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MCH-004

P.G. DIPLOMA IN ANALYTICAL CHEMISTRY (PGDAC)

Term-End Examination

December, 2019

MCH-004 : ELECTROANALYTICAL AND OTHER METHODS

Time : 3 hours *Maximum Marks : 75*

Note : *(i) Attempt any five questions.*

(ii) All questions carry equal marks.

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1. (a) Write the Nernst equation for galvanic cell. Calculate the cell potential. (given $a_{Zn^{2+}} = 5 \times 10^{-3}$, $a_{Cu^{2+}} = 2 \times 10^{-2}$) 5

   (b) Write the classification of electroanalytical methods. 5

   (c) How is the end-point detected in potentiometric titration ? Explain with the help of plots. 5

2. (a) Explain the alkaline error during pH measurement. 5

   (b) Why does accuracy increase in pH titrations compared to direct pH measurements ? 5

   (c) How can glass electrodes be made selective for ions other than hydrogen ion ? Give some examples. 5

3. (a) Calculate the dissociation constant of 0.05 mol dm^{-3} ethanoic acid if its molar conductivity is 16.3×10^{-4} sm^2mol^{-1} and limited conductivity is 3.9×10^{-2} sm^2mol^{-1}. 5

   (b) Beside concentration, which other factors affect the conductivity of the electrolyte solution ? 5

   (c) Explain the importance of over voltage in polarography. 5

4. (a) A solution containing 0.75 g of copper as Cu^{2+} requires one hour for complete deposition of copper at 1.25 A. Calculate the coulombs required and efficiency of the process. ($M_t = 63.54$) 5

   (b) Describe the solubility product of a sparingly soluble salt with a suitable example. 5

   (c) Discuss all the criteria for diagnosing reversible and irreversible redox reactions by cyclic voltammetry. 5

5. (a) Differentiate between Linear Scan Polarography and Pulse Polarography. 5

   (b) Define Diffusion Current with the help of Ilkovics' equation in polarography. 5

   (c) Explain the significance of half wave potential in polarography. 5

6. (a) What is Biamperometry ? Draw the types of curves for detection of end point. 5

(b) Discuss any five sources of errors in a thermogravimetric analysis. 5

(c) Explain the principle of Differential Thermal Analysis (DTA). 5

7. (a) Explain Pulse Height Analysis (PHA) used for recording gamma ray spectra. Define Resolution with the help of spectrum. 5

(b) What are radio tracer techniques ? Explain its advantages over conventional techniques. 5

(c) Explain Radio Immuno Assay (RIA) and discuss its methodology. 5

8. Write brief notes on any five of the following : 5x3=15

(a) Derivative Neutron Activation Analysis (DNAA)

(b) Enthalpograms in Thermometric Titrations

(c) Stripping Voltammetry

(d) Limiting Molar Conductivity

(e) Geiger Muller Counter

(f) Solid State Membrane Electrodes