MANGALORE UNIVERSITY

Department of Industrial Chemistry

ICP 458: PHYSICAL CHEMISTRY PRACTICALS-II

Course Outcomes:

Experiments to determine concentration of analyte by using electrochemical method like conductometry and potentiometry.

A. Electrochemistry: a. Conductometry (At least 5 experiments to be carried out)

1. Determination of hydrolysis constants (aniline hydrochlride etc.).
2. Titration of a mixture of acetic acid, monochloro and trichloacetic acids with NaOH.
3. Determination of concentrations/amounts of sulphuric acid, acetic acid and copper sulphate using sodium hydroxide.
4. Measurements of the conductance of a weak acid, HOAC and of the strong electrolytes NaOAc, HCl and NaCl and to calculate the ionisation constant of the acid.
5. Analysis of the mixture of HCl and NH_4Cl.
6. Determination of activity coefficient of Zinc ions in 0.002M $ZnSO_4$.
7. Determination of equivalent conductances and dissociation constants of weak acids.
8. Any other experiments of interest

B. Potentiometry (At least 7 experiments are to be carried out)

9. Determination of pK values of phosphoric acid by potentiometric titration with sodium hydroxide using glass electrode.
10. Determination of acidic & basic dissociation constants and isoelectric point of an amino acid.
11. Determination of the potential of an electrochemical cell and mean ionic activity coefficient.
12. Determination of activity coefficient of an electrolyte at different molalities.
13. Determination of pH of buffer solutions with a pH meter & evaluation of pK_a of acids
14. Determination of thermodynamics of a cell reaction
15. Determination of pKa values of mono, di and tri-acid base.
16. Determination of solubility of insoluble silver halide and the standard electrode potential using quinhydrone electrode
17. Determination of degree of hydrolysis of CH_3COONa and NH_4Cl.
18. Determination of hydrolysis constant of aniline hydrochloride.
19. Verification of Nernst equation for Ag^+, $Cu^{2+}$and Zn^{2+} species.
20. Determination of transport number of ions by emf method (Ag^+, Cd^{2+}, NO_3^{1-},SO_4^{2-})
21. pH titration of (a) HCl versus NaOH, (b) $CuSO_4$ versus NaOH and (c) HOAC versus NaOH and (d) lead nitrate versus potassium chromate.
22. Potentiometric titration of halides in mixtures (Cl^-, Br^- and I^-) with silver nitrate.
23. Potentiometric determination of dissociation constants of weak acids.
24. Any other experiment of interest.

References

1. Findlay's Practical Physical Chemistry, B. P. Levitt, Longman, London.
2. Experiments in Physical Chemistry,James and Prichard.
3. Experimental Physical Chemistry, Daniels et al.
6. Experimental Physical Chemistry, Das & Behera, Tata McGraw Hill, New Delhi, 1983.
7. Advanced Practical Physical Chemistry, Yadav, 1989.
8. Experiments in Physical Chemistry, J.C.Ghosh, Bharathi Bhavan, 1974.