of the solution? What is the molality of $Cl^{\ominus}$ ions? $(Mg = 24\text{amu})$

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

a. % by weight of $Na_2S_2O_3$

b. Mole fraction of $Na_2S_2O_3$

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

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163. The density of $0.06M$ solution of Kl in water is $1.006 gmL^{-1}$. Determine the molality of this solution $(K = 39, I = 127\text{amu})$

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164. $11.2g$ of carbon reacts with 21.1 litres of oxygen at $18^{\circ}C$ and $750mm$ of Hg. The cooled gases are passed through 2 litre of $2.5NNaOH$. Determine the concetration of $NaOH$ remaining in solution which is not converted to Na_2CO_3. Assume that CO does not react with $NaOH$:

a. Whatis the mole fraction of CO in the gases?

b. What is the concetration of $NaOH$ which is not converted to Na_2CO_3 in the remaining solution?

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165. $15mL1NH_2SO_4$, $25mL$ of $4NHNO_3$, and $20mL$ of $XMHCl$ were mixed and made up to $1000mL$. Prepared by dissolving $4.725g$ of pure $Ba(OH)_2.8H_2O$ in water made up to 0.25 litre. What is the molarity of HCl solution (i.e. find X)

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166. The acid solution has a specific gravity of 1.8, when it contains 62% by weight of the acid. The solution is diluted to such an extant this its specific gravity is lowered to 1.2. what is the % by weight of the acid new solution.

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167. A solution of KCl has a density of $1.69gmL^{-1}$ and is 67% by weight. Find the denisty of the solution if it is diluted so that the percentage by weight of KCl in the diluted solution is 30%`

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168. A gaseous hydrocarbon X, was burnt in excess of oygen. A $0.112dm^2$ sample of X, at STP gave $0.88g$ of CO_2. How many C-atoms

are there in one molecule of X?

a. 1 b. 2 c. 3 d. 4

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169. A mmonia is highly soluble gas in water and gives a alkaline solution of NH_4OH. What volume of NH_3 gas at STP will be required to the passed in $100mL$ of $0.5MH_2SO_4$ to bring down its strength to $0.25M$?

(For titrations with aqueous NH_3, it is assumed that NH_4OH dissociates to 100% extent)

a. 2.24 L b. 1.68 L c. 1.12 L d. 0.56 L`

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170. The equivalent weight of Na_2HPO_4 can be

a. $M/2$ as base b. $M/1$ as acid

c. Both (a) and (b) d. Neither (a) and (b)

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171. Arrange the following in order of increasing masses.

i. 1 molecules of oxygen ii. 1 atom of nitrogen

iii. 1 mol of water iv. 1×10^{-10} of iron

a. ii lt I lt iii lt iv b. ilt iilt ivlt iii

c. ii lt ilt ivlt iii d. iltiiltiiiltiv

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172. $10.1g$ of KNO_3 is dissolved in $500mL$ of H_2O. Mass of $Ba(NO_3)_2$ that should be added to this solution of get a molality (m) of 0.3 with respect to $NO_3^{\ominus}$ ion is

$(MwofKNO_3 = 101gmol^{-1}, MwofBa(No_3)_2 = 261gmol^{-1})$

a. $\approx 1.3g$ b. $\approx 13g$ c. $\approx 6.5g$ d. $\approx 65g$

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173. One litre of $N/2HCl$ solution was heated in a beaker. When the volume was reduced to $600mL$, $9.125g$ of HCl was lost out the new normality of solution is

a. ≈ 0.4

b. ≈ 0.8

c. ≈ 0.4 d. ≈ 0.2

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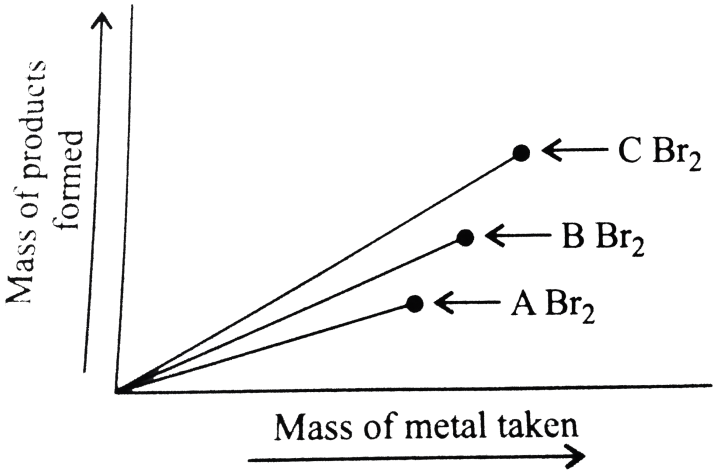
174. Three metals of alkaline earth metal group (A, B and C) When reacted with a fixed volume of liquid Br_2 separately gave a product (metal bromides) whose mass is plotted against the mass of metals taken as shown in the figure. From the plot, predict what relation can be concluded between the atomic weight of A, B and C

a. $C > B$

b. $B > A$,

$C < A < B$

Data is insufficient to predict



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175. The following chemical reactions used to be untilized to rapidly produce large amounts of N_2 gas inside an automobile air bag:

$2NaN_3 \rightarrow 2Na + 3N_2(g)$

$10Na + 2KNO_3 \rightarrow K_2 + 5Na_2O + N_2(g)$

$K_2O + Na_2O + SiO_2 \rightarrow$ Alkaline silicate (glass)

How many grams of KNO_3 are needed to produce enough N_2 to fill a $12.3L$ air baG AT $27^\circ C$ and 4 atm.

a. $202g$ b. $81.25g$

c. $404g$ d. $25.25g$

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Ex 1.1 Objective Questions

1. Objective question (only one correct).

I. Which of the following has least mass?

a. 1 mol of S b. 3×10^{23} atom of C

c. $2g$ atom of nitrogen d. $7.0gofAg$

ii. The simplest formula of a compound containing 50% of element A (atomic mass 10) and 50% of element B (atomic mass 20) is:

a. AB b. A_2B c. A_2B_3 d. AB_3

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2. A metal M of atomic weight 54.9 has a density of $7.42 g cm^{-3}$. Calculate the volume occupied and the radius of the atom of this metal assuming it to be sphere.

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3. Fil in the blanks

a. The mass of 1 molecule of water (H_2O) is .....

b. The number of molecules in $16g$ of sulphur dioxide (SO_2) are .....

c. The weight of one mole of sodium carbonate (Na_2CO_3) is.....

d. Moles and g equivalent in $196g$ of $Ca(OH)_2$ are ..... and .....

e. Moles and g equivalent in $196g$ of H_3PO_4 are ..... and .....

f. g atoms in $62g$ of P_4 are .....

f. g atoms in $24g$ of magnesium are.....

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4. Objective question .

i. A certains compound has the molecular formula X_4O_6. If $10gof X_4O_6$ has $5.72gX$, then atomic mass of X is:

a. 32 amu b. 42 amu c. 98 amu d. 37 amu

ii. For 109% labelled oleum, if the number of moles of H_2SO_4 and free SO_3 be p and q, respectively, then what will be the value of $\frac{p-q}{p+q}$

a. $1/9$ b. 9 c. 18 d. $1/3$

iii. Hydrogen peroxide in aqueous solution decomposes on warming to give oxygen according to the equation,

$2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$

Under conditions where 1 mol gas occupies $24dm^3$, $100cm^3$ of XM solution of H_2O_2 produces $3dm^3$ of O_2. Thus, X is

a. 2.5 b. 0.5 c. 0.25 d. 1

iv. $4g$ of sulphur is burnt to form SO_2 which is oxidised by Cl_2 water. The solution is then treated with $BaCl_2$ solution. The amount of $BaSO_4$ precipitated is:

a. 0.24 mol b. 0.5 mol

c. 1 mol d. 0.125 mol

v. A reaction occurs between 3 moles of H_2 and 1.5 moles of O_2 to give some amount of H_2O. The limiting reagent in this reaction is

a. H_2 and O_2 both b. O_2

c. H_2 d. Neither of them

vi. $4I^{\ominus} + Hg^{2+} \rightarrow HgO_4^-$, 1 mole each of Hg^{2+} and $I^{\ominus}$ will form:

a. 1 mol of HgI_4^{2-}

b. 0.5 mol of HgI_4^{-2}

0.25 mol of HgI_4^{2-}

2 mol of HgI_4^{-2}

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5. A $2.0g$ of mixture of Na_2CO_3 and $NaHCO_3$ loses $0.248g$ when heated to $300^\circ C$, the temperature at which $NaHCO_3$ decomposes to Na_2CO_3, CO_2, the temperature at which $NaHCO_3$ decomposes to Na_2CO_3, CO_3 and H_2O. What is the percentage of Na_2CO_3 in mixture?

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6. Fill in the blanks.

a. The equivalent weight of $NaHCO_3$ is .....and of SO_2 is .....

b. 2 mol of 50% pure $Ca(HCO_3)_2$ on heating forms 1 mol of CO_2. The % yield of CO_2 is .....

c. $5g$ of K_2SO_4 was dissolved in $250mL$ of solution. The volume of this solution that should be used so that $1.2g$ of $BaSO_4$ be precipitated fromk $BaCl_2$ is ..... (molecular mass of $K_2SO_4 = 174$ and $BaSO_4 = 233$)

d. The residue obtained on strongly heating $2.76gAg_2CO_3$ is .....

$$\left[Ag_2CO_3 \xrightarrow{\Delta} Ag + CO_2 + O_2\right]$$

Atomic mass of $Ag = 108$

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Ex 1.1 Objective Questions (Single Correct)

1. Objective question (single correct answer).

i. The molarity of a aqueous solution of glucose $(C_6H_{12}O_6)$ is 0.01 To $200mL$ of the solution, which of the following should be carried out to make it $0.02M$?

I. Evaporate $50mL$ of solution

III. Add $0.180g$ of glucose and then evaporate $50mL$ of solution

III. Add $50mL$ of water

The correct option is:

a. I b. III c. II d. I, II, III

ii. The atomic mass of Cu is 63.546. There are only two naturally occuring isotopes of copper Cu^{63} and Cu^{65}. The percentage of natural abundance of Cu^{63} in nearly

a. 30 b. 10 c. 50 d. 73

iii. An aqueous solution of urea (NH_2COHN_2) is 3.0 molal. The mole fraction of urea is

a. 0.33 b. 0.25 c. 0.66 d. 0.05

iv $0.2MH_2SO_4$ $(1mL)$ is diluted to 1000 times of its initial volume. the final normality of H_2SO_4 is:

a. 2×10^{-3} b. 2×10^{-4} c. 4×10^{-4} d. 2×10^{-2}

v. Which of the following question are dependant on temperature?

a. Molarlity b. Normality c. Mole fraction d. Molality

vi. A sample of H_2SO_4 density $1.85mL^{-1}$ is 90% by weight. What is the volume of the acid that has to be used to make $1L$ f $0.2MH_2SO_4$?

a. $16mL$ b. $18mL$ c. $12mL$ d. $10mL$

vii. The hydrated salt $Na_2SO_4.nH_2O$ undergoes 55.9% loss in weight on heating and becomes anhydrous. The value of n will be

a. 5 b. 7 c. 3 d. 10

viii. 0.2 mol of HCl and 0.1 mol of barium chloride is dissolved in water to produce a $500mL$ solution. The molarity of $Cl^{\ominus}$ is.

a. $0.06M$ b. $0.12M$ c. $0.09M$ d. $0.80M$

ix. The density of $1M$ solution of $NaCl$ is $1.055gmL^{-1}$. The molality of the solutions is.

a. 1.0585 b. 1.00 c. 0.0585 d. 0.10

x. Hydrochloric acid solution A and B have concentration of $0.5N$, and $0.1N$, respectively. The volume of solutions A and B required to make $2L$ of $0.2N$ hydrochloric acid are

a. $0.5LofA + 1.5ofB$

b. $1.0LofA + 1.0LofB$

c. $0.75LofA + 1.25LofB$

d. $1.5LofA + 0.5LofB$

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2. The molality of $1M$ solution of sodium nitrate is $0.858molkg^{-1}$. Determine the density of the solution. How much $BaCl_2$ would needed to make $250L$ of a solution having same concetration of $Cl^{\ominus}$ as the one containing $3.78g$ of $NaCl$ per $100mL$?

