CHEMISTRY

BOOKS - PRADEEP CHEMISTRY (HINGLISH)

SOME BASIC CONCEPTS OF CHEMISTRY

Sample Problem

1. Convert the following temperatures into degrees Fahrengeit :

(i) $25^{\circ}C$, the room temperature (ii) $37^{\circ}C$, the human body (physiological) temperature.

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2. On a particular day, the temperature recorded in New York was $60^{\circ}F$. What would be the equivalent temperature in $.^{\circ}C$?

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3. At what temperature will both the Celsius and Fahrenheit scales read the same value?

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4. Calculate

$(i)\left(5.7 \times 10^{6}\right) \times\left(4.2 \times 10^{5}\right) \quad (ii)\left(5.7 \times 10^{6}\right) \times\left(4.2 \times 10^{-3}\right) \quad (iii)(5.7$

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5. Calculate

$\left(5.7 \times 10^{6}\right) \div\left(4.2 \times 10^{3}\right) \quad (ii)\left(5.7 \times 10^{6}\right) \div\left(4.2 \times 10^{-3}\right) \quad (iii)(5.7 \times$

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6. Calculate (i) $4.56 \times 10^3 + 2.62 \times 10^2$ $(ii) 4.5 \times 10^{-3} - 2.6 \times 10^{-4}$.

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7. What is the difference between 5.0g and 5.00 g?

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8. How many significant figure are there in each of the following numbers?

(i) 6.005

(ii) 6.022×10^{23}

(iii) 8000

(iv) 0.0025

(v) π

(vi) the sum $18.5 + 0.4235$

(vii) the product 14×6.345.

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9. Express the following to four significant figures:

$(i) 6.45372 \quad (ii) 48.38250 \quad (iii) 70000 \quad (iv) 2.65986 \times 10^3 \quad (v) 0.$

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10. A sample of nickel weight 6.5425 g and has a density of $8.8 g / cm^3$. What is the volume ? Report the answer to correct decimal place.

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11. Express the result of the given calculation to the appropriate number of significant figures :

$$\frac{3.24 \times 0.08666}{5.006}$$

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12. A man weighs 175 1b. Express his weight in kg. Given that 1 kg = 2.205 1b.

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13. How many inches are there in 3.00 km ? Given that 1 km = 1000 m, 1 m = 1.094 yd, 1 yd = 36 in.

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14. Express the following in S.I. base units using power of 10 notation (example 2.54 mm = $2.43 \times 10^{-3} m$)

$(a) 1.35 mm \quad (b) 1 \text{ day} \quad (c) \ 6.45 \text{ mL} \quad (d) 48 \mu g \quad (e) 0.0426 \text{ in}$

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15. What is the mass (in grams) of an aluminium block whose dimensions are $2.0\,\text{in.} \times 3.0\,\text{in.} \times 4.0\,\text{in.}$ and whose density is $2.7 g / cm^3$? Given that 1 in. = 2.54 cm.

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16. The mass of precious stones is expressed in terms of 'carat'. Given that 1 carat = 3.168 grains and 1 gram = 15.4 grains, calculate the total mass of a ring in grams and kilograms which contains 0.500 carat diamond and 7.00 gram gold.

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17. 4.90 g of $KClO_3$ when heated produced 1.92 g of oxygen and the residue (KCl) left behind weighs 2.96 g. Show that these results illustrate the law of conservation of mass.

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18. 6.488 g of lead combine directly with 1.002g of oxygen to form lead peroxide (PbO_2). Lead peroxide is also produced by heating lead nitrate and it was found that the percentage of oxygen present in lead peroxides 13.38 percent. Use these data to illustrate the law of constant composition.

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19. Copper oxide was prepared by the following methods :

(a) In one case, 1.75 g of the metal were dissolved in nitric acid and igniting the residual copper nitrate yielded 2.19 g of copper oxide.

(b) In the second case, 1.14 g of metal dissolved in nitric acid were precipitated as copper hydroxide by adding caustic alkali solution. The precipitated copper hydroxide after washing, drying and heating yielded 1.43 g of copper oxide.

(c) In the third case, 1.45 g of copper when strongely heated in a current of air yielded 1.83 g of copper oxide. Show that the given data illustrate the law of constant composition.

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20. Carbon is found to form two oxides, which contain 42.9% and 27.3% if carbon respectively. Show that these figures illustrate the law of multiple proportions.

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21. Two oxides of a certain metal were separately heated in a current of hydrogen until constant weights were obtained. The water produced in each case was carefully collected and weighed. 2 grams of each oxide gave respectively 0.2517 grams and 0.4526 grams of water. Show that these results established the Law of Multiple Proportions.

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22. 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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23. Ammonia contains $82.35\,\%$ of nitrogen and $17.65\,\%$ of hydrogen. Water contains $88.90\,\%$ of oxygen and $11.10\,\%$ of hydrogen. Nitrogen trioxide contains $63.15\,\%$ of oxygen and $36.85\,\%$ of nitrogen. Show that these data illustrate the law of receprocal proportions.

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24. Chlorine has two isotopes of atomic mass units $34.97u$ and $36.97u$. The relative abundances of these two isotopes are 0.735 and 0.245 respectively. Find out the average atomic mass of chlorine.

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25. Naturally occurring boron consists of two isotopes whese atomic weights are 10.01 and 11.01. The atomic weight of natural boron is 10.81. Calculate the percentage of each isotope in natural boron.

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26. Calculate the percentage composition of the various elements in $MgSO_4$.

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27. Calculate the percentage of water of crystallisation in the sample of blue vitriol $(CuSO_4.5H_2O)$.

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28. Calcualte the percentage of cation in ammonium dichromate.

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29. On analysing an impure sample of sodium chloride, the percentage of chlorine was found to be 45.5. What is the percentage of pure sodium chloride in the sample ?

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30. An inorganic salt gave the following percentage composition :

$Na = 29.11, S = 40.51$ and $O = 30.38$

Calculate the empirical formula of the salt.

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31. 2.38 g of uranium was heated strongly in a current of air. The resulting oxide weighed 2.806 g. Determine the empirical formula of the oxide. (At. Mass U = 238 , O = 16)

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32. 2.746 g of a compound gave on analysis 1.94 g of silver, 0.268 g of sulphur and 0.538 g of oxygen. Calculate the empirical formula of the compound (At. Masses : Ag = 108, S = 32, O = 16)

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33. A crystalline hydrated sa,t on being rendered anhydrous, loses $45.6\,\%$ of its weight. The precentage composition of anhydrous salt is : $Al = 10.5\,\%$, $K = 15.1\,\%$, $S = 24.8\,\%$ and $I = 49.6\,\%$. Find the empirical formula of the anhydrous and crystalline salt :

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34. The percentage composition of ferrous ammonium sulphate is $14.32\,\%\ Fe^{2+}$, $9.20\,\%\ NH_4^+$, $49.0\,\%\ SO_4^{2-}$ and $27.57\,\%\ H_2O$. What is the empirical formula of the compound?

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35. A compound contains 4.07% hydrogen, 24.27% carbon and 71.65% chlorine. Its molar mass is 98.96 g. What are its empirical and molecular formulas?

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36. A compound on analysis was found to contain the following composition :

$Na = 14.31\,\%$, $S = 9.97\,\%$, $O = 69.50\,\%$ and $H = 6.22\,\%$

Calculate the molecular formula of the compound assuming that the whole of hydrogen in the compound is present as water of crystallisation. Molecular mass of the compound is 322.

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37. 1.615 g of anhydrous $ZnSO_4$ was left in moist air. After a few days its weight was found to be 2.875 g. What is the molecular formula of hydrated salt ? (At. Mass: Zn=65.5, S=32, O=16, H=1)

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38. All the oxygen in 0.5434g sample of pure oxide of iron is removed by reduction in a stream of H_2. The loss in weight is 0.1210g. What is the formula of the oxide of iron ? (At. Mass of Fe = 56)

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39. Magnetic oxide (Fe_3O_4) when when heated with hydrogen is reduced to iron and water is also produced. Write balanced equation for the reaction.

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40. Acetylene burns in oxygen to form carbon dioxide and water. Write the skeleton equation for the reaction and balance it.

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41. Balance the following skeleton equation :

$Mg_3N_2 + H_2O \rightarrow Mg(OH)_2 + NH_3.$

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42. By using partial equation method, balance the equation :

$NaOH + Cl_2 \rightarrow NaCl + NaClO_3 + H_2O.$

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43. Balance the following skeleton equation by the method of Partial Equations :

$P + HNO_3 \rightarrow H_3PO_4 + H_2O + NO_2.$

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44. Balance the following skeleton equation by the method of Partial Equations :

$$KMnO_4 + H_2SO_4 + (COOH)_2 \rightarrow K_2SO_4 + MnSO_4 + CO_2 + H_2O.$$

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45. Calculate the volume of hydrogen librated at N.T.P. when $500cm^3$ of $0.5N$ sulphuric acid react with excess of zinc.

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46. How many millilitres of 0.5 M H_2SO_4 are needed to dissolve 0.5 g of copper (II) Carbonate ?

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47. 50.0 kg of $N_2(g)$ and 10.0 kg of $H_2(g)$ are mixed to produce $NH_3(g)$. Calculate the $NH_3(g)$ formed. Identify the limiting reagent in the production of NH_3 in this situation.

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48. 3.0 g of H_2 react with 29.0 g of O_2 yield H_2O.

(i) Which is the limiting reagent.

(ii) Calculate the maximum amount of H_2O that can be formed

(iii) Calculate the amount of reactant left unreacted

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49. One litre of oxygen at STP is made to react with three litres of carbon monoxide at STP. Calculate the mass of each substance found after the reaction. Which one is the limiting reactant?

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50. What is the mass of the precipitate formed when 50 mL of $17.0\,\%$ solution of $AgNO_3$ is mixed with 50 mL of $11.6\,\%$ $NaCl$ solution?

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51. What volume of hydrogen at N.T.P would be liberated by the action of 50 mL of dilute H_2SO_4 of 40 % purity and having a specific gravity of $1.3gmL^{-1}$ on 65 g of zinc ? (Atomic mass of Zn = 65).

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Problem

1. Calculate the molecular mass of glucose $(C_6H_{12}O_6)$ molecule in amu.

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2. Calculate the mass of (i) an atom of silver (ii) a molecule of carbon dioxide.

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3. How many atoms and molecules of sulphur are present in 64.0 g of sulphur (S_8)?

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4. Calculate the number of molecules present (i) in 34.20 grams of cane sugar $(C_{12}H_{22}O_{11})$

(ii) in one litre of water assuming that the density of water is $1g/cm^3$.

(iii) in one drop of water having mass 0.05 g.

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5. Calculate the number of atoms of the constituent elements in 53 g of Na_2CO_3.

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6. Calculate the number of molecules present in 350 cm^3 of NH_3 gas at 273 K ans 2 atmosphere pressure.

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7. (i) Assuming the density of water to be $1g/cm^3$, calculate the volume occupied by one molecule of water.

(ii) Assuming the water molecule to be spherical, calculate the diameter of the water molecule.

(iii) Assuming the oxygen atom occupied half of the volume occupied by the water molecule, calculate approximately the diameter of the oxygen atom.

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8. Calculate the number of moles in : (i) 392 grams of sulphuric acid (ii) 44.8 litres of carbon dioxide at STP (iii) 6.022×10^{23} molecules of oxygen (iv) 9.0 grams of aluminium (v) 1 metric ton of iron (1 metric ton $= 10^3$kg) (vi) 7.9 mg of Ca (vii) 65μ of carbon.

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9. Calculate the mass of (i) 0.1 mole of KNO_3 (ii) 1×10^{23} molecules of methane and (iii) $112cm^3$ of hydrogen at STP.

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10. The following substances are present in different containers

(i) One gram atom of nitrogen

(ii) One mole of calcium

(iii) One atom of silver

(iv) One mole of oxygen molecules

(v) 1023 atoms of carbon and

(vi) One gram of iron.

The correct order of increasing masses (in grams) is/are

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11. Calculate the volume at N.T.P occupied by

(i) 14 g of nitrogen

(ii) 1.5 gram moles of carbon dioxide

(iii) 10^{21} molecules of oxygen.

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12. Suppose the elements X and Y combine to form two compounds of XY_2 and X_3Y_2. When 0.1 mole of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g , what are tha atomic masses of X and Y ?

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13. A solution is prepared by adding 2 g of a substance A to 18 g of water. Calculate the mass per cent of the solute.

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14. Calculate the molarity of NaOH in the solution prepared by dissolving its 4 g in enough water to form 250 mL of the solution.

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15. A solution of oxalic acid, $(COOH)_2.2H_2O$ is prepared by dissolving 0.63 g of the acid in 250 cm^3 of the solution. Calculate molarity

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16. Commercially availiable concentrated hydrochloric acid contains $38\,\%\,HCl$ by mass. (a) What is the molarity of this solution? The density

is $1.19 gm L^{-1}$?

(b) What volume of concentrated HCl is required to make 1.00litre of $0.10 M HCl$?

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17. How many grams of NaOH should be dissolved to make 100 cm^3 of 0.15 M NaOH solution?

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18. Calculate the molarityes and normalities of the solution obtained on mixing

(i) 100 mL of 0.2 M H_2SO_4 with 50 mL of 0.1 M HCl

(ii) 100 mL of 0.2 N H_2SO_4 with 50 mL of 0.1 N HCl

(iii) 100 mL of 0.1 M H_2SO_4 with 50 mL of 0.1 M NaOH

(iv) 50 mL of 0.1 N H_2SO_4 with 100 mL of 0.1 N NaOH.

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19. Calculate the number of oxalic acid molecules in $100mL$ of $0.02N$ oxalic acid

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20. Calculate the molarity of water if its density is $1000kg/m^3$.

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21. The density of 3 M solution of NaCl is 1.25g mL^{-1}. Calculate molality of the solution.

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22. Calculate the mole fraction of ethylene glycol $(C_2H_6O_2)$ and water in a solution containing $20\ \%$ of $C_2H_6O_2$ by mass.

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23. Find the molaity and molatity of a 15% solution w/w of H_2SO_4(density of $H_2SO_4 = 1.02gcm^{-3}$).

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24. The mole fraction fo benzene in a solution with toluene is 0.50 . Calculate the mass present of benzene in the solution.

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25. Calculate the molality of a sulphuric acid solution in which the mole fraction of water is 0.85.

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26. What is the mole fraction of the solute in 2.5 m aqueous solution?

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27. Calculate the amount of water (g) produced by the combustion of 16 g of methane

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28. How many moles of methane are required to produce $22gCO_2$ (g) after combustion?

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29. Calculate the mass of iron which will be converted into its oxide (Fe_3O_4) by the action of 18 g of steam on it.

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30. What mass of slaked lime would be required to decompose completely 4 grams of ammonium chloride and what would be the mass of each product?

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31. 1.5 g of an impure sample of sodium sulphate dissolved in water was treated with excess of barium chloride solution when 1.74 g of $BaSO_4$ were obtained as dry precipitate. Calculate the percentage purity of the sample.

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32. Current market prices of Al, Zn and Fe scraps per kg are Rs. 20, Rs. 16 and Rs. 3 respectively. If H_2 is to be prepared by the reaction of one of these metals with H_2SO_4, which would be the cheapest metal to use ? Which would be most expensive ?

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33. In order to find the strength of a sample of sulphuric acid, 10 g were dilluted with water and a piece of marble weighing 7 g placed in it. When all action had ceased, the marble was removed, washed, dried and was found to weight 2.2g. What was the percentage strength of sulphuric acid ?

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34. 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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35. [A] A solid mixture weighing $5.00g$ containing lead nitrate and sodium nitrate was heated below $600^\circ C$ until the mass of the residue was

constant. If the loss of mass is 28% find the mass of lead nitrate and sodium nitrate in the mixture.

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36. Calculate the amount of limen, $Ca(OH)_2$, required to remove hardness of 50,000 litres of well water which has been found to contain 1.62 g of calcium bicarbonate per 10 litre.

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37. What volume of carbon dioxide measured at $27^\circ C$ and 746.7 mm pressure will be obtained by treating $10.0g$ of pure marble with dilute hydrochloric acid ? (Aqueous tension at $27^\circ C$ is $26.7mm$)

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38. 1 gm of a mixture of calcium carbonate and magnesium carbonate gave on ignition 240 mL of carbon dioxide at S.T.P. What is the percentage composition of the mixture ?

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39. What volume of oxygen at N.T.P is needed to cause the complete combustion of 200 mL of acetylene ? Also calculate the volume of carbon dioxide formed.

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40. A gas mixture of 3.0 L of propane and butane on complete combustion at $27^{\circ}C$ produced 10.0 L of CO_2. Find out the composition of the gas mixture.

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41. A $5.0g$ sample of a natural gas consisting of CH_4, C_2H_4 was burnt in excess of oxygen yielding $14.5gCO_2$ and some H_2O as product. What is weight percentage of CH_4 and C_2H_4 in mixture?

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Example

1. 20 cc of a hydrocarbon mixed with 66 cc of oxygen were exploded in a eudiometer tube. The residual gases after cooling occupied 56 cc. On treatment with KOH solution, the volume decreased to 16 cc. Find the formula of the hydrocarbon.

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2. 5.2 cc of a gaseous hydrocarbon was exploded with excess of oxygen and product cooled. A contraction of 7.8 cc was observed. A further

contraction of 10.4 cc was noted on treatment with aqueous potash. Find the formula of the hydrocarbon and give I.U.P.A.C. name to it.

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Curiosity Question

1. Name two discoverles of chemistry which have helped mankind and the same discoveries have harmed the mankind and how?

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2. Many countries Including USA express the temperature of atmosphere in degrees fahrenhelt, if you land in USA and temperature in $59^{\circ} F$, what do you expect cold or hot. Compare with corresponding temperature in India.

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3. A lady purchases a necklace from a jeweller with diamonds embedded in it. The jeweller tells that total diamond used in the necklace is five carat. How much weight the should subtract from the weight of the ring to get the weight of gold?

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4. Gold biscults are available in the market which look exactiy similar to gold but actually they are not of pure gold (but of gold called fool's gold). How will check it by some simple physical property? Density of pure gold is well known to be 19.3 g cm^{-3}.

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5. Gold is heavier than aluminium. If we put a 100 g biscult of gold in water taken in a measuring cylinder or we put a 100 g aluminium bar in the measuring cylinder, will the rise in level of water be same or different in the two cases ? Give reason.

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6. A person is declared as a diabetic if his/her blood sugar/blood glucose level exceeds 160 mg/dL when tested 2 hours after meals. In some countries, it is reported in the units of m $molL^{-1}$. If a person has blood sugar of 10 m mol L^{-1}, is he/she diabetic or not? Explain.

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Problems For Practice

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

$(i)6.200 \quad (ii)0.052 \quad (iii)7.5 \times 10^4 \quad (iv)0.00050 \quad (v)67.32 - 6.3$

$(vii)(5.56)^2(8.24)/(3.6) \quad (viii)18.567/(8.1 \times 2)$

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2. 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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3. Express the number of 45000 in exponential notation to show

(i) tow significant figures

(ii) four significant figures.

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4. Convert 16.1 km to miles using the following units equivalents:

1 km = 1000 m, 1 ft = 12 inches, 1 m = 100 cm, 1 mile = 1760 yd, 1 inch = 2.54 cm, 1 yd = 3 ft

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5. What is the weight in pounds of a gold bar 12.0 inches long, 6.00 inches wide and 3.00 inches thick? The density of gold is $19.3 gcm^{-3}$. Given 1 inch = 2.54 cm, 1lb = 453.6 g.

