Total No. of printed pages = 4

BP 811ET

2025/30/05

B.Pharm. 8th Semester (Regular) End-Term Examination

ADVANCED INSTRUMENTATION TECHNIQUES

Full Marks – 75 Time – Three hours

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

1. Answer the following (Multiple Choice questions) : 1 × 20

(i) Signal splitting in NMR arises from

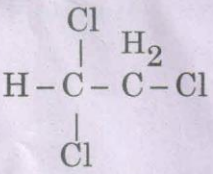
(a) Shielding effect

(b) Spin-spin decoupling

(c) Spin-spin coupling

(d) Deshieldin effect

(ii)



The possible number of NMR peaks for the above compound are

(a) 2 (b) 3

(c) 1 (d) No peaks

(iii) The unit for magnetic moment is -

(a) Tesla (b) Gauss

(c) Joule/gauss (d) No units

(iv) Select the nuclei that can produce NMR signal.

(P) $^{1}H_{1}$ (Q) $^{11}B_{5}$

(R) $^{19}F_{9}$ (S) $^{14}N_{7}$

(a) P, S (b) Q, S

(c) Q, R (d) P, R

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(v) In HPLC, the time taken for a particular compound to travel through the column to the detector is known as its

(a) Average time

(b) Retention time

(c) Travel Time

(d) Performance Time

(vi) In which state of matter mass spectroscopy is being performed?

(a) Solid

(b) Liquid

(c) Gas

(d) Plasma

(vii) Which species of the following is used to bombard with the sample for which mass spectroscopy has been performed?

(a) Electrons (b) Alpha Particles

(c) Neutrons (d) Protons

(viii) Inflame emission spectroscopy ,the flame acts

(a) To convert constituents of the liquid sample into the vapour state.

(b) To decompose these constituents into atoms or simple molecules.

(c) Both the above

(d) None of the above.

(ix) Fluorescence and phosphorescence spectra generally consist of many lines, mostly in _____ region

(a) UV (b) IR

(c) Microwave (d) Visible

(x) Braggs equation is

(a) $n\lambda = 2d\cos\theta$ (b) $n\lambda = 2d\sin\theta$

(c) $n\lambda = 2d\tan\theta$ (d) None of the above

(xi) _____ is used as radiation buffer in the analysis of sodium, potassium and sometimes calcium.

(a) Helium (b) Cesium

(c) Barium (d) Lithium

(xii) The distance between the centres of the peaks of doublet is called as?

(a) Coupling constant

(b) Spin constant

(c) Spin-spin coupling

(d) Chemical shift

(xiii) Highest m/z peak in mass spectrum is called as

(a) Base peak

(b) Fragment peak

(c) Isotopic peak

(d) Parent peak

(xiv) The closeness of test results to the true value is known as

(a) Accuracy (b) Precision

(c) Reproducibility (d) Range

(xv) Identify the relevant regulatory body in USFDA for approval of drugs.

(a) BLA (b) IND

(c) CBER (d) CDER

(xvi) In pharmacovigilance the term ADR stands for ————————

(a) Adverse Drug Reaction

(b) Adverse Dose Reaction

(c) Absolute Drug Reaction

(d) Absolute Dose Reaction

(xvii) Which parameter from LC-MS or GC-MS analysis is proportional to analyse concentration?

(a) Chromatographic retention time

(b) Total ion chromatogram

(c) Mass spectral m/z value

(d) Chromatographic peal area

(xviii) In RIA, what component is labelled with a readioactive isotope for detection?

(a) Enyzmes (b) Antigens

(c) Antibodies (d) Substrates

(xix) Solvent extraction is more effective when the extraction is repeated with

(a) Extra solvent (b) Large solvent

(c) Small solvent (d) No solvent

(xx) When the component has a small value of K, it is supposed to have an affinity for

(a) Mobile Phase

(b) No phase

(c) Stationary Phase

(d) Whole solution

2. Short Answer (Answer any *Seven* out of *Nine*) 7×5

(a) Enlist different ionization techniques used in Mass Spectrometry. Explain any one in details.

(b) Explain in details about chemical shift and spin-spin coupling.

(c) Write a note on TOF and Quadrupole mass analyzer.

(d) Explain Bragg's X ray spectrometer method.

(e) Discuss the steps involved in the calibration of an electronic balance.

(f) Explain the basic principle involved in Radio Immuno Assay.

(g) Give an account on the working and application of GC-MS.

(h) Describe the procedure involved in solid phase extraction method.

(i) Define coupling constant. Discuss the basic principle and application of C-13 NMR.

3. Long Answer (Answer any *Two* out of *Three*) 2×10

(a) Explain the different techniques involved in thermal method of analysis.

(b) Compare calibration and validation. Explain briefly about the process of calibration of UV spectrophotometer.

(c) Describe the principle involved in NMR spectrometer. Discuss the shielding and de-shielding effect in NMR spectra with suitable example.
