2022

(Held in 2023)

CHEMISTRY

Paper : CHMHE5016

(Analytical Methods in Chemistry)

(Theory)

Full Marks : 60
Pass Marks : 24

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer : 1×5=5

(a) Which of the following is the error in the result of the following calculations?

$70 \cdot 000 (+0 \cdot 07) / 14 \cdot 00 (+0 \cdot 01)$

(i) 0·015

(ii) 0·0015

(iii) 0·00015

(iv) 0·15

(b) Which of the following divisions does not belong to fingerprint region?

(i) 1500 cm^{-1}–1350 cm^{-1}

(ii) 2000 cm^{-1}–1500 cm^{-1}

(iii) 1350 cm^{-1}–1000 cm^{-1}

(iv) Below 1000 cm^{-1}

(c) The term 'precision' means

(i) the lack of bias in the data

(ii) the level of detail at which data is stored

(iii) the overall quality of the data

(iv) the extent to which a value approaches its true value

(d) Which of the following wavelength ranges is associated with UV spectroscopy?

(i) 0·8 µm–500 µm

(ii) 400 nm–1000 nm

(iii) 380 nm–750 nm

(iv) 0·01 nm–10 nm

(e) Column chromatography is an example of

(i) adsorption chromatography

(ii) ion-exchange chromatography

(iii) partition chromatography

(iv) None of the above

(Continued)

2. Answer the following questions : 2×5=10

(a) How do accuracy and precision differ?

(b) What is the concept of sampling in the chemical analysis?

(c) Define Lambert's law and Beer's law.

(d) What do you understand by flame emission spectroscopy? Give example.

(e) Write the principle of adsorption chromatography.

3. Answer any *five* of the following questions : 5×5=25

(a) What is solvent extraction? Briefly discuss about the uses of this process.

(b) Why is sampling important? Discuss.

(c) Describe the basic principle involved in the instrumentation of IR spectroscopy. Why is it called vibrational-rotational spectroscopy?

(d) Write briefly about voltametry technique.

(e) Write a brief note on gas-liquid chromatography.

(Turn Over)

(f) Write briefly about various types of the errors that occur in analytical measurements.

(g) Explain the following :

(i) Distribution ratio

(ii) Extraction efficiency

4. Answer any *two* of the following questions : 10×2=20

(a) Write briefly about the factors that affect the intensity of spectral lines.

(b) Define chromatography. On what principle does it work? Give its classification and efficiency.

(c) Explain single-beam and double-beam spectrophotometers. Which out of these is better and why?

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