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6. Express the following in SI units : (i) 5' 6", the average height of an Indian man. (ii) 80 miles per hour, the average speed of a roadways bus. (iii) 100 pounds, the average weight of an Indian girl. (Take 1 lb = 454 g) (iv) $-10^{\circ} C$, the lowest temperature in Simla. (v) 2 litres of milk, the average consumption of a family of 4 persons. (vi) 14 pounds per square inch (atmospheric pressure)

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7. Convert the following into kilograms :

(i) 500 Mg (mass of loaded jumbo jet)

(ii) 1 fg (mass of human DNA molecule)

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8. Convert the following into metre

(i) 40 Em (thickness of Milky way galaxy)

(ii) 1.4 Gm (diameter of Sun)

(iii) 41 Pm (distance of nearest star)

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9. Using the unit conversion factors, express

(i) 1.54 mm s^{-1} in pm μs^{-1}

(ii) 2.66 g cm^{-3} in μm^{-3}

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10. Vanadium metal is added to steel to impart strength. The density of vanadium is $5.96 g/cm^3$. Express this in S.I units $\left(kg/m^3\right)$.

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11. A piece of metal is 3 inch (represented by in) long. What is its length in cm?

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12. A jug contains 2L of milk. Calcualte the volume of the milk in m^3

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13. How many seconds are there in 2 days?

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14. What mass of silver nitrate will react with 5.85 g of sodium chloride to produce 14.35 g of silver chloride and 8.5 g of sodium nitrate if the law of conservation of mass is true?

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15. When $4.2gNaHCO_3$ is added to a solution of CH_3COOH (acetic acid) weighing $10g$, it is observed that $2.2g$of CO_2 is released to the atmosphere. The residue is found to weigh $12.0g$. Show that these observations are in agreement with the law of conservation of mass.

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

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17. 2.16 of copper metal when treated with nitric acid followed by ignition of the nitrate gave 2.70 g of copper oxide. In another experiment 1.15 g of

copper oxide upon reduction with hydrogen gave 0.92 g of copper. Show that the above data illustrate the Law of Definite Proportions.

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18. Silver chloride is prepared by

(i) dissolving 0.5 g of silver wire in nitric acid and adding excess of hydrochloric acid to silver nitrate formed. The silver chloride precipitated is separated, washed and dried. The weight of silver chloride is 0.66 g.

(ii) heating 1 g of silver metal in a current of dry chlorine gas till the metal is completely converted into its chloride. It is found to weight 1.32 g.

Illustrate the law of constant composition by the above data.

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19. Two oxide samples of lead were heated in the current of hydrogen and were reduced to the metallic lead. The following data were obtained

(i) Weight of yellow oxide taken = 3.45 gm, Loss in weight in reduction = 0.24 gm

(ii) Weight of brown oxide taken = 1.227 gm, Loss in weight in reduction = 0.16 gm.

Show that the data illustrates the law of multiple proportion.

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20. Copper gives two oxides. On heating 1.0 g of each in hydrogen gas, 0.888 g and 0.799 g of the metal are produced. Show that the results agree with the Law of Multiple Proportions.

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21. Two oxides of nitrogen contain the following percentage compositions : (i) Oxide A contains $63.64\,\%$ nitrogen and $36.36\,\%$ oxygen. (ii) Oxide B contains $46.67\,\%$ nitrogen and $53.33\,\%$ oxygen.

Establish the Law of Multiple Proportions.

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22. A metal forms two oxides. One contains $46.67\,\%$ of the metal and another, $63.94\,\%$ of the metal. Show that these results are in accordance with the law of multiple proportions.

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23. Nitrogen forms five compounds with oxygen in which 1.0 g of nitrogen combines with 0.572, 1.14, 1.73, 2.28 and 2.85 g of oxygen respectively. Show that these figures agree with law of multiple proportions.

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24. 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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25. If a certain oxide of nitrogen weighing 0.11 g gives 56 mL of nitrogen and another oxide of nitrogen weighing 0.15 g gives the same volume of nitrogen (both at sTP), show that these results support the law of multiple proportions.

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26. Carbon dioxide contains $27.27\,\%$ of carbon, carbon disulphide contains $15.79\,\%$ of carbon and sulphur dioxide contains $50\,\%$ of sulphur. Are these figures in agreements with the law of reciprocal proportions?

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27. 61.8 g of A combine with 80 g of B. 30.9 g of A combine with 106.5 g of C. B and C combine to form compound CB_2. Atomic weights of C and B are respectively 35.5 and 6.6. Show that the law of reciprocal proportions is obeyed.

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28. To account for atomic mass of nitrogen as 14.0067, what should be the ratio of $.^{15}N$ and $.^{14}N$ atoms in natural nitrogen? (atomic mass of $.^{14}N = 14.00307$ u and $.^{15}N = 15.001u$)

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29. What is the mass of (i) 1 mole of water (ii) 0.5 mole of CO_2 (iii) 2.5 moles of Cl_2?

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30. Calculate the number of moles in each of the following amounts of materials :

(i) 10.0 g of $CaCO_3$

(ii) 1×10^{23} molecules of CO_2

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31. What is the mass in grams of : (i) 6.022×10^{23} atoms of oxygen ? (ii) 1.0×10^{23} molecules of H_2S?

(iii) 6.022×10^{23} molecules of oxygen? (iv) 1.5 moles of H_2SO_4?

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32. Which of the following weighs most

(i) 50 g of iron (ii) 5 g atoms of nitrogen (iii) 0.1 g atom of silver (iv) 1×10^{23} atoms of carbon

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33. Calculate the number of molecules present in 22.0 g of CO_2.

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34. What is the mass of carbon dioxide which contains the same number of molecules as are contained in 40 g of oxygen?

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35. Calculate the mass of Na_2CO_3 which will have the same number of molecules as contained in 12.3 g of $MgSO_4.7H_2O$.

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36. Calculate the volume occupied by 10^{22} molecules of a gas at 300 K and 760 mm pressure.

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

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38. Calculate the mass of 1molecule of (i) oxygen (ii) ammonia

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39. (a) Calculate the volume occupied at STP by

(i)16.0 g of oxygen (ii) 1.5 moles of oxygen and (iii) 6.022×10^{23} molecules of carbon dioxide

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40. (i) How many grams of H_2S are contained in 0.40 mole of H_2S?

(ii) How many gram atoms of H and S are contained in 0.40 mole of H_2S?

(iii) How many molecules of H_2S are contained in 0.40 mole of H_2S?

(iv) How many atoms of H and S are contained in 0.40 mole of H_2S?

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41. You are supplied with a gas containing 0.32 g of oxygen. Calculate the number of moles and number of molecules present in it.

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42. The mass of a litre of oxygen at standard conditions of temperature and presssure is 1.43 g and the mass of one litre of SO_2 is 2.857 g.

(i) How many molecules of each gas are there in this volume?

(ii) What is the mass in grams of a single molecules of each gas ?

(iii) What are the molecular masses of SO_2 and O_2 respectively?

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43. The mass aof $350cm^3$ of a diatomic gas at 273 K at 2 atmospheres pressure is one gram. Calculate the mass of one atom of the gas.

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44. How many atoms and molecules are present in 124 g of phosphorus (P_4)?

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45. What is the mass of a water molecule in gram ? How many molecules are present in one drop of pure water which weight 0.05 g ? If the same drop of water evaporates in one hour, calculate the number of molecules leaving the liquid surface per second.

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46. The mass of carbon present in 0.5 mole of $K_4\left[Fe(CN)_6\right]$ is -

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47. The cost of table salt $(NaCl)$ and table sugar $(C_{12}H_{22}O_{11})$ are Rs 2 per kg and Rs. 6 per kg respectively. Calculate their cost per mole.

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48. Chlorophyll, the green colouring matter of plants responsible for photosynthesis, contains $2.68\,\%$ of magnesium by mass. Calculate the number of magnesium atoms in $2.00g$ of chlorophyll.

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49. 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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50. Calculate the total number of electrons presents in $1.4g$ of nitrogen gas.

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51. What is the mass in grams of one molecule of caffeine $(C_8H_{10}N_4O_2)$?

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52. How many molecules approximately do you expect to be present in (i) a small sugar crystal which weighs 10 mg (ii) one drop of water with 0.05 cc volume ?

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53. 9.7×10^{17} atoms of iron weigh as much as 1 cc of H_2 at S.T.P. What is the atomic mass of iron?

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54. What is the mass percent of the solute in the solution obtained by dissolving 5 g of the solute in 50 g of water ?

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55. A sample of NaOH weighing 0.40 is dissolved in water and the solution is made to 50.0 cm^3 in volumetric flask. What is the molarity of the resulting solution?

Watch Video Solution

56. How many moles and how many grams of sodium chloride are present in 250 mL of a 0.50 M NaCl solution ?

Watch Video Solution

57. Concentrated aqueous sulphuric acid is $98\ \%\ H_2SO_4$ by mass and has a density of $1.84 \mathrm{g\ cm}^3$. What volume of the concentrated acid is required to make 5.0 litre of 0.500 M H_2SO_4 solution?

Watch Video Solution

58. How many grams of barium chloride $(BaCl_2)$ are needed to prepare $100cm^3$ of 0.250 mL of a 0.50 M $BaCl_2$ solution?

Watch Video Solution

59. How many moles and how many grams of sodium chloride are present in 250 mL of a 0.50 M NaCl solution ?

Watch Video Solution

60. A sample of $NaNO_3$ weighing $0.38g$ is placed in a $50.0mL$ volumetric flask. The flask is then filled with water to the mark on the neck. What is the molarity of the solution?

Watch Video Solution

61. In a reaction vessel $0.184g$ of $NaOH$ is required to be added for completing the reaction. How many millilitre of $0.150MNaOH$ solution

should be added for this requirements?

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62. Molarity of H_2SO_4 is 0.8 M and its density is $1.06gcm^{-3}$. What will be concentration of the solution in terms of molality and mole fraction ?

Watch Video Solution

63. The concentration of H_2SO_4 in a botal labelled "conc. Sulphuric acid" is 18 M. The solution has a density of $1.84\ \mathrm{g\ cm^{-3}}$. What is the mole fraction and weight percentage of H_2SO_4 in this solution?

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64. Calculate the molality of 1 litre solution of 93% $H_2SO_4(\mathrm{weight\ /\ volume})$. The density of solution is 1.84 g mL^{-1}.

Watch Video Solution

65. What is the mole fraction of ethanol and water respectively in a sample of rectified spirit which contains 95 % of ehtanol by weight ?

Watch Video Solution

66. 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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67. An aqueous solution of sodium chloride is marked $10\ \%\ (w/w)$ on the bottle. The density of the solution is $1.071gmL^{-1}$. What is the molity and molarity? Also, what is the mole fraction of each components in the solution?

Watch Video Solution

68. H_2SO_4 used in lead storage cell is 38% by mass and has a density of 1.30 g cm^{-3}. Calculate its molarity.

Watch Video Solution

69. Find the percentage composition of potassium chlorate $(KClO_3)$

Watch Video Solution

70. Calculate the percentage of (i) SO_4^{2-} (ii) H_2O in pure crystals of Molar salt, viz., $FeSO_4.(NH_4)_2SO_4.6H_2O$.

Watch Video Solution

71. Calculate the percentage of water of crystallisation in the sample of washing soda, $Na_2CO_3.10H_2O$.

Watch Video Solution

72. A sample of clay is found to have the formula $Al_2O_3.\ K_2O.6SiO_2$. Calculate the percentage of alumina (Al_2O_3), potassium oxide (K_2O) and silica (SiO_2) in the sample.

Watch Video Solution

73. $Fe(SO_4)_3$ is empirical formula of a crystalline compound to iron. It is used in water and sewage treatment to aid in the removal of suspended impurities. Calculate the mass percentage of iron, sulphur and oxygen in this compound.

Watch Video Solution

74. Calculate the percent of carbon, hydrogen and oxygen in ethanol (C_2H_5OH)

Watch Video Solution

75. An inorganic salt on analysis gave the following percentage composition :

$Pb = 62.6, N = 8.4, O = 29$

What is empirical formula of the compound ? Also name the compound, (At. Mass Pb = 207, N = 14, O = 16).

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76. A sample of a salt has the percentage composition : Fe = 36.76 , S = 21.11 and O = 42.14

Calculate the empirical formula of the compound. (At. Mass Fe = 56, S = 32 and O = 16)

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77. A sample of a salt has the percentage composition : Fe = 36.76 , S = 21.11 and O = 42.14

Calculate the empirical formula of the compound. (At. Mass Fe = 56, S = 32 and O = 16)

Watch Video Solution

78. A salt containing water of crystallization gave the following percentage composition :

Mg = 9.76 , S = 13.01 , O = 26.01 and $H_2O = 51.22$

Calculate the simplest formula. (At. Mass of Mg = 24)

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79. Calculate the empirical formula of gold chloride which contains $35.1\ \%$ of chlorine. At mass of Au = 197.

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80. Calculate the empirical formula of a mineral having the following composition :

$CaO = 48.0\,\%$, $P_2O_2 = 41\,\%$, $CaCl_2 = 10.7\,\%$

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81. A crystalline compound when heated became anhydrous by losing 51.2 % of the mass. On analysis, the anhydrous compound gave the following percentage composition: Mg = 20.0 %, S = 26.66 % and O = 53.33 %, Calculate the molecular formula of the anhydrous compound and crystalline compound. The molecular mass of anhydrous compound is 120 u.

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82. A compound containing carbon, hydrogen and oxygen gave the following analytical data :

$C = 40.0\,\%$ and $H = 6.67\,\%$

Calculate the molecular formula of the compound if its molecular mass is 180.

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83. On analysis, a substance was found to have the following percentage composition:

$K = 31.84, Cl = 28.98$ and $O = 39.18$

Calculate its molecular formula if its molecular mass is 122.5.

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84. An organic liquid having carbon, hydrogen, nitrogen and oxygen was found to contain $C = 41.37\,\%$, $H = 5.75\,\%$, $N = 16.09\,\%$ and the rest oxygen. Calculate the molecular formula of the liquid if its V.D. is 43.3.

Watch Video Solution

85. A chemical compound is found to have the following composition :

$C = 19.57\,\%$, $Fe = 15.2\,\%$, $N = 22.83\,\%$, $K = 42.39\,\%$

Calculate the empirical formula of the compound. What will be its molecular formula if the molecular mass of the compound is 368 ? Name the compound.

Watch Video Solution

86. Butyric acid contains only C, H and O. A 4.24 mg sample of butyric acid is completely burned. It gives 8.45 mg of CO_2 and 3.46 mg og H_2O. The molecular mass of butyric acid was determined by experiment to be 88 amu. What is molecular formula?

Watch Video Solution

87. Balance the following equations by Hit and Trial Method :

(i) $SO_2 + H_2S \rightarrow S + H_2O$

(ii) $Al_4C_3 + H_2O \rightarrow Al(OH)_3 + CH_4$

(iii) $KMnO_4 + HCl \rightarrow KCl + MnCl_2 + H_2O + Cl_2$

(iv) $KMnO_4 + KOH \rightarrow K_2MnO_4 + MnO_2 + O_2$

(v) $FeS_2 + O_2 \rightarrow Fe_2O_3 + SO_2$

(vi) $Zm + NaOH \rightarrow Na_2ZnO_2 + H_2$

(vii) $Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + NaI$

(viii) $C_2H_6 + O_2 \rightarrow CO_2 + H_2O$

(ix) $Ca_2P_2 + H_2O \rightarrow Ca(OH)_2 + PH_3$

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88. Balance the following equation by partial Equation method:

(i) $PbS + O_3 \rightarrow PbSO_4 + O_2$

(ii) $K_2Cr_2O_7 + H_2SO_4 + SO_2 \rightarrow K_2SO_4 + Cr_2(CO_4)_3 + H_2O$

(iii)

$KMnO_4 + FeSO_4 + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + Fe_2(SO_4)_3 + Fe_2(S$

(iv) $Mg + HNO_3 \rightarrow Mg(NO_3)_2 + NH_4NO_3 + H_2O$

(v) $Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO + H_2O$

(vi) $C + H_2SO_4 \rightarrow CO_2 + SO_2 + H_2O$

(vii) $P_4 + HNO_3 \rightarrow H_3PO_4 + NO_2 + H_2O$

(viii) $CuSO_4 + KI \rightarrow K_2SO_4 + Cu_2I_2 + I_2$

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

(x) $I_2 + HNO_3 \rightarrow HIO_3 + NO_2 + H_2O$

View Text Solution

89. In the commercial manufacture of nitric acid, how many moles of NO_2 produce 7.33 mol of HNO_3 in the reaction :

$3NO_2(g) + H_2O(l) \rightarrow 2HNO_3(aq) + NO(g)$?

Watch Video Solution

90. How much iron can be theoretically obatined by the reduction of 1.0kg of Fe_2O_3?(At.wt.of Fe=56)`

Watch Video Solution

91. Calculate the weight of 60% H_2SO_4 required decomposing 50 g of chalk (Calcium carbonate) .

Watch Video Solution

92. Which is cheaper : $40\,\%$ hydrochloric acid at the rate of 50 paise per kilogram or $80\,\%\,H_2SO_4$ at the rate of 25 paise per kilogram to completely neutralize 7 kg of caustic potash?

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93. Excess of $AgNO_3$ solution was added to 2.2 g of commercial sample of common salt dissolved in water. The mass of dried precipitate of silver chloride was 2.11 g . Calculate the percent purity of common salt.

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94. A sample of dolomite contained $45\,\%$ of $CaCO_3$, $40\,\%$ of $MgCO_3$ and $15\,\%$ clay. Calculate the mass of sulphuric acid of $30\,\%$ strength required to react completely with 10 g of the sample.

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95. Calculate the mass of graphite that must be burnt to produce 13.2 g of CO_2.

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96. One gram of a mixture of potassium and sodium chlorides on treatment with excess of silver nitrate gave 2 g AgCl. What was the composition of the two salts in the original mixture?

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97. What volume of oxygen at $18^{\circ}C$ and $750mm$ pressure can be obtained from 10 g of potassium chlorate?

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98. What mass of iodine is liberated from a solution of potassium iodide when 1 litre of chlorine gas at $10^{\circ}C$ and 750 mm pressure is passed through it?

Watch Video Solution

99. 1.4 g of a sample of chalk $(CaCO_3)$ containing clay as impurity were treated with excess of dilute hydrochloric acid. Volume of CO_2 evolved when measured at $15^{\circ}C$ and 768 mm pressure was $282cm^3$. Calculate the percentage purity of the sample.

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100. How much marble of $96.5\ \%$ purity would be required to prepare 10 litres of carbon dioxide at STP when the marble is acted upon by dilute hydrochloric acid?

Watch Video Solution

101. Calculate the volume of SO_2 at STP obtained by burning 500 g of S containing $4\ \%$ sand by weight.

Watch Video Solution

102. 2.5 g of an impure sample of sodium bicarbonate when heated strongly gave 300 ml of carbon dioxide measured at 27° C and 760 mm pressure. Calculate the percentage purity of the sample

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103. 10 mL of liquid carbon disulphide (specific gravity 2.63) is burnt is oxygen. Find the volume of the resulting gases measured at STP.

