



CHEMISTRY

VMC MODULES ENGLISH

SOME BASIC CONCEPTS OF CHEMISTRY

Illustration

1. In an experiment, 2.4 g of Iron oxide on reduction with Hydrogen yields 1.68 g of Iron. In another experiment, 2.9 g of Iron oxide give 2.03 g of Iron on reduction with Hydrogen. Show that the above data illustrates the law of constant proportion.



2. 100g of mercuric oxide is heated and decomposed to produce 7.4g of oxygen. What mass of mercury must be produced in the reaction?

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3. 1.375g of cupric oxide was reduced by heating in a current of hydrogen and the weight of copper that remained was 1.098g In another experiment, 1.179g of copper was dissolved in nitric acid and the resulting copper nitrate converted into cupric oxide by ignition. The weight of cupric oxide formed was 1.476g. Show that these result illustrate the law of constant composition.

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4. metal combines with oxygen to form two oxides, having the following composition:

(i) 0.398g of the first metal oxide contains 0.318g of metal.

(ii) 0.716g of the second oxide contains 0.636g of the metal.

Show that the above data agrees with the law of multiple proportions.

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5. Hydrogen combines with oxygen and forms two compounds. In the first compound, hydrogen content is 5.93% while in the other compound it is 11.2%. Verify whether the data agrees with law of multiple proportions.

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6. 30g of solute are added to 120g of solution. Calculate the mass percentage of solution.



7. Carbon found in nature as a mixture of C-12 and C-13. The average atomic mass of carbon is 12.011u. What is the percentage abundance of





10. What will be the mass of one molecule of $CaCl_2$ in grams ?

11. If the mass of a sample of Na_2SO_4 is 7.1g , then how many molecules

of Na_2SO_4 must be present in the sample ?



12. There are $1.52 imes 10^{30}$ molecules of H_2SO_4 in a vessel, how many

kilograms of H_2SO_4 would that be?

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13. What will be the mass of 1.5g- molecule of Sulphuric acid ?

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14. How many molecules and atoms of Oxygen are present in 5.6 litres of

Oxygen (O_2) at NTP?

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

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16. 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.



17.3 L mixture of propane and butane on complete combustion at 298 K

gave 10 L CO_2 Calculate the compostion of the gas mixture.

18. Hydrogen and Oxygen are combined in the ratio 1:16 by mass in Hydrogen peroxide. Calculate the percentage of Hydrogen and Oxygen in Hydrogen peroxide.

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19. Two Oxides of a metal contain 30.0 and 27.6 per cent of Oxygen respectively. If the formula of the first Oxide be M_2O_3 , find that of the second oxide.

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20. A compound contains 34.8% Oxygen, 52.2% carbon and 13.0% Hydrogen. What is the empirical formula of the compound ?

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

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22. 100ml of a mixture of CH_4 and C_2H_4 were exploded with excess of oxygen. After explosion and cooling, the mixture was treated with KOH, where a reduction of 165 ml was observed. Find the composition of the mixture taken ?

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23. What will be the maximum mass of water that can be produced when

2 grams of hydrogen and 10 grams of oxygen are reacted ?

24. If 6 litre of Nitrogen and 10 litre of hydrogen are taken in a reactor and the reaction achieves 50% completion, then what will be the final volume of gases in the vessel ?



25. 1.878*g* of MBr_X when heated in a stream of HCl gas was completely converted to chloride MCl_X which weighed 1.0*g* The specific heat of metal is $0.14calg^{-1}$. Calculate the molecular weight of the metal bromide.

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26. 1.67 g mixture of Al and Zn was completely dissolved in acid and evolved 1.69 L of H_2 at STP. Calculate the weight Al and Zn in the mixture.



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

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28. 0.05 g of a sample of $KClO_3$ containing some KCl on decomposition liberated just sufficient oxygen for complete oxidation of 20 " mL of " CO. The volume of CO was measured at $27^{\circ}C$ and 750 mm Hg. Calculate the perentage purity of $KClO_3$.

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29. NaCl of 95 % purity is used to prepare salt cake (Na_2SO_4) by the reaction,

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

If the product (Na_2SO_4) is only 85% pure, what weight of NaCl is used up in producing 1 kg of the impure salt cake ?

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30. A sample of clay was partially dried. It then contained 50% slica and 7% water. The original clay contained 12% water find the percentage of silica in the original sample

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31. The oxide of an element contains 32.33 percent of the element and the vapour density of its Chloride is 79. Calculate the atomic mass of the element.

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



33. Calculate the volume of 8% by mass solution of $NaOH(d=1.34g/cm^3)$ to prepare 500 ml of 4% by mass solution of $NaOH(d=1.24g/cm^3)$.

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34. If the mole fraction of lodine in benzene is 0.25, then what will be the

molality of the solution ?



35. When 400 g of a 20% Solution was cooled 50 g of the solute precipitated. What is the percent concentration of the remaining solution.

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36. A solution is obtained by mixing 300g of 25% solution ad 400 g of 40% solution by mass. Calculate the mass percentage of the resulting solution.

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37. Calculate the oxidation state of the underlined atoms in the given

species.

(a) $\underline{N}O_2^+$

38. Calculate the oxidation state of the underlined atoms in the given species.

(b) $\underline{N}O_3^-$

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39. Calculate the oxidation state of the underlined atoms in the given species.

(c) $K\underline{M}nO_4$

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40. Calculate the oxidation state of the underlined atoms in the given species.