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3. $49g$ of H_2SO_4 is disslved in enough water to make one litre of a soltuion of density $1.049gcc^{-1}$. Find the molarity, normality, moality, and mole fraction of H_2SO_4 in the solution.

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Ex 1.1 Fill In The Blanks

1. Fill in the blanks. ltbRgt a. The mass of $MgCL_2$ should be dissolved in $750g$ of water in order to prepare a $1.05m$ solution is.....

b. The percentage composition (by mass) and mole fraction of each component is sugar containing $1000g$ of sugar in $2000g$ of water is.....

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Ex 1.2 Objective Question (Single Correct)

1. Objective question (single correct answer).

i. H_3PO_4 is a tribasic acid and one of its salt is NaH_2PO_4. What volume of $1MNaOH$ solution should be added to $12g$ of NaH_2PO_4 to convert in into Na_3PO_4 ?

a. $100mL$ b. 2 mol of $Ca(OH)_2$ c. Both d. None

iii. The normality of a mixture obtained mixing $100mL$ of $0.2mH_2SO_4$ with $100mL$ of $0.2MNaOH$ is:

a. $0.05N$ b. $0.1N$ c. $0.15N$ d. $0.2N$

iv $100mL$ solution of $0.1NHCl$ was titrated with $0.2N$ $NaOH$ solutions. The titration was discontinued after adding $30mL$ of $NaOH$ solution. The reamining titration was completed by adding $0.25NKOH$ solution. The volume of KOH required from completing the titration is:

a. $70mL$ b. $35mL$ c. $32mL$ d. $16mL$

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2. $4.0g$ of a mixture of $Nacl$ and Na_2CO_3 was dissolved in water and volume made up to $250mL$. $25mL$ of this solution required $50mL$ of $N/10HCl$ for complete neutralisation. Calculate the percentage composition of the original mixture.

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3. $500mL$ fo $2MHCl$, $100mL$ of $2MH_2SO_4$, and one gram equivalent of a monoacidic alkali are mixed together. $30mL$ of this solution requried $20mL$ of $143g$ $Na_2CO_3.xH_2O$ in one litre solution. Calculate the water of crystallisation of $Na_2CO_3.xH_2O$

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Ex 1.2 Fill In The Blanks

1. Fill in the blanks.

a. $2.24L$ ammonia at STP neutralised $100mL$ of a solution of H_2SO_4. The molarity of acid is.....

b. The equivalent weight of a metal carbonate $0.84g$ of which reacts exactly with $40mL$ of $N/2H_2SO_4$ is .....

c. $1.575g$, of hydrated oxalic acid $(COOH)_2.nH_2O$ is dissolved in water and the solution is made to $250mL$ On titration, $16.68mL$ of this solution is required for neutralisation of $25mL$ of $N/15NaOH$. The

value of water crystallisation, i.e., n, is.....

d. $1mL$ of H_3PO_4 was diluted to $250mL$. $25mL$ this solution requried $40.0mL$ of $0.10NNaOH$ for neutralisation using phenolphthanlen as indicator. The specific gravity of acid is.....

The density of 1.48 mass percent calcium hydroxide solution is $1.25gmL^{-1}$. The volume of $0.1MHCl$ solution required to neutralise $25mL$ of this solution is.....

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Exercises Subjective (Laws Of Chemical Combination)

1. $10mL$ of hydrogen combine with $5mL$ of oxygen to yield water. When 200 mL of hydrogen at N.T.P. are passed over heated CuO, the latter loses $0.144g$ of its mass. Do these results agree with the law of constant composition ?

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2. Common salt obtained from Clifton beach contained 6.75% chlorime while $6.40g$ of a sample of common salt from Khewra mine contained $3.888g$ of chlorine. Show that these data are in accordance with the law of constant composition.

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3. $3.2g$ sulphur combines with $3.2g$ of oxygen, to from a compound in one set of conditions. In another set of conditions $0.8g$ of sulphur combines with $1.2g$ of oxygen to form another compound. State the law illustrated by these chemical combinations.

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4. $1g$ of oxygen combines with $0.1260g$ of hydrogen to form H_2O. $1g$ of nitrogen combines with $0.2160g$ of hydrogen to form NH_3. Predict the

weight of oxygen required to combine with $1g$ of nitrogen to form an oxide.

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5. KCL contains 52 % of potassium, Kl contains 23.6% of potassium, and ICI contains 77.8% of iodine. Show that the above data is in agreement with the law of reciprocal proportions.

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6. What weight of sodium chloride would be decomposed by $4.9g$ of sulphric acid, if $6g$ of sodium bisulphate $(NaHSO_4)$ and $1.825g$ of hydrogen chloride were produced in the reaction and the law of conservation of mass is true?

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7. If the law of constant compositon is true, what weights of calcium carbon, and oxygen are present in $1.5g$ of calcium carbonate, if a sample of calcium carbonate from another source contains the following percentage composition: $Ca = 40.0\,\%$, $C = 12.0\,\%$, and $O = 48.0\,\%$?

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8. An element forms two oxides containing, 50% & 40% of oxygen respectively by weight of the element. Does these oxides illustrate the law of multiple proportions :-

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9. Elements A and B combine to form three different compounds:

$0.3gofA + 0.4gofB \rightarrow 0.7g$ of compound X

$18.0gofA + 48.0gofB \rightarrow 66.0g$ of compound Y

$40.0gofA + 159.99gofB \rightarrow 199.99g$ of compound Z

Show that the law of multiple proportions is illustrated by the data given above.

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10. An impure sample of sodium chloride that weighed $0.50g$ gave $0.90g$ of silver choride as precipitate on treatment with excess of silver nitrate solution. Calculate the percentage purity of the sample.

Watch Video Solution

11. How much magnesium sulphide can be obtained from $2.00g$ of Mg and $2.00g$ of S by the reaction.

$Mg + S \rightarrow MgS$. Which is the limiting reagent? Calculate the amount of one of the reactants which remains unreacted?

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12. $1.00g$ of a hydrated salt contains $0.2014g$ of iron, $0.1153g$ fo sulphur, $0.2301g$ of oxygen and $0.4532g$ of water of crystallisation. Find its empirical formula. $(Fe = 56, S = 32, O = 16)$

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13. A compound on analysis gave the following percentage composition by weight: hydrogen = 9.09, oxygen = 36.36 carbon = 54.55

Its VD is 44. Find the molecular formula of the compound.

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Exercises Subjective (Limiting Reagent)

1. An inorganic substance has the following composition:

$N = 35\,\%\, H = 5\,\%\,, O = 60\,\%$

On being heated, it yielded a gaseous compound containing

$N = 63.63\,\%$ and $O = 36.37\,\%$. Suggest a formula for each substance and equation for the chemical change.

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2. A compound of carbon, hydrogen, and nitrogen contains the three elements in the respective ratio of $9:1:3.5$ Calculculate the empirical formula. If the molecular weight of the compound is 108, what its molecular formula?

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Exercises Subjective (Empirical And Molecular Formulae)

1. Carbohydrates are compounds containing only carbon, hydrogen and oxygen having the atomic ratio of $H:O$ as $2:1$. When heated in the absence of air, these compounds decompose to form carbon and water. a. If $310g$ of a carbohydrates leaves a residue of $124g$ of carbon on

heating in absence of air, whatis the empirical formula of the carbohydrate?

If 0.0833 mole of hte carbohydrate contains $1.0g$ hydrogen , what is the molecular formula of the carbohydrate?

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2. $0.45g$ of an orgainc compound containing only C, H and N on combustion gave $1.1g$ of CO_2 and $0.3g$ of H_2O. What is the percentage of C, H and N in the orgainc compound.

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3. A pure sample of cobalt chloride weighting $1.30g$ was found to contains $0.59g$ cobalt and $0.71g$ chloride on quantitative analysis. What is the percentage composition of cobalt chloride?

Watch Video Solution

4. Glucose is a physiological sugar. What is the mass% C mass% H and mass% O in glucose $(C_6H_{12}O_6)$?

Watch Video Solution

Exercises Subjective (Avogadros Hypothesis And Mole Concept)

1. Find the weight of $NaOH$ in its 50 milli equivalents.

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2. Find the normality of H_2SO_4 having 50 milli equivalents in 2 litres.

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3. Find the weight of H_2SO_4 in $1200mL$ of a solution of $0.2N$ strength.

Watch Video Solution

4. What weight of Na_2CO_3 of 93% purity would be required to neutralise $45.6mL$ of $0.235N$ acid?

Watch Video Solution

5. What is the strength in gram per litre of a solution of H_2SO_4, $12mL$ of which neutralised by $15mL$ of $N/10$ $NaOH$ solution?

Watch Video Solution

6. Two litre of NH_3 at $30^\circ C$ and 0.20 atmosphere is neutralised by $134mL$ of a solution of H_2SO_4. Calculate the normality of H_2SO_4.

Watch Video Solution

7. $1g$ of calcium was burnt in excess of O_2 and the oxide was dissolved in water to make up $1L$ solution. Calculate the normality of alkaline soluiton.

Watch Video Solution

8. calculate the amount of KOH requried to neutralise 15 mEq of the following:

a. HCl b. $KHSO_4$ c. N_2O_5 d. CO_2

Watch Video Solution

9. What volume of a solution of hydrochloric acid containing $73g$ acid per litre would suffice for the exact neutralisation of sodium hydroxide obtained by allowing $0.46g$ of metallic sodium to act upon water.

Watch Video Solution

10. Find out the equivalent weight of H_3PO_4 in the reaction:

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

Watch Video Solution

11. What weight of $AgCl$ will be precipitated when a solution containing $4.77gNaCl$ is added to a solution of $5.77g$ of $AgNO_3$.

Watch Video Solution

Exercises Subjective (Mole Concept In Solution)

1. A sample of an alloy weighing $0.50g$ and containing 90% Ag was dissolved in concentrated HNO_3. Ag was analysed by volhard method in which $25mL$ of $KCNS$ was required for complete neutralisation. Determine the normality of $KCNS$.

Watch Video Solution

2. HNO_3 used as a reagent has specific gravity of $1.42gmL^{-1}$ and contains 70% by strength HNO_3. Calcualte:

a. Normality of acid

b. volume of acid the contains $63g$ pure acid

c. volume of water required to make $1N$ solution fromk $2mL$ concentration HNO_3.

Watch Video Solution

3. Find the molality fo H_2SO_4 solution whose specific gravity is $1.98gmL^{-1}$ and 98% (Weight/volume) H_2SO_4.

Watch Video Solution

4. A piece of Al wieghing $2.7g$ is titrated with $75.0mL$ of H_2SO_4 (specific gravity $1.8mL^{-1}$ and 24.7% H_2SO_4 by weight). After the

metal is completely dissolved, the solution is diluted to $400mL$. Calculate the molarity of free H_2SO_4 solution.

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5. A $10mL$ sample of human urine was found to have $5mg$ of urea on analysis. Calculate the molarity of the given sample w.r.t. urea. (molecular mass of urea = 60)

Watch Video Solution

6. Calcualate the molarity and molality of 20% aqueous ehtanol (C_5H_5OH) solution by volume. (density of solution $= 0.96gmL^{-1}$)

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7. If $4gNaOH$ are dissolved in $100mL$ of aqueous solution, what will be the differnce in its normality and molarity?

Watch Video Solution

8. An aqueous fo diabasic acid (molecular mass = 118) containing $35.4g$ of acid per litre of the solution has density $1.0077gmL^{-1}$.

Express the concentration in as many ways as you can?

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9. A solution contains 2.80 moles of acetone $(CH_3COCH)_3)$ and 8.20 mole of $CHCl_3$. Calculate the mole fraction of acetone.

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10. The percentage composition (by weight) of a solution is $45\,\%\,X$, $15\,\%\,Y$, and $40\,\%\,Z$. Calculate the mole fraction of each component of the solution. (Molecular mass of $X = 18$, $Y = 60$, and $Z = 60$)

Watch Video Solution

Exercises Linked Comprehension

1. A sample of urine containing $0.3g$ of urea was treated with an excess of $0.2M$ nitrous acid, according to the equation.

$NH_2CONH_2 + 2HNO_2 \rightarrow CO_2 + 2N_2 + 2H_2O$

The gass produced passed through aqueous KOH solution and the final valume is measured.