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104. The drain cleaner, Drainex contains small bits of aluminium which react with caustic soda to produce dihydrogen. What volume of dihydrogen at $20^{\circ}C$ and one bar will be released when 0.15 g of aluminium reacts?

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105. 5.6 litres of methane gas (CH_4) is ignited in oxygen gas. Calculate the number of moles of CO_2 formed.

Watch Video Solution

106. Calculate the volume of air containing 21% by volume of oxygen at NTP required to convert 294mL of SO_2 into SO_3 under the same conditions.

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

Watch Video Solution

108. Find out the volume of Cl_2 at STP produced by the action of 100 cm^3 of $0.2N$ HCl on excess of MnO_2.

Watch Video Solution

109. A mixture of ethane (C_2H_6) and ethene (C_2H_4) occupies $40L$ at $1.00atm$ and at $400K$. The mixture reacts completely with $130g$ of O_2 to produce CO_2 and H_2O. Assuming ideal gas behaviour, calculate the mole fractions of C_2H_4 and C_2H_6 in the mixture.

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110. 5.0 g of marble was added to 7.5 g dilute hydrochloric acid. After the reaction was over, it was found that 0.5 g of marble was left unused. Calculate the percentage strength of hydrochloric acid. What volume of CO_2 measured at STP will be evolved in the above reaction?

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111. Calculate the volume of $1.00molL^{-1}$ aqueous sodium hydroxide that is neutralized by $200mL$ of $2.00molL^{-1}$ aqueous hydrochloric acid and the mass of sodium chloride produced. Neutralization reaction is,

$$NaOH_{(aq.)} + HCl_{(aq.)} \rightarrow NaCl_{(aq.)} + H_2O_{(l)}$$

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112. Bromine is prepared commercially by the reaction :

$2Br^-(aq) + Cl_2(aq) \rightarrow 2Cl^-(aq) + Br_2(aq)$

Suppose we have 50.0 mL of 0.060 M solution of NaBr. What volume of 0.050 M solution of Cl_2 is needed to react completely the Br^- ?

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113. If 20.0 g of $CaCO_3$ is treated with 20.0 g of HCl, how many grams of CO_2 will be produced ?

Watch Video Solution

114. Zinc and hydrochloric acid react according to the reaction:

$Zn_{(s)} + 2HCl_{(aq.)} \rightarrow ZnCl_{2(aq.)} + H_{2(g)}$

If 0.30 mole of Zn are added to hydrochloric acid containing 0.52 mole HCl, how many moles of H_2 are produced?

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115. 500mL of 0.25M Na_2SO_4 solution is added to an aquesous solution is 15g of $BaCl_2$ resulting in the formation of a white precipatate of insoluble $BaSO_4$. How many moles and how many grams of $BaSO_4$ are formed.

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Advanced Problems For Competitions

1. What volume at STP of ammonia gas will be required to be passed into $30mL$ of $1NH_2SO_4$ solution to bring down the acid normality to $0.2N$?

Watch Video Solution

2. Two acids H_2SO_4 and H_3PO_4 are neutralized seqarately by the same amount of an alkali when sulphate and dihydrogen orthophosphate are formed respectively. Find the ratio of the masses of H_2SO_4 and H_3PO_4? (P = 31)

Watch Video Solution

3. A mixture of ethane (C_2H_6) and ethene (C_2H_4) occupies $40L$ at $1.00atm$ and at $400K$. The mixture reacts completely with $130g$ of O_2 to produce CO_2 and H_2O. Assuming ideal gas behaviour, calculate the mole fractions of C_2H_4 and C_2H_6 in the mixture.

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

Watch Video Solution

Watch Video Solution

5. A analysis of a pyrex glass showed $12.9\,\%\,B_2O_3$, $2.2\,\%\,Al_2O_3$, $3.8\,\%\,Na_2O$, $0.4\,\%\,K_2O$ and remaining is SiO_2. What is the ratio of Si to B atoms in the glass ? (At. Masses : Si = 28, B = 11, Al = 27, Na = 23, K = 39)

Watch Video Solution

6. 1 M NaOH solution was slowly added to 1 L of 210 g impure H_2SO_4 solution and the following plot was otained. Calculate the percentage purity of H_2SO_4 sample.

Watch Video Solution

7. Mole fraction of K_2CO_3 in a mixture of K_2CO_3 and $KHCO_3$ is 0.5. What will be the volume of 0.1 N HCl required to neutralize 1.252 g of the mixture?

Watch Video Solution

8. The mass of one litre sample of ozonised oxygen at NTP was found to be $1.5g$. When $100mL$ of this mixture at NTP were treated with terpentine oil, the volume was reduced to $90mL$. Hence calculate the molecular mass of ozone.

(Terpentine oil absorbs ozone)

Watch Video Solution

9. 1.6 g of pyrolusite ore was treted with 50 " mL of " 1.0 N oxalic acid and some sulphuric acid. The oxalic acid left undecomposed was raised to 250 mL in a flask. 25 " mL of " this solution, when titrated with 0.1 N $KMnO_4$ required 32 " mL of " this solution. Find out the percentage of pure MnO_2 and also the percentage of available oxygen from MnO_2.

Watch Video Solution

10. 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?

Watch Video Solution

11. One gram of an alloy of aluminium and magnesium when heated with excess of dil. HCI forms magnesium chloride, aluminium chloride and hydrogen. The evolved hydrogen collected over mercury at 0^0C has a volume of 1.2 litre at $0.92atm$ pressure. Calculate the composition of the alloy.

Watch Video Solution

12. A $2.0g$ sample of a mixture containing sodium carbonate, sodium bicarbonate and sodium sulphate is gently heated till the evolution of

CO_2 ceases. The volume of CO_2 at $750 mm Hg$ pressure and at $298 K$ is measured to be $123.9 mL$. A $1.5 g$ of the same sample requires $150 mL$ of $(M/10) HCl$ for complete neutralisation. Calculate the percentage composition of the components of the mixture.

Watch Video Solution

13. Upon mixing 45.0 ml of 0.25 M lead nitrate solution with 25.0 ml of 0.10 M chromic sulphate solution, precipitation of lead sulphate takes place. How many moles of lead sulphate are formed ? Also calculate the molar concentration of the species left behind in the final solution. Assume that lead sulphate is completely insoluble (At.wt. of Pb = 207.2).

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14. A mixture of $20 mL$ of CO, CH_4 and N_2 was burnt in excess of O_2 resulting in reduction of $13 mL$ of volume. The residual gas was then treated with KOH solution to show a contraction of $14 mL$ in volume.

Calculate volume of Co, CH_4 and N_2 in mixture. All measurements are made at constant pressure and temperature.

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15. A sample of Mg was burnt in air to give a mixure of MgO and Mg_3N_2. The ash was dissolved in $60Meq.$ of HCl and the resulting solution was back titrated with $NaOH$. $12Meq.$ Of $NaOH$ was then added and the solution distrilled. The ammonia released was then trapped in $10Meq.$ of second acid solution. Back titration of this solution required $6Meq.$ of the base Calculate the percentage of Mg burnt to the nitride.

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16. A precipitate of $AgCl$ and $AgBr$ weighs $0.4066g$. On heating in a current of chlorine, the $AgBr$ is converted to $AgCl$ and the mixutre loses $0.0725g$ in weight. Find the $\%$ of Cl in original mixture.

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17. A piece of aluminium weighing 2.7 g is heated with 75 mL of H_2SO_4 which has a density of $1.18 \mathrm{g\,mL^{-1}}$ and contains $24.7\,\%$ by mass. When whole of the metal had dissolved, the solution was diluted to 400 mL. Calculate the molarity of free H_2SO_4 in the resulting solution.

Hence, molarity $= \frac{7.17}{98} \times \frac{1}{400} \times 1000 = 0.183M$

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Test Your Grip Multiple Choice Questions

1. The highest temperature among the following is

A. $203^\circ F$

B. 278 K

C. $105^\circ C$

D. All are equal

Answer: C

Watch Video Solution

2. Which one of the following represents smallest quantity?

A. $1850mg$

B. $1.85 \times 10^{-4}g$

C. $1.85 \times 10^{3}\mu g$

D. $1.85 \times 10^{-6}kg$`

Answer: B

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3. Given the number: 161 cm, 0.161 cm, 0.0161 cm. The number of significant figures for the three numbers are

A. 3, 4 and 5 respectively

B. 3, 3 and 3 respectively

C. 3, 3 and 4 respectively

D. 3, 4 and 4 respectively

Answer: C

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4. 100 g of ethylene polymerizes to polythene according to the equation :m

The mass of polythene produced will be

A. 100 ng

B. 100/n g

C. 100 n/2 g

D. 100 g

Answer: C

View Text Solution

5. The numbr of atoms in 0.1 mole of a triatomic gas is _____.

$\left(N_A = 6.02 \times 10^{23} \text{mol}^{-1}\right)$

A. 1.800×10^{22}

B. 6.026×10^{22}

C. 1.806×10^{23}

D. 3.600×10^{23}

Answer: A

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6. One mole of CO_2 contains

A. 6.02×10^{23} atoms of C

B. 6.02×10^{23} atoms of O

C. 18.1×10^{23} molecules of CO_2

D. 3 g atoms of CO_2

Answer: C

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7. If molecular mass of O_2 and SO_2 are 32 and 64 respectively. If one litre of O_2 at $15^\circ C$ and 759mm pressure contains N molecules, the number of molecuels in two litre of SO_2 under the same conditions of temperature and pressure will be:

A. N/2

B. N

C. 2N

D. 4N

Answer: C

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8. Which of the following has the smallest number of molecules?

A. 11.2 L of O_2 at NTP

B. 8.0 g of O_2

C. 0.1 mole of O_2

D. 2.24×10^4mL of O_2

Answer: C

Watch Video Solution

9. How much of NaOH is required to neutralise 1500 cm^3 of 0.1 M HCl?

A. 40 g

B. 4 g

C. 6 g

D. 60 g

Answer: C

Watch Video Solution

10. The volume of water to be added to $100cm^3$ of $0.5NH_2SO_4$ to get decinormal concentration is

A. $100cm^3$

B. $450cm^3$

C. $500cm^3$

D. $400cm^3$

Answer: D

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11. Haemoglobin contain $0.33\,\%$ or iron by weight. The molecular weight of haemoglobin is approximately 67200. The number of iron atoms. (At wt of Fe=56) present in one molecule of haemoglobin is

A. 6

B. 1

C. 4

D. 2

Answer: C

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12. Two elemets $X($ atomic weight $= 75)$ and $Y($ atomic weight $= 16)$ combine to give a compound having $75.8\,\%$ X.` The formula of the compound is

A. XY

B. X_2Y

C. XY_2

D. X_2Y_3.

Answer: A

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13. $100mL$ of phosphine (PH_3) on hearing forms phosphorous (P) and hydrogen (H_2). The volume change in the reaction is

A. an increase of 50 ml

B. an increase of 100 ml

C. an increase of 150 ml

D. a decrease of 50 ml

Answer: A

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14. If $1\frac{1}{2}$ moles of oxygen combine with Al to form Al_2O_3 the weight of Al used in the reaction is (Al=27)

A. 2.7

B. 54

C. 40.5

D. 81

Answer: B

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

A. 2.16 g

B. 2.48 g

C. 2.32 g

D. 2.26 g

Answer: C

Watch Video Solution

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

A. one mole of phosphine

B. two moles of phosphoric acid

C. two moles of phosphine

D. one mole of phosphorus pentoxide.

Answer: C

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17. If 0.5 mol of $BaCl_2$ is mixed with 0.2 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. 0.3

D. 0.1

Answer: D

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18. If 30 ml of H_2 and 20 ml of O_2 react to form water, what is left at the end of the reaction ?

A. 10 ml of H_2

B. 5 ml of H_2

C. 10 ml of O_2

D. $5\ \text{ml of}\ O_2$

Answer: D

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19. The specific heat of a metal os 0.16 its approximate atomic weight would be

A. 32

B. 16

C. 40

D. 64

Answer: C

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20. A, E, M and n represent atomic weight, equivalent weight, molecular weight and valency of an element. The correct relation is

A. $A = E \times n$

B. $A = M / E$

C. $A = M / n$

D. $M = A \times n$

Answer: A

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Test Your Grip Fill In The Blanks

1. Two basic units of which all substances are made up are.....and..... .

Watch Video Solution

2. AZT (azidothymindine) is used for helping .....victims.

Watch Video Solution

3. Medicines used to reduce tension are called ..... .

Watch Video Solution

4. If a system consists of a number of phases, it is said to be ..... .

Watch Video Solution

5. Elements which possess characters of both inetals and non-metals are called ____ .

Watch Video Solution

6. $\mathrm{Kg\,m^{-1}s^{-2}}$ is the unit of..... .

Watch Video Solution

7. 1 yoctometer is.....m whereas 1 yottametre is.....m.

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8. The number of significant figures present in 0.0200 is .....whereas number of significant figures in a dozen (12) is..... .

Watch Video Solution

9. The law which does not follow Dalton's atomic theory is..... .

Watch Video Solution

10. Equal volumes of all gases under similar conditions of temperataure and pressure contain equal number of molecules. This statement is called..... .

Watch Video Solution

11. 1 u (amu) is equal to

Watch Video Solution

12. The number of molecules in 1 kg mole is ..... .

Watch Video Solution

13. The number of atoms present in a molecule of a substance is called its_____

Watch Video Solution

14. The normality of 500 mL of 0.2 M sulphuric acid is ..... .

Watch Video Solution

15. The number of molecules present in $1cm^3$ of an ideal gas at STP is called .....and its value is..... .

Watch Video Solution

16. The empirical formula of hydrogen peroxide is.....

Watch Video Solution

17. Amount of oxalic acid $(COOH)_2.2H_2O$ in grams required to prepare 200 mL of 0.5 M oxalic acid solution is..... .

Watch Video Solution

18. On mixing two reactants, the substance that reacts completely is called .....whereas the other is called..... .

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Conceptual Questions

1. What is the difference between analgesics and anaesthetics?

Watch Video Solution

2. Classify the following substances into elements, compounds and mixtures : (i) Milk (ii) 22-carat gold (iii) Iodized table salt (iv) Diamond (v) Smoke (vi) Steel (vii) Dry ice (ix) Mercury (x) Air (xi) Aerated drinks (xii) Glucose (xiiii) Petrol/Diesel/Kerosene oil (xiv) Steam (xv) Cloud.

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3. What physical quantities are represented by the following units and what are their common names ?

(i) kgm^2s^{-2}

(ii) $kgms^{-2}$

(iii) dm^3

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4. Given that density of water is $1\ \mathrm{g\ mL^{-1}}$. What is its density in kg m^{-3}?

Watch Video Solution

5. What is the difference between the following ?

$(i) 2.5 \times 10^3 g$ and $2.50 \times 10^3 g (ii) 160 cm$ and $160.0 cm.$

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6. Why Law of conservation of mass should better be called as Law of concervation of mass and energy?

Watch Video Solution

7. 1 L of a gas at S.T.P.weighs 1.97 g. What is the vapour density of the gas?

Watch Video Solution

8. Why atomic masses are the average values?

Watch Video Solution

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

Watch Video Solution

10. What is the difference between the mass of a molecule and gram molecular mass ?

Watch Video Solution

11. Which of the following has largest number of oxygen atoms?

$1.0g$ of O atoms, 1.0 g of O_2, 1.0 g of ozone (O_3). Justify your answer.

Watch Video Solution

12. Calculate the percentage of the naturally occurring isotopes $.^{35}Cl$ and $.^{37}Cl$ that accounts for the atomic mass of chlorine taken as 35.45.

Watch Video Solution

13. Write the formulae and names of three compounds containing same percentage composition of C, H and O.

Watch Video Solution

14. A compound made up of two elements A and B has $A = 70\,\%$, $B = 30\,\%$. Their relative number of moles in the compound is 1.25 and 1.88, calculate :

Atomic masses of the elements A and B

Watch Video Solution

15. Potassium bromide KBr contains $32.9\,\%$ potassium by mass. If $6.40g$ of bromine reacts with $3.60g$ of potassium, calculate the number of moles of potassium which combine with bromide to form KBr.

Watch Video Solution

16. A sample of hard water contains 20 mg of Ca^{2+} ions per litre. How many milliequivalents of Na_2CO_3 would be required to soften 1 litre of sample ?

Watch Video Solution

Ncert Questions And Exercises With Answers

1. Calculate the molecular mass of the following :

(i) H_2O

(ii) CO_2

(iii) CH_4

Watch Video Solution

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

Watch Video Solution

3. Determine the empirical formula of an oxide of iron which has $69.9\,\%$ iron and $30.1\,\%$ oxygen by mass. (Atomic mass : Fe = 55.85 amu, O = 16.00 amu).

Watch Video Solution

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

a. 1 mol of carbon is burnt in air

b. 1 moles of carbon is brunt in $16g$ of dioxygen.

2 moles of carbon are burnt in $16g$ of dioxygen.

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5. Calculate the mass of sodium acetate (CH_3COONa) required to make $500mL$ of 0.375 molar aqueous solution. Molar mass of sodium of acetate is $82.0245gmol^{-1}$.

Watch Video Solution

Watch Video Solution

6. Calculate the concentration of nitric acid in moles per litre in a sample which has a density $1.41g/mL$ and the mass percent of nitric acid in it being $69\,\%$.

Watch Video Solution

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

Watch Video Solution

8. Determine the molecular formula of an oxide of iron in which the mass percent of iron oxygen are 69.9 and 30.1 respectively. Given that the molar mass of the oxide is $159.8gmol^{-1}$ (Atomic mass : Fe = 55.85, O = 16.00 amu)

Watch Video Solution

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

	% natural abundance	Molar mass
$._{}^{35}Cl$	75.77	34.9689
$._{}^{37}Cl$	24.23	36.9659

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

(i) Number of moles of carbon atoms.

(ii) Number of moles of hydrogen atoms.`

(iii) Number of molecules of ethane.

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

13. Pressure is determined as force per unit area of the surface. The SI unit of pressure, pascal is as shown below:

$1 Pa = N m^{-2}$

If the mass of air at sea level is $1034 g cm^{-2}$, calculate the pressure in pascal.

Watch Video Solution

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

Watch Video Solution

15. Match the following prefixes with their multiples:

	Prefixes	Multiples
(i)	micro	10^{6}
(ii)	deca	10^{9}
(iii)	mega	10^{-6}
(iv)	giga	10^{-15}
(v)	femto	10

Watch Video Solution

16. What do you mean by significant figures?

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

(i) Express this in per cent by mass.

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

Watch Video Solution

18. Express the following in the scientific notation:

(i) 0.0048, (ii) 234,000

(iii) 8008, (iv) 500.0

(v) 6.0012

Watch Video Solution

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

(i) 0.0048 (ii) 208 (iii)5005 (iv) 126,000 (v) 500.0 (vi) 2.0034

Watch Video Solution

20. Round up the following upto three significant figures:

a. 34.216

b. 10.4107

c. 0.04597

d. 2808

Watch Video Solution

21. The following data are obtained when dinitrogen and dioxygen react to gether to form different compounds:

	Mass of dinitrogen	Mass of dioxygen
$i.$	$14g$	$16g$
$ii.$	$14g$	$32g$
$iii.$	$28g$	$32g$
$iv.$	$28g$	$80g$

a. Which law of chemical combination is obeyed by the above experimental data? Give its statement.

d. Fill in the blanks in the following conversions:

I. $1km$= ..... mm= .....pm

II. $1mg =$ ..... $kg =$ ..... ng

III. $1mL$= ..... L= ..... dm^3

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22. If the speed of light is $3.0 \times 10^8 ms^{-1}$, calculate the distance covered by mass light in 2.00 micros.

