

**2015**

( 4th Semester )

**CHEMISTRY**

Paper : CHEM-241

( Analytical Chemistry—I )

Full Marks : 55

Time : 2½ hours

( PART : B—DESCRIPTIVE )

( Marks : 35 )

The figures in the margin indicate full marks  
for the questions

1. (a) What are determinate errors? How do these errors get transmitted to the final result through additions and subtractions? 3
- (b) Define the term 'precision'. What are the different ways of expressing precision of an experimental data? 1+3=4

## OR

2. (a) Evaluate the following expressions rounding off the answer to the appropriate number of significance : 3

$$(i) 42.71 \text{ g} + 9.643 \text{ g} + 8.0 \text{ g}$$

$$(ii) 0.165 \text{ m}^3 \times 10.487 \text{ kg m}^{-3}$$

$$(iii) \frac{3.24 \times 0.08666}{5.006}$$

(b) Write the main differences between accuracy and precision. 2

(c) What is meant by confidence limit? How is it determined? 2

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

(i) Standard solution

(ii) Titration

(b) Differentiate between equivalence point and end point of a titration. 2

(c) Describe the preparation of 2L of 0.015 M hypo ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ ; m.wt = 248). 3

**OR**

4. (a) What are iodometric and iodimetric titrations? Give an example for iodimetric titration. 3
- (b) What are redox indicators? Give examples. 2
- (c) How do you prepare 2L of 2 N  $\text{H}_2\text{SO}_4$  from concentrated  $\text{H}_2\text{SO}_4$ ? (Strength of concentrated  $\text{H}_2\text{SO}_4 = 36 \text{ N}$ ) 2
5. (a) Write briefly the theory of precipitation. 3
- (b) Describe the separation and estimation of iron and calcium ions in a mixture. 4
- OR**
6. (a) Write a note on post-precipitation. 2
- (b) How are the following organic reagents used in inorganic analysis? 1  $\frac{1}{2} + 1 \frac{1}{2} = 3$
- (i) Dimethylglyoxime
  - (ii) Acetylacetone
- (c) How would you separate iron and copper ions present in a mixture? 2

7. (a) Derive an expression for the hydrolysis constant of a salt of a weak acid and a strong base. 3
- (b) Define and explain the term 'ionic product of water'. 2
- (c) What is common-ion effect? Explain with example. 2
- OR**
8. (a) What are buffer solutions? Explain the buffer action of an acidic buffer. 3
- (b) Calculate the pH of (i) 0.0001 M HCl and (ii) 0.04 M HNO<sub>3</sub> solutions, assuming complete dissociation in each case. 2
- (c) What are interfering anions? Discuss the removal of any one interfering anions in inorganic qualitative analysis. 2
9. (a) Describe the principle of determination of pH of a solution using a glass electrode. 3
- (b) Write a note on electrophoresis. 2
- (c) Discuss the effect of radiation on water. 2

**OR**

**10.** (a) Describe briefly the uses of radio-isotopes in medicine. 3

(b) Write notes on the following : 2+2=4

- (i) Neutron activation analysis
- (ii) Isotope dilution techniques

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**2015**

( 4th Semester )

**CHEMISTRY**

Paper : CHEM-241

( Analytical Chemistry—I )

( PART : A—OBJECTIVE )

( Marks : 20 )

The figures in the margin indicate full marks for the questions

**SECTION—A**

( Marks : 5 )

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

1. The number of significant figures in 0.00601 is

- (a) 6 ( )
- (b) 5 ( )
- (c) 3 ( )
- (d) 2 ( )

2. Which among the following is a primary standard?

(a)  $\text{KMnO}_4$  ( )

(b)  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  ( )

(c)  $\text{HCl}$  ( )

(d)  $\text{H}_2\text{SO}_4$  ( )

3. Which among the following ions forms a precipitate with oxine?

(a) Molybdenum ( )

(b) Aluminum ( )

(c) Copper ( )

(d) Calcium ( )

( 3 )

4. The solubility of  $\text{CaF}_2$  is  $1 \times 10^{-4}$  mol L<sup>-1</sup>. Its solubility product will be
- (a)  $2 \times 10^{-8}$  ( )
- (b)  $4 \times 10^{-8}$  ( )
- (c)  $8 \times 10^{-12}$  ( )
- (d)  $4 \times 10^{-12}$  ( )
5. The pH at which — of the weak acid is dissociated is known as  $pK_a$  value.
- (a) 25% ( )
- (b) 50% ( )
- (c) 75% ( )
- (d) 100% ( )

( 4 )

SECTION—B

( Marks : 15 )

*Each question carries 3 marks*

1. Describe briefly the *F*-test, a test of significance.

( 5 )

2. What is an acid-base indicator? Discuss the principle of choosing indicator for a particular acid-base titration.

( 6 )

3. What do you mean by coprecipitation? Explain giving example.

4. Define the term 'solubility product'. Explain the uses of solubility product in qualitative analysis.

Constitutes the aqueous soln 3.0 ppt as precipitate and  
bars best filtering.

## CHEMISTRY

## Paper - CHEM - IV

## Analytical Chemistry - I

## PART : A—OBJECTIVE

( Marks : 20 )

The figures in the margin indicate full marks for the questions.

## SECTION-A

( Marks : 6 )

Put a Tick ( ✓ ) mark against the correct answer of the multiple provided :

1. The number of significant figures in 0.00601 is

- (a) 6
- (b) 5
- (c) 3
- (d) 2

5. In an experiment, the concentration of  $Zn^{2+}$  (zinc ion) in a given sample was found to be 20.17 ppm. Considering the accepted value is 20.00 ppm, calculate the absolute error 3.0 both as percent and parts per thousand.

Q. Which among the following ions forms a precipitate with  $Zn^{2+}$ ?

(a) Molybdate

(b) Aluminum

(c) Copper

(d) Calcium

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