(Given, $Mw_{\text{urea}} = 60gmol^{-1}$, molar volume of gas at standard condition, i.e., at room temperature $25^\circ C$ and 1 atm pressure. RTP

(room temperature pressure) also is $24.4L$ or $24400mLmol^{-1}$)

What is the volume at RTP?

A. $122mL$

B. $244mL$

C. $366mL$

D. $488mL$

Answer: B

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2. A sample of urine containing $0.3g$ of urea was treated with an excess of $0.2M$ nitrous acid, according to the equation.

$NH_2CONH_2 + 2HNO_2 \rightarrow CO_2 + 2N_2 + 2H_2O$

The gass produced passed through aqueous KOH solution and the final valume is measured.

(Given, $Mw_{\text{urea}} = 60gmol^{-1}$, molar volume of gas at standard

condition, i.e., at room temperature $25^{\circ}C$ and 1 atm pressure. RTP (room temperature pressure) also is $24.4L$ or $24400mLmol^{-1}$)

What is the volume of HNO_2 consumed by urea?

A. $12.5mL$

B. $25mL$

C. $50mL$

D. $75mL$

Answer: C

Watch Video Solution

3. Fluoro carbon polymers can be made by fluorinationg polythene.

(i) $(CH_2)_n + 4nCoF_3 \rightarrow (CF_2)_n + 2nHF + 4nCoF_2$

Where n is large integer. The CoF_3 can be regenarted by the above reaction.

(ii) $2CoF_2 + F_2 \rightarrow 2CoF_3$

If the HF formed in reactionn (i) cannot be reused, calculate the weight of F_2 consumed by $1.0g$ of $(CF_2)_n$ produced.

A. $2.0g$

B. $2.52g$

C. $1.52g$

D. $3.0g$

Answer: C

Watch Video Solution

4. Fluoro carbon polymers can be made by fluorinationg polythene.

(i) $(CH_2)_n + 4nCoF_3 \rightarrow (CF_2)_n + 2nHF + 4nCoF_2$

Where n is large integer. The CoF_3 can be regenarted by the above reaction.

(ii) $2CoF_2 + F_2 \rightarrow 2CoF_3$

If HF can be recovered and electrolyzed to H_2 and if F_2, is used for

regenerating CoF_3, what is the net consuption of F_2 for $1.0g$ of $(CF_2)_n$.

A. $1.0g$

B. $1.26g$

C. $0.76g$

D. $1.5g$

Answer: C

Watch Video Solution

5. Consider the following series of reaction:

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

$3NaClO \rightarrow 2NaCl + NaClO_3.$

$4NaClO_3 \rightarrow 3NaClO_4 + NaCl$

How much Cl_2 is needed to prepare $122.5gNaClO_4$ by above sequence?

A. $284.0g$

B. $213.0g$

C. $142.0g$

D. $71.0g$

Answer: A

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6. How much Cl_2 in needed to prepare $106.5g$of $NaClO_3$ by the above sequence?

A. $284.0g$

B. $213.0g$

C. $142.0g$

D. $71.0g$

Answer: B

Watch Video Solution

7. One of the reactions used in the petroleum industry for improving octance number of fuels is

$C_7H_{14} \rightarrow C_7H_8 + 3H_2$

The two hydrocarbons C_7H_{14} and C_7H_8 are liquid, H_2 formed is gas. Whatis the percentage reduction in liquid weight accompanying the completion of the above reaction?

A. $\approx 1\,\%$

B. $\approx 3\,\%$

C. $\approx 5\,\%$

D. $\approx 6\,\%$

Answer: D

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8. In aviation gasoline of 100 octane number, $1.0mL$ of tetraethy lead (TEL), $(C_2H_5)_4Pb$, of density $1.615gmL^{-1}$, per litre is added to the product. TEL is prepared as follows:

$4C_2H_5Cl + 4Na(Pb) \rightarrow (C_2H_5)_4Pb + 4NaCl + 3Pb$

Calculate the amount of C_2H_5Cl required to make enough TEL for $1.0L$ of gasoline.

A. $0.645g$

B. $1.29g$

C. $1.935g$

D. $2.58g$

Answer: B

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9. The percentage labelling (mixture of H_2SO_4 and SO_3) refers to the total mass of pure H_2SO_4. The total amount of H_2SO_4 found after adding calculated amount of water to $100g$ oleum is the percentage labelling of oleum. The higher the percentage lebeling of oleum higher is the amount of free SO_3 in the oleum sample.

What is the amount of free SO_3 in an oleum sample labelled as '118%'.

A. 0.4

B. 0.5

C. 0.7

D. 0.8

Answer: D

Watch Video Solution

10. The percentage labelling (mixture of H_2SO_4 and SO_3) refers to the total mass of pure H_2SO_4. The total amount of H_2SO_4 found after adding calculated amount of water to $100g$ oleum is the percentage labelling of oleum. The higher the percentage lebeling of oleum higher is the amount of free SO_3 in the oleum sample.

The percent free SO_3 is an oleum is 20%. Label the sample of oleum in terms of percent H_2SO_4.

A. 1.135

B. 1.045

C. 1.0675

D. 1.2

Answer: B

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11. The percentage labelling (mixture of H_2SO_4 and SO_3) refers to the total mass of pure H_2SO_4. The total amount of H_2SO_4 found after adding calculated amount of water to $100g$ oleum is the percentage labelling of oleum. The higher the percentage lebeling of oleum higher is the amount of free SO_3 in the oleum sample.

$100g$ sample of '149%' oleum was taken and calculated amount of H_2O was added to make $H_2SO_4.500mL$ solution of $xMKOH$ solution is required to neutralize the solution. The value of x is.

A. $1M$

B. $2M$

C. $4M$

D. $6M$

Answer: D

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12. Cisplation is used an anticancer agent for the treatment of solid tumors, and its prepared as follows:

$$\underset{\substack{\text{Potassium tetra}\\\text{Chloro platinate}}}{K_2[PtCl_4]} + 2NH_3 \rightarrow \underset{\text{Ciplatin}}{\left[Pt(NH_3)_2Cl_2\right]} + 2KCl$$

Given $83.0g$ of $K_2[PtCl_4]$ is used with $83.0g$ of NH_3.

Atomic weights: $K = 39$, $Pt = 415$, $Cl = 35.5N = 14]$

Which reactant is the limiting reagent and which is in excess?

A. $K_2[PtCl_4]$ NH_3

B. NH_3 $K_2[PtCl_4]$

C. None None

D. Both Both

Answer: A

Watch Video Solution

13. Cisplation is used an anticancer agent for the treatment of solid tumors, and its prepared as follows:

$$\underset{\text{Potassium tetra Chloro platinate}}{K_2[PtCl_4]} + 2NH_3 \rightarrow \underset{\text{Ciplatin}}{[Pt(NH_3)_2Cl_2]} + 2KCl$$

Given $83.0g$ of $K_2[PtCl_4]$ is used with $83.0g$ of NH_3.

Atomic weights: $K = 39$, $Pt = 415$, $Cl = 35.5N = 14]$

The number of mol of $K_2[PtCl_4]$ and NH_3 used, respectively, are

A. 0.1,0.2

B. 0.2,0.04

C. 0.3,0.6

D. 0.03,0.06

Answer: B

Watch Video Solution

14. Cisplation is used an anticancer agent for the treatment of solid tumors, and its prepared as follows:

$$\underset{\substack{\text{Potassium tetra}\\\text{Chloro platinate}}}{K_2[PtCl_4]} + 2NH_3 \rightarrow \underset{\text{Ciplatin}}{[Pt(NH_3)_2Cl_2]} + 2KCl$$

Given $83.0g$ of $K_2[PtCl_4]$ is used with $83.0g$ of NH_3.

Atomic weights: $K = 39$, $Pt = 415$, $Cl = 35.5N = 14]$

The number of mol of excess reactant is

A. 4.68

B. 4.78

C. 4.58

D. 4.48

Answer: D

Watch Video Solution

15. Iodine can be prepared by the following reactions.

$2NaIO_3 + 5NaSO_3 \rightarrow 2NaSO_4 + 2Na_2SO_4 + H_2O + I_2$

How much $NaIO_3$ is reuired to produce $127g$ is I_2?

A. $1.98kg$

B. $3.96kg$

C. $5.94kg$

D. $0.99kg$

Answer: A

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16. Iodine can be prepared by the following reactions.

$2NaIO_3 + 5NaSO_3 \rightarrow 2NaSO_4 + 2Na_2SO_4 + H_2O + I_2$

How much $NaHSO_3$ is required to produce $381g$ of I_2?

A. $156.0g$

B. $390.0g$

C. $520.0g$

D. `780.0 g

Answer: D

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17. When phosphours (P_4) is heated in limited amount of O_2. P_4O_6 (tetraphosphorous hexaoxide) is obtained, and in excess of O_2, P_4O_{10} (tetraphosphours decaoxide) is obtained.

i. $P + 3O_2 \rightarrow P_4O_6$, ii. $P_4 + 5O_2 \rightarrow P_4O_{10}$

What mass of P_4O_6 will be produced by the combustion of $2.0g$ of P_4 with $2.0g$ of O_2.

A. 0.0145 mol

B. 0.0072 mol

C. 0.029

D. 0.0048

Answer: B

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18. What mass of P_4O_{10} will be produced by the combustion of $2.0g$ of P_4 with $2.0g$ of O_2

A. $1.04g$

B. $0.52g$

C. $2.04g$

D. $3.04g$

Answer: C

Watch Video Solution

19. When phosphours (P_4) is heated in limited amount of O_2. P_4O_6 (tetraphosphorous hexaoxide) is obtained, and in excess of O_2, P_4O_{10} (tetraphosphours decaoxide) is obtained.

i. $P + 3O_2 \rightarrow P_4O_6$, ii. $P_4 + 5O_2 \rightarrow P_4O_{10}$

How many moles of O_2 left unreacted initiallyin reaction (i) ?

A. 0.0145 mol

B. 0.072 mol

C. 0.029 mol

D. 0.0048 mol

Answer: A

Watch Video Solution

20. Copper (Cu) and (Zn) react differently with HNO_3 as follows:

$Cu + 4H^{\oplus}(aq) + 2NO_3^{\ominus}(aq) \rightarrow 2NO_2(g)_C u^{2+} + 2H_2O$

$4Zn + 10H^{\oplus}(aq) + 2NO_3^{\ominus}(aq) \rightarrow NH_4^{\oplus} + 4Zn^{2+} + 3H_2O$

What volume of $2.0MHNO_3$ would react with $10.0g$ of a brass $(90.\ \%\ Cu, 10.0\ \%\ Zn)$ according to the above equation?

A. $\approx 100mL$

B. $\approx 150mL$

C. $\approx 200mL$

D. $\approx 300mL$

Answer: D

Watch Video Solution

21. Copper (Cu) and (Zn) react differently with HNO_3 as follows:

$Cu + 4H^{\oplus}(aq) + 2NO_3^{\ominus}(aq) \rightarrow 2NO_2(g)_Cu^{2+} + 2H_2O$

$4Zn + 10H^{\oplus}(aq) + 2NO_3^{\ominus}(aq) \rightarrow NH_4^{\oplus} + 4Zn^{2+} + 3H_2O$

What volume of NO_2 gas at $27^{\circ}C$ and 1.0 atm pressure would be produced?

A. $6.97L$

B. $5.97L$

C. $4.97L$

D. $3.97L$

Answer: A

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22. In coal, pyrites (FeS_2) is present as a pollution-causing impurity, which is removed by combustion.

$2FeS_2 + 5O_2 \rightarrow 4SO_2 + 2FeO.$

Calculate the moles of SO_2 produced by burning 1.0metric ton $\left(10^3 kg\right)$ of coal containing 0.05% by mass of pyrites impurity?

A. $8.32mol$

B. $4.16mol$

C. $12.48mol$

D. $2.08mol$

Answer: A

Watch Video Solution

23. In coal, pyrites (FeS_2) is present as a pollution-causing impurity, which is removed by combustion.

$2FeS_2 + 5O_2 \rightarrow 4SO_2 + 2FeO.$

What volume of $3.0MKOH$ would be required to react with the SO_2 produced in

A. $2.77L$

B. $5.54L$

C. $1.38L$

D. $8.31L$

Answer: B

Watch Video Solution

24. In coal, pyrites (FeS_2) is present as a pollution-causing impurity, which is removed by combustion.

$2FeS_2 + 5O_2 \rightarrow 4SO_2 + 2FeO.$

A process designed to remove orgainc sulphur from coal prior to combustion involves the reaction.