Watch Video Solution

23. In the reaction, $A + B_2 \rightarrow AB_2$, identify the limiting reagent, if any, in the following mixtures

(i) 300 atoms of A+200 molecules of B

(ii) 2 mole A+3 mol B

(iii) 100 atoms of A+100 molecules of B

(iv) 5 mol A+2.5 mol B

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

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

a. Calculate the mass of ammonia produced if $2.00 \times 10^3 g$ dinitrogen reacts with $1.00 \times 10^3 g$ of dihydrogen.

b. Will any of the two reactants remain unreacted?

c. If yes, which one and what would be its mass?

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

Watch Video Solution

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

Watch Video Solution

27. Convert the following into basic units :

(i) 28.7 pm

(ii) 15.15 μs

(iii) 25365 mg

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

(i) 1 g Au (s)

(ii) 1 g Na (s)

(iii) 1 g Li (s)

(iv) 1 g of Cl2(g)

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29. Calculate the molarity of a solution of ethanol in water in which the mole fraction of ethanol is 0.020.

Watch Video Solution

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

Watch Video Solution

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

a. $\dfrac{0.02856 \times 298.15 \times 0.112}{0.5785}$

b. 5×5.364

c. $0.0125 + 0.7864 + 0.0215$

Watch Video Solution

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

Isotope	Isotopic molar mass	Abundance
$._{}^{36}Ar$	$35.96755 gmol^{-1}$	$0.337\ \%$
$._{}^{38}Ar$	$37.96272 gmol^{-1}$	$0.063\ \%$
$._{}^{40}Ar$	$39.9624 gmol^{-1}$	$99.600\ \%$

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33. Calculate the number of atoms in each of the following

a. $52 mol$ of He

b. $52u$ of He

c. $52g$ of He

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

Watch Video Solution

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

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$$

What mass of $CaCO_3$ is required to react completely with $25mL$ of $0.75MHCl$?

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

$4HCl_{(aq)} + MnO_{2(s)} \rightarrow 2H_2O_l + MnCl_{2(aq)} + Cl_{2(g)}$

How many gram of HCl react with $5.0g$ of manganese water to make $250.0mL$ solution.

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Ncert Exemplar Problems With Answers Hints And Solutions Ncert Exemplar Problems Chapter 1 Some Basic Concepts Of Chemistry Multiple Choice Questions I

1. Two students performed the same experiment separately and each one of them recovered two readings of mass which are given below. Correct reading of mass is 3.0 g. On the basis of given data, mark the correct

optioin out of the following statements.

Student	Readings	
	(I)	(II)
A	3.01	2.99
B	3.05	2.95

A. Results of both the students are neither accurate nor precise.

B. Results of student A are both precise and accuate.

C. Resulte of student B are neither precise nor accurate.

D. Results of student B are both precise and accurate.

Answer: B

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2. A measured temperature on Fahrenheit scale is $200^\circ F$. What will this reading be on clesius scale?

A. $40^\circ C$

B. $94^\circ C$

C. $93.3^\circ C$

D. $30^\circ C$

Answer: C

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3. What will be the molarity of a solution, which contains 5.85g of $NaCl(s)$ per 500mL?

A. $4molL^{-1}$

B. $20molL^{-1}$

C. $0.2molL^{-1}$

D. $2molL^{-1}$

Answer: C

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4. If 500 mL of a 5M solution is diluted to 1500 mL, what will be molarity of the solution obtained ?

A. $1.5M$

B. $1.66M$

C. $0.017M$

D. $1.59M$

Answer: B

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5. The number of atoms present in one mole of an element is equal to Avogadro number. Which of the following element contains the greatest number of atom?

A. 4g He

B. 46g Na

C. 0.40 g Ca

D. 12g He

Answer: D

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6. If the concentration of glucose $(C_6H_{12}O_6)$ in blood is 0.9g L^{-1}, what will be the molarity of glucose in blood ?

A. 5 M

B. 50 M

C. 0.005 M

D. 0.5 M

Answer: C

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7. What will be the molality of the solution containing 18.25 g of HCl gas in 500 g of water ?

A. 0.1 m

B. 1 M

C. 0.5 m

D. 1 m

Answer: D

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8. One mole of any substance contains 6.022×10^{23} atoms/molecules. Number of molecules of H_2SO_4 present in 100 mL of 0.02 M H_2SO_4 solution is :

A. 12.044×10^{20} molecules

B. 6.022×10^{23} molecules

C. 1×10^{23} molecules

D. 12.044×10^{23} molecules.

Answer: A

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9. What is the mass percent of carbon in carbon dioxide ?

A. $0.034\ \%$

B. $27.27\ \%$

C. $3.4\ \%$

D. $28.7\ \%$

Answer: B

Watch Video Solution

10. The empirical formula and molecular mass of a compound are CH_2O and 180 g respectively. What will be the molecular formula of the compound ?

A. $C_9H_{18}O_9$

B. CH_2O

C. $C_6H_{12}O_6$

D. $C_2H_4O_2$

Answer: C

Watch Video Solution

11. If the density of a solution is $3.12 \mathrm{g\,mL^{-1}}$, the mass of 1.5 mL solution in significant figures is

A. 4.7 g

B. $4680 \times 10^{-3} g$

C. $4.680g$

D. $46.80g$

Answer: A

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12. Which of the following statements about a compound is incorrect?

A. A molecule of a compound has atoms of different elements.

B. A compound cannot be separated into its constituent elements by physical methods of separation.

C. A compound retains the physical properties of its constituent elements.

D. The ratio of atoms of different elements in a compound is fixed.

Answer: C

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13. Which of the following statements is correct about the reaction given below:-

$4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(g)$

A. Total mass of iron and oxygen in reactants = total mass of iron and oxygen in product therefore it follows law of conservation of mass.

B. Total mass of reactants = total mass of product , therefore, law of multiple proportions is followed

C. Amount of Fe_2O_3 can be increased by taking one of the reactants (iron or oxygen) in excess.

D. Amount of Fe_2O_3 produced will decrease if the amount of any one of the reactants (iron or oxygen) is taken in excess.

Answer: A

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14. Which of the following reactions is not correct according to the law of conservation of mass?

A. $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$

B. $C_3H_8(g) + O_2(g) \rightarrow CO_2(g) + H_2O(g)$

C. $P_4(s) + 5O_2(g) \rightarrow P_4O_{10}(s)$

D. $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

Answer: B

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15. Which of the following statements indicates that law of multiple proportion is being followed?

A. Sample of carbon dioxide taken from any source will always have carbon and oxygen in the ratio $1:2$

B. Carbon forms two oxides namely CO_2 and CO, where masses of oxygen which combine with fixed mass of carbon are in the simple ratio $2:1$

C. When magnesium burns in oxygen, the amount of magnesium taken for the reaction is equal to the amount of magnesium in magneisum oxide formed.

D. At constant temperature and pressure, 200 mL of hydrogen will combine with 100 mL oxygen to produce 200 mL of water vapour.

Answer: B

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Ncert Exemplar Problems With Answers Hints And Solutions Ncert Exemplar Problems Chapter 1 Some Basic Concepts Of Chemistry Multiple Choice Questions Ii

1. One mole of oxygen has at STP is equal to :

A. 6.022×10^{23} molecules of oxygen

B. 6.022×10^{23} atoms of oxygen

C. 16 g of oxygen

D. 32 g of oxygen

Answer: A::D

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2. Sulphuric acid reacts with sodium hydroxide as follows

$H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$

when 1L of 0.1M sulphuric acid solution is allowed to react with 1L of 0.1M sodium hydroxide solution, the amount of sodium solphate formed and its molarity in the solution obtained is

A. $0.1 \text{ mol } \text{L}^{-1}$

B. 7.10 g

C. $0.025 \text{ mol } \text{L}^{-1}$

D. 3.55 g

Answer: B::C

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3. Which of the following pairs have the same number of atoms ?

A. 16 g of O_2 (g) and 4 g of $H_2(g)$

B. 16 g of O_2 and 44 g of CO_2

C. 28 g of N_2 and32 g of O_2

D. 12 g of C(s) and 23 g of Na(s)

Answer: C::D

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4. Which of the following solutions have the same molar concentration ?

A. 20 g of NaOH in 200 mL of solution

B. 0.5 mol of KCl in 200 mL of solution

C. 40 g of NaOH in 100 mL of solution

D. 20 g of KOH in 200 mL of solution

Answer: A::B

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5. 16g of oxygen has same number of molecules as in

A. 16 g of CO

B. 28 g of N_2

C. 14 g of N_2

D. 1.0 g of H_2

Answer: C::D

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6. Which of the following terms is/are unitless ?

A. Molality

B. Molarity

C. Mole fraction

D. Mass percent

Answer: C::D

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7. One of the statements of Dalton's atomic theory is given below "Compound are formed when atoms of different element combine in a fixed ratio "

Which of the following laws is not related to this statement?

A. Law of conservation of mass

B. Law of definite proportions

C. Law of multiple proportions

D. Avogadro law

Answer: A::D

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Ncert Exemplar Problems With Answers Hints And Solutions Ncert Exemplar Problems Chapter 1 Some Basic Concepts Of Chemistry Short Answer Questions

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

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2. How many significant figures should b e present in the answer of the following calculations?

$$\frac{2.5 \times 1.25 \times 3.5}{2.01}$$

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3. What is the symbol for SI unit of mole? How is the mole defined?

Watch Video Solution

4. What is the difference between Molarity and Molality.

Watch Video Solution

5. Calculate the mass per cent of calcium, phosphorus and oxygen in calcium phosphate $Ca_3(PO_4)_2$.

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6. 45.4L of dinitrogen reacted with 22.7L of dioxygen and 45.4 L of nitrous oxide was formed the reaction is given below

$2N_2(g) + O_2(g) \rightarrow 2N_2O(g)$

Which law is being obeyed in this experiment? Write the statement of the law?

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7. If two elements can combine to form more than one compound, the masses of one element that combine with a fixed mass of the other element, are in whole number ratio.

(a) Is this statement true?

(b) It yes, according to which law?

(c) Give one example related to this law.

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8. Calculate the average atomic mass of hydrogen using the following data :

Isotope	% Natural abudance mass	Atomic mass(amu)
$._1^1 H$	99.985	1
$._1^2 H$	0.015	2

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9. Hydrogen gas is prepared in the laboratory by reacting dilute HCl with granulated zinc, Following reaction takes place

$Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Calculate the voluem of hydrogen gas liberated at STP when 32.65 g of zinc reacts with HCl. 1 mol of a gas occupies 22.7 L volume at STP, atomic mass of Zn=65 .3u

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10. 3.0 molal $NaOH$ solution has a density of $1.110 g/mL$. The molarity of the solution is:

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11. Volume of a solution chagnes with chagne in temperature, then what will the molality of the solution be affected by temperature? Give reason for your answer.

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12. If 4 g of NaOH dissovles in 36g of H_2O, calculate the mole fraction of each component in the solution. (specific gravity of solution is $1gmL^{-1}$).

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13. The reactant which is entirely consumed in reaction is known as limiting reagent. In the reaction $2A + 4B \rightarrow 3C + 4D$, when 5 moles of A react with 6 moles of B, then

(a) which is the limiting reagent?

(b) calculate the amount of C formed?

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Ncert Exemplar Problems With Answers Hints And Solutions Ncert Exemplar Problems Chapter 1 Some Basic Concepts Of Chemistry Matching Type Questions

1. Match the following

(i)	88 g of CO_2	(a)	0.25 mol
(ii)	6.022×10^{23} molecules of H_2O	(b)	2 mol
(iii)	5.6 litres of O_2 at STP	(c)	1 mol
(iv)	96 g of O_2	(d)	6.022×10^{23} molecules
(v)	1 mole of any gas	(e)	3 mol

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2. Match the following physical quantities with units

	Phyrical quantity		Unit
(i)	Molarity	(a)	$g\ mL^{-1}$
(ii)	Mole fraction	(b)	mol
(iii)	Mole	(c)	Pascal
(iv)	Molality	(d)	Unitless
(v)	Pressure	(e)	$mol\ L^{-1}$
(vi)	Luminous intensity	(f)	Candela
(vi)	Surface Tension	(g)	$mol\ kg^{-1}$
(vii)	Density	(h)	Nm^{-1}
(viii)	Mass	(i)	kg

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Ncert Exemplar Problems With Answers Hints And Solutions Ncert Exemplar Problems Chapter 1 Some Basic Concepts Of Chemistry Assertion And Reason Type Questions

1. Assertion (A) : The empirical mass of ethene is half of its molecular mass

Reason (R) : The empirical formula represents the simplest whole number ratio of various atoms present in a compound.

A. Both A and R true and R is the correct explanation of A.

B. A is true but R is false.

C. A is false but R is true.

D. Both A and R are false.

Answer: A

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2. Assertion(A) One atomic mass unit is defined as one twelth of the mass of one carbon-12 atom.

Reason(R) Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard.

A. Both A and R are true and R is the correct explanation of a.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false.

D. Both A and R are false.

Answer: B

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3. Assertion(A) Significant figures for 0.200 is 3 where as for 200 it is 1. Reason(R) Zero at the end or right of a number are significatn provided they are not on the right side of the decimal point.

A. Both A and R are true and R is the correct explanation of a.

B. Both A and R are true but R is not the correct explanation of A.

C. A is true but R is false.

D. Both A and R are false.

Answer: C

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4. Assertion (A) : Combustion of 16 g of methane gives 18 g of water

Reason (R) : In the combustion of methane, water is one of the products.

A. Both A and are true but R is not the correct explanation of A.

B. A is true but R is false.

C. A is false but R is true.

D. Both A and R are false.

Answer: C

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Ncert Exemplar Problems With Answers Hints And Solutions Ncert Exemplar Problems Chapter 1 Some Basic Concepts Of Chemistry Long Answer Questions

1. A vessel contains 1.6g of dioxygen at STP(273.15k,1atm pressure). The gas is now trasnferred to another vessel at constnat temperature. Whre

pressure becomes half of the original pressure. Calculate

(a) Volume of the new vessel.

(b) number of molecuels of dioxygen.

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2. Calcium carbonate reacts with aqueous HCl to give $CaCl_2$ and CO_2 according to the reaction given below

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$

What mass of $CaCl_2$ will be formed when 250mL of 0.76 M HCl reac ts with 1000 g of $CaCO_3$? Name the limiting reagent. Calculate the number of moles of $CaCl_2$ formed in the reaction.

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3. Define the law of multiple proportions, Explain it with two examples. How des this law point to the existence of atoms?

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4. A b ox contains some identical red coloured balls. Labelleda as A, each weighing 2g. Another box contains identicla blue coloured balls. Labelled as B, each weighing 5g. Consider combination AB,AB_2, A_2B and A_2B_3 and show that law of multiple proportions is applicable.

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Additional Questions Very Short Answer Questions

1. What is AZT ? To which use is it being put?

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2. Name two chemical compounds used in treatment of cancer.

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3. What is generally added for sterilization of water to make it fit for drinking purposes?

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4. What is the atomicity of propane molecule?

Watch Video Solution

5. What is the S.I. unit of density ?

Watch Video Solution

6. If temperature is $10^{\circ} C,$ what is temperature in Fahrenheit?

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7. What is the number of significant figures in 1.050×10^4?

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8. Iron and oxygen combine to form three oxides, FeO, Fe_2O_3 and Fe_3O_4. Which law does it prove?

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9. How does the formula $C_{12}H_{22}O_{11}$ violate Dalton's atomic theory?

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10. What is one a.m.u. or one 'u'?

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11. Which isotope of carbon is used for getting relative atomic masses?

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12. How many molecules are present in 1 kg mole of a substance?

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13. What is the S.I. unit of molarity?

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14. The emperical formula of Acetic acid is

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15. Write the balanced equation for the reaction of aluminium carbide with water.

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16. What is limiting reactant in a reaction ?

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Additional Questions Short Answer Questions

1. Chemistry can prove to be a blessing or a curse depends upon the uses to which it is put. Comment.

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2. Give examples of homogeneous mixture in different physical states (two each).

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3. Define element compound and mixture

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4. Classify the following as pure substances or mixtures. Separate the pure substances into elements, compounds and divide the mixtures into homogenous and heterogenous :

(i) Air (ii) Milk (iii) Graphite (iv) Gasoline (v) Diamond (vi) Tap water (vii) Distilled water (viii) Oxygen (ix) Brass (x) 22 Carat gold (xi) Steel (xii) Iron (xiii) Sodium chloride (xiv) Iodised table salt.

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5. Give three main points of difference between a compound and a mixture.

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6. What does symbol SI signify ? Name the seven basic SI units ?

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7. Define precision and accuracy.

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8. What do you mean by significant figures?

Watch Video Solution

9. Under what conditions the zeros in a number are significant ?

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10. What do you understand by unit conversion factor ? How does it help to convert height in feet to height in metres ?

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11. After rounding off 1.235 and 1.225, we will have their answer respectively as

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12. Give one experiment involving a chemical reaction to prove that the law of conservation of mass is true. Or State and explain law of conservation of mass.

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13. Copper oxide obtained by heating copper carbonate or copper nitrate contains copper and oxygen in the same ratio by mass. Which law is illustrated by this observation ? State the law.

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14. N and O combine with H to form NH_3 and H_2O and they combine with each other to form NO_2. Which law is illustrated? Explain briefly.

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15. Define Gay Lussac's law of gaseous volume. Explain with one suitable example.

Watch Video Solution

16. What are the postulates of Modern Atomic Theory?

Watch Video Solution

17. Which isotope is used as a reference on the atomic scale ? What is one amu or one 'u'?

Watch Video Solution

18. Why atomic mass is an average value ? Explain with suitable example.

Watch Video Solution

19. How is mole related to

(i) mass, (ii) volume and (iii) number of molecules of a substance?

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20. What is the SI definition of mole?

Watch Video Solution

21. Comment on the statement : '1 mole of hydrogen'

Watch Video Solution

22. What is the difference between (i)Normality and Molarity ? (ii) Molarity and Molality?

Watch Video Solution

23. Define Empirical formula and Molecular formula. What is the relationship between them ?

Watch Video Solution

24. Write the empirical formulae of the following :

$(i)N_2O_4(ii)C_6H_6(iii)C_6H_{12}O_6(iv)H_2O_2(v)H_2O(vi)Na_2CO_3(vii)CH_3CO$

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25. What is a limiting reagent ? Explain with a suitable example.

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Additional Questions Long Answer Questions

1. Briefly explain the importance of chemistry in our daily life.

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2. Define 'matter'. Briefly describe the physical as well as chemical classification of matter.

Watch Video Solution

3. List the main pionts of difference between a compound and a mixture.

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4. What do you understand by 'significant figures' ? What are the rules for dtermining the number of significant figures ? Illustrate with suitable examples.

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5. What do you understand by Dimensional Analysis? Explain with a suitable example.

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6. State and explain the 'Law of Conservation of Mass'.

