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(4th Semester)

CHEMISTRY

FOURTH 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) Name the types of determinate errors. How do these errors get propagated in division and multiplication? 1+2=3
- (b) In a set of measurements, the following concentrations of Fe (ppm) were reported :
20.2, 20.4, 20.3, 20.1, 19.9, 20.0, 19.8

Calculate—

- (i) average deviation from mean; 2
- (ii) standard deviation. 2
- (c) Describe Q-test for retention or rejection of an anomalous result. 2

OR

2. (a) Write the difference between accuracy and precision with suitable example. 2
- (b) Describe the F-test and the test of significance. 3
- (c) Calculate the absolute error in the following : 2
(15 02 0 02)(0 2000 0 0001)
3. (a) Explain the following terms : 2
- (i) Analyte
- (ii) Redox indicator
- (b) Calculate the normality of a solution containing 6.3 g of oxalic acid crystals (mol wt 126) dissolved in 500 ml of solution. 2

(3)

- (c) What are acid-base titrations? Give examples. Discuss the use of indicators in acid-base titration. 3

OR

4. (a) Distinguish between equivalence point and end point in volumetric titrimetry. 2
- (b) Write Ostwald's theory of indicators taking phenolphthalein as an example. 3
- (c) Write the theory involved in iodometric titrations. Give relevant equations. 2
5. (a) Briefly explain the following : $2 \times 2 = 4$
- (i) Coprecipitation
- (ii) Postprecipitation
- (b) Illustrate with example the use of the following reagents in inorganic analysis : 3
- (i) Oxine
- (ii) Cupferron
- (iii) -nitroso- -naphthol

OR

6. (a) Write the theory of precipitation. 3

(4)

- (b) Describe the process of separation and estimation of iron and calcium present together in a mixture. 4

7. (a) Determine the pH of—

- (i) 0.001 M HCl; 2
- (ii) 0.10 M NaOH. 2

- (b) Derive the relation between the hydrolysis constant (K_h) and dissociation constant of the acid (K_a) and base (K_b) of a salt of weak acid and weak base. 3

- (c) Explain any two applications of common-ion effect. 2

OR

8. (a) What is meant by solubility product of an electrolyte? Explain giving two examples the use of the concept of solubility product in quantitative analysis. 3

- (b) Define and explain ionic product of water. 2

- (c) Describe the process of removal of any one interfering anion in qualitative analysis. 2

(5)

9. (a) Write the preparation of glass-membrane electrode. 2
- (b) What is the principle of isotope dilution analysis? 2
- (c) Write any three applications of isotopes in medicine. Explain in detail. 3

OR

10. (a) Describe briefly the theory and application of polarimetry. 3
- (b) What is the effect of radiation on water? 2
- (c) What is the principle of ion-selective electrode operation? 2

Subject Code : CHEM/IV/04

Booklet No. **A**

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Date Stamp

To be filled in by the Candidate

DEGREE 4th Semester
(Arts / Science / Commerce /
.....) Exam., **2017**
Subject
Paper

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To be filled in by the Candidate

DEGREE 4th Semester
(Arts / Science / Commerce /
.....) Exam., **2017**
Roll No.
Regn. No.
Subject
Paper
Descriptive Type
Booklet No. B

INSTRUCTIONS TO CANDIDATES

1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.
2. This paper should be ANSWERED FIRST and submitted within 45 minutes of the commencement of the Examination.
3. While answering the questions of this booklet, any cutting, erasing, overwriting or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.

Signature of
Scrutiniser(s)

Signature of
Examiner(s)

Signature of
Invigilator(s)

CHEM/IV/04

2 0 1 7

(4th Semester)

CHEMISTRY

FOURTH 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 : 1×5=5

1. Which of the following sets has the same significant numbers?

- (a) 0·102 and 0·001 ()
- (b) 0·0102 and 0·1002 ()
- (c) 0·01001 and 0·1001 ()
- (d) 2·302 and 0·232 ()

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(2)

2. The normality of a solution of sulphuric acid is $N / 10$.
Its molarity will be

(a) $M / 5$ ()

(b) $M / 10$ ()

(c) $M / 40$ ()

(d) $M / 20$ ()

3. Heating any precipitate to a certain temperature with
a solvent is known as

(a) digestion ()

(b) distillation ()

(c) coprecipitation ()

(d) postprecipitation ()

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(3)

4. If S is the solubility of CaF_2 , the solubility product would be

(a) $K_{\text{sp}} = S^2$ ()

(b) $K_{\text{sp}} = 4S^3$ ()

(c) $K_{\text{sp}} = S^3$ ()

(d) $K_{\text{sp}} = 4S^2$ ()

5. Polarimeter works on the principle of

(a) polarisation of light ()

(b) change of electrical conductivity of solution with composition ()

(c) change of angle of refraction with composition ()

(d) change of electrical conductivity of solution with temperature ()

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(4)

SECTION—B

(Marks : 15)

Each question carries 3 marks

1. Calculate the results of the following expressions :
2+1=3

(a) $(23\ 4\ 0\ 1)(17\ 7\ 0\ 05)$

(b) $(16\ 6\ 0\ 1)\ 2(16\ 7\ 0\ 2)\ 3(7\ 3\ 0\ 1)$

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(5)

2. What are primary standards? Give two examples. What are the qualities which a primary standard must have?

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(6)

3. Describe the process of fractional precipitation.

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(7)

4. What is a buffer solution? Give two examples. Explain the buffer action of an acidic buffer.

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(8)

5. Write a short note on radiometric titrations.

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