(d) $\underline{C}r_2O_7^{2\,-}$

41. Calculate the oxidation state of the underlined atoms in the given

species.

(e) $\underline{F}e_2O_3$

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42. The oxidation state of Fe in Fe_3O_4 is :

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43. Calculate the n- factor of reactants in the given chemical changes?

(a)
$$K_2 Cr_2 O_7 \stackrel{H^+}{\longrightarrow} Cr^{+3}$$

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44. Calculate the n-factor of reactants in the given chemical changes?

(b)
$$C_2 O_4^{2\,-}
ightarrow CO_2$$



45. Calculate the n-factor of reactants in the given chemical changes?

(c)
$$S_2 O_3^{2\,-} \stackrel{
m alkaline}{\longrightarrow} SO_4^{2\,-}$$

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46. Calculate the n-factor of reactants in the given chemical changes?

(d) $I^{\,-}
ightarrow ICl$



47. Calculate the n-factor of reactants in the given chemical changes?

(a) $S_2 O_3^{2-} \stackrel{
m acidic}{\longrightarrow} S_4 O_6^{2-}$

48. Calculate the n-factor of reactants in the given chemical changes?

(b)
$$I^{\,-}
ightarrow I_2$$

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49. Calculate the n-factor of reactants in the given chemical changes?

(c) $IO_3^-
ightarrow ICl$

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50. Calculate the n-factor of reactants in the given chemical changes?

(d) $FeSO_4
ightarrow Fe_2O_3$



51. Calculate the n-factor of reactants in the given chemical changes

(a) $PH_3
ightarrow H_3PO_3$



52. Calculate the n-factor of reactants in the given chemical changes

(b) $CuS
ightarrow Cu^{2+} + SO_2$

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53. Calculate the n-factor of reactants in the given chemical changes

(c) $NO_3^-
ightarrow N_2O$

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54. Calculate the n-factor of reactants in the given chemical changes

(e) $As_2O_3
ightarrow As_2O_5$

55. Calculate the n-factor of reactants in the given chemical changes

(e) $As_2O_3
ightarrow As_2O_5$

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56. Calculate the n-factor of reactants in the given reactions.

(b) $FeC_2O_4
ightarrow Fe^{3\,+} + CO_2$

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57. Calculate the n-factor of reactants in the given reactions.

(b) $FeC_2O_4
ightarrow Fe^{3\,+} + CO_2$

Watch Video Solution

58. Calculate the n-factor of reactants in the given reactions.

(c)
$$\left[Fe(CN)_6
ight]^{4-}
ightarrow Fe^{3+} + CO_2 + NO_3^-$$

59. Calculate the n-factor of reactants in the given reactions.

(d) $Fe(NO_3)_3
ightarrow Fe^{2+} + NO$

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60. Calculate the n-factor of reactants in the given reactions.

(e)
$$Fe_2(SO_4)_3
ightarrow Fe^{2\,+} + SO_2$$

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61. Calculate the n-factor of reactants in the given reactions.

(b) $FeC_2O_4
ightarrow Fe^{3\,+} + CO_2$

62. Calculate the n-factor of reactants in the given chemical changes?

(a)
$$K_2 Cr_2 O_7 \stackrel{H^+}{\longrightarrow} Cr^{+3}$$



63. Calculate n factor of $HCuCl_2$ in the given reaction,

$$2HCuCl_2 \stackrel{\mathrm{dil.\ With}}{\longrightarrow} Cu + Cu^{+\,2} + 4Cl^- + 2H^+.$$

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64. Which of the following reactions are exothermic?

A. C + O2 \rightarrow CO2

 $B. 2Mg + O2 \rightarrow 2MgO$

 $C. CuSO4 + 5H2O \rightarrow CuSO4.5H2O$

D. All the above

Answer:

65. A 10.0 ml of $(NH_4)_2SO_4$ solution was treated with excess of NaOH. The ammonia evolved was absorbed in 50 ml of 0.1 N HCl. The excess HCl required 20 ml of 0.1 N. NaOH. Calculate the strength of $(NH_4)_2SO_4$ in the solution.

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66. Why is propane stored in household tanks but natural gas is not?



67. 0.7 grams of Na_2CO_3 . xH_2O were dissolved in water and the volume was made to 100 mL, 20 mL of this solution required 19.8 mL of N/10 HCl for complete neutralization. The value of x is Report your answer by rounding it upto nearest whole number.



68. 3.4g sample of H_2O_2 solution containing $x \% H_2O_2$ by weight requires $xmLofaKMnO_4$ solution for complete oxidation under acidic condition. The normality of $KMnO_4$ solution is

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69. Why is mass conserved in chemical reactions?

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70. A $5 - 0cm^3$ solutions of H_2O_2 liberates of 0.508g of iodine from acidified KI solution. Calculate the volume strength of H_2O_2 at N.T.P.

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Solved Examples

1. The mass of 83.4% pure salt cake (Na_2SO_4) that can be produced from 250 kg of 94.5% pure salt in the reaction $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$ is :

A. 344 kg

B. 244 kg

C. 444 kg

D. 222 kg

Answer: A

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2. 2 grams of a gas mixture of CO and CO_2 on reaction with excess I_2O_5 yields 2.54 grams of I_2 . What would be the mass% of CO in the original mixture?