Watch Video Solution

7. Defind 'Law of Constant Composition or Definite Proportions'. Explain with a suitable example.

Watch Video Solution

8. State the Law of Multiple Proportions. Explain with two suitable examples.

Watch Video Solution

9. State law of reciprocal proportions.

Watch Video Solution

10. What is Gay Lussac's Law of Gaseous Volumes ? Explain with two suitable examples.

Watch Video Solution

11. What are the main postulates of Dalton's atomic theory ? What were its limitations ? How has the theory been modified ?

Watch Video Solution

12. Define : (i) Atom (ii) Molecule (iii) Atomic mass (iv) Gram atomic mass (v) Molecular mass (vi) Gram molecular mass.

Give suitable examples in each case.

Watch Video Solution

13. Define Avogadro's law. Taking a suitable example, prove that it is not in constradiction with Dalton's Atomic Theory.

Watch Video Solution

14. Define Avogadro number and mole. What is their importance ?

Watch Video Solution

15. What are Empirical and Molecular Formullae ? How are they related to each other?

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Analytical Questions And Problems With Answers Solutions Questions

1. Explain why is air sometime considered as a heterogeneous mixture.

Watch Video Solution

2. Rewrite the following after necessary corrections :

(i) The length of a rod is 10 cms.

(ii) The work done by a system is 10 joules (small letter is unsed in place of capital).

Watch Video Solution

3. Is the law of constant composition true for all types of compounds? Explain why or why not?

Watch Video Solution

4. Two bulbs A and B of equal capacity contain 10 g of oxygen (O_2) and ozone (O_3) respectively. Which bulb will have

(i) larger number of molecules?

(ii) larger number of oxygen atoms?

Watch Video Solution

5. Why molality is preferred over molarity in expressing the concentration of solution ?

Watch Video Solution

6. In the combustion of methane, what is the limiting reactant and why?

Watch Video Solution

7. Taking N_2 and O_2 as main compounds of air ($79\,\%\,N_2, 21\,\%\,O_2$ by volume) what is the molecular mass of air? How has it been arrived at ?

Watch Video Solution

8. What is the equivalent weight of $KH(IO_3)_2$ as an oxidant in presence of 4.0 (N) HCl when Icl becomes the reduced form ? $(K = 39.0, I = 127.0)$.

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9. What is kg-mole ? Find out the total number of electrons in a kg-mole of O_2.

Watch Video Solution

Analytical Questions And Problems With Answers Solutions Problems

1. The average molar mass of a mixture of methane (CH_4) and ethene (C_2H_4) present in the ratio of $a : b$ is found to be $20.0 gmol^{-1}$. If the ratio were reversed, what would be the molar mass of the mixture ?

View Text Solution

2. $25cm^3$ of 0.2 M solution of metal chloride (MCl_x) reacted with $150cm^3$ of 0.1 M $AgNO_3$ solution completely to form the precipitate of AgCl. What is the formula of metal chloride ?

Watch Video Solution

3. A black dot used as a full stop at the end of a sentence has a mass of about one attogram. Assuming that the dot is made up of carbon, calculate the approximate number of carbon atoms present in the dot.

Watch Video Solution

4. 20.0 mL of a mixture of oxygen (O_2) and ozone (O_3) was heated till ozone was completely decomposed. The mixture of cooling was found to have a volume of 21 mL. Calculate the percentage of ozone by volume in the mixture.

Watch Video Solution

5. Calculate the atomicity of mercury molecules from the following data :

(a) 10.0 g of mercury combine with 0.8 g of oxygen to form an oxide.

(b) 500 mL of mercury vapour at S.T.P. weigh = 4.465g

(c) Specific heat of mercury is 0.033.

Watch Video Solution

6. 4 g carbon were heated with 8 g of sulphur. How much carbon disulphide (CS_2) will be formed when that reaction is complete ? What will be its percentage purity?

Watch Video Solution

7. Gastric juice contains 3g HCl per liter. If a person produces 2.5 L of gastric juice per day, how many antacid tables each containing 400 mg of $Al(OH)_3$ are needed to neutralize all the HCl produced in one day ?

Watch Video Solution

Watch Video Solution

8. The vapour density of mixture consisting of NO_2 and N_2O_4 is 38.3 at $26.7^\circ C$. Calculate the number of moles of NO_2 I $100g$ of the mixture.

Watch Video Solution

9. A metal weighing 0.43 g was dissolved in 50 mL of 1 N H_2SO_4. The unreacted H_2SO_4 required 14.2 mL of 1 N NaOH for neutralisation. Calculate the equivalent weight of the metal?

View Text Solution

10. 10 mL of an HCl solution gave 0.1435 g of AgCl when treated with excess of $AgNO_3$ .The normality of the resulting solution is

Watch Video Solution

11. A mixture of $H_2C_2O_4$ and $HCOOH$ is heated with conc H_2SO_4. The gas produced is collected and on treatment with KOH solution, the volume of the gas decreases by $\frac{1}{6}$ calculate the molar ratio of the two acids in the original mixture.

Watch Video Solution

12. 1.2 g mixture of Na_2CO_3 and K_2CO_3 was dissolved in water to form $100cm^3$ of a solution. $20cm^3$ of this solution required $40cm^3$ of 0.1 N HCl for neutralisaiton. Calculate the weight of Na_2CO_3 and K_2CO_3 in the mixture.

View Text Solution

13. 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.

Watch Video Solution

14. (i)10 g of lead on heating gave 10.78 g of litharge, PbO. (ii) 9.775 g of red lead (Pb_3O_4) yielded on strong heating 9.545 g of litharge. (iii) 4.87 g of lead peroxide (PbO_2) gave on heating 4.545 g of litharge.

Show that these results illustrate the law of multiple proportions.

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15. What is the mass of a mole of water containing 50% of heavy water (D_2O)?

Watch Video Solution

16. Insulin contains 3.4% sulphur. Calculate minimum mol.wt. of insulin.

Watch Video Solution

17. The formula weight of an acid is $82.0.100cm^3$ of a solution of this acid containing $39.0g$ of the acid per litre were completely neutralised by $95.0cm^3$ of aqueous $NaOH$ containing $40.0g$ of $NaOH$ per litre. What is the basicity of the acid?

Watch Video Solution

18. $50cm^3$ of 0.2 N HCl is titrated against 0.1 N NaOH solution. The titration is discontinued after adding $50cm^3$ of NaOH solution. The remaining titration is completed by adding 0.5 N KOH solution. What is the volume of KOH required for completing the titration ?

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19. An alloy of metals X and Y weighs 12 g and contains atoms X and Y in the ratio of 2:5. The percentage by mass of X in the sample is 20. If atomic mass of X is 40, what is the atomic mass of metal Y?

Watch Video Solution

Watch Video Solution

20. An L.P.G. cylinder weight 14.8 kg when empty. When full, it weighs 29 kg and shows a pressure of 2.5 atm. In the course of use at $27^{\circ}C$, the weight of the full cylinder reduced to 23.2 kg. Find out the volume of $n-$ butane in cubic metres used up at $27^{\circ}C$ and 1 atm. [Mol. mass of butane = 58]

Watch Video Solution

Competition Focus Jee Main And Advanced Medical Entrance Special I Multiple Choice Question

1. Which of the following is a chemical fertilizer?

A. Urea

B. Sodium

C. Ammonium sulphate

D. All of these

Answer: D

Watch Video Solution

2. Which one of the following is not a mixture?

A. Brass

B. Air

C. 22 carat gold

D. Water

Answer: D

Watch Video Solution

3. 1 mm Hg represents a pressure of

A. $101.3\mathrm{N\ m^{-2}}$

B. $1013\mathrm{N\ m^{-2}}$

C. $133.3\mathrm{N\ m^{-2}}$

D. $1333\ \ \mathrm{N\ m^{-2}}$

Answer: C

Watch Video Solution

4. The number of significant figures in π are

A. 1

B. 2

C. 3

D. infinite

Answer: D

Watch Video Solution

5. Two oxides of a metal contain 36.4% and 53.4% of oxygen by mass respectively. If the formula of the first oxide is M_2O, then that of the second is

A. M_2O_3

B. MO

C. MO_2

D. M_2O_5

Answer: B

Watch Video Solution

6. Which one of the following sets of compounds correctly illustrate the law of reciprocal proportions?

A. P_2O_3, PH_3, H_2O

B. P_2O_5, PH_3, H_2O

C. N_2O_5, NH_3, H_2O

D. N_2O, NH_3, H_2O

Answer: A

Watch Video Solution

7. 116 mg of a compound on vaporisation in a victor Meyer's apparatus displaces 44.8 mL of air measured at S.T.P The molecular mass of the compound is

A. 116

B. 232

C. 58

D. 44.8

Answer: C

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8. An element X has the following isotopic composition :

$.^{200}X : 90\%, \quad .^{199}X : 8.0\%, \quad .^{202}X : 2.0\%$

The weighted average atomic mass of the naturally occurring element X is closest to :

A. 199 amu

B. 200 amu

C. 201 amu

D. 202 amu

Answer: B

Watch Video Solution

9. 1L of a gas is at a pressure of 10^{-6} mm of Hg at $25^{\circ}C$. How many molecules are present in the vessel.

A. 3.2×10^{6}

B. 3.2×10^{13}

C. 3.2×10^{10}

D. 3×10^{4}

Answer: B

Watch Video Solution

10. If 10^{21} molecules are removed from 200 mg of CO_2, the number of moles of CO_2 left will be ?

A. 2.88×10^{-3}

B. 1.66×10^{-3}

C. 4.54×10^{-3}

D. 1.66×10^{-2}

Answer: A

Watch Video Solution

11. The weight of a molecule of the compound $C_{60}H_{122}$ is

A. $1.4 \times 10^{-21} g$

B. $1.09 \times 10^{-21} g$

C. $5.025 \times 10^{23} g$

D. $16.023 \times 10^{23} g$

Answer: A

Watch Video Solution

12. $10 dm^3$ of N_2 gas and 10 dm^3 of gas X at the same temperature contain the same number of molecules The gas X is

A. CO

B. CO_2

C. H_2

D. NO

Answer: A

Watch Video Solution

13. How many moles of electrons weigh one kilogram?

A. 6.023×10^{23}

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

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

D. $\frac{1}{9.108 \times 9.023} \times 10^{8}$

Answer: D

Watch Video Solution

14. The total number of electrons in 18 mL of water $(\text{density} = 1\ \text{g}\ \ mL^{-}1)$ is

A. 6.02×10^{23}

B. 6.02×10^{25}

C. 6.02×10^{24}

D. $6.02 \times 18 \times 10^{23}$

Answer: C

Watch Video Solution

15. A gas mixture contains $50\,\%$ helium and $50\,\%$ methane by volume. What is the percent by weight of methane in the mixture.

A. $19.97\,\%$

B. $20.05\,\%$

C. $50\,\%$

D. 80.03%

Answer: D

Watch Video Solution

16. If $1/6$, in place of $1/12$, mass of carbon atom is taken to be the relative atomic mass unit, the mass of one one of a substance will:

A. increase two fold

B. decrease twice

C. be a function of molecular mass of the substance

D. remain unchanged.

Answer: D

Watch Video Solution

17. A person has as many notes as number of oxygen atoms in 24.8 g $Na_2S_2O_3.5H_2O$ (mol. Wt. = 248). A note counting machine counts 48 million notes per day. How many days it would take to count these notes?

A. 10^{12}

B. 10^{14}

C. 10^{16}

D. 10^{18}

Answer: C

Watch Video Solution

18. Number of mole of $1m^3$ gas at NTP are:

A. 4.46

B. 44.6

C. 446

D. 4460

Answer: B

Watch Video Solution

19. Volume occupied by one molecule of water (density = 1 g cm^{-3})

A. $9.0 \times 10^{-23} cm^3$

B. $6.023 \times 10^{-23} cm^3$

C. $3. \times 10^{-23} cm^3$

D. $5.5 \times 10^{-23} cm^3$

Answer: C

Watch Video Solution

20. The mass of $2.24 \times 10^{-3} m^3$ of a gas is 4.4 g at 273.15 K and 101.325 Kpa pressure. The gas may be

A. NO

B. NO_2

C. C_3H_8

D. NH_3

Answer: C

Watch Video Solution

21. The total number of atoms of all elements present in mole of ammonium dichromate is

A. 19

B. 6.023×10^{23}

C. 114.473×10^{23}

D. 84.322×10^{23}

Answer: C

Watch Video Solution

22. If 1 ml of water contains 20 drops. Then no. of molecules in a drop of water is

A. 6.023×10^{23}

B. 1.376×10^{26}

C. 1.6673×10^{21}

D. 4.346×10^{20}

Answer: C

Watch Video Solution

23. Which has the maximum number of molecules among the following ?

A. 44 g of CO_2

B. 48 g O_2

C. 8 g H_2

D. 64 g SO_2

Answer: C

Watch Video Solution

24. The number of water molecules is maximum in

A. 18 gram of water

B. 18 moles of water

C. 18 molecules of water

D. 1.8 gram of water

Answer: B

Watch Video Solution

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

A. 18 mL of water

B. 0.18 g of water

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

D. 10^{-3} mol of water

Answer: A

Watch Video Solution

26. Which one of the following is the lighest?

A. 0.2 mole of hydrogen gas

B. 6.023×10^{22} molecules of nitrogen

C. 0.1 g of silver

D. 0.1 mole of oxygen gas

Answer: C

Watch Video Solution

27. $50mL$ of $10NH_2SO_4$, $25mL$ of $12NHCI$ and $40mL$ of $5NHNO_3$ are mixed and the volume of the mixture is made 1000 mL by adding water. The normality of resulting solution will be

A. 1 N

B. 2 N

C. 3 N

D. 4 N

Answer: A

Watch Video Solution

28. 25.3 g of sodium carbonate, Na_2CO_3 is dissolved in enough water to make 250 mL of solution. If sodium carbonate dissociates completely, molar concentration of sodium ions, Na^+ and carbonate ions, CO_3^{2-} are respectively (Molar mass of $NaCO_3 = 106gmol^{-1}$)

A. $0.125M$

B. $0.25M$

C. $0.4M$

D. $0.5M$

Answer: A

Watch Video Solution

29. 0.3 g of an acid is neutralized by $40cm^3$ of 0.125 N NaOH. Equivalent mass of the acid is

A. 60

B. 45

C. 30

D. 63

Answer: A

Watch Video Solution

30. 25.3 g of sodium carbonate, Na_2CO_3 is dissolved in enough water to make 250 mL of solution. If sodium carbonate dissociates completely, molar concentration of sodium ions, Na^+ and carbonate ions, CO_3^{2-} are respectively (Molar mass of $NaCO_3 = 106gmol^{-1}$)

A. 0.477 M and 0.477 M

B. 0.955 M and 1.910 M

C. 1.910 M and 0.955 M

D. 1.90 M and 1.910 M

Answer: C

Watch Video Solution

31. The number of molecules in 100 mL of $0.02N\ H_2SO_4$ is:

A. 6.02×10^{22}

B. 6.0×10^{21}

C. 6.02×10^{20}

D. 6.02×10^{18}

Answer: C

Watch Video Solution

32. A 100 ml solution of 0.1N-HCl was titrated with 0.2 N-NaOH solution. The titration was discontinued after adding 30 ml of NaOH solution. The

remaining titration was completed by adding 0.25N-KOH solution. The volume of KOH required for completing the titration is

A. 70 ml

B. 32 ml

C. 35 ml

D. 16 ml

Answer: D

Watch Video Solution

33. The ratio of masses of oxygen and nitrogen in a particular gaseous mixture $1:4$. The ratio of number of their molecule is :

A. $3:16$

B. $1:4$

C. $7:32$

D. $1:8$

Answer: C

Watch Video Solution

34. A mixture of gases contains H_2 and O_2 gases in the ratio of $1:4(w/w)$. What is the molar ratio of the two gases in the mixture?

A. $16:1$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: D

Watch Video Solution

35. Suppose the elements X and Y combine to form two compounds of XY_2 and X_3Y_2. When 0.1 mole of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g , what are tha atomic masses of X and Y ?

A. 40, 30

B. 60, 40

C. 20, 30

D. 30, 20

Answer: A

Watch Video Solution

36. An organic compound made of C, H and N contains 20% of nitrogen. Its molecular weight is

A. 70

B. 140

C. 100

D. 65

Answer: A

Watch Video Solution

37. Percentage of Se in peroxidase anhydrase enzyme is $0.5\,\%$ by weight (at. Wt. $= 78.4$), then minimum molecular weight of peroxidase anhydrase enzyme is:

A. 1.568×10^4

B. 1.568×10^3

C. 15.68

D. 3.136×10^4

Answer: A

Watch Video Solution

38. An alkaloid contains 17.28% of nitrogen and it's molecular mass is 162. The number of nitrogen atoms present in one molecular of alkaloid is

A. five

B. four

C. three

D. two

Answer: D

Watch Video Solution

39. The crystalline salt $Na_2SO_4.xH_2O$ on heating loses 55.9 % of its weight. The formula of the crystalline salt is

A. $Na_2SO_4.5H_2O$

B. $Na_2SO_4.7H_2O$

C. $Na_2SO_4.2H_2O$

D. $Na_2SO_4.10H_2O$

Answer: D

Watch Video Solution

40. $0.1mol$ of a carbonhydrate with empirical formula CH_2O contains $1g$ of hydrogen. What is its molecular formula?

A. $C_5H_{10}O_5$

B. $C_6H_{12}O_6$

C. $C_4H_8O_4$

D. $C_3H_6O_3$

Answer: A

Watch Video Solution

41. The most abundant elements by mass in the body of a healthy human adult are: Oxygen (61.4%), Carbon (22.9%), Hydrogen (10.0%), and Nitrogen (2.6%). The weight which a 75 kg person would gain if all $._1^1 H$ atoms are replaced by $._1^2 H$ atoms is:

A. 7.5 kg

B. 10 kg

C. 15 kg

D. 37.5 kg

Answer: A

Watch Video Solution

42. The ration of mass per cent of C and H of an organic compound $\left(C_x H_y O_z\right) \text{is} 6:1$. If one molecule of the above compound $\left(C_x H_Y O_z\right)$ contains half as much oxygen as required to burn one molecule of

compound C_xH_Y compleltely to CO_2 and H_2O. The empirial formula of compound $C_xH_yO_z$ is:

A. $C_3H_6O_3$

B. C_2H_4O

C. $C_3H_4O_2$

D. $C_2H_4O_3$

Answer: D

Watch Video Solution

43. In Haber process 30 litre of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only$50\ \%$ of the expected product. What will be the composition of gaseous mixture under the aforesaid condition in the end ?

A. 20 litres NH_3, 25 litres N_2, 20 litres H_2

B. 10 litres NH_3, 25 litres N_2, 15 litres H_2

C. 20 litres NH_3, 10 litres N_2, 30 litres H_2

D. 20 litres NH_3, 25 litres N_2, 15 lites H_2

Answer: B

Watch Video Solution

44. For the formation of 3.65 g of hydrogen chloride gas, what volumes of hydrogen gas and chlorine gas are required at NTP conditions?

A. 1.12 lit, 1.12 lit

B. 1.12 lit, 2.24 lit

C. 3.65 lit, 1.83 lit.

D. 1 lit., 1 lit.

Answer: A

Watch Video Solution

45. The mass of carbon anode consumed (giving only carbon dioxide) in the production of $270kg$ of aluminium metal from bauxite by the Hall process is

A. 90 kg

B. 540 kg

C. 180 kg

D. 270 kg

Answer: A

Watch Video Solution

46. The dehydration yield of cyclohexanol to cyclohexene is $75\,\%$. What would be the yield if $100g$ of cyclohexanol is dehydrated?