$X - S - Y + 2NaOH \rightarrow X - O - Y + Na_2S + H_2O$

$CaCO_3 \rightarrow CaO + CO_2$

$Na_2S + CO_2 + H_2O \rightarrow Na_2CO_3 + H_2S$

$CaO + H_2O \rightarrow Ca(OH)_2$

$Na_2CO_3 + Ca(OH)_2 \rightarrow CaCO_3 + 2NaOH$

In the processing in 320 metric tons of a coal having 1.0% sulphur content, how much limestone $(CaCO_3)$ must be edecomposed to provied enough $Ca(OH)_2$ to regenerate the $NaOH$ used in the original leaching step?

A. 2.0 metric ton

B. 4.0 metric ton

C. 8.0 metric ton

D. 10.0 metric ton

Answer: D

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25. In coal, pyrites (FeS_2) is present as a pollution-causing impurity, which is removed by combustion.

$2FeS_2 + 5O_2 \rightarrow 4SO_2 + 2FeO.$

What mass of H_2SO_4 can be prepared from $3.0g$ of Cu_2S if each atom of S in Cu_2S is converted into 1 molecule of H_2SO_4?

A. $1.85g$

B. $68.62g$

C. $3.85g$

D. $4.85g$

Answer: A

Watch Video Solution

26. Salt cake (Na_2SO_4) is prepared as follows:

$2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$

How much salt cake could be produced from $100.0g$ of 90% pure saltin the above reaction?

A. $109.8g$

B. $54.9g$

C. $36.6g$

D. $209.8g$

Answer: A

Watch Video Solution

27. Salt cake (Na_2SO_4) is prepared as follows:

$2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$

How much 80% pure salt cake could be produced form $100.0g$ of 90% pure salt in the above reaction?

A. $43.92g$

B. $68.62g$

C. $87.84g$

D. $137.25g$

Answer: D

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28. A mixture of a mol of C_3H_8 and b mol of C_2H_4 was kept is a container of VL exerts a pressure of 4.93 atm at temperature T. Mixture was burnt in presence of O_2 to convert C_3H_8 and C_2H_4 into CO_2 in the container at the same temperature. The pressure of gases after the reaction and attaining the thermal equilirium with atomsphere at temperature T was found to be 11.08 atm.

The moles fraction of C_3H_8 in the mixture is

A. 0.25

B. 0.75

C. 0.45

D. 0.55

Answer: A

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29. A mixture of a mol of C_3H_8 and b mol of C_2H_4 was kept is a container of VL exerts a pressure of 4.93 atm at temperature T. Mixture was burnt in presence of O_2 to convert C_3H_8 and C_2H_4 into CO_2 in the container at the same temperature. The pressure of gases after the reaction and attaining the thermal equilirium with atomsphere at temperature T was found to be 11.08 atm.

The mole fraction of C_2H_4 in the mixture is

A. 0.25

B. 0.75

C. 0.45

D. 0.55

Answer: B

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30. A mixture of a mol of C_3H_8 and b mol of C_2H_4 was kept is a container of VL exerts a pressure of 4.93 atm at temperature T. Mixture was burnt in presence of O_2 to convert C_3H_8 and C_2H_4 into CO_2 in the container at the same temperature. The pressure of gases after the reaction and attaining the thermal equilirium with atomsphere at temperature T was found to be 11.08 atm.

The moles of O_2 needed for combustion at temperature T is equal to

A. $14a$

B. $14b$

C. $15a$

D. $12b$

Answer: A

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Exercises Multiple Correct (Laws Of Chemical Combination)

1. Which of the statement are correct?

A. Physical quantity represented by work in joule is kgm^2s^{-2}

B. physical quantity represented by force in newton is kgm^2S^{-1}

C. physical quantity represented by work in joule is $kgms^{-2}$

D. Physical quantity represented by fore in newton is kgm^2s^{-2}

Answer: A::B

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2. Which of the statements are false?

A. Physical quantity represented by volume is dm^3

B. The length of pencil is 5cms.

C. The work done by a system is 5 Joules.

D. Air sometimes is considered as a hetrogeneous mixture due to the presence of dust particles which form a separate phase.

Answer: B::C

View Text Solution

3. Which of the statement are true?

A. Law of constant compositon is true for all types of compounds.

B. Molar volume of a gas at standard conditions is $22.4L$.

C. vapour density of a gas is twice of its molecula mass.

D. Atomic masses of most elements are fractional.

Answer: D

View Text Solution

4. Which of the statement are true?

A. The equivalent weight of $Ca_3(PO_4)_2$ is $Mw/6$.

B. The equivalent weight of $Na_3PO_4.12H_2O$ is $Mw/3$.

C. The equivalent weight of K_2SO_4 is $Mw/2$.

D. The equivalent weight of potas alum $K_2SO_4Al_2(SO_4)_3.24H_2O$ is $Mw/8$

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

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5. Which of the statement are ture?

A. Brass is an elements

B. Dry ice is a mixture

C. Aerated drink, e.g., coca cola, is a mixture.

D. Diesel is a mixture

Answer: C::D

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6. Two bulbs A and B contains $16gO_2$ and $16gO_3$, respectively. Which of the statements are ture?

A. Both bulbs contains same number of atoms.

B. Both bulbs contains different number of atoms.

C. Both bulbs contain same number of molecules.

D. Bulb A contains $N_A/2$ molecules while bulb B contains $N_A/3$ molecules. (N_A = Avogadro's number).

Answer: A::D

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7. A bulb contains $1.6g$ of O_2 contains.

A. 0.05 mol of O_2

B. 3.011×10^{22} molecules of O_2

C. $1.12L$ of O_2 at STP

D. $1.22L$ of O_2 at STP

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

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8. Which of the following have same significant figures?

A. 0.07

B. 0.7

C. 7

D. 70

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

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9. Which of the following have same significant figures?

A. 6.02×10^{23}

B. 7.70×10^{-20}

C. 7.50

D. 0.75

Answer: A::B::C

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10. Which of following relations are correct?

A. $1eV = 9.11 \times 10^{-4} J$

B. $1L = 1dm^3$

C. $1J = 1.98\text{cal}$

D. 1 atm $= 1.01325$ bar

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

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11. Which of the following statements are correct?

A. French chemist A. Lavoisier is called th father of chemistry and proposed the law of conservation of mass.

B. French chemist joseph proust proposed the law of definite proportions

C. Dalton proposed the law of multiple proportion.

D. Richter proposed the law of reciprocal proportions.

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

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12. Whichof the statement are ture about the law of chemical combination?

A. Potassium combines with two isotopes of chlorine $.^{35}Cl$ and $.^{37}Cl$) to form two samples of KCl. Their formation follows the law of definite composition.

B. Different proportion of oxygen in the varius oxidies of sulphur prove the law of multiple proportiens.

C. H_2O and H_2S contains $11.11\,\%$ hydrogen and $5.88\,\%$ hydrogen, respectively, whereas SO_2 contains 50% sulphur. The above data prove the law of reciprocal proportions.

D. In the decomposition of NH_3, $2NH_3 \xrightarrow{\Delta} N_2 + 3H_2$, the ratio of volumes of NH_3, N_2 and H_2 is $2:1:3$ The above data proves the Gay Lussac law.

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

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13. Which of the following statements are wrongs?

A. $1.6g$ of a hydrocarbon on combustion in excess of oxygen produces 1.2 of CO_2 and 0.4 of H_2O. The data illustrates the law of conservation of mass.

B. The product of atomic mass and specific heat of any element is a constant and is approximately 6.4. Thus is known as Dulong Petit's law.

C. The atomic masses of any elements is fractional because they are mixtures of allotropes.

D. The best standard of atomic mass is hydrogen - 1.008`

Answer: C::D

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14. Which of the following pair of compounds illustrate the law of multiple proportions?

A. SO_2 and SO_3

B. NO_2 and N_2O

C. MgO and $Mg(OH)_2$

D. NO and N_2O_5

Answer: A::B::D

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15. Which of the following statements are correct?

A. A sample of $CaCO_3$ contains $Ca = 40\,\%$, C = 12%, and $O = 48\,\%$. If the law of constant compositon is true, then the mass of Ca in $10g$ $CaCO_3$ from another source is $4.0g$

B. $12g$ of carbon is heated in vacuum and there is no change in the mass, is the best example of the law of conservation of mass.

C. Air is heated at constant pressure and there is no change in mass but the increases, is the best example of the law of conservation of mass.

D. SO_2 gas was prepared by (i) heating Cu with cone H_2SO_4 (ii) burning sulphur in oxygen, (iii) reacting observed that is each case, S and O combines in the ratio of 1:1. This data illustrates the law of constant composition.

Answer: A::D

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Exercises Multiple Correct (Mole Concept)

1. Which of the following statements is/are correct?

A. Chloropicrin $(CCl_3.NHO_2)$ can made cheapy for use as an insectide by the following reaction:

$CH_3NO_2 + Cl_2 \rightarrow CCl_3NO_2 + HCl$

B. In a rocket motor fueled with butane (C_4H_{10}), 0.1 mol of butane requires $14.56L$ of O_2 at STP for complete combustion.

C. A portable hydrogen generator utilises the reaction:

$\left(CaH_2 + H_2O \rightarrow Ca(OH)_2 + H_2\right), 2.1gofCaH_2$ would produce $2.24L$ "of" H_2 at STP

D. In the Mond process for purifying nickel, the volatile nickel carbonyl $\left[Ni(CO)_4\right]$ is produced by the reaction. $Ni + Co \rightarrow Ni(CO)_4$. $58.87g$ of Ni utilises $89.6L$ of CO at standard conditions.

Answer: A::B::C

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2. Which of the following statements is/are correct?

A. CaC_2 is made in an electric furnace by the reaction

$CaO + C \rightarrow CaC_2 + CO$

$16.0g$ of CaC_2 is obtained from $9.0gofC$

B. Polyethene can be proudced form CaC_2 as follows

$CaC_2 + H_2O \rightarrow Ca + HC \equiv CH$

$HC \equiv CH + H_2 \rightarrow H_2C = CH_2$

$n(CH_2 = CH_2) \rightarrow -(CH_2 - CH_2)_2 -$ (polyethen)

$32.0 kg of CaC_2$ produces $14.0 kg$ of polyethene.

C. $1.435 g$ of $AgCl$is obtained from 17.55 of $\left[Ag(NH_3)_2\right]Cl$ by the following reaction:

$\left[Ag(NH_3)_2\right]Cl + 2HNO_3 \rightarrow AgCl + 2NH_4NH_3.$

D. Commercial sodium hydrosulfite is 50% pure $Na_2S_2O_4$. It is prepared as follows:

i. $Zn + 2SO_2 \rightarrow ZnS_2O_4$

ii. $ZnS_2O_4 + Na_2CO_3 \rightarrow ZnCO_3 + Na_2S_2O_4)$

174.0 metric ton of commerical product $(Na_2S_2O_4)$ can be made from 65.4 metric ton of Zn, with a sufficient supply of other reactants.

Answer: A::B

Watch Video Solution

3. Which of the following statements is/are corrects?

A. $21.2g$ sample of impure of $Na_2CO_3 = CaCO_3 = 0.1mol.$

B. The percentage of moles of Na_2CO_3 is 60%

C. The number of mole of $Na_2CO_3 = CaCO_3 = 0.1mol$

D. The number of moles of $NaCl$ formed is 0.1 mol

Answer: A::C

Watch Video Solution

4. Which of the following statements is/are correct

A. The reaction.

$$Bi + 4HNO_3 + 3H_2O \rightarrow Bi(NO_3)_3.\ 5H_2O + NO$$

$2.09g$ of Bi in HNO_3 produces $48.5g$ of bismuth nitrate.

