



III Semester M.Sc. Degree Examination, December 2014
(2010-11 Onwards Scheme) (NS)

CHEMISTRY

Analytical Chemistry

C – 301-AC : Principles of Chemical Analysis

Time : 3 Hours

Max. Marks : 80

Instruction : Answer question No.1 and **any five** of the following.

Answer **any ten** of the following.

(2×10=20)

1. a) What are titration curves in acid base titrations ? Give an example.
 - b) Why is it some times necessary to adjust the oxidation state of the analyte in redox-titrations ?
 - c) What are precipitation titrations ? Write their limitations.
 - d) Why is EDTA called remarkable titrant in complexometric titrations ?
 - e) Write the composition of Karl-Fischer reagent and indicate its uses.
 - f) What are amphiprotic, acidic, aprotic and basic solvents ? Give an example for each of the above solvents.
 - g) Write the equation (formula) which is used to determine the percentage of the analyte from the weight of the precipitate in gravimetric analysis.
 - h) Define the terms “Kinetic method of analysis” and “rate law”.
 - i) Write different types of non selective membrane electrodes.
 - j) How is stability constant different from conditional stability constant ?
 - k) Indicate the difference between indicator electrode and a reference electrode.
 - l) Write the requirements that should be met in order that a gravimetric method be successful.
2. a) 50 ml of 0.100 M HCl is titrated with 0.100 M NaOH. Calculate the pH at the start of the titration and after the addition of 10, 50, and 60 ml of titrant.

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- b) Write a note on structural chemistry of redox indicators with suitable examples.
- c) Illustrate with suitable examples the role of masking and demasking agents in EDTA titrations. (4+4+4 = 12)
3. a) How is Karl-Fischer reagent standardised? Explain its utility in the determination of water in samples.
- b) Write a note on differentiating ability of solvents as applied to non aqueous titrations.
- c) Discuss the factors that must be considered in choosing a proper adsorption indicator for a precipitation titration. (4+4+4=12)
4. a) Describe with a neat diagram, the construction of glass electrode for pH measurement and explain its working.
- b) Explain catalytic kinetic method of determining mercury ion.
- c) Illustrate the application of precipitation titration in the determination of oxalates. (4+4+4=12)
5. a) How is the colour-change (pH range) in acid-base titration determined? Explain with an example.
- b) Illustrate the application of permanganate as titrant in the determination of iron in iron ores.
- c) 50 ml of a solution containing 0.0100 M of Ca^{2+} ions buffered at pH 10.0 is titrated with 0.0100 M EDTA solution. Calculate values of P_{Ca} at starting of titration, after the addition of 10ml of titrant, at equivalence point and after adding 60 ml of titrant. (4+4+4=12)
6. a) Describe the gas-sensing probe for carbon monoxide with a schematic diagram.
- b) Discuss methods of minimising Co-precipitation in gravimetry.
- c) Explain uncatalyzed kinetic method of determining thiocyanate ion by spectroscopic measurement. (4+4+4=12)
7. a) Illustrate a non-aqueous titration in glacial acetic acid medium.
- b) Classify and describe the properties of ion selective membranes.
- c) Discuss a complexometric titration involving monodentate ligand. (4+4+4=12)
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