A. 82.35 g

B. 61.76 g

C. 38.34 g

D. 17.65 g

Answer: B

Watch Video Solution

47. A mixture of CO_2 and CO is passed over red hot graphite when 1 mole of mixture changes to 33.6 L (converted to STP). Hence, mole fraction of CO_2 in the mixture is

A. 0.25

B. 0.33

C. 0.5

D. 0.66

Answer: C

View Text Solution

48. 3.28 g of a sample of pure copper when heated in presence of oxygen of some time forms black copper oxide (CuO) which weighs 3.92 g. What approximate percent of copper remains unoxidized?

A. $4.6\,\%$

B. $5.6\,\%$

C. $6.6\,\%$

D. $7.6\,\%$

Answer: A

Watch Video Solution

49. An ore contains $1.24\,\%$ of the mineral argentite, Ag_2S by mass. How many grams of this ore would have to be processed in order to obtain 1.0 g of pure solid silver?

A. 46.3 g

B. 92.6 g

C. 69.45 g

D. 23.15 g

Answer: B

Watch Video Solution

50. The decomposition of cetian mass of $CaCO_3$ gave $11.2dm^3$ of CO_2 gas at STP. The mass of KOH required to completely neutralise the gas is:

A. 56 g

B. 28 g

C. 42 g

D. 20 g

Answer: A

Watch Video Solution

51. 20.0 g of magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g of magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample?

A. 60

B. 84

C. 75

D. 96

Answer: B

Watch Video Solution

52. A mixture of $CaCl_2$ and NaCl weighing 4.44 is treated with sodium carbonate solution to precipitate all the Ca^{2+} ions as calcium carbonate. The calcium carbonate so obtained is heated strongly to get 0.56 g of CaO. The percentage of NaCl in the mixture of (atomic mass of Ca=40) is

A. 75

B. 30.6

C. 25

D. 69.4

Answer: A

Watch Video Solution

53. A mixture of ethane and ethene occupies 41 L at atm and 500 K. The mixture reacts compeletly with 10/3 mole of oxygen to produce CO_2 and water. The mole fraction of ethane and ethene in the mixture are (R=0.0821L atm $K^{-1}mol^{-1}$ respectively

A. 0.50, 0.50

B. 0.75, 0.25

C. 0.67, 0.33

D. 0.25, 0.75

Answer: C

Watch Video Solution

54. Express of CO_2 is passed through 50 mL of 0.5 M calcium hydroxide solution. After the completion of the reaction, the solution was evaporated to dryness. The solid calcium carbonated was completely neutralized with 0.1 N hydrochloric acid. The volume of hydrochloric acid required is (At mass of carbon = 40)

A. 200 mL

B. 500 mL

C. 400 mL

D. 300 mL

Answer: B

Watch Video Solution

55. In the reaction, $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$, when 1 mole of ammonia and 1 mole of O_2 are made to react to completion

A. 1.0 mole of H_2O is produced

B. 1.0 mole of NO will be produced

C. all the oxygen will be consumed

D. all the ammonia will be consumed

Answer: C

Watch Video Solution

56. 20 mL of methane is completely burnt using 50 mL of oxygen. The volume of the gas left after cooling to room temperature is

A. 80 mL

B. 40 mL

C. 60 mL

D. 30 mL

Answer: D

Watch Video Solution

57. The number of Cl^- ions in 100 mL of 0.001 M HCl solution is

A. $6.022 \times 10\,\%\,(23)$

B. 6.022×10^{20}

C. 6.022×10^{19}

D. 6.022×10^{24}

Answer: C

Watch Video Solution

58. 50 mL solution of $BaCl_2$ (20.8% w//v) and 100 mL solution of H_2SO_4 (9.8% w//v) are mixed (Ba = 137, Cl = 35.5, S=32)

$$BaCl_2 + H_2SO_4 \rightarrow BaSO_4 \downarrow 2HCl$$

Weight of $BaSO_4$ formed is:

A. 11.65 g

B. 23.3 g

C. 29.8 g

D. 46.6 g

Answer: A

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59. What is the mass of the precipitate formed when 50 mL of 16.9% solution of $AgNO_3$ is mixed with 50 mL of 5.8% NaCl solution?

A. 7 g

B. 14 g

C. 28 g

D. 3.5 g

Answer: A

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60. How many moles of lead (II) chloride will be formed from a reaction between 6.5 g of PbO and 3.2 g of HCl?

A. 0.044

B. 0.333

C. 0.011

D. 0.029

Answer: D

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61. 1 gram of carbonate (M_2CO_3) on treatment with excess HCl produces 0.1186 mole of CO_2. The molar mass of $M_2CO_3 \text{in g mol}^{-1}$

A. 118.6

B. 11.86

C. 1186

D. 84.3

Answer: D

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62. For reaction $A + 2B \rightarrow C$. The amount of C formed by starting the reaction with 5 mole of A and 8 mole of B is :

A. 5 moles

B. 8 moles

C. 16 moles

D. 4 moles

Answer: D

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63. In an experiment, 4g of M_2O_x oxide was reduced to 2.8g of the metal. If the atomic mass of the metal is $56 g \text{mol}^{-1}$, the number of oxygen atoms in the oxide is:

A. 1

B. 2

C. 3

D. 4

Answer: C

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64. When $22.4L$ of $H_2(g)$ is mixed with 11.2 of $Cl_2(g)$, each at STP, the moles of HCl(g) formed is equal to

A. 1 mol of HCl (g)

B. 2 mol of HCl (g)

C. 0.5 mol of HCl (g)

D. 1.5 mol of HCl (g)

Answer: A

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65. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reactant is left in excess and how much?

A. Mg, 0.16 g

B. $O_2, 0.16g$

C. $Mg, 0.44g$

D. $O_2, 0.28g$

Answer: A

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66. The molecular formula of a commercial resin used for exchanging ions in water softening is $C_8H_7SO_3Na(mol.\ Wt.\ 206)$. What would be the maximum uptake of Ca^{2+} ions by the resin when expressed in mole per gram resin?

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

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

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

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

Answer: D

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67. 10 g hydrogen is reacted with 64 g of oxygen. The amount of water formed will be (in moles)

A. 3

B. 4

C. 1

D. 2

Answer: B

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68. A 100% pure sample of a divalent metal carbonate weighing 2 g on complete thermal decomposition releases 448 cc of carbon dioxide at STP. The equivalent mass of the metal is

A. 40

B. 20

C. 28

D. 12

Answer: B

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69. When a metal is burnt, its weight is increased by 24%. The equivalent weight of the metal wil be:

A. 120

B. 80

C. 60

D. 40

Answer: D

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70. The percentage of element M is 53 in its oxide of molecular formula M_2O_3. Its atomic mass is about

A. 45

B. 9

C. 18

D. 27

Answer: D

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71. A metal M of equivalent mass E forms an oxide of molecular formula M_xO_y. The atomic mass of the metal is given by the correct equation.

A. $2E(y/x)$

B. xy/E

C. E/y

D. y/E

Answer: A

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72. A bivalent metal has an equivalent mass of 32. The molecular mass of the metal nitrate is

A. 168

B. 192

C. 188

D. 182

Answer: C

Watch Video Solution

73. 0.32 g of metal gave on treatment with an acid 112 mL of hydrogen at NTP. Calculate the equivalent weight of the metal

A. 58

B. 32

C. 11.2

D. 24

Answer: B

Watch Video Solution

74. Sucross solution which is $40\ \%$ by mass is heated till it becomes $50\ \%$ by mass. Water lost form 100 g of the solution is

A. 10 g

B. 15 g

C. 20 g

D. 25 g

Answer: C

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75. One gram of a mixture of Na_2CO_3 and $NaHCO_3$ consumes y gram equivalent of HCl for complete neutralization. One gram of the mixture is strongly heated, then cooled and the residue treated with HCl. The gram equivalent of HCl now required for complete neutralization will be

A. 2 y

B. 3 y

C. y

D. y/2

Answer: C

Watch Video Solution

76. The total ionic strength (total molarity of all the ions) containing 0.2 M $CuSO_4$ and $0.1M Al_2(SO_4)_3$ is

A. 0.5 M

B. 0.7 M

C. 0.9 M

D. 1.2 M

Answer: C

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77. If Avogadro number N_A is changed form $6.022 \times 10^{23} \text{mol}^{-1}$ to $6.022 \times 10^{20} \text{mol}^{-1}$, this would change_____

A. the ratio of the chemical species to each other in a balanced equation

B. the ratio of the elements to each other in a compound

C. the definition of the mass in units of gram

D. the mass of one mole of carbon

Answer: D

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78. 3750 mg of an alcohool reacts with required amount of methyl magnesium bromide and release 140mL of methane gas at STP. The alcohol is :

A. ethanol

B. n-butanol

C. methanol

D. n-propanol

Answer: D

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Competition Focus Jee Main And Advanced Medical Entrance Special Ii Multiple Choice Question

1. 8 g of O_2 has the same number of molecules as in :

A. 7 g CO

B. $14gN_2$

C. $11gCO_2$

D. $16gSO_2$

Answer: A::C::D

Watch Video Solution

2. A vessel contains 4.4 g of CO_2. It means that it contains

A. 0.1 mol of CO_2

B. 6.02×10^{22} molecules of CO_2

C. 8.8 g atoms of oxygen

D. 1120 mL of CO_2 at S.T.P.

Answer: A::B

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3. 1 g Mg was burnt in a closed vessel containing 2 g oxygen. Which of the following are not correct?

A. 0.25 g of Mg will be left unburnt

B. 1.33 of O_2 will be left unreacted

C. 2.5 g of MgO will be formed

D. The mixture at the end will weigh 3 g.

Answer: A::C

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4. Which of the following methods of expressing concentration varies with temperature ?

A. Molarity

B. Molality

C. Normality

D. Mole fraction

Answer: B::D

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Competition Focus Jee Main And Advanced Medical Entrance Special Iii Multiple Choice Question

1. Earlier the concept of equivalent weight was very common and the concentrations of the solutions were expressed in terms of normolities. The convenience was that the substances reacted in the ratio of their gram equivalents. So there was no need for writing the balanced

equations to determine the amounts of the substances reacted. However, determination of equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in different reactions. For example, $KMnO_4$ has different equivalent weight in the basic medium than in teh acidic medium. Hence, now-a-days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality, molarity, mole fractions etc. are also used

The equivalent mass of Cu

A. will be same in CuO and Cu_2O

B. will be double in Cu_2O than in CuO

C. will be double in CuO than in Cu_2O

D. depends upon whether copper is pure or impure.

Answer: B

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2. Earlier the concept of equivalent weight was very common and the concentrations of the solutions were expressed in terms of normolities. The convenience was that the substances reacted in the ratio of their gram equivalents. So there was no need for writing the balanced equations to determine the amounts of the substances reacted. However, determination of equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in different reactions. For example, $KMnO_4$ has different equivalent weight in the basic medium than in teh acidic medium. Hence, now-a-days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality, molarity, mole fractions etc. are also used

The chloride of an element is found to contain 52.8% chlorine. The equivalent mass of the element is

A. 63.4

B. 31.7

C. 47.2

D. 18.7

Answer: B

Watch Video Solution

3. Earlier the concept of equivalent weight was very common and the concentrations of the solutions were expressed in terms of normolities. The convenience was that the substances reacted in the ratio of their gram equivalents. So there was no need for writing the balanced equations to determine the amounts of the substances reacted. However, determination of equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in different reactions. For example, $KMnO_4$ has different equivalent weight in the basic medium than in teh acidic medium. Hence, now-a-days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality, molarity, mole fractions etc. are also used

A 40% hydrochloric acid is found to have a density of 1.20 g mL^{-1}. The molarity of the solution is nearly

A. 11 M

B. 12 M

C. 13 M

D. 14 M

Answer: C

Watch Video Solution

4. Earlier the concept of equivalent weight was very common and the concentrations of the solutions were expressed in terms of normolities. The convenience was that the substances reacted in the ratio of their gram equivalents. So there was no need for writing the balanced equations to determine the amounts of the substances reacted. However, determination of equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in

different reactions. For example, $KMnO_4$ has different equivalent weight in the basic medium than in teh acidic medium. Hence, now-a-days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality, molarity, mole fractions etc. are also used

The molality of the above solution will be nearly

A. 15.3 m

B. 16.3 m

C. 17.3 m

D. 18.3 m

Answer: D

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5. Earlier the concept of equivalent weight was very common and the concentrations of the solutions were expressed in terms of normolities. The convenience was that the substances reacted in the ratio of their

gram equivalents. So there was no need for writing the balanced equations to determine the amounts of the substances reacted. However, determination of equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in different reactions. For example, $KMnO_4$ has different equivalent weight in the basic medium than in teh acidic medium. Hence, now-a-days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality, molarity, mole fractions etc. are also used

The mole fraction of hydrochloric acid in the solution will be

A. 0.25

B. 0.3

C. 0.35

D. 0.4

Answer: A

Watch Video Solution

6. Earlier the concept of equivalent weights was very common and the concentrations of the solutions were expressed in terms of normalities. The convenience was that the substances reacted in the ratio of their gram equivalents . So there was no need to write balanced equation to determine the amounts of the substraces reacted. However, determination or equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in different reactions, For example, $KMnO_4$ has different equivalent weight in the basic medium than inthe acidic medium. Hence, now a days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality. mole fraction etc. are also used.

The volume of the above solution required to make 1.0 L of 0.10 M HCl will be

A. 5.6 mL

B. 6.6 mL

C. 7.6 mL

D. 8.6 mL

Answer: C

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Competition Focus Jee Main And Advanced Medical Entrance Special Iv Matching Type Questions

1. Match the entries of column I with appropriate entries of column II and choose the correct option out of the four option (a), (b), (c), (d) given at the end of each question.

Column I	Column II
(A) German silver and gold jewellery	(p) Elements
(B) Antimony and Bismuth	(q) Isomorphs
(C) $ZnSO_4.7H_2O$ and $FeSO_4.7H_2O$	(r) Polymorphs
(D) Zinc blende and Wurtzite	(s) Mixtures
(E) Graphite and Diamond	(t) Metalloids

A. A-p, B-r, C-t, D-q, E-s

B. A-s, B-t, C-q, D-r, E-p

C. A-q, B-r, C-p, D-t, E-s

D. A-t, B-s, C-r, D-q, E-p

Answer: B

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2. Match the entries of column I with appropriate entries of column II and choose the correct option out of the four option (a), (b), (c), (d) given at the end of each question.

Column I	Column II
(A) femto	(p) 10^{9}
(B) yotta	(q) 10^{-15}
(C) giga	(r) 10^{-18}
(D) atto	(s) 10^{24}

A. A-q, B-p, C-r, D-s

B. A-s, B-q, C-p, D-r

C. A-q, B-s, C-p, D-r

D. A-r, B-s, C-p, D-q

Answer: C

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Competition Focus Jee Main And Advanced Medical Entrance Special V Matrix Match Type Questions

1.

Column I (No. of significant figures)	Column II (Numbers)
(A) 1	(p) 6.022×10^{23}
(B) 2	(q) 0.0085
(C) 3	(r) 2.850
(D) 5	(s) 0.0200

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2.

Column I (No. of moles)	Column II (Amount)
(A) 0.1 mole	(p) 4480 mL of CO_2 at STP
(B) 0.2 mole	(q) 0.1 g atom of iron
(B) 0.25 mole	(r) 1.5×10^{23} molecules of oxygen gas
(C) 0.25 mole	(s) 9 mL of water
(D) 0.5 mole	(t) 200 mg of hydrogen gas

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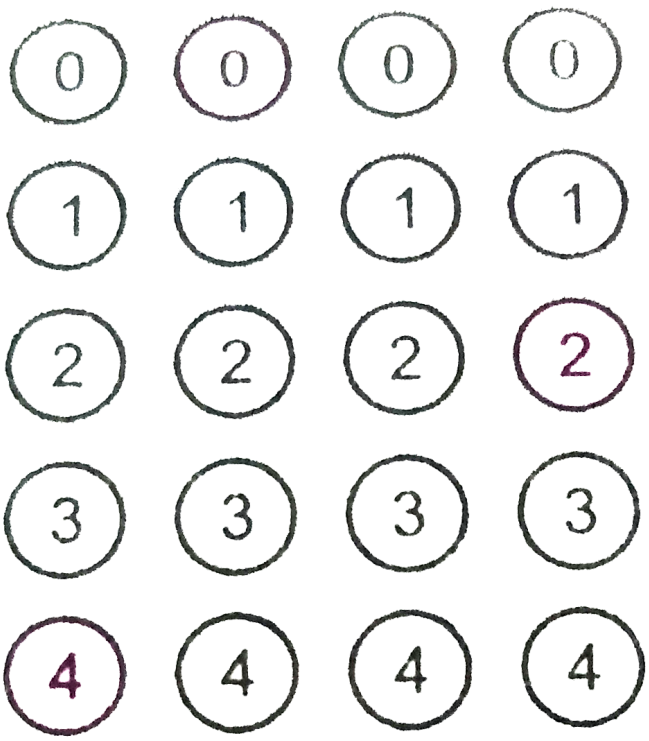
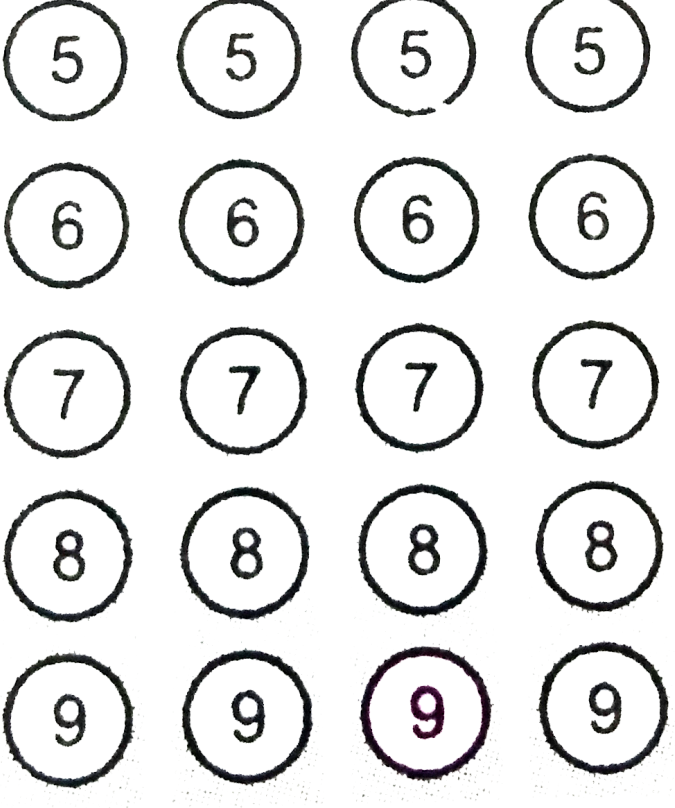
Competition Focus Jee Main And Advanced Medical Entrance Special Vi Integer Type Questions

1. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of bubbles should be as shown on the side:





`The number of metalloids present in the following elements is tin, lead, arsenic, palladium, anitmony, tungsten, bismuth, osmium, lanthanum