(Atomic weight $Bi = 209g$, $Mwof Bi(NO_3)_3.5H_2O = 485g$)

B. $4.0g$ of 63% HNO_3 by mass is required to react with $2.09g$ of Bi

C. The volume of NO gas produced at STP (1 bar $273K$) is $0.227L$

D. The volume of NO gas prodcued at $SATP$ (1 bar, $298K$) is $0.247L$.

Answer: B::C::D

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5. Which of the following statement is/are correct

A. The weight of $CaCO_3$ in the original mixture is $0.5g$.

B. The weight of calcium in the original mixture is $0.2g$

C. The weight percent of calcium in the original mixture is 40% Ca

D. The weight percent of Ca in the original mixture is 20% Ca

Answer: A::B::D

View Text Solution

6. Which of the following statements is/are correct

A. $196.0g$ of pure H_2SO_4 is required for the production of $365.0g$ of conc HCl containing 40% HCl by weight.

B. $245.0g$ of 80% H_2SO_4 by weight is required for the production of $365.0g$ conc. HCl containing 40% HCl be weight

C. 2 mol of pure H_2SO_4 is required for the production of $365g$ of 40% HCl

D. 2.5 mol of 80% H_2SO_4 is required for the production of $36.5g$ of 40% HCl`.

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

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Exercises Multiple Correct (Limiting Reagent)

1. Which of the following statements is/arecorrect

A. Fe is the limiting reagent.

B. The mass O_2 left over at the end of the reaction is $1.2g$

C. The mass of Fe_2O_3 produced is $12.0g$

D. O_2 is the limiting reagent.

Answer: A::B::C

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2. Which of the following statements is/are correct?

A mixture containing $64.0gH_2$ and $64.0gO_2$ is ignited so that water is formed as follows:

$2H_2 + O_2 \rightarrow 2H_2O$

A. $H_2 + O_2 \rightarrow 2H_2O$

B. O_2 is the limiting reagent

C. The reaction mixture contains $72.0 g of H_2O$ and $56.0 g$ of unreacted H_2.

D. The reaction mixture contains $56.0 g$ of H_2O and $72.0 g$ of unreacted H_2.

Answer: B::C

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3. Which of the following statements is / are wrongs?

The following reactions occur:

A. P_4 is the limiting quantity

B. O_2 is the limiting quantity

C. mass of P_4O_{10} obtained is $2.2 g$

D. Mass ov P_4O_6 obtained is $2.84g$

Answer: B::C::D

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4. Which of the following is/are correct.

The following reaction occurs: ltrgt $CS_2 + 3Cl_2 \xrightarrow{\Delta} CCl_4 + S_2Cl_2$

$1.0g$ of CS_2 and $2.0g$ of Cl_2 reacts.

A. $0.714gCS_2$ is used in the reaction.

B. $0.286gCS_2$ is in formed.

C. $1.45gofCCl_4$ is formed

D. $0.8gCl_2$ is in excess

Answer: A::B::C

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5. Which of the following statements is/are correct"

The following reaction occurs:

$2Al + 3MnO \xrightarrow{\Delta} Al_2O_3 + 3Mn.$

$108.0g$ of Al and $213.0g$ of MnO was heated to initiate the reaction.

$(Mwof MnO = 71$, atomic weight of $Al = 13)$

A. Al is present in excess

B. MnO is present is excess.

C. $54.0g$ of Al is required

D. $159.0g$ of MnO is in excess.

Answer: A::C

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6. Which of the following statements is/are correct?

i. 21.0 o lithium reacts with $32.0g of O_2$.

$4Li + O_2 \rightarrow 2Li_2O$

ii. $3.9g$ of K reacts with $4.26g of Cl_2$

$2K + Cl_2 \rightarrow 2KCl$

Atomic weights of $Li = 7$ and $K = 39$. $Mw of Li_2O = 30$ and $KCl = 74.5 g mol^{-1}$

A. In reaction (i), O_2 is in excess.

B. $45.0 g of Li_2O$ is formed in reaction (i)

C. In reaction (ii), Cl_2 is in excess.

D. $7.45 g of KCl$ is formed is reaction (ii).

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

Watch Video Solution

7. Which of the following is / are correct?

The following reaction occurs:

$Na_2CO_3 + 2HCl \rightarrow 2NACl + CO_2 + H_2O$

106. $g$ofNa_2CO_3 reacts with $109.5g$ofHCl.

A. The HCl is in excess.

B. $117.0g$ of $NaCl$ is formed.

C. The volume of CO_2 produced at 1 bar and $273K$ is $22.7L$

D. The volume of CO_2 produced at 1 bar and $298K$ is $24.7L$

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

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Exercises Multiple Correct (Mole Concept In Solution)

1. Which of the following solution contains approximately equal hydrogen ion concentration

A. $100mLof0.1MHCl + 50mLH_2O$

B. $75mLof0.1MHCl + 75mLH_2O$

C. $50mLof0.1MH_2SO_4 + 100mLH_2$

D. $100mLof0.1NH_2SO_4 + 50mLH_2O$

Answer: C::D

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2. Which of the following solution contains same molar concentration?

A. $166g.\ KI/L$ solution.

B. $33.0g(NH_4)_2SO_4$ in $200mL$ solution

C. $25.0gCuSO_4.5H_2O$ in $100mL$ solution

D. $27.0mgAl^{3+}$ per mL solution.

Answer: A::C::D

Watch Video Solution

3. Which of the following have equal mass of $Cl^{\ominus}$ ions in $1.0L$ of each of the following solution?

A. $5\ \%\ NaCl$ (density $= 1.07gmL^{-1}$)

B. $5\ \%\ KCl\left(d = 1.06gmL^{-1}\right)$

C. $58.5gNaCl$

D. $55.5gBaCl_2$

Answer: C::D

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4. Which of the following statement is/are correct?

Excess of $H_2(g)$ is bubbled into $1.0L$ of $0.1MCuCl_2$ solution.

$Cu^{2+} + H_2S(g) \rightarrow CuS(s) + 22H^{\oplus}$

A. 9.55 of CuS is produced.

B. The concentratikon of $H^{\oplus}$ ions is $0.2M$

C. The concentration of $H^{\oplus}$ ions is $0.1M$

D. $95.5gCuS$ is produced

Answer: A::B

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5. Which of the following statement is/are correct?

$20.0mL$ of $6.0MHCl$ is mixed with $50.0mL$ of $2.0MBa(OH)_2$, and $30mL$ of water is added.

A. The concentration of $\overset{\ominus}{O}H$ remaining in solution is $0.8M$.

B. The concentration of $Cl^{\ominus}$ remaining in solution is $1.2M$

C. The concentration of Ba^{2+} remaining in solution is $1.0M$

D. 80 mmols of $\overset{\ominus}{O}H$ is in excess.

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

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6. Which of the following is/are correct?

$100mL$ of $3.0MHClO_3$ reacts with excess of $Ba(OH)_2$ according to the equation:

$Ba(OH)_2 + 2HClO_3 \rightarrow Ba(ClO_3) + 2H_2O$

$(Mw$ of $Ba(ClO_3)_2 = 304gmol^{-1})$

A. 1.5 mol of $Ba(ClO_3)_2$ is formed

B. 3 mol of $Ba(ClO_3)_2$ is formed

C. $45.6g$ of $Ba(ClO_3)_2$ is obtained

D. $4.56g$ of $Ba(ClO_3)_2$ is obtained.

Answer: A::C

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7. An excellent solution for cleaning grease stains from cloth of leather consists of the folllowing components: CCl_4 (80% by volume), ligroin (16%) and amyl alcohol (4%) How many mL of each should to taken to make up $80mL$ of solution?

A. $64mLCCl_4$

B. $12.8mL$ ligroin

C. $32mL$ of amy alcohol

D. $3.2mL$ of amyl alcohol

Answer: A::B::D

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8. Which of the following statements is/are correct

A. Mass of $Al_2(SO_4)_3.18H_2O$ needed ot make up $100mL$ of an aqueous solution of concentration $27.0mg$ of Al^{3+} per mL is $33.3g$

B. Mass of $CrCl_3.6H_2O(Mw = 266.5g)$ needed ot prepare $1.0L$ solution containing $26.0gCr^{3+}$ per litre is $133.25g$. (Atomic weight of $Cr = 5g$)

C. Mass of NH_4Cl needed to prepare 100ml for solution containing $80mg\ NH_4Cl$ per mL is $8.0g$

D. Mass of NH_3 per mL of solution needed for solution of NH_3 in water containing 20% NH_3 by weighter (density $= 0.8gmL^{-1}$_ is $0.16gmL^{-1}$

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

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9. $100 ml of 0.06 M Ca(NO_3)_2$ is added to $50 mL$ of $0.06 M Na_2C_2O_4$. After the reaction is complete.

A. 0.003 moles of calcium oxalate will get precipated

B. 0.03 M of excess Ca^{2+} will remains in excess.

C. $Na_2C_2O_4$ is the limiting reagent

D. $Ca(NO_3)_2$ is the excess reagent.

Answer: A::C::D

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10. If $100 mL of 1 M H_2SO_4$ solution is mixed with $100 mL$ of 98% (W/W) of H_2SO_4 solution $\left(d = 0.1 gmL^{-1}\right)$, then

A. Concentration of solution becomes half.

B. Volume of solution beomces $200 mL$.

C. Mass of H_2SO_4 is the solution is $98g$

D. mass of H_2SO_4 in the solution is $19.6g$.

Answer: B::D

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11. $KClO_4$ can be prepared by following reactions:

i. $Cl_2 + 2KOH \rightarrow KCl + KClO + H_2O$

ii. $3KClO \rightarrow 2KCl + KClO_3$

iii. $4KClO_3 \rightarrow 3KlI_4 + KCl$

(Atomic weight of K, Cl, and O are 369,35.5 and 16)

A. The amount of Cl_2 required to prepare $277g$ of $KClO_4$ by above series of reaction is $568g$.

B. The volume of KOH in litres used by Cl_2, if KOH is $1.5M$, is $1.067L$.

C. The amount of Cl_2 required to prepare $200 g \text{of} KClO_4$ by above series of reactionis $284 g$

D. The volume of KOH in litres used by Cl_2, if KOH is $1.5 M$, is $10.76 L$

Answer: A::D

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12. When $100 mL$ of $0.1 M KNO_3$ and $400 mL$ of $0.2 M HCl$ and $500 mL$ of $0.3 M H_2SO_4$ are mixed, then in the resulting solution

A. The molarity of $K^{\oplus} = 0.01 M$

B. The molarity of $SO_4^{2-} = 0.15 M$

C. The molarity of $H^{\oplus} = 0.38 M$

D. The molarity of $NO_3^{\ominus} = 0.08$ and $Cl^{\ominus} = 0.01 M$

Answer: A::B::C

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13. $100g$ sample of clay (containing 19% H_2O, 40% silica, and inert inpurities as rest) is partically dried so as to contains 10% H_2O.

Which of the following is/are correct statements (s) ?

A. The percentage of silica in it is 44.4%

B. The mas of partically dried clay is $90.0g$.

C. The precentage of inert impurity in it is 45.6%

D. The mass of water evaporated is $10.0g$

Answer: A::C

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14. In which of the following pairs, $10g$ of each have an equal number of molecules?

