MISCELLANEOUS EXERCISE

Choose the correct options for each of the following questions.

1. What volume of 0.1 M H_2SO_4 will be required to produce 17.0 g of H_2S by the following reaction ?

$$5H_2SO_4 + 10\,NaI \longrightarrow$$
$$4\,Na_2SO_4 + 5I_2 + H_2S + 4H_2O$$

   (A) 70.0 L   (B) 50.0 L
   (C) 25.0 L   (D) 5.0 L

2. A 10.0 gm sample of a mixture of calcium and sodium chloride is treated with Na_2CO_3 to precipitate the calcium as calcium carbonate. This $CaCO_3$ is heated to convert all the calcium to CaO and the final mass of CaO is 1.62 gms. The % by mass of $CaCl_2$ in the original mixture is :

   (A) 15.2%   (B) 32.1%
   (C) 21.8%   (D) 11.7%

3. 11.4 gm of a mixture of butene, C_4H_8 and butane C_4H_{10}, was burned in excess oxygen. 35.2 gm of CO_2 and 16.2 gm of H_2O were obtained. Calculate the percentage by mass of butane in original mixture.

   (A) 50.87%   (B) 49.13%
   (C) 50%   (D) None of these

4. P and Q are two elements which forms P_2Q_3 and PQ_2. If 0.15 mole of P_2Q_3 weights 15.9g and 0.15 mole of PQ_2 weights 9.3g, the atomic weight of P and Q is (respectively) :

   (A) 18, 26   (B) 26, 18
   (C) 13, 9   (D) None of these

5. Equal volumes of 0.200 M HCl and 0.400 M KOH are mixed. The concentrations of the ions in the resulting solution are :

   (A) $[K^+] = 0.40\,M$, $[Cl^-] = 0.20\,M$, $[H^+] = 0.20\,M$

   (B) $[K^+] = 0.20\,M$, $[Cl^-] = 0.10\,M$, $[OH^-] = 0.10\,M$

   (C) $[K^+] = 0.10\,M$, $[Cl^-] = 0.10\,M$, $[OH^-] = 0.10\,M$

   (D) $[K^+] = 0.20\,M$, $[Cl^-] = 0.10\,M$, $[OH^-] = 0.20\,M$

6. 1.0 gm of a mixture of $CaCO_3$ and NaCl reacts completely with 120 ml of 0.1 N HCl. The percentage of NaCl is:

   (A) 40%   (B) 50%
   (C) 60%   (D) 66%

7. A metal oxide has the formula Z_2O_3. It can be reduced by hydrogen to give free metal and water. 0.16 gm of the metal oxide requires 6 mg of hydrogen for complete reduction. The atomic weight of the metal is :

   (A) 27.9   (B) 159.6
   (C) 79.8   (D) 55.8

8. A 0.13 g sample of a purified carbonate was dissolved in 50.0 mL of 0.1M HCl and boiled to eliminate CO_2. Back titration of the excess HCl required 24.0 mL of 0.1 M NaOH. Identify the carbonate.

   (A) $CaCO_3$ (B) Na_2CO_3
   (C) $MgCO_3$ (D) Insufficient Data

9. In a pathology laboratory, a sample of urine containing 0.120 g of urea, NH_2CONH_2, ($M_0 = 60$) was treated with an excess of 0.5 Molar nitrous acid. The urea reacted according to the equation.

$$NH_2CONH_2 + 2HNO_2 \longrightarrow CO_2 + 2N_2 + 3H_2O$$

   The gases produced were passed through aqueous sodium hydroxide and the final volume measured.
   What was this volume at room temperature and pressure ?
   [Molar volume of a gas at r.t.p. is 24000 cm^3 mol^{-1}].

   (A) 9.6 cm^3 (B) 14.4 cm^3
   (C) 48.0 cm^3 (D) 96.0 cm^3

10. The volume of a solution of 1.5 M NH_3 required to produce 100 ml of NH_3 containing 1.7 g per litre of NH_3 is :

    (A) 6.67 L   (B) 6.67 mL
    (C) 66.7 mL   (D) 0.667 L

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

    (A) $4N_A, 3N_A$ (B) $4N_A, 2N_A$
    (C) $3N_A, 3N_A$ (D) $2N_A, 3N_A$

12. Two elements X (at. wt. 76) and Y (at. wt. 16) combine to give a compound having 76% of X. The formula of compound will be :

    (A) XY   (B) X_2Y
    (C) XY_3 (D) X_2Y_3

13. The molecular mass of a oxide of an element is 44. The equivalent weight of element is 14. The atomic weight of the element is :
(A) 14
(B) 28
(C) 42
(D) 56

14. The mass of N_2F_4 produced by the reaction of 2.0g of NH_3 and 8.0 g of F_2 is 3.56 g. What is the per cent yield ?

$$2\,NH_3 + 5F_2 \longrightarrow N_2F_4 + 6HF$$

(A) 79.0
(B) 71.2
(C) 84.6
(D) None of these

15. 100 mL of mixture of NaOH & Na_2SO_4 is neutralized by 10 mL of 0.5 M H_2SO_4. Hence, NaOH in 100 mL solution is :
(A) 0.2 g
(B) 0.4 g
(C) 0.6 g
(D) None of these

16. Two samples of HCl of 1.0M and 0.25 M are mixed. Final volumes of these samples taken in order to prepare 0.75 M HCl solution. Assume no water is added.
I. 20mL, 10 mL
II. 100 mL, 50 mL
III. 40 mL, 20 mL
IV. 50 mL, 25mL
The correct choice is :
(A) I, II, IV
(B) I, II
(C) II, III, IV
(D) I, II, III, IV

17. 12.5 mL of a solution containing 6.0g of a dibasic acid in 1 L was found to be neutralized by 10 mL of a decinormal solution of NaOH. The molecular weight of the acid is :

(A) 150
(B) 120
(C) 110
(D) 75

18. What volume of 90% alcohol by weight (d = 0.8 g ml^{-1}) must be used to prepare 80 mL of 10% alcohol by weight (d = 0.9g mL^{-1})?
(A) 10
(B) 20
(C) 30
(D) 40

19. The volume of a solution of 1.5 M NH_3 required to produce 100 ml of NH_3 containing 1.7 g per litre of NH_3 is :
(A) 0.67 L
(B) 6.7 L
(C) 6.7 mL
(D) 0.67 mL

20. A 2.0 g mixture of Na_2CO_3 and $NaHCO_3$ loses 0.248 g when heated to 300°C, the temperature at which $NaHCO_3$ decomposes to Na_2CO_3, CO_2 and H_2O. The % Na_2CO_3 in mixture is :
(A) 33.33%
(B) 66.6%
(C) 25%
(D) 50%

21. A mixture containing Na_2CO_3, NaOH and inert matter weighs 0.75 g. When the aqueous solution is titrated with 0.50 N HCl, the colour of the phenolphthalein disappears when 21.00 mL of the acid has been added. Methyl orange is then added and 7.00 mL more of the acid is required to give a red colour to the solution. The % of Na_2CO_3 is :
(A) 49.5
(B) 24.5
(C) 37.1
(D) None of these