B. 30

C. 70

D. 35

Answer: B

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3. 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. 0.00246

B. 0.0246

C. 0.246

D. 2.46

Answer: A



4. For the reaction $Ba(OH)_2 + 2HClO_3 \rightarrow Ba(ClO_3)_2 + 2H_2O$. Calculate the number of moles of H_2O formed when 0.1 mole of $Na(OH)_2$ is treated with 0.0250 mole $HClO_3$.

A. 0.1

B. 0.125

C. 0.025

D. 3.75

Answer: C

5. Ammonia gas is passed into water, yielding a solution of density $0.93g/cm^3$ and containing 18.6% NH_3 by weight. The mass of NH_3 per cc of the solution is

A. $0.17g/cm^3$ B. $0.34g/cm^3$ C. $0.51g/cm^3$

D. $0.68g/cm^3$

Answer: A

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6. Objective question (single correct answer).

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

ii. The normality of a mixture obtained mixing 100mL of $0.2mH_2SO_4$

with 100mL of 0.2MNaOH is:

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

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

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

A. 100 cc

B. 300 cc

C. 200 cc

D. 80 cc

Answer: C



7. Equivalent mass of a bivalent metal is 32.7g. Molecular mass of its

chloride will be :

A. 68.2

B. 103.7

C. 136.4

D. 166.3

Answer: C

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8. How much water is to be added to dilute 10mL of 10NHCl to make it

decinormal?

A. 990 ml

B. 1010 ml

C. 100 ml

D. 1000 ml

Answer: A

9. 0.45g of an acid of mol. Mass 90 was neutralised by 20mL of 0.54N caustic potash (KOH). The basicity of acid is :

A. 1 B. 2 C. 3

Answer: B

D. 4

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10. In the reaction,

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

Equivalent wieght of iodine will be equal to

- A. Its molecular mass
- B. $\frac{1}{2}$ of its molecular mass C. $\frac{1}{4}$ of its molecular mass
- D. Twice its molecular mass

Answer: B

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11. The composition of a sample of Wustite is $Fe_{0.93}O_{1.00}$. What percentage of the iron is present in the form of Fe(III)?

A. 15.05~%

 $\mathsf{B.}\,10\,\%$

 $\mathsf{C.}\,48.4\,\%$

D. 16.66 %

Answer: A

12. Sample of haemoglobin is found to contain 0.333% of iron. Assuming that each molecule of haemoglobin contains four iron atoms, which of these is the correct molecular mass of haemoglobin ?

A. 67267g/mole

- B. 76543g/mole
- C. 11218g/mole
- D. 30033g/mole

Answer: A



13. Atoms of elements A, B and C combine to form a compound in the atomic ratio of 1:6:2. Atomic masses of A, B and C are 64, 4 and 16

respectively. What will be the maximum mass of a compound formed from 1.28 g of A, $3 imes10^{23}$ atoms of B and 0.04 moles of C ?

A. 12 g

B. 24 g

C. 2.4 g

D. 0.12 g

Answer: C

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14. Ratio of the amounts of H_2S needed to precipitate all the metal ions

from 100 ml of $1MAgNO_3$ and 100 ml of 1M $CuSO_4$ will be :

A. 1:1

B. 1:2

C.2:1

 $\mathsf{D}.\,3\!:\!4$

Answer: B

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15. 2.5 g of the carbonate of a metal was treated with 100 ml of $1 NH_2SO_4$. After the completion of the reaction, the solution was boiled off to expel CO_2 and was then titrated against 1 N NaOH solution. The volume of alkali that would be consumed, if the equivalent weight of the metal is 20.

A. 50 ml

B. 25 ml

C. 75 ml

D. 100 ml

Answer: A

16. A metallic chloride contained 47.23 % of metal 'M'. 1.0 g of this metal displaced from a compound 0.88 g of another metal X. What will be the equivalent mass of metal M ?

A. 11.78 g

B. 27.96 g

C. 31.77 g

D. 23.42 g

Answer: C

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

A. 41.3 g

B. 23.8 g

C. 37.8 g

D. 49.1 g

Answer: A

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18. 1.0 g of an alloy of Al and Mg when treated with excess of dil HCl gave $MgCl_2$, $AlCl_3$ and hydrogen. Evolved hydrogen collected over Hg at $0^{\circ}C$ has a volume of 1.20 litres at 0.92 atm pressure. The percentage of Aluminium in the alloy is :

A. 15~%

B. 55 %

 $\mathsf{C.}\,46~\%$

D. 25~%

Answer: C


19. mixture of KBr and NaBr weighing 0.563 g was treated with aqueous $AgNO_3$ and all the bromide ion was recovered as 0.975 g of pure AgBr. What fraction of total mass is KBr in the sample ?

A. 0.61

B. 0.22

C. 0.83

D. 0.45

Answer: A

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Illustration The Concept

1. One litre of sample of hard water contains 0.8 mg of $CaCl_2$ and 0.8 mg of MgCl_2 . Find the total hardness in terms of parts of $CaCO_3$, per 10^6 parts of water by mass.





1. Classify the following substances as either being a homogenous or

heterogenous mixture?

- (1) Sugar + Water
- (2) Sand + Water
- (3) mixture of different pulses
- (4) Air in the atmospheric column
- (5) Soda
- (6) Alloys

2. Classify the following substances as either being an element or a compound?

A. O_3

 $\mathsf{B.}\,S_8$

 $C. CCl_4$

 $\mathsf{D}.\,NO_2$

Answer:

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3. Are these mixtures or pure substances?

