

**P.G. DIPLOMA IN ANALYTICAL CHEMISTRY
(PGDAC)**

Term-End Examination

June, 2022

MCH-001 : BASIC ANALYTICAL CHEMISTRY

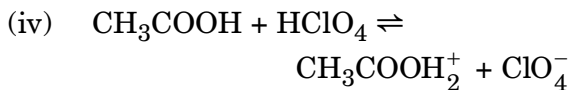
Time : 3 hours

Maximum Marks : 75

Note : Attempt any **five** questions. All questions carry equal marks. Marks of each sub-part are indicated.

1. (a) List the modern methods of separation techniques and explain any one. 5
- (b) Explain the term 'interfering substance' when analysing a sample. How can interference be avoided ? 5
- (c) Write the full forms of the following :
- (i) BOD (ii) COD (iii) DO (iv) TOC
- Write the temperature at which the water sample should be preserved for BOD determination. 5

2. (a) Calculate the pH of a 10^{-5} M aqueous sodium hydroxide solution at room temperature 25°C . 5
- (b) List the steps involved in performing quantitative analysis and explain any one. 5
- (c) Describe determinate errors and its sources. 5
3. (a) What are the causes of chemical burns ? Write the steps of first aid for chemical burns. 5
- (b) Explain the term 'significant figures'. State the number of significant figures in each of the following : 5
- (i) 0.162 (ii) 10.06 (iii) 200.0 (iv) 0.0260
- (c) What is meant by pseudo first-order reaction ? Write the rate law for second-order reaction. 5
4. (a) Consider the following equations and identify conjugate acid, if any, from RHS : 5
- (i) $\text{CH}_3\text{OH} + \text{HNO}_2 \rightleftharpoons \text{CH}_3\text{OH}_2^+ + \text{NO}_2^-$
- (ii) $\text{NH}_3 + \text{CH}_3\text{OH} \rightleftharpoons \text{NH}_4^+ + \text{CH}_3\text{O}^-$
- (iii) $\text{CH}_3\text{COOH} + \text{H}_2\text{O} \rightleftharpoons \text{CH}_3\text{COO}^- + \text{H}_3\text{O}^+$



(b) Explain the following terms : 5

(i) Mean (ii) Median (iii) Mode

(c) How is coprecipitation useful in separation of trace quantities of radioisotopes ? Explain. 5

5. (a) With reference to analytical chemistry, explain the terms (i) primary standard, and (ii) secondary standard. Give one example of each. 5

(b) Explain the role of an indicator in volumetric analysis. Name two indicators each for (i) Acid-base titrations, and (ii) Redox titration. 5

(c) Iodine solution can be used for the determination of (i) an oxidising agent, and (ii) a reducing agent. Explain, giving one example of each. 5

6. (a) Explain the following terms :

(i) Amphiprotic solvent

(ii) Aprotic solvent

Give one example of each type. 5

- (b) Explain, giving suitable example, the masking-demasking method of estimating different ions in a mixture by EDTA titration. 5
- (c) What are the different ways to use electrochemical cells ? 5
7. (a) Describe Volhard's method for determining Ag^+ . 5
- (b) Name the liquids used for washing the following precipitates obtained during estimation of Ag^+ , Ba^{2+} and Ca^{2+} respectively :
- (i) AgCl
- (ii) BaSO_4
- (iii) CaC_2O_4
- Give reasons for your answer. 5
- (c) Why is sodium kept under kerosene oil and phosphorus under water ? Explain. 5
8. (a) Differentiate between accuracy and precision, giving suitable examples. 5
- (b) Describe in brief the collection of gaseous pollutants with concentration. 5
- (c) Write a short note on Personal Protective Devices. 5
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