A. N_2O and CO

B. N_2 and C_3O_2

C. N_2 and CO

D. N_2O and CO_2

Answer: C::D

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15. Equal weights of X (atomic weight = 36) and Y (atomic weight = 24) are reacted to form the compound X_2Y_3, which of the following is/are correct

A. X is the limiting reagent

B. Y is the limiting reagen.

C. NO reactant is left over.

D. Mass of X_2Y_3 formed is double the mass of X taken.

Answer: C::D

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Exercises Single Correct

1. $10g$ of $CaCO_3$ contains

A. 10 moles of $CaCO_3$

B. $0.1g$ atom of Ca

C. 6×10^{23} atoms of Ca

D. 0.1 of equivalent of Ca

Answer: B

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2. A candle is burnt in a beaker until extinguishers itseft. A sample of gaseous mixutre in the beaker contains 6.08×10^{20} molecules of O_2, and 0.50×10^{20} molecules of CO_2. The total pressure is $734mm$ of Hg . The partial pressure of O_2 would be

A. $760.0mm\text{of}Hg$

B. $76.0mm\text{of}Hg$

C. $7.6mm\text{of}Hg$

D. $0.76mm\text{of}Hg$

Answer: B

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3. Two glucose solution are mixed. One has a volume of $480mL$ and a concentration of $1.50M$ and the second has a volume of $250mL$ and concentration $1.20M$. The molarity of final solution is

A. $1.20M$

B. $1.50M$

C. $1.344M$

D. $2.70M$

Answer: C

Watch Video Solution

4. $1.0g$ of a monobasic acid when completely acted upon Mg gave $1.301g$ of anhydrous Mg salt. Equivalent weight of acid is

A. 35.54

B. 36.54

C. 17.77

D. 18.27

Answer: B

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5. $0.1g$ of metal combines with $46.6mL$ of oxygen at STP. The equivalent weight of metal is

A. 12

B. 24

C. 6

D. 36

Answer: A

Watch Video Solution

6. The vapour density of chloride of an element is 39.5. The Ew of the elements is 3.82. The atomic weight of the elements is

A. 15.28

B. 7.64

C. 3.82

D. 11.46

Answer: B

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7. The Mw of a oxide of an element is 44. The Ew of the element is 14. The atomic weight of the element is

A. 14

B. 28

C. 42

D. 56

Answer: A

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8. Potassium selenate is isomorphous with potassium sulphate and contains $50.0\ \%$ of Se. The atomic weight of Se is

a. 142, b. 71, c. 47.33, d. 284

A. 142

B. 71

C. 47.33

D. 284

Answer: A

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9. The Ew of an element is 13. It forms an acidic oxide which KOH forms a salt isomorphous with K_2SO_4. The Aw of element is

a. 13, b. 26, c. 52, d. 78

A. 13

B. 26

C. 52

D. 78

Answer: D

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10. $0.05g$ of a piece of metal in dilute acid gave $24.62mL$ of H_2 at $27^\circ C$ and $760mm$ pressure. The Ew of metal is

A. 25

B. 12.5

C. 50

D. 37.5

Answer: A

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11. An element A (atomic weight = 12) and B (atomic weight = 35.5) combines ot form a compound X. If 5 mol of B comibnes with 1 mol of A to give 1 mol of X. The weight of 1 mol of X would be

A. $47.5g$

B. $74.0g$

C. $154.0g$

D. $148.0g$

Answer: C

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12. If $1L$ of O_2 at $15^\circ C$ and $750mm$ pressure contains N molecules, the number of molecules in 2 litre of SO_2 under the same conditions of temperature and pressure will be

A. $N/2$

B. N

C. $2N$

D. N

Answer: C

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13. When $2g$ of a gas A is introduced into an evacuated flask kept at $25^\circ C$, the pressure is found to be $1atm$. If $3g$ of another gas B is then heated in the same flask, the total pressure becomes $1.5atm$. Assuming ideal gas behaviour, calculate the ratio of the molecular weights M_A and M_B.

A. $1:3$

B. $3:1$

C. $2:3$

D. $3:2$

Answer: A

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14. How many moles of ferric alum $(NH_4)_2SO_4Fe_2(SO_4)_3.24H_2O$ can be made from the sample of Fe

containing $0.0056g$ of it?

A. $10^{-4}mol$

B. $0.5 \times 10^{-4}mol$

C. $0.33 \times 10^{-4}mol$

D. $2 \times 10^{-4}mol$

Answer: B

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15. Suppose elements X and Y combine to form two compounds XY_2 and X_3Y_2 when 0.1 mole of former weigh $10g$ while 0.05 mole of the latter weigh $9g$. What are the atomc weights of X and Y.

A. 40,30

B. 60,40

C. 20,30

D. 30,20

Answer: A

Watch Video Solution

16. In an experiment, $6.67g$ of $AlCl_3$ was produced and $0.654g$ Al remainded unreacted. How many g atoms of Al and Cl_2 were taken originally $(Al = 27, Cl = 35.5)$?

A. 0.07,0.15

B. 0.07,0.05

C. 0.02,0.05

D. 0.02,0.15

Answer: A

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17. Nine volumes of gaseous mixture consisting of gaseous organic compound A and just sufficient amount of oxygen required for complete combustion yielded on burning 4 volumes of CO_2, 6 volumes of water vapours, and 2 volumes of N_2, at all volumes measured at the same temperature and pressure. If the compounds contains C, H, and N only, the molecular formula of compound A is

A. $C_2H_3N_2$

B. $C_2H_6N_2$

C. $C_3H_6N_2$

D. C_3H_6N

Answer: B

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18. $27g$ of Al will react completely with..... g of O_2

A. $8g$

B. $10g$

C. $24g$

D. $49g$

Answer: C

Watch Video Solution

19. $2L$ of air formed $1915mL$ of ozonised air when passed through Brodio's apparatus. The volume of ozone formed is

A. $85mL$

B. $170mL$

C. $225mL$

D. $425 = .5mL$

Answer: B

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20. $n-$ Butance (C_4H_{10}) is produced by monobromation of C_2H_6 followed by the Wurtz reaction. Calculate the volume of ethane at STP requried to produce $55g$ of n-butane. The bromination takes place with 90% yield and the Wurtz reaction with 85% yield.

A. $27.75L$

B. $55.5L$

C. $111L$

D. $5.55L$

Answer: B

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21. $1g$ of the carbonate of a metal was dissolved in $25mL$ of $N-HCl$. Te resulting liquid $5mL$ of $N-NaOH$ for neutralisation. The Ew of the metal `Carbonate is

A. 50

B. 30

C. 20

D. None

Answer: A

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22. 5mL of $NHCI$, $20mL$ of $N/2H_2SO_4$ and 30 mL of $N/3HNO_3$ are mixed together and volume made to one litre. The normality of the resulting solution is

A. $N/5$

B. $N/10$

C. $N/20$

D. $N/40$

Answer: D

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23. The Ew of H_3PO_4 in reaction is

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

$(Ca = 40, P = 31, O = 16)$

A. 49

B. 98

C. 32.66

D. 147

Answer: A

Watch Video Solution

24. $10g$ of a sample of a mixture of $CaCl_2$ and $NaCl$ is treated to precipitate all the calcium as $CaCO_3$. This $CaCO_3$ is heated to convert all the Ca to CaO and the final mass of CaO is 1.62 g.The percent by mass of $CaCl_2$ in the origial mixture is

A. 0.321

B. 0.162

C. 0.218

D. 0.11

Answer: A

Watch Video Solution

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

A. $1:4$

B. $1:8$

C. $7:32$

D. $3:16$

Answer: C

Watch Video Solution

26. If 0.5 mole of $BaCl_2$ mixed with 0.20 mole of Na_3PO_4 the maximum number of moles of $Ba_3(PO)_2$ then can be formed is

A. 0.1

B. 0.2

C. 0.5

D. 0.7

Answer: A

Watch Video Solution

27. Upon mixing $50.0mL$ of $0.1M$ lead nitrate solution with $50.0mL$ of $0.05M$ chromic sulphate solution, precipitation of lead sulphate takes place. How many moles of lead sulphate are formed and what is the molar concertration of chromic suplhate left in the solution?

A. 0.0005,0.0084

B. 0.0084,0.005

C. 0.005,0.00084

D. 0.05,0.00084

Answer: A

Watch Video Solution

28. The melting point of a substance was quoted as $52.5^\circ C$, $52.57^\circ C$, $52.571^\circ C$, and $52.5713^\circ C$. Which of these values would be most acceptable and which will have maximum uncertanity?

A. $52.5^\circ C$

B. $52.57^\circ C$

C. $52.571^\circ C$

D. $52.5713^\circ C$

Answer: A::B

View Text Solution

29. $600mL$ of ozonised oxygen at STP were found to weigh one gram. What is the volume of ozone in the ozonised oxygen?

A. $200mL$

B. $150mL$

C. $100mL$

D. $50mL$

Answer: A

Watch Video Solution

30. The weight of $1L$ of ozonised oxygen at STP was found to be $1.5g$. When $100mL$ of this mixture at STP was treated with turpentine oil, the volume was reduced to $90mL$. The molecular weight of ozone is

A. 49

B. 47

C. 46

D. 47.9

Answer: D

Watch Video Solution

31. Calculate the density of NH_3 at $30^\circ C$ and 5 atm pressure.

A. $3.42gL^{-1}$

B. $2.42gL^{-1}$

C. $1.71gL^{-1}$

D. $3.84gL^{-1}$

Answer: A

Watch Video Solution

32. What weight of a metal of equivalent weight 12 will give $0.475g$ of its chloide?

A. $0.12g$

B. $0.24g$

C. $0.36g$

D. $0.48g$

Answer: A

Watch Video Solution

33. $4.2g$ of a metallic carbonate MCO_3 was heated in a hard glass tube and CO_2 evolved was found to have $1120mL$ of volume at STP. The Ew of the metal is

A. 12

B. 24

C. 18

D. 15

Answer: A

Watch Video Solution

34. If $0.5g$ of a mixture of two metals. A and B with respective equivalent weights 12 and 9 displace $560mL$ of H_2 at STP from an acid, the composition of the mixture is

A. $40\ \%\ A, 60\ \%\ B$

B. $60\ \%\ A, 40\ \%\ B$

C. $30\ \%\ A, 70\ \%\ B$

D. $70\ \%\ A, 30\ \%\ B$

Answer: A

Watch Video Solution

35. What is the valency of an element of which the eqivalent weight is 12 and the specific heat is 0.25?

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

36. The mineral rutile is an oxide of titanium containing 39.35% oxygen and is isomorphous with cassiterite (SnO_2). The atomic weight of titanium is

A. 68.1

B. 58.1

C. 48.1

D. 38.1

Answer: C

Watch Video Solution

37. A mixture of ethylene and excess of H_2 had a pressure of $600mmHg$ the mixture was passed over nickel catalyst to convert ethylene to ethane.The pressure of the resultant mixture at the similar conditions of temperature and volume dropped to $400mmHg$ The fraction of C_2H_4 by volume in the original mixture is

A. $1/3$ rd of the total volume

B. $1/4$ th of the total volume

C. $2/3$ rd of the total volume

D. $1/2$ nd of the total volume

Answer: A

Watch Video Solution

38. $13.4g$ of a sample of unstable hydrated salt $Na_2SO_4.XH_2O$ was found to contains $6.3g$ of H_2O. The number of molecular of water of crystalistion is

A. 5

B. 7

C. 2

D. 10

Answer: B

Watch Video Solution

39. A bag contains $0.32g$ of oxygen. The same valume of an unknown gas A under similar conditions of temperature and pressure weigh $0.26g$. The gas A is known to contain only C and H in 1:1 ratio. The molecular formula of the compound is

A. C_2H_2

B. C_4H_4

C. C_3H_4

D. CH

Answer: A

Watch Video Solution

40. A mineral consists of an equimolar mixture of the carbonates of two bivalent metals. One metal is present to the extent of 15.0% by

weight, $3.0g$ of the mineral on heating lost $1.10g$ of CO_2. The percent by weight of other metal is

A. 65

B. 25

C. 75

D. 35

Answer: D

Watch Video Solution

41. One litre of $0.15MHCl$ and one ltire of $0.3MHCl$ is given. What is the maximum volume of $0.2MHCl$ which one can make from these two solution. Now water is added.

A. $1.2L$

B. 1.5 L`

C. $1.3L$

D. 1.4 L`

Answer: B

Watch Video Solution

42. Ammonia in $0.224g$ of a compound $Zn(NH_3)_xCl_2$ is neutralised by $30.7mL$ of $0.20MHCl$. The value of x in the formula is

A. 4

B. 5

C. 6

D. 8

Answer: C

Watch Video Solution

43. The normility of a solution that results from mixing $4g$ of $NaOH, 500mL$ of $1MHCl$, and $10.0mL$ of H_2O_4 (specific gravity 1.149% H_2SO_4 by weight) is

The total volume of solution was made to $1L$ with water)

A. 0.51

B. 0.71

C. 1.02

D. 0.45

Answer: A

Watch Video Solution

44. A 4 : 1 molar mixture of He and CH_4 is contained in vessel at 20 per pressure. Due to a hole in the vessel the gas mixture leakes out. What is the compostion of mixture effusing out initially.

A. $33.3\ \%\ He, 66.7\ \%\ CH_4$

B. $66.7\ \%\ He, 33.3\ \%\ CH_4$

C. $40\ \%\ He, 60\ \%\ CH_4$

D. $60\ \%\ He, 40\ \%\ CH_4$

Answer: B

Watch Video Solution

45. An organic compound contains C, H and O. If $C(\ \%\ ) : H^{\%} = 6:1$, what is the simplest formula of the compound, given that one mole of the compound contains half as much oxygen as would be required to burn all the C and H atoms in it to CO_2 and H_2O?