A. FeS

B. Graphite

C. Uranium

D. Saline solution

Answer:

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Practice Exercise 2

1. If the mass of an atom of C - 12 becomes half of its actual value then the atomic mass of phosphorous will change from 31 amu to what new value?

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2. The atomic weight of Cu is 63.546. There are only two naturally occurring isotopes of copper .⁶³ Cu and .⁶⁵ Cu. The natural abundance of the.⁶³ Cu isotope must be approximately.



1. How many oxygen atoms are there in 2.5g – molecules of K_2SO_4 . $Al_2(SO_4)_3$. $12H_2O$?

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 $\mathbf{2.3.6} imes 10^{22} NH_3$ molecules contain how many moles of hydrogen?

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Practice Exercise 4

1. How many litres of CO_2 gas at STP will react with 2.5 moles of KOH exactly to form K_2CO_3 ?



?

1. If 5.6 litres of hydrogen and 22.4 litres of oxygen react in a vessel to form water then the mass of water formed will be?

2. What mass of *CO* will be formed when 9 gm anhydrous oxalic acid is

dehydrated with conc H_2SO_4 ?

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Practice Exercise 7

1. What is the n-factor for H_3PO_4 in the reaction $2NaOH+H_3PO_4
ightarrow Na_2HPO_4+2H_2O?$



with 11.2 litre of H_2S oxidizing it into sulphur?

1. 0.012g of $Ca(HCO_3)_2$ is present in 500 ml of water. Presuming density of water to be 1g/cc, what is the hardness in ppm in terms of $CaCO_3$?

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2. 20ml of $0.5 \,\mathrm{M\,KMnO_4}$ in acidic media exactly neutralises 30ml of a

 H_2O_2 solution. The volume strength of H_2O_2 solution will be?

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In Chapter Exercise A

1. What mass of H2SO4 must be employed in the reaction $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$ if $22.08gBaCl_2$ is used up and 2.33gBaSO4, 0.73gHCl are formed. A. 0.98 g

B. 1.23 g

C. 0.72 g

D. 0.49g

Answer: A

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2. In accordance with law of definite proportions, 2.16g of Ag must combine with how much amount of carbon to form silver carbide (Ag_2C_2) ?

A. 12g

B. 0.24g

C. 0.12g

D. 2.4g

Answer: B



3. Carbon combines with oxygen to form three oxides CO_2 , CO and C_3O_2 . Among which pair of oxides does law of multiple proportions not hold true?

A. CO_2 and CO

B. CO and C_3O_2

 $C.CO_2$ and C_3O_2

D. It holds true in all cases

Answer: B



4. If carbon combines with hydrogen to form methane and carbon also combines with oxygen to form carbon dioxide then as per law of reciprocal proportions the ratio of hydrogen and oxygen by mass that combines should be?

A.8:1

 $\mathsf{B.}\,2\!:\!1$

C.1:8

 $\mathsf{D}.\,1\!:\!2$

Answer: C

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5. State the law of definite proportion.

A. The discovery of multiple compounds formed between the same

two elements

B. The discovery of non-stoichiometric compounds

C. The discovery of networked solids

D. The discovery of salt-like carbides

Answer: B

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6. What mass of sodium chloride would be decomposed by 9.8 g of sulphuric acid if 12 g of sodium bisulphate and 2.75 g of hydrogen chloride were produced in a reaction?

A. 5.6 g

B. 7.8 g

C. 3.1 g

D. 4.95 g

Answer: D



7. Which of these is a necessary condition for law of definite proportions to hold true?

A. The compound under observation must not sublime

B. The compound under observation must be pure

C. The compound should not crack on heating

D. The compound should not be radioactive

Answer: B

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8. Which of these is not a fruit?

A. When petrol is combusted in a vessel, finally the vessel is empty

B. When a piece of camphor is left standing in a dish, after a long time

the dish is empty

C. When a bottle of chloroform is left open, after a short time the

bottle has nothing in it.

D. None of the above choices is a violation of the law.

Answer: D

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9. Which of these statements is incorrect regarding the laws of chemical combinations?

- A. Combination of elements in ratio by atoms is same as their combination ratio by mass
- B. Elements may not combine with each other also. For instance,

sodium and potassium don't combine to form compounds.

- C. Elements can have multiple valencies
- D. Fixed amount of an element should combine with different

amounts of another element for law of multiple proportions.

Answer: A

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In Chapter Exercise B

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

A. N/2

B. N

C. 2N

D. 4N

Answer: C



2. $4.4gmofCO_2$ and 2.24 litreof H_2 at STP are mixed in a container. The total number of molecules present in the container will be:

A. $6.023 imes 10^{23}$

 $\texttt{B}.\,1.2046\times10^{23}$

 $\text{C.}\,6.023\times10^{22}$

D. $6.023 imes10^{24}$

Answer: B



3. Myoglobin stores oxygen for metabolic processes in muscle. Chemical analysis shows that it contains 0.34% Fe by mass. Minimum molecular

mass of myoglobin is

A. 16470 gm

B. 16176 gm

C. 17500 gm

D. 1647 gm

Answer: A

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4. An element , X has the following isotopic composition : $(200)X: 90\%, ^{199}X: 8.0\%, ^{202}X: 2.0\%$ The weighted average atomic mass of the naturally occurring element X is closest to naturally occurring element X is closest to

A. 201 amu

B. 202 amu

C. 199 amu

D. 200 amu

Answer: D



5. The atomic weights of two alements A and B are 40 and 80 reapectively. If x g of A contains y atoms, how many atoms are present in 2x g of B?

