No. of Printed Pages : 5

**MCH-001**

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

00001 **Term-End Examination**

**December, 2017**

## MCH-001 : BASIC ANALYTICAL CHEMISTRY

*Time : 3 hours* *Maximum Marks : 75*

***Note :*** *Answer any **five** questions. Marks are indicated against each part. Log tables may be asked for, if required.*

**1.** (a) In replicate determination of iron in a given sample, the following amounts of iron (in mg) were obtained :

52·42, 52·47, 52·46, 52·50, 52·49

Examine which value, if any, needs to be rejected. Give reasons in support of your answer. *5*

(b) How is a water sample preserved for analysis of (i) Mercury, and (ii) Phosphate ? *5*

(c) What is a Titration Curve ? Draw a suitable labelled titration curve for a titration between a weak acid and a strong base. *5*

2. (a) Give the classification of non-aqueous solvents citing two examples of each type. 5

(b) Explain the principle of Volhard titration. 5

(c) Calculate the pH and pOH of a solution prepared by dissolving 4·0 g of acetic acid in water to make 250 mL of the solution. ($K_a = 1{\cdot}76 \times 10^{-5}$) 5

3. (a) Define any ***five*** of the following terms : 5

(i) Hazardous chemical

(ii) Flammable liquid

(iii) Corrosive chemical

(iv) Flammable solid

(v) Explosive

(vi) Oxidising substances

(b) Give any five advantages of the graphical logarithmic extrapolation method. 5

(c) What do you understand by coprecipitation during a gravimetric determination ? Give ways of minimising it. 5

4. (a) What are the essential requirements of a substance to be used as a primary standard ? Give the names and formulae of any two such substances. 5

(b) What information is obtained from the statement, "$E^0$ for the reaction $Ce^{4+} + e \rightleftharpoons Ce^{3+}$ is 1·44 V whereas for $Zn^{2+} + 2e \rightleftharpoons Zn$ is – 0·76 V" ? 5

(c) Explain, giving examples, the masking-demasking method of estimating different ions in a mixture by titrating against EDTA. 5

**5.** (a) What are Redox Indicators ? Explain their working with the help of a suitable example. 5

(b) Explain Levelling Effect. 5

(c) Give the classification of Kinetic methods. 5

**6.** (a) What are gaseous pollutants ? How are gaseous samples collected ? 5

(b) Identify the chemical in Column B which is incompatible with the one in Column A. 5

| | *A* | | *B* |
|---|---|---|---|
| (i) | Mercury | I. | Kerosene |
| (ii) | Na metal | II. | Hydrogen and Anhydrous $NH_3$ |
| (iii) | Phosphorus (elemental) | III. | Water |
| (iv) | Iodine | IV. | $KClO_3$, $KClO_4$ |
| (v) | $H_2SO_4$ | V. | Acetylene, Fulminic acid |

(c) Differentiate between Precision and Accuracy. Illustrate with suitable examples. 5

7. (a) What are Precipitation Titrations ? Describe one of the applications of precipitation titrations. 5

(b) Sucrose is hydrolysed to glucose and fructose in an aqueous medium as per the following equation :

$$C_{12}H_{22}O_{11} + H_2O \longrightarrow C_6H_{12}O_6 + C_6H_{12}O_6$$

What is the order of the reaction ? If 50% sucrose is hydrolysed in 90 minutes, how much time would it require for the reduction of concentration to 25% of the initial concentration ? 5

(c) It is required to prepare a buffer of pH 4·3. Of the available acids, acetic acid, benzoic acid and formic acid and their sodium salts, which acid and its salt is most suitable to prepare the buffer ? Give reasons. $pK_a$ of the three acids are 4·75, 4·20 and 3·70 respectively. 5

8. Write short notes on any ***three*** of the following : *3×5=15*

(a) The "Q" test for Rejection of Data

(b) Application of Complexometric Titration

(c) Buffers and Buffer Capacity

(d) Role of Computers in Analytical Instrumentation