

Question Paper

Exam Date & Time: 11-Jan-2021 (01:30 PM - 04:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

Instrumental Methods of Analysis [PQA-BP701T - S3]

Marks: 75

Duration: 180 mins.

I Multiple Choice Questions (MCQs)

Section Duration: 30 mins

Answer all the questions.

- 1) The specific absorptivity of an analyte showing absorbance 0.450 for 10 $\mu\text{g/mL}$ concentration in 1 cm cuvette is (1)
- 4.5
45
450
4500
- 2) UV Spectroscopy can be classified as (1)
- Molecular absorption spectroscopy
Molecular emission spectroscopy
Atomic absorption spectroscopy
Atomic emission spectroscopy
- 3) Why deuterium lamp is preferred as a radiation source in UV spectrophotometer? (1)
- because it gives emission lines at longer wavelengths
because it does not require calibration
because it gives 3-5 times intense output than H₂ lamp in the region 160-375 nm
because it is made up of silica or quartz
- Which of the following is not an ideal property of detector? (1)
- Instantaneous response to input radiations
High dark current
Low electrical noise
All of the above
- 5) Emission wavelength is longer than absorption wavelength because (1)
- Energy dissipation through vibrational relaxation
Involvement of singlet excited state
Involvement of triplet excited state
All of the above
- 6) Which of the following group will have highest frequency of absorption? (1)
- CH₂-CH₂-
-C=O
-C \equiv C-
-CH₃
- 7) _____ reagent is used to detect amino acids in chromatography. (1)
- Dragendorff's
Ninhydrin

Bratten
Marshall
Phenolphthalein

- 8) Cation is _____ charged ion, moves towards _____ (1)
- Positively, Cathode
Positively, anode
Negatively, cathode
Negatively, anode
- 9) In reverse phase chromatography, the stationary phase is _____ (1)
- Polar
Non - Polar
Either polar or non- polar
None of the above
- 10) Thin layer chromatography is _____ (1)
- Partition chromatography
Electric mobility of ionic species
Adsorption chromatography
None of the above
- 11) The type of adsorption chromatography where the separation depends on the reversible adsorption of charged solute molecules to immobilized ion exchange groups of opposite charge is: (1)
- Size exclusion chromatography
Ion exchange chromatography
Partition chromatography
Affinity Chromatography.
- 12) Among the following anions, which has the lowest ion exchange capacity? (1)
- Phosphate
Sulphate
Iodide
Carbonate
- 13) Which of the following chromatographic technique is the most preferred for the "Desalting of proteins"? (1)
- Ion exchange chromatography
Partition chromatography
Size exclusion chromatography
Adsorption chromatography
- 14) Which of the following carrier gas is not used in Gas Chromatography? (1)
- Nitrogen
Oxygen
Hydrogen
Helium
- 15) Principle of electrochemical detector (ECD) depends on (1)
- Ionization ability of β radiation to ionize the Helium gas
Ionization of electronegative compounds
Thermal conductivity of carrier gas
Temperature of the hot wire filament
- 16) Which of the following HPLC detector is an example of 'bulk property detector'? (1)
- UV-Visible detector
Fluorescence detector
Electrochemical detector

Refractive index detector

17) Which of the following is NOT TRUE of polarography? (1)

DME is used as the working electrode since it is a polarisable electrode.
The advantage of DME is that it prevents passivity of the electrode.
Nitrogen is purged through the electrolytic solution before a polarographic experiment to remove oxygen from the electrolytic solution
Hg is used as the working electrode since it produce amalgams with metals and helps in electrolysis of these metals.

18) Principle of quantitative analysis using polarography is based on (1)

Nernst equation
Ilkovic equation
Beer-lambert equation
Kirckoff's law

19) Which of the following electrode is used as indicator electrode in a pH meter? (1)

Platinum electrode
Silver-Silver chloride electrode
Glass electrode
Calomel electrode

20) Which of the following is NOT TRUE of conductometry? (1)

A conductivity cell having electrodes of large surface area is used for the measurement of conductance of a solution of low conductance.
Cell constant is calculated using a solution containing 7.41938 g of KCl in 1000g of solution.
The concentration of the titrating reagent must be at least 10 times that of the solution being titrated.
The end point in a titration between weak acid with a weak base is not sharp and is difficult to get accurately.

II Long Answers

Answer all the questions.

- 1) What is scattering. Enlist the types of scattering with appropriate examples. (5M) (10)
Explain any two instruments that follow elastic scattering. (5M)
- Write the theory and instrumentation requirements of HPLC. Explain the principle of UV-Visible detector used in HPLC. (10)

III Short Answers

Answer all the questions.

- 1) Explain simultaneous equation method of multicomponent analysis. (5)
- 2) Explain the principle of fluorimetry. (5)
- 3) With the help of neat and labelled diagram, write a note on Golay detector used in IR spectroscopy. (5)
- 4) Explain the principle behind column chromatography and enlist the steps involved in developing column chromatography. (5)
- 5) Define chromatography. Enlist types of chromatographic techniques. (5)
- 6) Explain the principle of glass electrode (5)
- 7) Construct a conductometric titration curve for a weak acid with a weak base and explain the shape of the curve. (5)

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