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

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

С. у

D. 2y

Answer: C

6. A sample of AIF_3 contains $3.0 imes 10^{24}$ $F^{\,-}$ ions. The number of formula

units of the sample are

A. $9 imes 10^{24}$

 ${\rm B.3\times10^{24}}$

 $\text{C.}\,0.75\times10^{24}$

D. $1.0 imes10^{24}$

Answer: D

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7. Number of atoms in 558.5 gram Fe (At. wt. of $Fe=55.85gmol^{-1}$) is

A. Twice that in 60g of carbon

B. $6.022 imes 10^{22}$ atoms

C. Half than those in 8g Helium

D. $558.5 imes 6.022 imes 10^{22}$ atoms

Answer: A



8. What is the total number of atoms present in 25.0 mg of camphor, $C_{10}H_{16}O$?

A. $9.89 imes 10^{19}$

 $\texttt{B.}\,9.89\times10^{20}$

 ${\sf C}.\,6.02 imes10^{20}$

D. $2.67 imes10^{21}$

Answer: D

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9. Which has the highest number of oxygen atoms?

 $1gO_2$ or $1gO_3$ or 1gO

A. $1gO_2$

 $\mathsf{B.}\,1gO_3$

C. 1*gO*

D. All have same atoms

Answer: D

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In Chapter Exercise C

1. The density of a gaseous element is 5 times that of oxygen under similar conditions. If the molecule is triatomic, what will be its atomic mass ?

A. 32

B. 160

C. 53.3

Answer: C



2. A gaseous nitrogen oxide contains 30.4~% of nitrogen, one molecule of which contains one nitrogen atom. The density of the oxide relative to oxygen gas is :

A. 0.94

B. 1.44

C. 1.5

D. 2.75

Answer: B

3. Ten millilitre of a gaseous hydrocarbon was burnt completely in 80 ml of O_2 at STP. The volume of the remaining gas is 70 ml. The volume became 50 ml, on treatment with NaOH. The formula of the hydrocarbon is:

A. C_3H_6

 $\mathsf{B.}\, C_2 H_4$

 $\mathsf{C.}\,CH_4$

D. C_6H_6

Answer: B

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4. Two elements A (Atomic Mass 12 g/mole) and B (Atomic Mass 16 g/mole) combine to yield a compound. The percentage mass of A in the compound is 27.3 %. The formula of the compound will be :

A. A_2B_2

B. AB

 $\mathsf{C}.A_2B$

D. AB_2

Answer: D

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5. The carbonate of a metal is isomorphous with $MgCO_3$ and contains

10.34 percent of carbon. Atomic mass of metal will be:

A. 56

B. 98

C. 40

D. 23

Answer: A

6. A gaseous alkane is exploded with O_2.

The volume of O_2 required for complete combustion and the volume of CO_2 formed after combustion is 7:4 calculate the molecular formula of the alkane.

A. C_2H_6

 $\mathsf{B.}\, C_3H_4$

 $\mathsf{C}. C_6 H_6$

D. CH_4

Answer: A



7. A polystryrene, having formula $Br_3C_6H_2(C_8H_8)_n$, was perpared heating styrene with tribromobenzoyl peroxide in the absence of air. If it was found to contain 10.46% bromine by weight, find the value of n.

A. 19		
B. 20		
C. 15		
D. 10		

Answer: A



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

A. XY_2

 $\mathsf{B.}\, X_2Y$

 $\mathsf{C}.\, X_2Y_3$

D. XY_3

Answer: B

9. How many molecules of water are present as water of crystallisation in Borax $Na_2B_4O_7$. nH_2O if it loses 47.117% of mass on heating till it becomes anhydrous?

A. 10 B. 8 C. 6 D. 4

Answer: A



10. The volume in litres of CO_2 liberated at STP when 10 grams of 90%

pure limestone is heated cmpletely is

A. 22.4 litres

B. 2.24 litres

C. 20.16 litres

D. 2.016 litres

Answer: D

Watch Video Solution

11. In the reaction $4A + 2B + 3C \rightarrow A_4B_2C_3$, the number of moles of product formed will be_____ if starting from 2 moles of A, 1.2 moles of B and 1.44 moles of C

A. 32

B. 160

C. 53.3

D. 80

Answer: C



12. The mass of sodium hydroxide produced when 175.5 g of NaCl reacts with excess of $Ca(OH)_2$ is 102 g. The percentage yield is :

A. 0.94

B. 1.44

C. 1.5

D. 2.75

Answer: B

Watch Video Solution

13.30g Mg and 30g O_2 are reacted and the residual mixture contains:

A. C_3H_6

 $\mathsf{B.}\, C_2 H_4$

 $\mathsf{C}.\,CH_4$

D. C_6H_6

Answer: B

Watch Video Solution

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

A. A_2B_2

B. AB

 $\mathsf{C}.\,A_2B$

D. AB_2

Answer: D

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

A. C_2H_6

- B. C_3H_4
- $\mathsf{C}. C_6 H_6$
- D. CH_4

Answer: A



16. Consider the following reaction sequence:

 $S_8(s)+8O_2(g)
ightarrow 8SO_2(g)$

 $2SO_2(g)+O_2(g)
ightarrow 2SO_3(g)$

How many grams of SO_3 are produced from 1 mole S?

