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AT–403

B.Sc. (Part–III) Semester–VI Examination

6S : INDUSTRIAL CHEMISTRY (R/V)

Instrumental Methods of Chemical Analysis, Green Chemistry

Time : Three Hours] [Maximum Marks : 80

Note :—(1) Question No. 1 is compulsory and carries 8 marks.

(2) Remaining all **six** questions carry 12 marks each.

(3) Give chemical equations and draw diagrams wherever necessary.

(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks :

(i) The small quantity removed from bulk material for analysis is called as _____.

(ii) The results of chromatography separations are expressed in terms of _____.

(iii) In green chemistry, the synthesis of chemicals is designed in such a way that there is _____ pollution to the environment.

(iv) The technique of solvent extraction is sometimes also called as _____ extraction. 2

(B) Choose the correct alternatives :

(i) In IR spectroscopy, the region of interest for analytical purpose is :

(a) 7000–5000 cm^{-1} (b) 4000–400 cm^{-1}

(c) 10000–8000 cm^{-1} (d) 12000–10000 cm^{-1}

(ii) In column chromatography, the method of separation is :

(a) Adsorption (b) Partition

(c) Ion exchange (d) All of these

(iii) Paper chromatography is particularly suitable for :

(a) Ion exchange (b) Adsorption

(c) Partition (d) Molecular sieving

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(iv) Which of the following statements with respect to an ion exchange resin is not true ?

(a) It should be sufficiently cross linked

(b) It should be highly porous

(c) It should possess sufficient number of functional groups

(d) It should be chemically reactive. 2

(C) Answer is **one** sentence each :

(i) What is a dye ?

(ii) Define error.

(iii) Give the principle of solvent extraction.

(iv) Define ion exchange capacity. 4

UNIT–I

2. (A) Explain the sampling technique of liquids. 4

(B) Discuss different types of errors. 4

(C) Describe random and non-random sampling. 4

OR

3. (P) Give an account of sampling of solids. 4

(Q) Explain :

(i) Mean deviation

(ii) Standard deviation. 4

(R) Discuss accuracy and precision. 4

UNIT–II

4. (A) Describe the technique of paper chromatography. 4

(B) Explain the principle and applications of thin layer chromatography. 4

(C) Discuss the instrumentation of gas liquid chromatography. 4

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5. (P) Explain the principle of high performance liquid chromatography and give its applications. 4

(Q) Describe the technique of thin layer chromatography. 4

(R) What are rf values ? Explain the method of their measurement. 4

UNIT–III

6. (A) Discuss the experimental details of column chromatography. 6

(B) What is ion exchange ? Describe its analytical applications. 6

OR

7. (P) Discuss the experimental technique of solvent extraction. 6

(Q) Give the classification of ion exchangers and explain the factors affecting ion exchange. 6

UNIT–IV

8. (A) Explain the instrumentation and technique of flame photometry. 6

(B) Give the principle of X-ray fluorescence and explain its technique. 6

OR

9. (P) Give the principle of IR spectroscopy and explain its applications. 6

(Q) Give an account of elemental theory of flame photometry. 6

UNIT–V

10. (A) Give the classification of dyes on the basis of mode of application. 4

(B) Explain :

(i) Acid dyes

(ii) Dye intermediates. 4

(C) Discuss :

(i) Chromophore

(ii) Auxochrome. 4

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11. (P) Explain the preparation and applications of methyl orange dye. 4

(Q) Describe picric acid dye with respect to its preparation and applications. 4

(R) Discuss :

(i) Sulphur dyes

(ii) Pigment dyes. 4

UNIT–VI

12. (A) Discuss the principle of green chemistry. 4

(B) Explain :

(i) Green fuels

(ii) Biocatalysis. 4

(C) Give an account of alternative reaction condition and alternative final products. 4

OR

13. (P) Discuss alternative starting materials and alternative reagents. 4

(Q) Explain the goals of green chemistry. 4

(R) Give an account of green solvents. 4

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