

Five Year Integrated M.Sc. Examination 2022

Semester - V

Course: CH-3-5-5

(Analytical Chemistry-I)

Time: Three Hours

Full Marks: 40

Questions are of value as indicated in the margin

Group-A

1. Answer **any five** questions: 5 × 2
= 10
- (a) Write a note on reverse phase chromatography.
- (b) What are gross errors? Give an example.
- (c) How do you standardize a KMnO_4 solution? Explain with balanced equations.
- (d) Write the name and draw the structures of two organic precipitating agents.
- (e) Which indicator is used in iodometric titration? When it is added and why?
- (f) Explain the phenomenon of post-precipitation with suitable example. How it can be overcome?

Group-B

Answer **any six** questions

2. (a) Show that the frequency distribution for measurements with indeterminate errors results in a Gaussian curve. 2
- (b) Write down the half-cell reaction for $\text{BrO}_3^-/\text{Br}^-$ system. What is the E^0 value of the system? What happens at the end point of titration (after all the analytes are consumed) using bromate? Give chemical equation. 3
3. What are the various stages of precipitate formation? Explain each of them in brief. Hence explain the formation of colloidal precipitate. 1+3+1
4. (a) Sketch the apparatus of column chromatography set-up. Discuss the different methods to pack the column. 1+2
- (b) Draw the structure of metal-EDTA complex where EDTA behaves as a hexadentate ligand. Name and draw the structure of an indicator used in complexometric titration. 1+1
5. (a) Using a suitable diagram, explain situations of (i) low accuracy low precision, (ii) low accuracy high precision, (iii) high accuracy low precision and (iv) high accuracy high precision. 2
- (b) Explain how you can use the techniques of masking and demasking to estimate Mg, Zn and Cu content of a mixture. Give chemical equations. 3
6. (a) What are the various techniques to obtain easily filterable crystalline precipitate for an analyte that 2

gives a colloidal precipitate?

(b) Discuss the process of estimation of Ca^{2+} complexometrically using EDTA. 3

7. (a) In connection to chromatography name a (i) non-polar organic compound, (ii) polar organic compound, (iii) non-polar eluting solvent and (iv) polar eluting solvent. 2

(b) What are the various sources of instrumental errors? How they can be eliminated? 2+1

8. Draw the titration curves for argentometric titration of 100 ml of 0.1 M (i) NaCl and (ii) KI solutions with 0.1 M AgNO_3 solution using at least five data points for each (two pre-equivalence, equivalence and two post-equivalence). Solubility products of AgCl and AgI are 1.8×10^{-10} and 8.3×10^{-17} , respectively 5