A. 19

B. 20

C. 15

D. 10

Answer: A

Watch Video Solution

17. $4Fe+3O_2
ightarrow 2Fe_2O_3$ (reference to iron)

A. XY_2

 $\mathsf{B}.\, X_2Y$

 $\mathsf{C}.\, X_2Y_3$

 $\mathsf{D.}\, XY_3$

Answer: B



18. 30 ml of a mixture of oxygen (O_2) and ozone (O_3) was heated till ozone was completely decomposed. The mixture on cooling was found to expand 40 ml. The volume of O_2 in original mixture was :

A. 10

B. 8

C. 6

D. 4

Answer: A

19. Polythene can be produced from calcium carbide according to the following sequence of reactions.

 $CaC_{2}+2H_{2}O
ightarrow Ca(OH)_{2}+C_{2}H_{2}, C_{2}H_{2}+H_{2}
ightarrow C_{2}H_{4}, nC_{2}H_{4}
ightarrow (C_{2})$

The mass of polythene which can be produced from $20.0~{
m kg}~{
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A. 22.4 litres

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C. 20.16 litres

D. 2.016 litres

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21. 200 ml of an aqueous solution of glucose $(C_6H_{12}O_6)$ has molarity of 0.01 M. Which of the following operations can be done to this solution so as to increase molarity to 0.015 M ?

A. 0.94

B. 1.44

C. 1.5

D. 2.75
Answer: B



22. The normality of HCl solution with a density of 1.19gm/ml containing 37~%~ HCl by mass is :

A. C_3H_6

 $\mathsf{B.}\, C_2 H_4$

 $\mathsf{C.}\,CH_4$

D. C_6H_6

Answer: B



23.10L of hard water required 5.6g of lime for removing hardness. Hence

temperorary hardness in ppm of $CaCO_3$ is:

A. A_2B_2

B. AB

 $\mathsf{C}.A_2B$

D. AB_2

Answer: D

Watch Video Solution

24. Permanent hardness is due to $CI^{\, eta}$ and SO_4^{2-} of Mg^{2+} and Ca^{2+}

and is removed by adding Na_2CO_3 .

 $CaSO_4 + Na_2CO_3
ightarrow CaCO_3 + Na_2SO_4 \ CaCl_2 + Na_2CO_3
ightarrow CaCO_3 + 2NaCl$ Which of the following

statements is / are correct?

A. 56

B. 98

C. 40

D. 23

Answer: A



25. Equal moles of water and user are taken in a flask. What is mass percentage of urea in the solution ?

A. C_2H_6

- $\mathsf{B.}\, C_3H_4$
- $\mathsf{C.}\, C_6 H_6$
- D. CH_4

Answer: A



26. Hardness of water is 200 ppm. The normality and molarity of $CaCO_3$

in the water is

(a).
$$2 imes 10^{-6} ig(N, 2 imes 10^{-6} M ig)$$

(b). $4 imes 10^{-2} N, 2 imes 10^{-2} M$
(c). $4 imes 10^{-3} N, 2 imes 10^{-3} M$
(d). $4 imes 10^{-1} N, 2 imes 10^{-1} M$

A. 19

B. 20

C. 15

D. 10

Answer: A

Watch Video Solution

27. 50 ml of water sample requires 10 ml of $\frac{M}{50}HCl$ for complete neutralization. Calculate hardness of H_2O (temporary) in ppm.

A. 2ppm

B. 20 ppm

C. 200ppm

D. 324ppm

Answer: B

Watch Video Solution

28. The density of the solution of a salt X is 1.15g mL^{-1} . 20 mL of the solution when completely evaporated gave a residue of 4.6g of the salt. Calculate the mass percentage of the solute in solution.

A. 10

B. 8

C. 6

D. 4

Answer: A

1. The density of a gaseous element is 5 times that of oxygen under similar conditions. If the molecule is triatomic, what will be its atomic mass ?

A. 0.25

B. 0.3

C. 0.24

D. 2.32

Answer: C



2. A gaseous nitrogen oxide contains 30.4~%~ of nitrogen, one molecule of

which contains one nitrogen atom. The density of the oxide relative to

oxygen gas is :

A. 58.12

B.85

C. 42.5

D. 33.3

Answer: B

Watch Video Solution

3. Ten millilitre of a gaseous hydrocarbon was burnt completely in 80 ml of O_2 at STP. The volume of the remaining gas is 70 ml. The volume became 50 ml, on treatment with NaOH. The formula of the hydrocarbon is:

A. 90 g of magnesium oxide only

B. 75 g of magnesium oxide and 15 g of magnesium

C. 50 g of magnesium oxide and 10 g of oxygen

D. 75 g of magnesium oxide and 15 g of oxygen

Answer: B



4. Two elements A (Atomic Mass 12 g/mole) and B (Atomic Mass 16 g/mole) combine to yield a compound. The percentage mass of A in the compound is 27.3 %. The formula of the compound will be :

A. 11.2 kg

B. 32.14 kg

C. 36 kg

D. 56 kg

Answer: B

5. The carbonate of a metal is isomorphous with $MgCO_3$ and contains 10.34 percent of carbon. Atomic mass of metal will be:

A. 980 mg

B. 400 mg

C. 1.75 g

D. 0.74 g

Answer: D

Watch Video Solution

6. A gaseous alkane is exploded with O_2.

The volume of O_2 required for complete combustion and the volume of CO_2 formed after combustion is 7:4 calculate the molecular formula of the alkane.