A. CH_2O

B. $C_2H_2O_3$

C. C_3H_6O

D. $C_3H_6O_2$

Answer: B

Watch Video Solution

46. $10mL$ of a gaseous hydrocarbon is exploded with $100mL$ of oxygen. The residual gas on cooling is found to measure $95mL$ of which $20mL$ is absorbed by caustic soda and the remainder by alkaline pyrollgallol. The fomula of the hydrocarbon is

A. CH_4

B. C_2H_6

C. C_2H_4

D. C_2H_2

Answer: D

Watch Video Solution

47. A mixture of formic acid and oxalic acid is heated with conc. H_2SO_4. The gas producted is collected and treated with KOH solution, whereby the volume decrease by $1/6th$. The molar ratio of the two acids (formic acid/oxalic acid) is

A. $4:1$

B. $1:4$

C. $2:1$

D. $1:2$

Answer: A

Watch Video Solution

48. $2H_2O_2(l) \rightarrow 2H_2o(l) + O_2(g)$

$100mL$ of X molar H_2O_2 gives $3L$ of O_2 gas under the condition when

1 moe occupies $24L$. The value of X is

A. 2.5

B. 1

C. 0.5

D. 0.25

Answer: D

Watch Video Solution

49. One mole of potassium chlorote is thermally decomposed and excess of aluminium is burnt in the gaseous product. How many mole(s) of aluminium oxide are formed?

A. 1

B. 1.5

C. 2

D. 3

Answer: A

Watch Video Solution

50. A certain compound has the molecular formula X_4O_6. If $10g$ of X_4O_6 has $5.72gX$, the atomic mass of X is

A. 32 amu

B. 37 amu

C. 42 amu

D. 98 amu

Answer: A

Watch Video Solution

51. $5.6g$ of a metal forms $12.7g$ of metal chloride. Hence equivalent weight of the metal is

A. 127

B. 254

C. 56

D. 25

Answer: D

Watch Video Solution

52. The molarity of H_2SO_4 is $18M$. Its density is $1.8gmL^{-1}$.

A. 36

B. 200

C. 500

D. 18

Answer: C

Watch Video Solution

53. 10L of hard water required $0.56g$ of lime (CaO) for removing hardness. Hence, temporary hardness in p p m (part per million, 10^6) of $CaCO_3$ is

A. 100

B. 200

C. 10

D. 20

Answer: B

Watch Video Solution

54. How many grams of phosphoric acid would be needed to neutralise $100g$ of magnesium hydroxide? (The molecular weight are: $H_3PO_4 = 98$ and $Mg(OH)_2 = 58.3$)

A. $66.7g$

B. $252g$

C. $112g$

D. $168g$

Answer: C

Watch Video Solution

55. The simplest formula of a compound containing 50% of an element X (atomic weight 10) and 50% of element Y (atomic weight 20) is:

A. XY

B. X_2Y

C. XY_2

D. X_2Y_3

Answer: B

Watch Video Solution

56. On repeated sparking, $10mL$ of a mixture of carbon monoxide and nitrogen required $7mL$ of oxygen for combustion. What was the volume of nitrogen? (All volumes are measured under identical conditions).

A. $7/2mL$

B. $4mL$

C. $7mL$

D. $17/2mL$

Answer: B

Watch Video Solution

57. When $10mL$ of ehtyl alcohol (density $= 0.7893gmL^{-1}$) is mixed with $20mL$ of water (density $0.9971gmL^{-1}$) at $25^{\circ}C$, the final solution has a density of $0.9571gmL^{-1}$. The percentage change in total volume on mixing is

A. 3.1%

B. 2.4%

C. 1%

D. None of these

Answer: A

Watch Video Solution

58. The molality of $1L$ solution with $x\ \%\ H_2SO_4$ is equal to 9. The weight of the solvent present in the solution is $910g$. The value of x is:

A. 90

B. 80.3

C. 40.13

D. 9

Answer: B

Watch Video Solution

59. The density of $1M$ solution of $NaCl$ is $1.0585gmL^{-1}$. The molality of the solution is

A. 1.0585

B. 1.00

C. 0.10

D. 0.0585

Answer: B

Watch Video Solution

60. $100mL$ of mixture of $NaOH$ and Na_2SO_4 is neutralised by $10mL$ of $0.5MH_2SO_4$. Hence, in $100mL$ solution is

A. $0.2g$

B. $0.4g$

C. $0.6g$

D. None

Answer: B

Watch Video Solution

61. A organic compound contains 4% sulphur. Its minimum molecular weight is

A. 200

B. 400

C. 800

D. 1600

Answer: C

Watch Video Solution

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

A. $1:4$

B. $1:8$

C. $7:32$

D. $3:16$

Answer: C

Watch Video Solution

63. $0.116g$ of $C_4H_4O_4(A)$ in neutralised by $0.074g$ of $Ca(OH)_2$. Hence protonic hydrogen $\left(H^{\oplus}\right)$ in (A) will be

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

64. A hydrate of Na_2SO_3 has 50% water by mass. It is

A. $Na_2SO_3.5H_2O$

B. $Na_2SO_3.6H_2O$

C. $Na_2SO_3.7H_2O$

D. $Na_2SO_3.2H_2O$

Answer: C

Watch Video Solution

65. $10g$ mixture of $NaHCO_3$ and Na_2CO_3 has $1.68gNaHCO_3$.

It is heated at $400K$. Weight of the residue will be

A. $9.38g$

B. $8.32g$

C. $10.0g$

D. $1.68g$

Answer: A

Watch Video Solution

66. Mole fraction of ethanol is ethanol water mixture is 0.25. Hence, the percentage concentration of ethanol by weight of mixture is

A. 0.25

B. 0.75

C. 0.46

D. 0.54

Answer: C

Watch Video Solution

67. $N_2 + 3H_2 \rightarrow 2NH_3$

Molecular weight of NH_3 and N_2 and x_1 and x_2, respectively. Their equivalent weights are y_1 and y_2, respectively. Then $(y_1 - y_2)$

A. $\left(\frac{2x_1 - x_2}{6}\right)$

B. $(x_1 - x_2)$

C. $(3x_1 - x_2)$

D. $(x_1 - 3x_2)$

Answer: A

Watch Video Solution

68. How may moles of electrons weigh one kilogram?

A. $6.023 \times^{23}$

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

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

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

Answer: D

Watch Video Solution

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

A. $4.14g$

B. $5.14g$

C. $6.14g$

D. $7.14g$

Answer: A

Watch Video Solution

70. How many moles of O_2 will be liberated by one mole of CrO_5 is the following reaction:

$$CrO_5 + H_2SO_4 \rightarrow Cr_2(SO_4)_5 + H_2O + O_2$$

A. 4.5

B. 2.5

C. 1.25

D. None

Answer: D

Watch Video Solution

71. $BrO_3^{\ominus} + 5Br^{\ominus} \rightarrow Br_2 + 3H_2O$

IF $50mL 0.1M BrO_3^{\ominus}$ is mixed with $30mL$ of $0.5M Br^{\ominus}$ solution that contains excess of $H^{\oplus}$ ions, the moles of Br_2 formed are

A. 6.0×10^4

B. 1.2×10^{-4}

C. 9.0×10^{-3}

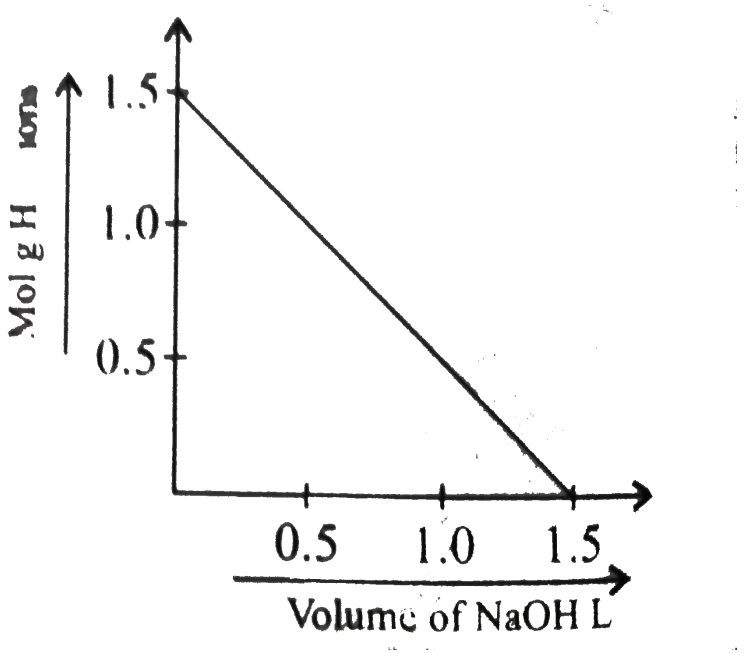
D. 1.8×10^{-3}

Answer: C

Watch Video Solution

72. To $1L$ of $1.0M$ impure H_2SO_4 sample, $1.0MNaOH$ solution was added and a plot was obtained as follows:

The % purity of H_2SO_4 and the slope of curve, respectively, are:



A. $75\%, -1/2$

B. $75\%, -1$

C. $50\%, -1/3$

D. $50\%, -1/2$

Answer: B

Watch Video Solution

73. The expression relating mole fraction of solute (χ_2) and molarity (M) of the solution is: (where d is the density of the solution in gL^{-1} and Mw_1 and Mw_2 are the molar masses of solvent and solute, respectively

A. $x_2 = \dfrac{M \times Mw_1}{M(Mw_1 \times Mw_2) + 1000d}$

B. $x_2 = \dfrac{M \times Mw_1}{M(Mw_1 \times Mw_2) + d}$

C. $x_2 = \dfrac{M \times Mw_1}{M(Mw_1 \times Mw_2) - 1000d}$

D. $x_2 = \dfrac{M \times Mw_1}{M(Mw_1 \times Mw_2) - d}$

Answer: B

Watch Video Solution

74. At $100^\circ C$ and 1 atm, if the density of the liquid water is $1.0gcm^{-3}$ and that of water vapour is $0.0006gcm^{-3}$, then the volume occupied by water molecules in $1L$ steam at this temperature is

A. $6cm^3$

B. $60cm^3$

C. $0.6cm^3$

D. $0.06cm^3$

Answer: D

Watch Video Solution

75. Consider the ionisation of H_2SO_4 as follow"

$H_2SO_4 + 2H_2P \rightarrow 2H_3O^{\oplus} SO_4^{2-}$

The total number of ions furnised by $100mL$ of $0.1M$ H_2SO_4 will be

A. 1.2×10^{23}

B. 0.12×10^{23}

C. 0.18×10^{23}

D. 1.8×10^{23}

Answer: C

Watch Video Solution

76. Calculate the number of oxygen atoms requried to combine with $7.0g$ of N_2 to form N_2O_3 if 82% of N_2 is converted into products.

$$N_2 + \frac{3}{2}O_2 \rightarrow N_2O_3$$

A. 3.24×10^{23}

B. 3.6×10^{23}

C. 18×10^{23}

D. 6.02×10^{23}

Answer: B

Watch Video Solution

77. 36.5% HCl has density has density equal to $1.20 gmL^{-1}$. The molarity (M) and molality (m), respectively, are

A. 15.7,15.7

B. 12,12

C. 15.7,12

D. 12,15.7

Answer: D

Watch Video Solution

78. $10mL$ of $1MBaCl_2$ solution and $5mL0.5NK_2SO_4$ are mixed together ot precipitate out $BaSO_4$. The amount of $BaSO_4$ precipated will be

A. 0.005 mol

B. 0.00025 mol`

C. 0.025 mol

D. 0.0025 mol

Answer: D

Watch Video Solution

79. Mole fraction of a solute in an aqueous solution is 0.2. The molality of the solution will be

A. 13.88

B. 1.388

C. 0.138

D. 0.0138

Answer: A

Watch Video Solution

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80. An exess of $NaOH$ was added to $100mL$ of a $FeCl_3$ solution which gives $2.14 \text{of} Fe(OH)_3$. Calculate the normality of $FeCl_3$ solution.

A. $0.2N$

B. $0.3N$

C. $0.6N$

D. $1.8N$

Answer: C

Watch Video Solution

81. Two samples of HCl of $1.0M$ and $0.25M$ are mixed. Find volumes of these samples taken in order to prepare $0.75MHCl$ solution. Assume no water is added.

