

**M.Sc. 1st Semester Practical Examination, 2021**  
**CHEMISTRY**  
**Course Title: Inorganic Chemistry Practical**  
**Course Code: CHEM 104C (PR)**  
**Course ID: 11464**

**Time: 2 Hours**

**Full Marks: 40**

*The figures in the right hand side margin indicate full marks.*  
*Candidates are required to give their answers in their own words as far as practicable*

1. Answer *any five* of the followings: 2×5 = 10
- (a) Why freshly prepared cuprous chloride become green in colour after sometimes?
  - (b) What is ligand exchange reaction? Give example.
  - (c) What do you mean by inert and labile complexes? Give examples.
  - (d) Write down the structure of tetraammine(carbonato- $\kappa^2$  O,O')cobalt(III) nitrate complex.
  - (e) Define secondary standard. Give examples.
  - (f) What do you mean by indicator range?
  - (g) What is EBT?
2. Answer *any four* of the followings: 5×4 = 20
- (a) (i) What do you mean by disproportionation reaction? Give two examples.  
(ii) Write a balanced chemical equation for the preparation of  $\text{MnPO}_4$ . 1+2+2 = 5
  - (b) (i) Write down the indicators used in the complexometric estimation of  $\text{CaCO}_3$ ,  $\text{MgCO}_3$  and  $\text{Fe}_2\text{O}_3$  in dolomite by EDTA.  
(ii) Why EDTA is not use as a primary standard?  
(iii) Why maintenance of a fixed pH is very importance for the complexometric estimation of metal ions by EDTA? 2+1+2 = 5

(c) (i) Write down the structure of xylenol orange and calcon indicator.

(ii) Give two examples of the compounds of manganese in which Mn is in its +3 oxidation state.  $3+2 = 5$

(d) Write a balanced equation for the preparation of cuprous chloride. Calculate the % of yield when 1 g of cuprous chloride is obtained from 1.5 g of copper (II) sulphate pentahydrate.  $2.5+2.5 = 5$

(e) What is the role of  $\text{KMnO}_4$  in the preparation of  $\text{MnPO}_4$ ? Why slow addition of  $\text{KMnO}_4$  is recommended in the preparation of  $\text{MnPO}_4$ . Why 2-3 drops of dil.  $\text{H}_2\text{SO}_4$  is added while dissolving  $\text{MnSO}_4$  in water?  $2+2+1 = 5$

(f) (i) What are alums? Give two examples with molecular formula.

(ii) What is water of crystallization?

(iii) What are addition compounds?  $(1+2)+1+1 = 5$

3. Attempt *any one* of the followings:  $10 \times 1 = 10$

(a) (i) How do you prepare 500 mL of  $\text{NH}_4\text{Cl}-\text{NH}_3$  buffer solution of pH 10?

(ii) How do you prepare 100 mL of ( $\sim M/50$ ) zinc acetate dihydrate solution?

(iii) "For the complexometric estimation of  $\text{Ca}^{2+}$ , a small amount of 0.1 (M)  $\text{Na}_2\text{MgEDTA}$  solution may be added to  $\text{Ca}^{2+}$  solution before titration" - Explain.

(iv) Write down the principle used in complexometric estimation of  $\text{CaCO}_3$ ,  $\text{MgCO}_3$  and  $\text{Fe}_2\text{O}_3$  in dolomite by EDTA.

(v) In a dolomite sample 38 mg  $\text{Ca}^{2+}$  and 24 mg  $\text{Mg}^{2+}$  is present. Calculate the amount of  $\text{CaCO}_3$  and  $\text{MgCO}_3$  present in the sample.  $2+2+2+2+2 = 10$

(b) (i) Write a balanced chemical equation for the preparation of chrome alum. What is the role of adding alcohol in the preparation? Why conc.  $\text{H}_2\text{SO}_4$  is added? What is the colour and shape of crystals of chrome alum?

(ii) Write down the structure of hexaammine nickel(II) chloride and bis(dimethyl glyoxime) nickel(II) complex.  $(2+1+2+2)+(1.5+1.5) = 10$