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BP 701 T

2024

B.Pharm. 7th Semester End-Term Examination

INSTRUMENTAL METHODS OF ANALYSIS

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) The possible transition for water molecule in UV-visible region are (CO1)

(a) $\sigma \rightarrow \sigma^*$ (b) $n \rightarrow \pi^*$, $\pi \rightarrow \pi^*$

(c) $\sigma \rightarrow \sigma^*$, $n \rightarrow \pi^*$ (d) $n \rightarrow \sigma^*$

(ii) The purpose of secondary filter in fluorescence spectroscopy is (CO1)

(a) Allows only excitation radiation

(b) Allows only emission radiation

(c) Allows both excitation and emission radiations

(d) Allows transmitted radiation

(iii) The fluorescence intensity depends on all of the following except (CO3)

(a) Concentration (b) Polarity

(c) Path length (d) Intensity of incident radiation

(iv) Which detector(s) is/are used in Fluorimetry? (CO3)

(a) Photo voltaic cell (b) PMT

(c) Photo tube (d) All of the above

(v) The λ of σ to σ^* transitions lies in the (CO1)

(a) IR region (b) Visible region

(c) UV region (d) None of the above

(vi) Which of the following spectroscopy techniques is associated with molecular emission? (CO3)

(a) UV-Visible spectroscopy (b) IR spectroscopy

(c) Fluorescence spectroscopy (d) X-ray diffraction

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(vii) The primary filter is placed in between (CO3)

(a) Source and cell (b) Cell and detector

(c) Source and detector (d) Anywhere

(viii) The most widely used detector in spectrofluorometer is (CO1)

(a) Barrier layer (b) Golay detector

(c) Bolometer (d) PMT

(ix) Which of the following is a non-dispersive type of spectrophotometer? (CO1)

(a) Spectrofluorometer (b) Spectrophotometer

(c) Flame photometer (d) FTIR

(x) The wave numbers correspond to the wavelength 2.5 μm is (CO1)

(a) 14,000 cm^{-1} (b) 4,000 cm^{-1}

(c) 3,600 cm^{-1} (d) 400 cm^{-1}

(xi) Which of the following causes the vibration of atoms? (CO1)

(a) The number of protons contained in a nucleus

(b) Electron movement to higher energy levels

(c) The molecule's total molecular weight

(d) Dipole moments between atoms

(xii) Which of the following bending vibration takes place in different planes? (CO1)

(a) Asymmetric stretching (b) Rocking

(c) Scissoring (d) Twisting

(xiii) Chromatography is an analytical technique and it is used for (CO2)

(a) Identification of chemical species

(b) Separation of chemical species

(c) Quantification of chemical species

(d) All of the above

(xiv) In which type of chromatography, the stationary phase is held in a narrow tube and the mobile phase is forced through it under pressure? (CO2)

(a) Column Chromatography (b) Planar Chromatography

(c) Liquid Chromatography (d) Gas Chromatography

(xv) In thin layer chromatography, the stationary phase is made of _____ and the mobile phase is made of _____. (CO2)

(a) Solid, liquid (b) Liquid, liquid

(c) Liquid, gas (d) Solid, gas

(xvi) In size exclusion chromatography, solute molecules are separated based on _____. (CO2)

(a) Molecular geometry and size (b) Molecular composition

(c) Molecular phase (d) Molecular formula

(xvii) Ion exchange chromatography is based on (CO2)

(a) Electrostatic attraction (b) Electrical mobility of ionic species

(c) Partition chromatography (d) Adsorption chromatography

(xviii) Which of the following is an example of bulk property or general detector in HPLC? (CO2)

(a) Fluorescence detector (b) Refractive index detector

(c) Electrochemical detector (d) UV-Visible detector

(xix) Which of the following is used as a carrier gas in gas chromatography? (CO2)

(a) Carbon dioxide (b) Oxygen

(c) Helium (d) Methane

(xx) Which of the following is used as a spraying reagent in paper chromatography? (CO2)

(a) Conc. HCl (b) NaCl solution

(c) Ninhydrin solution (d) $CuSO_4$ solution

2. Short answers. (Answer *seven*) 7×5

(a) Describe the factors affecting ion-exchange chromatography. (CO2]

(b) Explain chromophore, auxochrome, red and blue shift with example/diagram. (CO1)

(c) Mention the applications of AAS. (CO2)

(d) Discuss briefly about the sample handling in IR spectroscopy. (CO1)

(e) Compare dispersive and non-dispersive IR. (CO1)

(f) Explain the principle of paper and thin layer chromatography (CO3)

(g) Discuss the application of electrophoresis. (CO3)

(h) Describe the instrumentation of HPLC. (CO3)

(i) Explain the principle of flame photometry. (CO2)

3. Long answers. (Answer any *two*) 2 × 10

(a) State the Beer-Lambert's law and derive the Beer-Lambert's equation. (CO1)

(b) What are the different detectors used in UV-VIS spectroscopy? Discuss in details of any two such detectors. (CO1)

(c) Explain the different types of vibrations observed in IR spectroscopy. Mention the different light sources of IR-Spectrophotometer. (CO3)