(I) $20mL$, $10mL$ (II) $100mL$, $50mL$k

(III) $40mL$, $20mL$ (IV) $50mL$, $25mL$

A. I,II,IV

B. I,II

C. II,III,IV

D. I,II,III,IV

Answer: D

Watch Video Solution

82. If $100mL$ of H_2SO_4 and $100mL$ of H_2O are mixed, the mass percent of H_2SO_4 in the resulting solution $\left(d_{H_2SO_4} = 0.09gmL^{-1}, d_{H_2O} = 1.0mL^{-1}\right)$

A. 90

B. 47.36

C. 50

D. 60

Answer: B

Watch Video Solution

83. $12.5mL$ of a solution containing $6.0g$ of a dibasic acid in $1L$ was found to be neutralized by $10mL$ a decinormal solution of $NaOH$. The molecular weight of the acid is

A. 150

B. 120

C. 110

D. 75

Answer: A

Watch Video Solution

84. One litre of a sample of hard water contains $5.55mg$ of $CaCl_1$ and $4.75mg$ of $MgCl_2$. The total harness of ppm of $CaCO_3$ is

A. 5 ppm

B. 10 ppm

C. 20 ppm

D. None of these

Answer: B

Watch Video Solution

85. $10mL$ of $0.2NHCl$ and $30mL$ of $0.1NHCl$ to gether exaclty neutralises $40mL$ of solution of $NaOH$, which is also exactly neutralised by a solution in water of $0.61g$ of an organic acid. What is the equivalent weight of the organic acid?

A. 61

B. 91.5

C. 122

D. 183

Answer: C

Watch Video Solution

86. A metal oxide has the formul Z_2O_3. It can be reduced by hydrogen to give free metal and water. $0.2g$ of the metal oxide requires $12mg$ of hydrogen for complete reduction. The atomic weight of the metal is

A. 52

B. 104

C. 26

D. 78

Answer: C

Watch Video Solution

87. The reaction between yttrium metal and dilute HCl produces $H_2(g)$ and Y^{3+} ions. The molar ratio of yttrium to that hydrogen produced is

A. $2:3$

B. $3:2$

C. $1:2$

D. $2:1$

Answer: A

Watch Video Solution

88. What volume of H_2 at $273K$ and 1 atm will be consumed in obtaining $21.6g$ of elemental boron (atomic mass of $B = 10.8$) from the reduction of BCl_3 with H_2.

A. $89.6L$

B. $67.2L$

C. $44.8L$

D. $22.4L$

Answer: B

Watch Video Solution

Exercises Assertion-Reasoning

1. Assertion (A): Atomic mass of potassium is 39.

Reason (R): An atom of postassium is 39 times heavier than $1/2th$ of

the mass of carbon atom $\left(C^{12}\right)$.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

Watch Video Solution

2. Assertion (A): Both $138g$ of K_2CO_3 and $12g$ of carbon have some number of carbon atoms.

Resaon (R): Both contains $1g$ atom of carbon which contains 6.022×10^{23} carbon atoms.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

Watch Video Solution

3. Assetion (A): 1 Avogram is equal to 1 amu.

Reason (R): Avogram is reciprocal of Avogadro's

Reason (R): Avogram is reciprocal of Avogadro's number.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: C

Watch Video Solution

4. Assertion (A): $1g$ of O_2 and $1g$ atom of O_3 have equal number of molecules.

Reason (R): Mass of 1 mol atom is equal to its gram atomic mass.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: B

Watch Video Solution

5. Assetion (A): 1 mol H_2 and N_2 have same volume at same temperature and pressure.

Reason (R): 1 mol gas at STP occupies $24.4L$ volume.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: B

Watch Video Solution

6. Assertion (A): The equivalent mass of element is varialbe.

Reason (R): It depents on the valency of the element.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

Watch Video Solution

7. Assertion (A): Calmel is a chemical compound whereas brass is a mixture.

Reason (R): Calomel always contains 5.6 times as much mercury as chlorine by weight. Brass can be made with widely different ratios of copper and zine.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

Watch Video Solution

8. Assertion (A): pure water obtained from different states of india always contains hydrogen and oxygen in the ration of 1:8 by mass.

Reason (R): Total mass of reactants and products during chemical change is always the same.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: B

9. Assertion (A): The standard unit of expressing the mass of atom is amu.

Reason (R): amu is also called as avogram.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: B

Watch Video Solution

10. Assertion (A) : If $30mL$ of H_2 and $20mL$ of O_2 react to form water, $5mL$ of H_2 is left at the end of the reaction.

Reason (R): H_2 is the limiting reagent.

A. If both (A) and (R) are correct and (R) is the correct explantion for (A)

B. If both (A) and (R) are correct but (R) is not the correct explantion for (A)

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: D

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Exercises Integers

1. What volume of 90% alcohol by weight $\left(d = 0.8 gmL^{-1}\right)$ must be used to prepared $80mL$ of 10% alcohol by weight $\left(d = 0.9 gmL^{-1}\right)$

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2. $50mL$ of $1MHCl$, $100mL$ of $0.5MHNO_3$, and xmL of $5MH_2SO_4$ are mixed together and the total volume is made upto $1.0L$ with water. $100mL$ of this solution exactly neutralises $10mL$ of $M/3Al_2(CO_3)_3$. Calculate the value of x.

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3. How many mL of a solution of concertration $100mgCo^{2+}$ per mL is needed to prepare $10mL$ of a solution of concentration $20mgCo^{2+}$ per mL.

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4. HCl gas is passed into water, yielding a solution of density $1.095gmL^{-1}$ and containing 30% HCl by weight. Calculate the

molarity of the solution.

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5. A solution contains $75mgNaCl$ per mL. To what extent must it be diluted to give a solution of concentration $15mgNaCl$ per mL of solution.

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6. To prepare $100g$ of a 92% by weight solution of $NaOH$ how many g of $H_2O$is needed?

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7. To make a benzene soluble cement, $60g$ rosion is melted in an ion pot and $68g$ beeswax and $12g$ shellac are added. How much of shellac

should be taken to makes $35g$ cement?

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8. In the reaction: $2Al + Cr_2O_3 \rightarrow Al_2O_3 + 2Cr$,

$4.98g$ of Al reacted with $20.0gCr_2O_3$. How much grams of reactant ramains at the completion of the reaction?

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9. Silver is removed from the solutions of its salts with metallic zinc, according to the reaction

$Zn + 2Ag^{\oplus} \rightarrow Zn^{2+} + 2Ag.$

A $65.4g$ piece of Zn is put into a $100L$ vat containing $3.25g$ $Ag^{\oplus}$ per litre. How amny moles of reactant remained unreacted?

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10. A sample contains a mixtrure of $NaHCO_3$ and Na_2CO_3.

HCl is added to $15.0g$.of the sample, yielding $11.0g$ of $NaCl$. What percent of the sample is Na_2CO_3?

$$\begin{bmatrix} \text{Reaction are} \\ Na_2CO_3 + 2HCl \rightarrow 2NaCl + CO_2 + H_2O \\ NaHCO_2 + HCl \rightarrow NaCL + CO_2 + H_2O \end{bmatrix}$$

$Mwof NaCl = 58.5, Mwof NaHCO_3 = 84, Mwof Na_2CO_3 = 106 gmol^{-1}$

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11. A person takes $6.1g$ of an anta-acid tablet comprising bicarbonate ion at 20.8%. The volume of CO_2 evolved at (1 atm and $25^\circ C$) in the stomach (on neutralisation) multipled by a factor of '10' will be xL. Calculate the approximate (integer) value of x.

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12. The specific gravity of a salt solution is 1.025. If VmL of water is added to $1L$ of this solution to make its density $10.2gmL^{-1}$, what

value of V in mL approxmately?

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13. A $19.6g$ of a given gaseous sample contains $2.8g$ of molecules $\left(d = 0.75gL^{-1}\right)$, $11.2g$ of molecules $\left(d = 3gL^{-1}\right)$ and $5.6g$ of molecules $\left(d = 1.5gL^{-1}\right)$. All density measurements are made at STP. Calculate the total number of molecules (N) present in the given sample. Report your answer in $10^{23}N$

Assume Avogardro's number as 6×10^{23}.

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Archives Single Correct

1. The largest number of molecules in

A. $36g$ of water

B. $28g$ of carbon monoxide

C. $46g$ of ethly alcohol

D. $54g$ of nitrogen pentoxide

Answer: A

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

A. $1:1$

B. $1:2$

C. $2:1$

D. $9:4$

Answer: A

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

A. 22

B. 44

C. 66

D. 88

Answer: C

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

A. $2.16g$

B. $2.48g$

C. $2.32g$

D. $2.64g$

Answer: A

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5. Equal weights of methane and oxygen are mixed in an empty container at $25^{\circ}C$. The fractin of the total pressure exerted by oxygen is

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

B. $\frac{1}{2}$

C. $\frac{2}{3}$

D. $\frac{1}{3} \times \frac{273}{298}$

Answer: A

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

A. 0.7

B. 0.5

C. 0.2

D. 0.1

Answer: D

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7. An isotope of $Ge\,{}^{76}_{32}$ is

A. Ge.$^{77}_{32}$

B. As. $^{77}_{32}$

C. Se. $^{77}_{32}$

D. Se. $^{78}_{34}$

Answer: A

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8. A molal solution is one that contains 1 mol of a solute in

A. $1000g$ of solvent

B. $1L$ of solven

C. $1L$ of solution

D. $22.4L$ of solution

Answer: A

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

A. Molarity

B. Normality

C. Formality

D. Molality

Answer: D

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

A. 0.1

B. 0.9

C. 0.3

D. 0.6

Answer: D

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11. At $100^\circ C$ and 1 atm, if the density of the liquid water is $1.0 gcm^{-3}$ and that of water vapour is $0.00006 gcm^{-3}$, then the volume occupied by water molecules in $1L$ steam at this temperature is

A. $6cm^3$

B. $60cm^3$

C. $0.6cm^3$

D. $0.06cm^3$

Answer: D

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

A. $40mL$

B. $20mL$

C. $10mL$

D. $4mL$

Answer: A

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

A. 6.023×10^{23}

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

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

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

Answer: D

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

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

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

The number of moles of Y and Z are

A. 0.01,0.01

B. 0.02,0.01

C. 0.01,0.02

D. 0.02,0.02

Answer: A

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

A. 24 g of $C(12)$

B. 56 g of $Fe(56)$

C. 27 of $Al(27)$

D. 108 g of $Ag(108)$

Answer: A

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

A. 55.58

B. 55.95

C. 55.75

D. 55.05

Answer: B

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

A. $1.78M$

B. $2.00M$

C. $2.05M$

D. $2.22M$

Answer: C

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Archives Integer

1. The value of n in the molecular formula $Be_nAl_2SiO_{18}$ is .....

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

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3. Silver (atomic weight $108 g mol^{-1}$) has a density of $10.5 g cm^{-3}$. The number of silver atoms on a surfaces of area $10^{-12} m^2$ can be expressed in scientific notation as $Y \times 10^{-x}$, The value of x is .....

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4. Among the following, what is the number of elements showing only one non-zero oxidation state?

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Archives Fill In The Blanks

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

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

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

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

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Archives Subjective

1. What is the molarityk and molality of a 13% solution (by weight) of sulphric acid with a density of $1.02mL^{-1}$? To what volume should

$100mL$ of this acid be diluted in order to preapre a $1.5N$ solution?

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2. Calculate the density of NH_3 at $30^\circ C$ and 5 atm pressure.

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3. When $4.215g$ of a metallic carbonate was heated in a hard glass tube, the CO_2 evolved was found to measure $1336mL$ at $27^\circ C$ and $700mm$ pressure. What is the equivalent weight of the metal?

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

a. The precentage by weight of sodium thiosulphate.

b. The mole fraction of sodium thiosulphate.

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

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

Calculate

a. the molal concentration.

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

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

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7. Calculate the volume occupied by $5.0g$ of acetylene gas at $50^{\circ}C$ and $740mm$ pressure.

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8. On mixing $45.0mL$ of $0.25M$ lead nitrate solution with $25.0mL$ of $0.10M$ chromic sulphate solution, precipitation of lead sulphate are formed? Also calculate the molar concentration of the species left behind solution. Assume the lead sulphate is completely insoluble.

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9. When $0.575 \times 10^{-2}kg$ of Glaube's salt is dissolved in water, we get $1dm^3$ of a solution of density $1077.2kgm^{-3}$. Calculate the molarity, molality, and mole fraction of Na_2SO_4 in the solution.

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

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

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