2014

(4th Semester)

CHEMISTRY

Paper : CHEM–241

(Analytical Chemistry—I)

Full Marks : 55

Time : 2 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 35)

The figures in the margin indicate full marks for the questions

1. *(a)* A result of an analysis was determined as 15·752 g while the accepted value was 15·872 g. Calculate the absolute and relative errors. 2

(b) Round-off 5174·55 to five, three and two significant figures. 1½

(c) What is the basis of rejection of results? How would you justify a rejection? 2+1½=3½

OR

2. *(a)* What do you mean by a test of significance? Discuss taking the example of *t*-test. 3

(b) Differentiate between accuracy and precision. 2

(c) Write a short note on 'reporting of analytical data'. 2

3. *(a)* Define the following terms : 1×2=2

(i) Titrant

(ii) Endpoint

(b) What are primary and secondary standards? 2

(c) Differentiate between acid-base and redox titration. 3

OR

4. *(a)* Define the following terms : 1×2=2

(i) Titration

(ii) Indicator

(b) Find out the molarity of a 10% solution of oxalic acid ($C_2H_2O_4 \cdot 2H_2O$). 3

(c) What is iodometric titration? Give at least one example. 2

(Continued)

5. *(a)* How is barium estimated gravimetrically? 4

(b) How are following organic reagents used in inorganic analysis? 1×3=3

(i) Oxine

(ii) Cupferron

(iii) Acetylacetone

OR

6. *(a)* How would you separate calcium and barium ions present in the mixture? 4

(b) Discuss the theory used in purification of precipitates. 3

7. *(a)* What is an electrolyte? Differentiate between weak and strong electrolytes. 1+2=3

(b) Discuss the use of common ion effect in salt analysis. 2

(c) What are interfering anions? How do they affect the analysis of a cation in inorganic qualitative analysis? 2

OR

8. *(a)* Derive an expression for the hydrolysis constant of a strong acid and a weak base. 3

(b) What is the basis of group separation in inorganic salt analysis? 2

(c) Write a note on 'solubility product'. 2

9. (a) Give three advantages and three disadvantages of using glass electrodes. 3

(b) Mention two uses of isotope labelling. 1

(c) Discuss the 'theory of electrophoresis'. 3

OR

10. (a) Discuss in brief about neutron activation analysis. 3

(b) Write a note on 'electroosmosis'. 2

(c) Briefly describe the usefulness of 'polarimetry technique'. 2

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(4th Semester)

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Paper : CHEM–241

(Analytical Chemistry—I)

(PART : A—OBJECTIVE)

(*Marks* : 20)

SECTION—A

(*Marks* : 5)

Each question carries 1 mark

Put a Tick (✓) mark against the correct answer in the brackets provided :

1. How many significant figures should be present in the answer of the following calculation?

$$\frac{0{\cdot}02856 \times 298{\cdot}15 \times 0{\cdot}0112}{0{\cdot}8758}$$

(a) 2 ( )

(b) 3 ( )

(c) 4 ( )

(d) 5 ( )

2. The reagent used for the quantitative estimation of Ni, is

   (a) cupron ( )

   (b) alizarin ( )

   (c) oxine ( )

   (d) dimethylglyoxime ( )

3. Radiophosphorus (P-32) is also used in the treatment of

   (a) ulcer ( )

   (b) hair loss ( )

   (c) leukaemia ( )

   (d) None of the above ( )

4. An aqueous solution of ammonium acetate is

   (a) fairly acidic ( )

   (b) fairly alkaline ( )

   (c) fairly neutral ( )

   (d) faintly acidic ( )

5. The molarity of a 1 *N* solution of H_2SO_4 is

(a) $\frac{1}{2}$ ( )

(b) 1 ( )

(c) 2 ( )

(d) 4 ( )

SECTION—B

(*Marks* : 15)

Each question carries 3 marks

1. Differentiate between molarity and molality of a solution.

2. A piece of preserved hair has 40% as much ^{14}C as a fresh one has today. Calculate the approximate life of the hair. ($t_{\frac{1}{2}}$ of ^{14}C = 5770 years)

3. Calculate the dissociation constant of a conjugate base of HF.

4. Write a note on 'minimization of errors'.

8. Differentiate between co-precipitation and post precipitation.

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