

**M.Sc. III Semester Degree Examination, April/May - 2024****INDUSTRIAL CHEMISTRY****SEC - 3 : Instrumental Methods of Analysis****(NEP)**

Time : 2 Hours

Maximum Marks : 30

- Chromatography is a physical method that is used to separate and analyse _____.
(A) Simplex mixtures (B) Complex mixtures
(C) Viscous mixtures (D) Metals
- In which type of chromatography, the stationary phase held in a narrow tube and the mobile phase is forced through it under pressure ?
(A) Column chromatography (B) Planar chromatography
(C) Liquid chromatography (D) Gas chromatography
- In chromatography, the stationary phase can be _____ supported on a solid.
(A) Solid or liquid (B) Liquid or gas (C) Solid only (D) Liquid only
- In chromatography, which of the following can the mobile phase be made of ?
(A) Solid or liquid (B) Liquid or gas (C) Gas only (D) Liquid only
- Which of the following cannot be used as an adsorbent in Column adsorption chromatography ?
(A) Magnesium oxide (B) Silica gel
(C) Activated alumina (D) Potassium permanganate
- Which of the following steps takes place after injection of feed in Column chromatography ?
(A) Detection of components (B) Separation in the column
(C) Elution from the column (D) Collection of eluted component
- What happens during the 'elution from the column' phase in chromatography ?
(A) Components with greatest affinity elute first
(B) Components with least affinity elute first
(C) Components elute in a random manner
(D) Components elute according to their concentration in the mixture
- In chromatogram, the position of peaks on the time axis can be used to determine which of the following ?
(A) Components of the sample (B) Amount of component in the sample
(C) Column efficiency (D) Column resolution



9. In chromatogram, the area under the peak can be used to determine which of the following ?
(A) Components of the sample (B) Amount of component in the sample
(C) Column efficiency (D) Column resolution
10. Using Chromatogram as detector in Chromatography, a graph is obtained between _____ and time.
(A) Quantity (B) Density (C) Concentration (D) Specific gravity
11. Which of the following types of chromatography involves the process, where the mobile phase moves through the stationary phase by the influence of gravity or capillary action ?
(A) Column Chromatography (B) High Pressure Liquid Chromatography
(C) Gas Chromatography (D) Planar Chromatography
12. Beer Lambert's law gives the relation between which of the following ?
(A) Reflected radiation and concentration
(B) Scattered radiation and concentration
(C) Energy absorption and concentration
(D) Energy absorption and reflected radiation
13. In which of the following ways, absorption is related to transmittance ?
(A) Absorption is the logarithm of transmittance
(B) Absorption is the reciprocal of transmittance
(C) Absorption is the negative logarithm of transmittance
(D) Absorption is a multiple of transmittance
14. Beer's law states that the intensity of light decreases with respect to _____.
(A) Concentration (B) Distance (C) Composition (D) Volume
15. Lambert's law states that the intensity of light decreases with respect to _____.
(A) Concentration (B) Distance (C) Composition (D) Volume
16. The representation of Beer Lambert's law is given as $A = abc$. If 'b' represents distance, 'c' represents concentration and 'A' represents absorption, what does 'a' represent ?
(A) Intensity (B) Transmittance
(C) Absorptivity (D) Admittance
17. What is the unit of absorbance which can be derived from Beer Lambert's law ?
(A) $L \text{ mol}^{-1} \text{ cm}^{-1}$ (B) $L \text{ gm}^{-1} \text{ cm}^{-1}$ (C) Cm (D) No unit
18. What is the unit of molar absorptivity or absorptivity which is used to determine absorbance A in Beer Lambert's formula ?
(A) $L \text{ mol}^{-1} \text{ cm}^{-1}$ (B) $L \text{ gm}^{-1} \text{ cm}^{-1}$ (C) Cm (D) No unit



19. NMR spectroscopy is used for determining structure in which of the following materials ?
(A) Radioactive materials (B) Insoluble chemical compounds
(C) Liquids (D) Gases
20. NMR is the study of the absorption of _____ by nuclei in a magnetic field.
(A) Radioactive radiation (B) IR radiation
(C) Radio frequency radiation (D) Microwaves
21. NMR spectrometer provides _____ and _____ methods of determining structure in soluble chemical compounds.
(A) Accurate, destructive (B) Accurate, non-destructive
(C) Inaccurate, destructive (D) Inaccurate, non-destructive
22. NMR spectroscopy indicates the chemical nature of the _____ and spatial positions of _____.
(A) Electrons, Protons (B) Neutrons, electrons
(C) Nuclei, electrons (D) Nuclei, neighbouring nuclei
23. In NMR spectroscopy, the spinning nuclei in a strong magnetic field must be irradiated by which of the following ?
(A) Perpendicular and stronger field
(B) Perpendicular and weaker field
(C) Parallel and stronger field
(D) Parallel and weaker field
24. Interaction between matter and electromagnetic radiation can be observed by subjecting a substance to magnetic fields in which of the following manner ?
(A) Both fields should be stationary
(B) Both fields should be varying
(C) One field should be stationary and the other should be varying
(D) It must be subjected to only one field
25. When energy is absorbed by the sample, the absorption can be observed as a change in signal developed by which of the following components ?
(A) Amplifier (B) Photodetector
(C) GM counter (D) Radio frequency detector
26. Which of the following statements is false about single beam absorption instruments?
(A) Tungsten bulb is used as a source
(B) Beam splitter is used to get parallel beam
(C) Test tube is used as sample holder
(D) Photovoltaic cell as detector



27. Which of the following statement is false about double beam absorption instruments ?
- (A) It is similar to single beam instruments except two beams are present
 - (B) Tungsten bulb is used as a source
 - (C) Reference beam must have a higher intensity than sample beam
 - (D) Both the beams after they pass through respective samples are compared
28. For the separation of which of the following substances, Gas-solid chromatography is being used ?
- (A) Thermally stable organic components
 - (B) Volatile organic components
 - (C) Thermally stable inorganic components
 - (D) Low molecular weight gaseous species
29. Which of the following is the disadvantage of helium, which can be used as carrier gas in gas chromatography ?
- (A) Dangerous to use
 - (B) Expensive
 - (C) Reduced sensitivity
 - (D) High density
30. Which of the following is the commonly used support material for the packed column in gas chromatography ?
- (A) Glass
 - (B) Metal
 - (C) Diatomaceous earth
 - (D) Stainless steel

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