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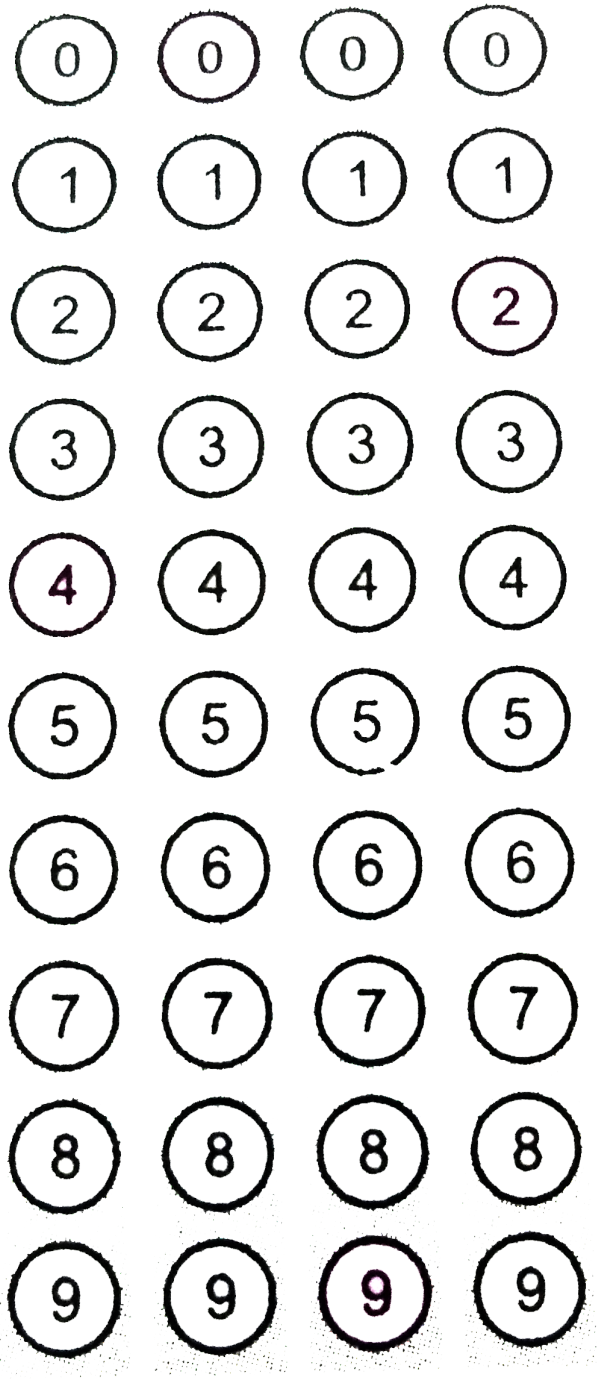
2. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of

bubbles should be as shown on the side:


A B
0 0 0 0
1 1 1 1
2 2 2 2
3 3 3 3
4 4 4 4
5 5 5 5
6 6 6 6
7 7 7 7
8 8 8 8
9 9 9 9

A termerature of $41^{\circ} F$ when expressed in terms of degrees centigrade will be

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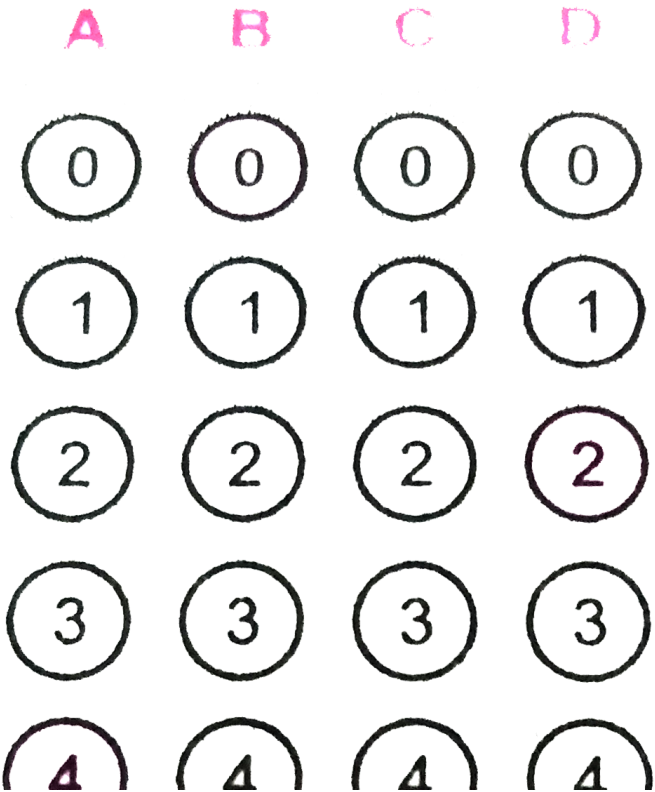
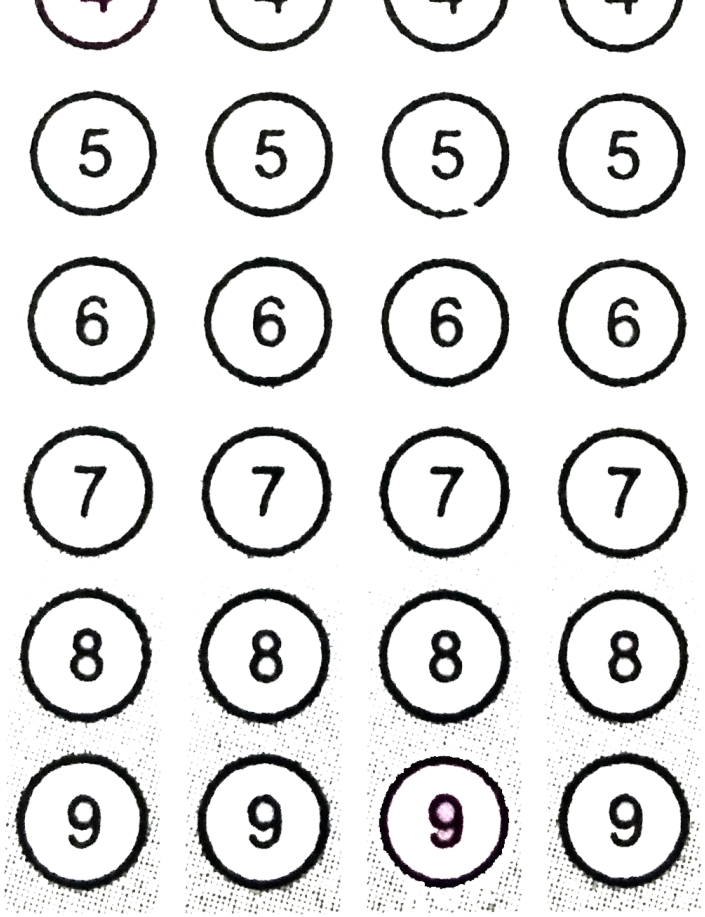
3. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of bubbles should be as shown on the side:





The prefix 'giga' represents 10^x where x is

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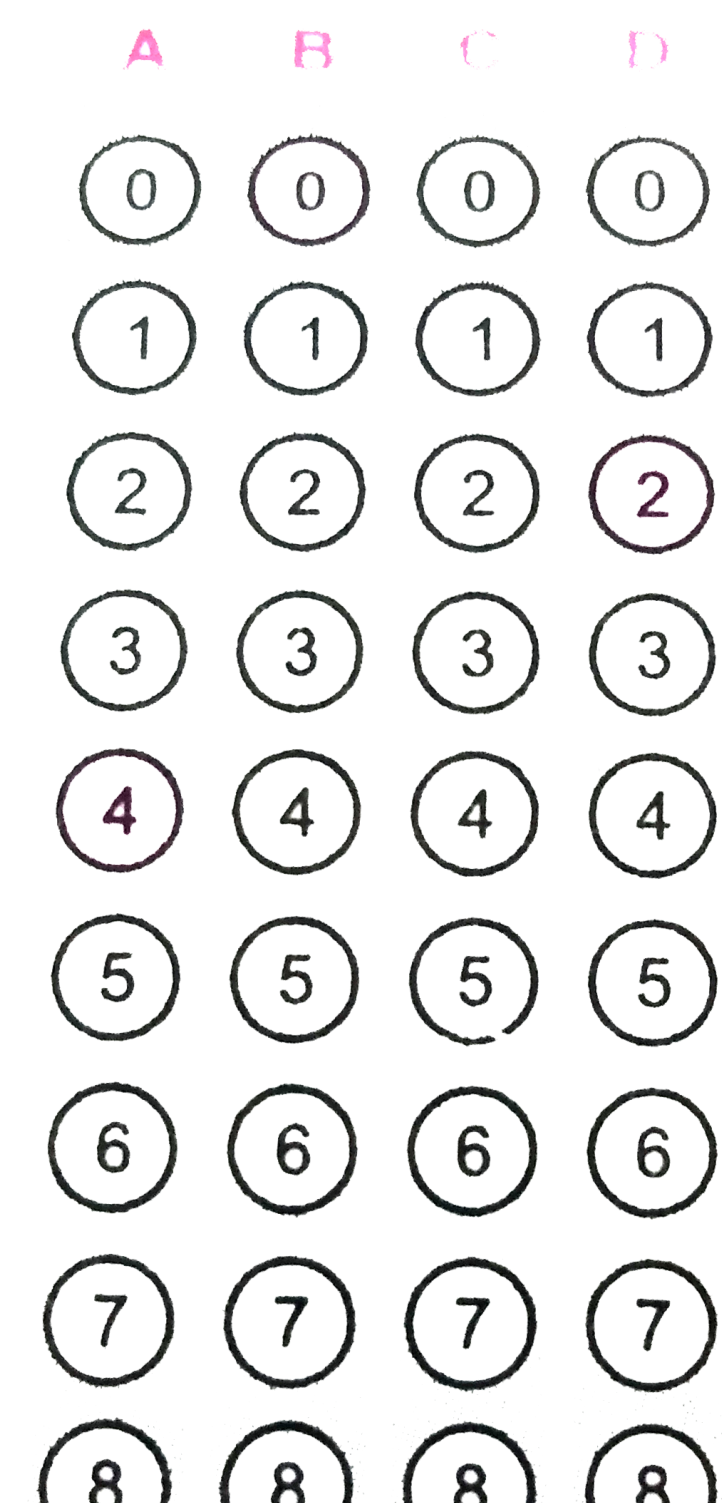
4. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of

bubbles should be as shown on the side:



The number of significant figures in the value 0.000524000 is

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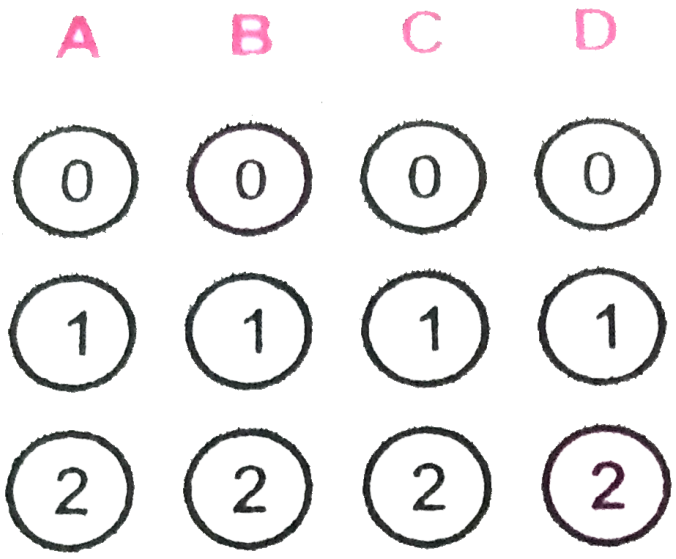
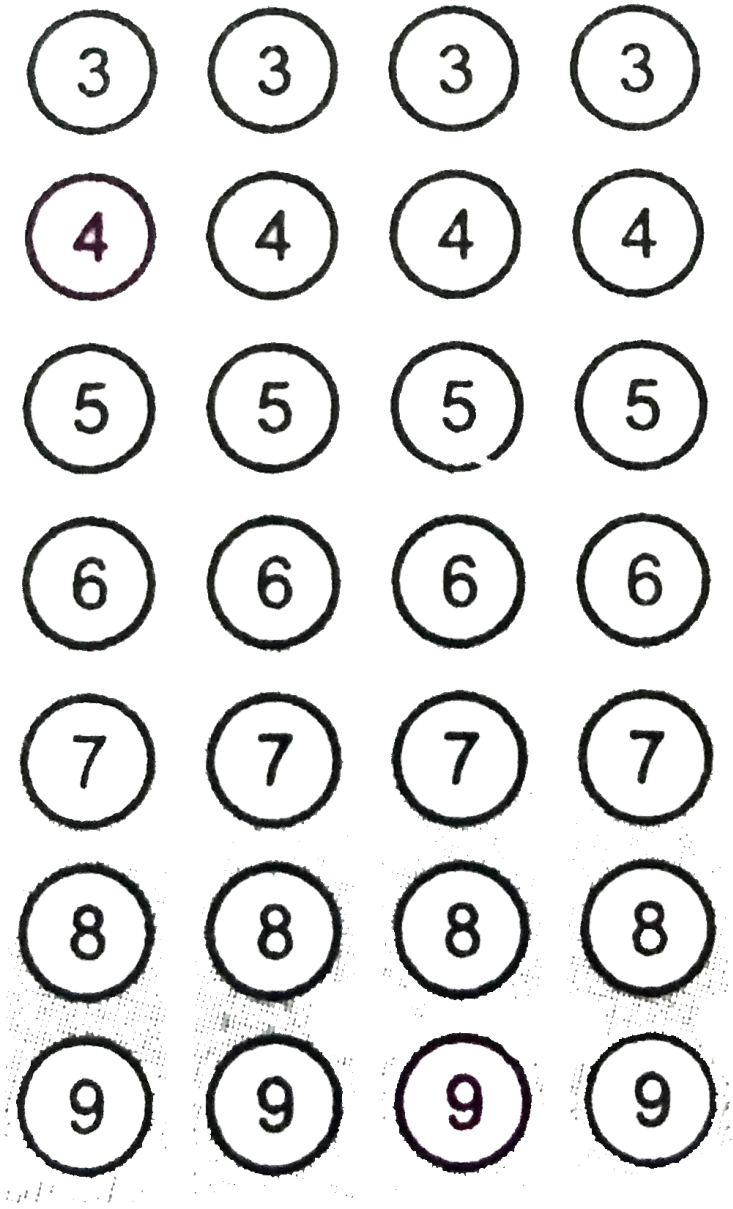
5. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of bubbles should be as shown on the side:





Copper react with nitric acid to form copper (II) nitric oxide and water.

The number of nitric acid molecules in the balanced equation is

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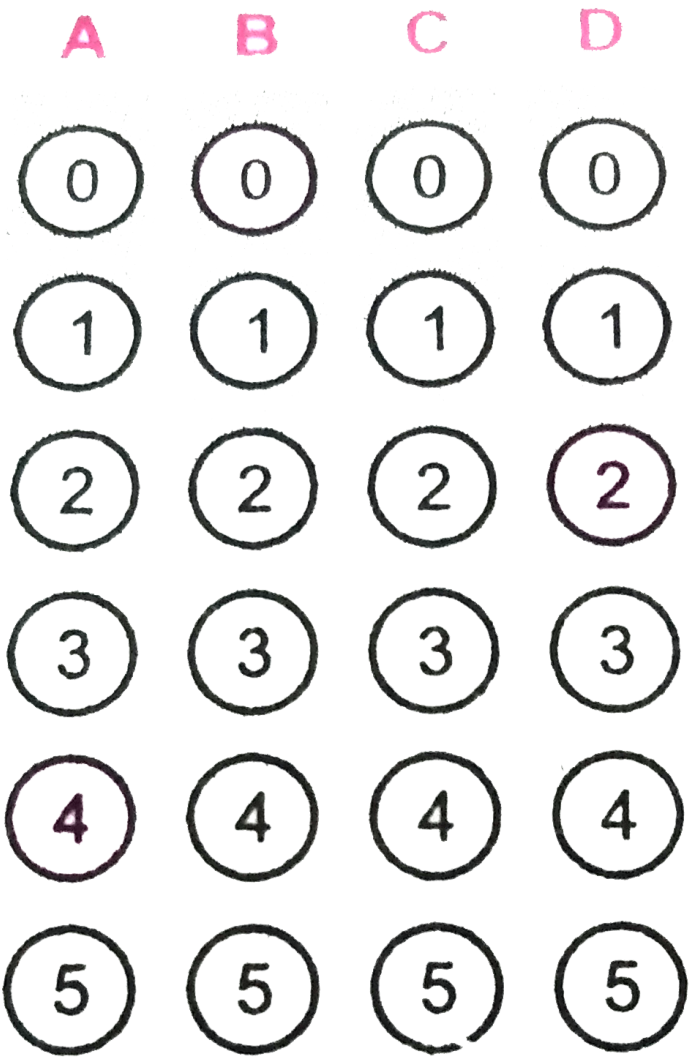
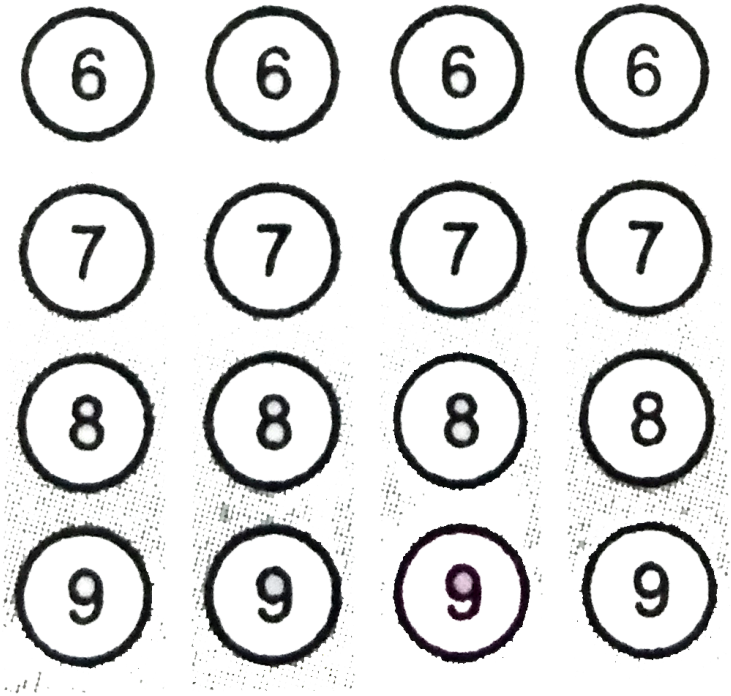
6. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of bubbles should be as shown on the side:





Silver (atomic weight = $108\ \mathrm{g\ mol}^{-1}$) has a density of 10.5 g cm^{-3}. The number of silver atoms on a surface 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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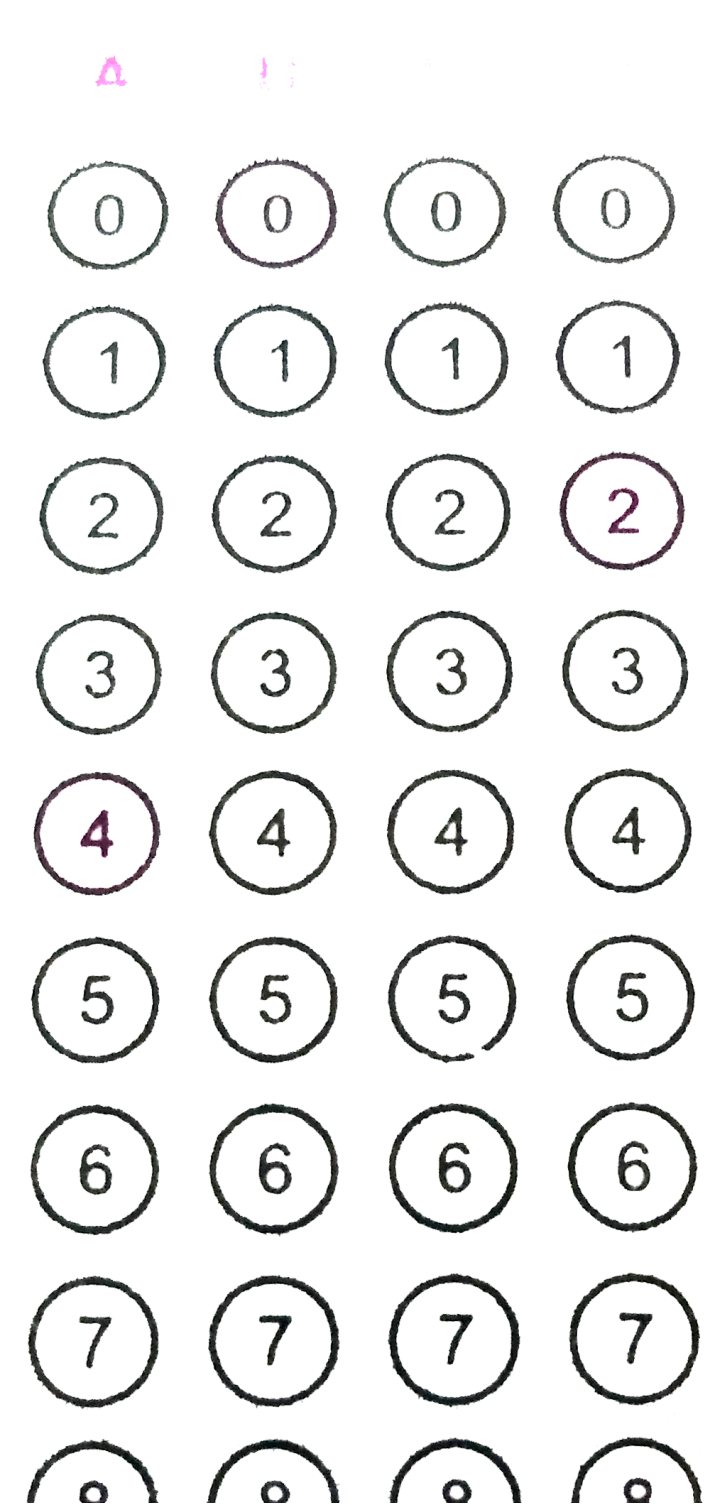
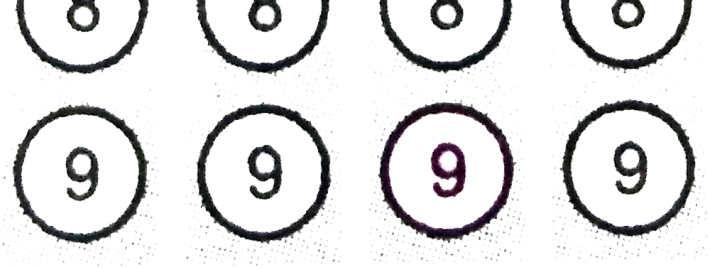
7. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of

bubbles should be as shown on the side:





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

O, Cl, F, N, P, Sn, Tl, Na, Ti

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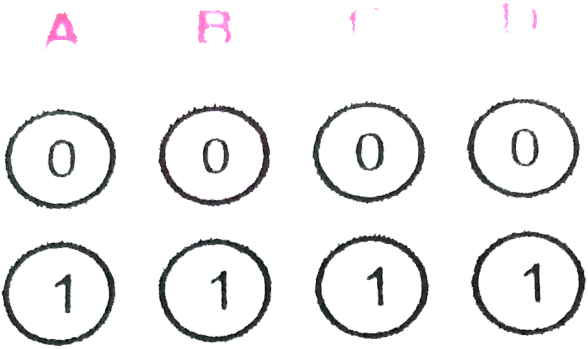
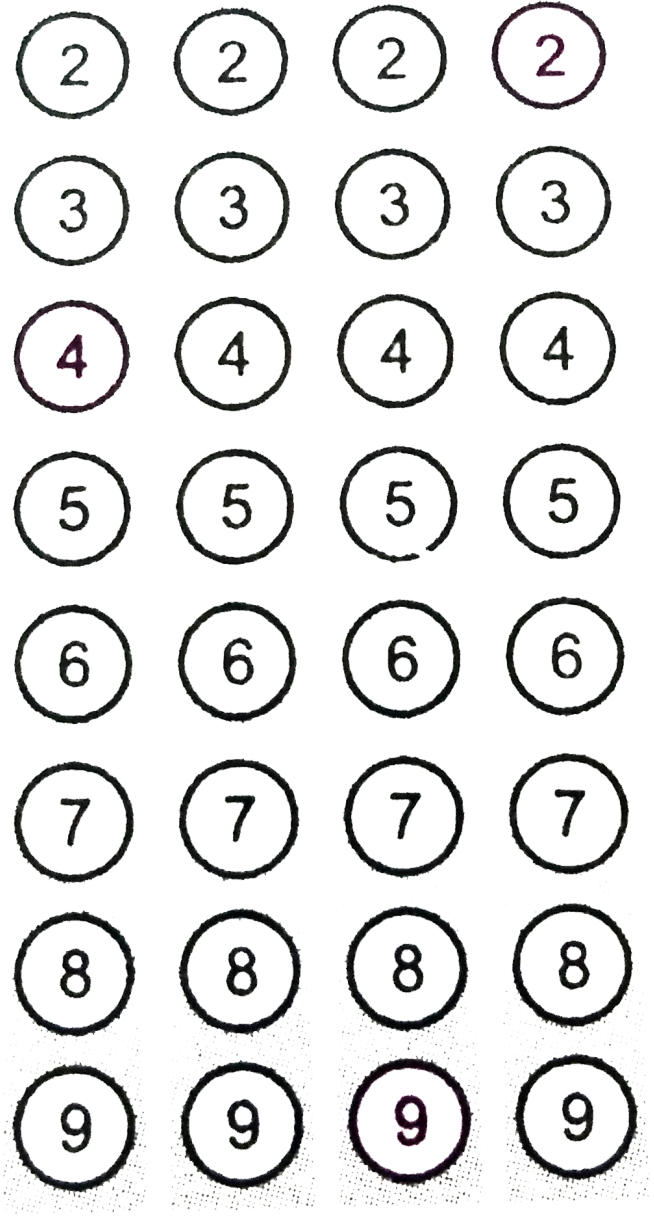
8. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of bubbles should be as shown on the side:





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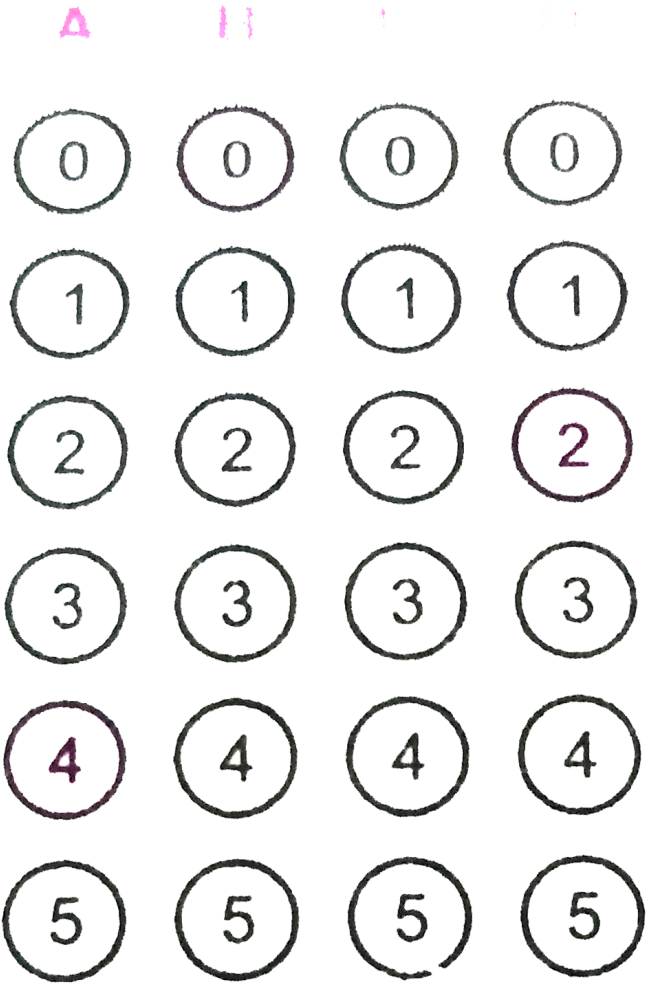
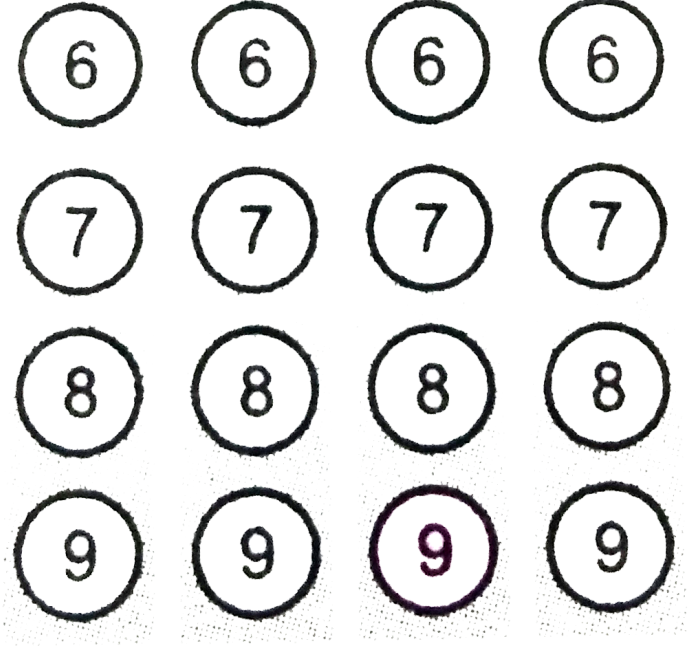
9. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of bubbles should be as shown on the side:





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

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10. The answer to each of the following questions is a single digit integer, ranging from 0 to 9. If correct answers to the question number A,B,C and D (say) are 4,0,9 and 2 respectively, then correct darkening of bubbles should be as shown on the side.

(C) Reaction of Br_2 with Na_2CO_3 in aqueous solution gives sodium bromide and sodium bromate with evolution of CO_2 gas. The number of sodium bromide molecules involved in the balanced chemical equation is

.....

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11. If the value of Avogadro numberis $6.023 \times 10^{23} mol^{-1}$ and the vaueof Boltzmann constant is $1.380 \times 10^{-23} JK^{-1}$, then the number of significant digits in the calculated value of the universal gas constant is

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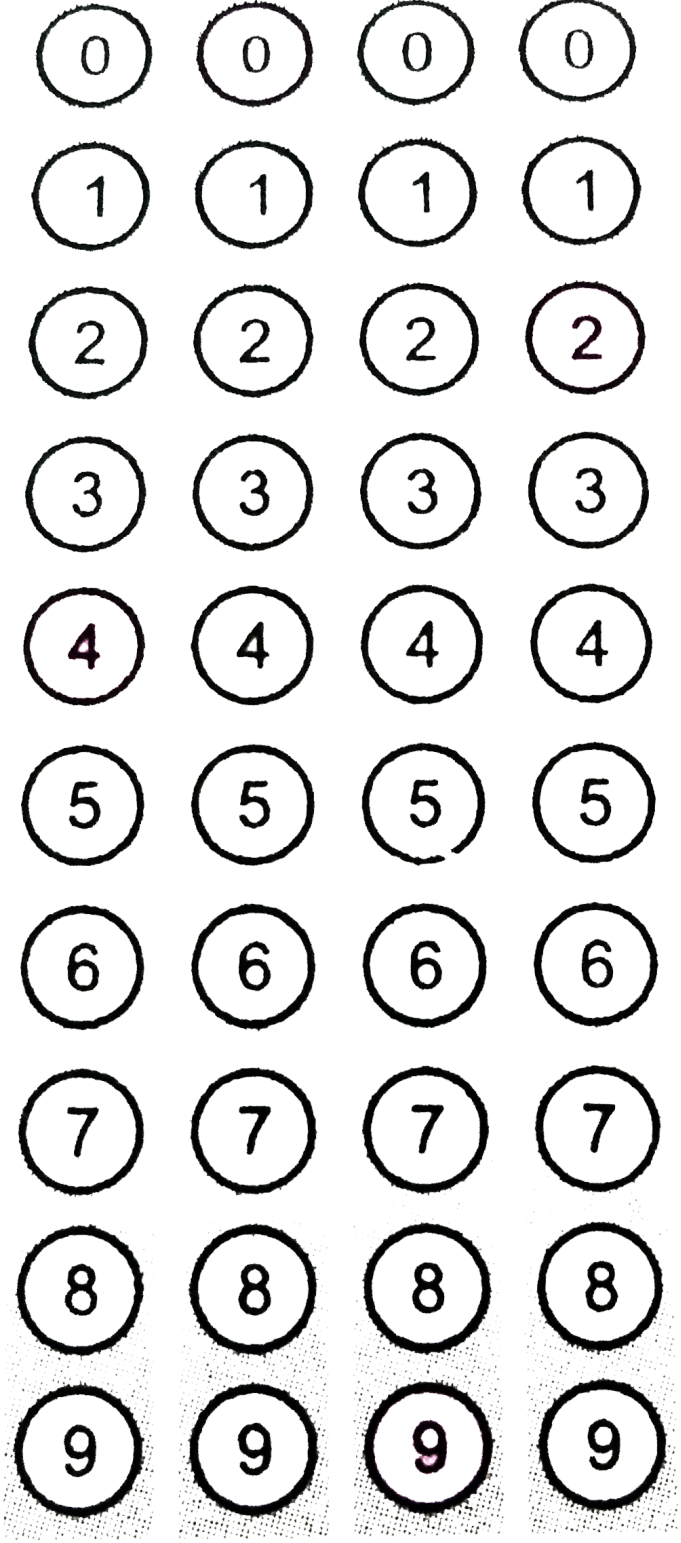
12. The answer to each of the following question is a single digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of bubbles should be as shown on the side:


0 0 0 0
1 1 1 1
2 2 2 2
3 3 3 3
4 4 4 4
5 5 5 5
6 6 6 6
7 7 7 7
8 8 8 8
9 9 9 9

Three moles of B_2H_6 are completely reacted with methanol. The number of moles of boron containing product formed is

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Competition Focus Jee Main And Advanced Medical Entrance Special Vii Numerical Value Type Questions

1. The ammonia prepared by treating ammonium sulphate with calcium hydroxide is completely used by $NiCl_2.6H_2O$ to form a stable coordination compound. Assume that both the reactions are $100\,\%$ complete. If 1584 g of ammonium sulphate and 952 g of $NiCl_2.6H_2O$ are used in the preparation, the combined weight (in grams) of gypsum and the nickel- ammonia coordination compound thus produced is ____.

(Atomic weights in $gmol^{-1}$: H = 1, N = 14, O = 16, S = 32, Cl = 35.5, Ca = 40, Ni = 59)

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Competition Focus Jee Main And Advanced Medical Entrance Special Viii Assertion Reason Type Questions Type I

1. Assertion (A) : A single $._{}^{12}C$ atom has mass exactly 12 amu and a mole of these atoms has a mass of exactly 12 gram.

Reason (R) : A mole of atoms of any element has a mass in gram equal to the atomic mass of the element.

A. Statement-1 is True, Statement-2 is True , Statement-2 is the correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True , Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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2. Assertion :The ratio of volume of gaseous reactants and products is in agreement with their molar ratio.

Reason : Volume of a gas is inversely proportional to the number of mole of a gas

A. Statement-1 is True, Statement-2 is True , Statement-2 is the correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True , Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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3. Assertion (A): The standard unit of expressing the mass of atom is amu.

Reason (R): amu is also called as avogram.

A. Statement-1 is True, Statement-2 is True , Statement-2 is the correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True , Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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4. Statement-1. Under identical conditions, 1 L of O_2 gas an 1 L of O_3 gas contain the same number of oxygen atoms.

Statement-2. 1 L of O_2 and 1 L of O_3 contain the same number of moles under identical conditions.

A. Statement-1 is True, Statement-2 is True , Statement-2 is the correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True , Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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Competition Focus Jee Main And Advanced Medical Entrance Special Viii Assertion Reason Type Questions Type Ii

1. Assertion. Phenol is a disinfectant.

Reason. Disinfectants are used to stop infection of the wounds.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: C

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2. Assertion. Cinnabar is a chemical compound whereas brass is a mixture. Reason. Cinnabar always contains 6.25 times as much mercury as sulphur by weight. Brass can be made with widely different ratios of copper and zinc.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: A

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3. 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 assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: B

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4. Assertion. The size of a degree on Fahrenheit scale is smaller than that on celsius scale.

Reason. When temperature on celsius scale reads 0°, it reads 32° on Fahrenheit scale.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: B

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5. Assertion. The number 14.56 ± 0.01 has three significant figures.

Reason. Number of significant figures is total number of digits except the last digit whose value is uncertain.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: D

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6. Assertion. Gay Lussac's law does not follow from Dalton's atomic theory. Reason. Dalton's atomic theory explains law of chemical combination by mass only.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: A

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7. Assertion. Average atomic mass of an element depends mainly on the heavier isotope.

Reason. Average atomic mass is obtained by multiplying the atomic mass of the heavier isotops with its fractional abundance.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: D

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8. Statement-1 : Atomic mass of sodium is 23u

Statement-2 : An atom of sodium is 23 times heavier than atom of C-12 isotope

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: C

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9. Assertion. Both 106 g of sodium carbonate and 12 g of carbon have same number of carbon atoms.

Reason. Both contain 1 g atom of carbon which contains 6.023×10^{23} carbon atoms.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: A

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10. Assertion : Equivalent weight of a base $= \frac{\text{Molecular weight}}{\text{Acidity}}$

Reason : Acidity is the number of replaceable hydrogen atoms in one molecule of the base.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: C

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11. Assertion: Equal moles of different substnaces contains same number of constituent particles.

Reason: Equal weights of different substances contain the samme number of contituent particles.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: C

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12. Assertion: Empirical and molecular formula of Na_2CO_3 is same.

Reason: Na_2CO_3does not form hydrate.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: C

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13. Assertion. In a combustion reaction in the air, oxygen is the limiting reactant.

Reason. Oxygen is present in limited amount (only $21\ \%$) in the air.

A. If both assertion and reason are true, and reason is the true explanation of the assertion.

B. If both assertion and reason are true, but reason is not the true explanation of the assetion.

C. If assertion is true, but reason if false

D. If both assertion and reason are false.

Answer: D

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