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(5th Semester)

CHEMISTRY

EIGHTH (A) PAPER [CHEM-354 (A)]

(Analytical Chemistry)*Full Marks : 75**Time : 3 hours***(PART : B—DESCRIPTIVE)****(Marks : 50)***The figures in the margin indicate full marks
for the questions*

1. (a) State the law of distribution of solutes between two immiscible solvents. What are its limitations? 3+1=4
- (b) Distinguish between distribution coefficient and distribution ratio. 3
- (c) Give the sequence of extraction process. 3

OR

2. (a) Justify the statement that in the process of extraction, the extracting solvent should be used in parts instead of using the whole liquid in one lot. 3
- (b) Write short notes on uses of the following compounds in extraction methods : 2+2=4
- (i) Oxine
- (ii) Dithiocarbamates
- (c) Calculate the mg of iron (III) left unextracted from 100 ml of a solution having 200 mg of Fe^{3+} and is 6 M in HCl after three extractions with 25 ml of ethyl ether. The value of D for this extraction is 150. 3
3. (a) What is overvoltage? What factors affect the overvoltage? 2
- (b) Describe the acid-base titration involving—
- (i) strong acid with a strong base;
- (ii) weak acid with a strong base. $2\frac{1}{2}+2\frac{1}{2}=5$
- (c) Describe the basic principle of coulometry and explain coulometric titrations giving suitable examples. 3

(3)

OR

4. (a) Define the following : 3
Half-wave potential, diffusion current and residual current
- (b) What are the advantages of DME over a solid micro-electrode? 3
- (c) What is meant by voltametry? Give two reasons for using a supporting electrolyte in voltametry. 4
5. (a) What is DTA? What is the theoretical basis of DTA? 1+3=4
- (b) Describe the basic principle of TG and DTA. 4
- (c) What are the advantages of TG 750 over other balances? 2

OR

6. (a) What are the differences between DTA and DTC? 3
- (b) How is DTA used in the measurement of specific heat of reaction? 3
- (c) Describe the quantitative analysis using DTA technique. 4

(4)

7. (a) The force constant for the band in HF is about 9×10^5 dynes/cm. Calculate the vibrational absorption peak for HF. 3
- (b) A sample was excited by the 4358 Å line of mercury. A Raman line was observed at 4447 Å. Calculate the Raman shift in cm^{-1} . 3
- (c) Diagram the fundamental modes of vibration of CO_2 and predict which modes will be infrared active and which will be Raman active. 4

OR

8. (a) Compare the atomic absorption and flame emission instrument as to—
(i) excitation source;
(ii) sample cell;
(iii) parameter which is measured for quantitative measurements. 4
- (b) What are the advantages in atomic absorption of a heated graphite atomizer over a flame atomizer? 3
- (c) Why is internal standard procedure seldom used in atomic absorption determinations? 3

(5)

9. (a) Describe the basic theory of analysis of milk. 5
- (b) What is meant by saponification value? How is it determined? 5

OR

10. (a) Write a short note on iodine-bromine value. 3
- (b) What is meant by RM value? How is it used to characterize fats and oils? 4
- (c) Differentiate between animal and vegetable oils. 3

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Subject Code :

V/CHEM (viii) (A)

Booklet No. **A**

Date Stamp

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To be filled in by the Candidate

DEGREE 5th Semester
(Arts / Science / Commerce /
.....) Exam., **2016**

Subject

Paper

**To be filled in by the
Candidate**

DEGREE 5th Semester
(Arts / Science / Commerce /
.....) Exam., **2016**

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 **1 (one) Hour** 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
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Examiner(s)

Signature of
Invigilator(s)

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V/CHEM (viii) (A)

2 0 1 6

(5th Semester)

CHEMISTRY

EIGHTH (A) PAPER [CHEM-354 (A)]

(Analytical Chemistry)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(Marks : 10)

Put a Tick (✓) mark against the correct answer in the
brackets provided : 1×10=10

- 1.** When the distribution coefficient K_D is small, the solvent extraction technique used is

- (a) continuous extraction ()
- (b) batch extraction ()
- (c) Soxhlet extraction ()
- (d) Craig extraction ()

(2)

2. Which of the following will not be extractable with 18-crown-6?

(a) K ()

(b) Na ()

(c) Cs ()

(d) Sr ()

3. In polarography, which of the following parameters is plotted against each other?

(a) Potential vs. Conductance ()

(b) Potential vs. Current ()

(c) Current vs. Time ()

(d) Conductance vs. Time ()

4. Conductometric titrations are best suited to

(a) redox titrations ()

(b) complexometric titrations ()

(c) acid-base titrations ()

(d) argentometric titrations ()

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(3)

5. Differential scanning calorimetry is a technique useful in determining

(a) glass transition temperature ()

(b) melting point ()

(c) heat capacity ()

(d) All of the above ()

6. In thermogravimetric (TG) curve, the horizontal rows (plateaus) indicate the regions where there is

(a) weight loss ()

(b) weight gain ()

(c) no weight change ()

(d) constant weight change ()

7. IR spectroscopy has been used for the characterization of

(a) gaseous samples only ()

(b) liquid samples only ()

(c) solid samples only ()

(d) gaseous, liquid and solid samples ()

(4)

8. The highest energy transition among the following is

(a) $n - \pi^*$ ()

(b) $\pi - \pi^*$ ()

(c) $n - \sigma^*$ ()

(d) $\sigma - \sigma^*$ ()

9. Fresh cow milk is

(a) exactly neutral ()

(b) slightly alkaline ()

(c) slightly acidic ()

(d) sometimes acidic and sometimes alkaline ()

10. Iodine value indicates

(a) number of saturated bond ()

(b) number of unsaturated bond ()

(c) number of ester group ()

(d) number of carboxylic acid group ()

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(5)

SECTION—B

(Marks : 15)

Answer the following questions :

3×5=15

1. Write a short note on ion-exchange resin.

2. The distribution coefficient of I_2 between CCl_4 and H_2O is 85. Calculate the concentration of I_2 remaining after extracting 50 ml of an aqueous $1.00 \times 10^{-3} M$ solution of I_2 with (a) 50 ml CCl_4 , (b) two 25 ml portions of CCl_4 and (c) five 10 ml portions of CCl_4 .

(7)

3. Write short notes on the following :

(a) Decomposition potential

(b) The counter or back potential

(8)

4. What are the factors which affect thermogravimetric curves?

(9)

5. A solution containing 6.23 ppm KMnO_4 had a transmittance of 0.195 in a 1.00 cm cell at 520 nm. Calculate the molar absorptivity of KMnO_4 at 520 nm.

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