A. 4.8~%

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Answer: B

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C. 13.5 gm

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A. 980 mg

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 $\mathsf{B}.\,95.2\,\%$

 $\mathsf{C}.\,90\,\%$

 $\mathsf{D}.\,80~\%$

Answer: B

Watch Video Solution

26. Hardness of water is 200 ppm. The normality and molarity of $CaCO_3$ in the water is (a). $2 \times 10^{-6} (N, 2 \times 10^{-6} M$ (b). $4 \times 10^{-2}N, 2 \times 10^{-2}M$ (c). $4 \times 10^{-3}N, 2 \times 10^{-3}M$ (d). $4 \times 10^{-1}N, 2 \times 10^{-1}M$ A. 1280

B. 640

C. 960

D. 320

Answer: B



27. 50 ml of water sample requires 10 ml of $\frac{M}{50}HCl$ for complete neutralization. Calculate hardness of H_2O (temporary) in ppm.

- A. 2ppm
- B. 20 ppm

C. 200ppm

D. 324ppm

Answer: C

28. The density of the solution of a salt X is 1.15g mL^{-1} . 20 mL of the solution when completely evaporated gave a residue of 4.6g of the salt. Calculate the mass percentage of the solute in solution.

A. 20 ml

B. 10 ml

C. 25 ml

D. 15 ml

Answer: B

Watch Video Solution

In Chapter Exercise E

1. The density of a gaseous element is 5 times that of oxygen under similar conditions. If the molecule is triatomic, what will be its atomic

mass?

A. 55 mL

B. 58 mL

C. 70 mL

D. 79 mL

Answer: C



2. A gaseous nitrogen oxide contains 30.4% of nitrogen, one molecule of which contains one nitrogen atom. The density of the oxide relative to oxygen gas is :

A. evaporate 50 mL solution

B. add 0.180 g glucose

C. both (1) and (2) are correct

D. none of the above is correct

Answer: B

Watch Video Solution

3. Ten millilitre of a gaseous hydrocarbon was burnt completely in 80 ml of O_2 at STP. The volume of the remaining gas is 70 ml. The volume became 50 ml, on treatment with NaOH. The formula of the hydrocarbon is:

A. 12.02 N

B. 6.03 N

C. 18.4 N

D. 11.9 N

Answer: A

4. Two elements A (Atomic Mass 12 g/mole) and B (Atomic Mass 16 g/mole) combine to yield a compound. The percentage mass of A in the compound is 27.3 %. The formula of the compound will be :

A. 56

B. 0.5

C. 200

D. 162

Answer: D

Watch Video Solution

5. The carbonate of a metal is isomorphous with $MgCO_3$ and contains

10.34 percent of carbon. Atomic mass of metal will be:

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B. 0.106 gm

C. 1.06 gm

D. 10.6 gm

Answer: C

Watch Video Solution

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The volume of O_2 required for complete combustion and the volume of CO_2 formed after combustion is 7:4 calculate the molecular formula of

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C. 77 %

D. 83~%

Answer: C



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Answer: B

Watch Video Solution

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Watch Video Solution

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- B. 3:7
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A. 20~%

B. 26 %

 $\mathsf{C.}\,80~\%$

D. 40~%

Answer: A

O Watch Video Solution

In Chapter Exercise F

1. Oxidation number of As in $H_2 {
m As} O_4^-$ is

A. 6

B. 7

C. 5

D. 9

Answer: C

2. The oxidation number of phosphorus in $Ba(H_2PO_2)_2$ is :

A. +1 B. -1 C. +2 D. 3

Answer: A



3. A mole of N_2H_4 loses 10 mol of electrons to form a new compound Y. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in Y ? (There is no change in the oxidation number of hydrogen.) B.-3

C. + 1

 $\mathsf{D.}+5$

Answer: A

Watch Video Solution

4. Among the following molecules, in which does bromine show the maximum oxidation state?

A. $Hg_2(BrO_3)_2$

 $\mathsf{B.}\,Br-Cl$

 $\mathsf{C.}\,KBrO_4$

D. Br_2

Answer: C

5. A metal ion $M^{3\,+}$ loses three electrons , its oxidation number will be

 $\mathsf{A.}+3$

 $\mathsf{B.}+4$

C. -3

D.+6

Answer: D

Watch Video Solution

6. In the reaction

$$3Br_2+6CO_3^{2-}+3H_2O
ightarrow 5Br^{m heta}+BrO_3^{m heta}+6HCO_3^{m heta}$$

A. bromine is oxidized and the carbonate radical is reduced

B. bromine is reduced and the carbonate radical is oxidized

C. bromine is neither reduced nor oxidized

D. bromine is both reduced and oxidized

Answer: D



7. In which of the following compounds the transition metal has an oxidation number of +2?

A. $Fe_2(SO_4)$

 $\mathsf{B.}\,Sc_2O_3$

 $\mathsf{C}.\,V_2O_5$

D. $NiSO_4$

Answer: D

8. Which of the following has been arranged in order of increasing oxidation number of nitrogen?

A.
$$NH_3 < N_2O_5 < NO < N_2$$

B. $NO_2^+ < NO_3^- < NO_2^- < N_3^-$
C. $NH_4^+ < N_2H_4 < NH_2OH < N_2O$

D.
$$NO_2 < NaN_3 < NH_4^+ < N_2O$$

Answer: C

Watch Video Solution

9. The oxidation number of carboxylic carbon atom in CH_3COOH is

- $\mathsf{A.}+2$
- $\mathsf{B.}+4$
- $\mathsf{C.}+1$
- $\mathsf{D.}+3$

Answer: D Watch Video Solution 10. The number of electrons involved in the reduction of nitrate (NO_3^{e}) to hydrazine (N_2H_4) is A.8 B.7

Answer: B

C. 5

D. 3

Watch Video Solution

In Chapter Exercise G

1. Equivalent weight of N_2 in the change

 $N_2
ightarrow NH_3$ is

A. 28/6

B. 28

C. 28/2

D. 28/3

Answer: A



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

A. 1.5 times

B. 2 times

C. 3 times

D. 4 times

Answer: A



3. Equivalent mass of H_3PO_2 when it disproportionate into PH_3 and H_3PO_3 is:

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

B. $\frac{3}{4}M$
C. $\frac{2}{3}M$
D. $\frac{M}{5}$

- -

Answer: C

4. In the following reaction, $O_3+6I^-+6H^+ o 3I_2+3H_2O$ equivalent mass of O_3 (with molecular mass M) is :

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

B. $\frac{M}{4}$
C. $\frac{M}{24}$
D. $\frac{M}{6}$

Answer: D

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5.1 mol of FeC_2O_4 is oxidized by x mol of $Cr_2O_7^{2-}$ in acidic medium, x is

A. 3

:

B. 1.5

C. 0.5

 $\mathsf{D}.\,1.0$

Answer: C



6. 2 gm of a metal when dissolved in HNO_3 , gets converted into nitrate salt. The nitrate was then precipitated to form 2.66 gm of metal chloride. Equivalent mass of metal can be :

A. 28

B. 23.5

C. 9

D. 108

Answer: D

7. In the reaction $VO+Fe_2O_3
ightarrow FeO+V_2O_5$. What is the n-factor for V_2O_5 ?

A. Mol Mass

B.
$$\frac{\text{Mol Mass}}{4}$$

C. $\frac{\text{Mol Mass}}{6}$
D. $\frac{\text{Mol Mass}}{8}$

Answer: C

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8. When BrO_3^- ion reacts with Br^- iron in acid solution Br_2 is liberated. The equivalent weight of $KBrO_3$ in this reaction is:

A.
$$\frac{\text{Mol Mass}}{8}$$

B.
$$\frac{\text{Mol Mass}}{3}$$

C.
$$\frac{\text{Mol Mass}}{5}$$

D.
$$\frac{Mol Mass}{6}$$

Answer: C



9. Calculate equivalent weight of H_3PO_4 and $Ca(OH)_2$ on the basis of given reaction.

A. 59

B.49

C. 25

D. 98

Answer: D

10. $FeS + KMnO_4 + H_2SO_4
ightarrow Fe_2(SO_4)_3 + K_2SO_4.$ The equivalent

mass FeS in the above reaction is :

A.
$$\frac{\text{Mol wt.}}{1}$$
B.
$$\frac{\text{Mol wt.}}{3}$$
C.
$$\frac{\text{Mol wt.}}{3}$$
D.
$$\frac{\text{Mol wt.}}{9}$$

Answer: D

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In Chapter Exercise H

1. If 36.44 ml of 0.01652 M KMnO_4 solution in acid media is required to completely oxidize 25 ml of a H_2O_2 solution. What will be the molarity of H_2O_2 solution?

A. 0.0602

B. 0.1204

C. 0.24

D. 0.030

Answer: A

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2. A piece of Zn is dissolved in 40 ml of $\frac{N}{10}HCl$ completely. The excess of acid was neutralized by 15 ml of $\frac{N}{5}NaOH$. The weight of Zn which react with HCl is :

A. 65 gm

B. 0.065 gm

C. 0.0325 gm

D. 32.25 gm

Answer: C



3. 5.3 g of M_2CO_3 is dissolved in 150 mL of 1 N HCl . Unused acid required 100 mL of 0.5 NaOH. What will be the equivalent mass of M?

A. 23 B. 12 C. 24

D. 13

Answer: A



4. $0.5\,\mathrm{g\,NaOH}$ was added to $200\,\mathrm{ml}\,0.1\,\mathrm{M\,HCl}\text{,}$ final concentration of

reactant left is :

A. 3/80

B.2/80

C.3/40

D. 5/80

Answer: A



5. 3.92g of ferrous ammonium sulphate crystals are dissolved in 100ml of water, 20ml of this solution requires 18ml of $KMnO_4$ during titration for complete oxidation. The weight of $KMnO_4$ present in one litre of the solution is

A. 34.76 g

B. 12.38 g

C. 1.238 g

D. 3.476 g

Answer: D

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6. 25mL of 2NHCl, $50mLof4NHNO_3$ and xmL2 MH_2SO_4 are mixed together and the total volume is made up to 1L after dilution. 50mL if this acid ixture completely reacteed with 25mL of a $1NNa_2CO_3$ solution. The value of x is:

A. 25 mL

B. 40 mL

C. 60 mL

D. 50 mL

Answer: A

7. How many grams of I_2 are present in a solution which requires 40 mL, of 0.11 N $Na_2S_2O_3$ to react with it.

A. 12.7 g

B. 0.558 g

C. 25.4 g

D. 11.4 g

Answer: B

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8. What will be the volume of H_2S released at $0^{\circ}C$ and 1 atm pressure when 16.6 g of KI reacts with excess of H_2SO_4 according to the equation $KI + H_2SO_4 \rightarrow I_2 + K_2SO_4 + H_2S$ +H_(2)O`.

A. 2.24 lit

B. 280 ml

C. 224 ml

D. 1.12 lit

Answer: B