CUET PG Forensic Science Practice Test 9 PDF

TOPIC -> CHEMICAL SEPARATION & INSTRUMENTAL TECHNIQU (50 M.C.Q)

Q1. Azeotropic distillation becomes necessary when:
A) Relative volatility = 0
B) Relative volatility ≈ 1
C) Boiling points differ by >50°C
D) Vapor pressure is constant

Q2. Steam distillation is unsuitable for compounds that:
A) Are water-insoluble
B) Decompose at steam temperature
C) Have high vapor pressure
D) Are aromatic

Q3. Sublimation efficiency depends primarily on:
A) Triple point pressure
B) Critical temperature
C) Heat capacity
D) Dielectric constant

Q4. Zone refining is based on difference in:
A) Partition coefficient
B) Solid solubility
C) Vapor density
D) Surface tension

Q5. In crystallization, "oiling out" occurs when:
A) Supersaturation is too low
B) Cooling is too slow
C) Impurity melting point < solvent temp
D) Solute separates as a liquid phase instead of crystals

Q6. Distribution law fails when solute:
A) Is non-volatile
B) Associates/dissociates
C) Is colored
D) Is ionic only

Q7. In solvent extraction, multiple small-volume extractions are preferred because:
A) Reduce emulsions
B) Increase partition ratio
C) Improve recovery mathematically
D) Lower density difference

Q8. McCabe–Thiele method is related to:
A) Gas chromatography
B) Fractional distillation
C) TLC
D) Electrophoresis

Q9. Van Deemter equation minimum corresponds to:
A) Maximum plate height
B) Optimal linear velocity
C) Zero diffusion
D) Infinite efficiency

Q10. The Eddy diffusion (A) term in the Van Deemter equation is absent in:
A) Packed columns
B) Capillary (Open Tubular) columns
C) TLC (Thin Layer Chromatography)
D) Paper chromatography

Chromatography

Q11. Normal phase LC uses stationary phase that is:
A) Non-polar
B) Ionic
C) Polar
D) Zwitterionic

Q12. In reversed-phase HPLC, increasing % organic solvent usually:
A) Increases retention
B) Decreases retention
C) Stops elution
D) Broadens peaks only

Q13. Rf value is MOST affected by:
A) Plate thickness
B) Chamber saturation
C) Spot color
D) UV lamp type

Q14. Tailoring factor >1 indicates:
A) Fronting
B) Ghost peak
C) Tailing
D) Co-elution

Q15. Selectivity factor (α) must be:
A) = 0
B) < 1
C) = 1
D) > 1

Q16. In GC, split ratio affects:
A) Column temperature
B) Sample load
C) Carrier gas identity
D) Detector voltage

Q17. Kovats index is independent of:
A) Column length
B) Temperature program (isothermal)
C) Carrier gas flow
D) Detector type

Q18. ECD detector is most sensitive to:
A) Hydrocarbons
B) Halogenated compounds
C) Alcohols
D) Ketones

Q19. In TLC, streaking usually indicates:
A) Low sample
B) Overloading
C) Weak solvent
D) Thin plate

Q20. LC-MS interface commonly uses:
A) FID
B) ESI/APCI
C) TCD
D) NPD

Spectroscopy

Q21. Beer–Lambert law deviates at high concentration due to:
A) Stray light
B) Molecular interaction
C) Detector noise
D) Short path length

Q22. UV absorption requires:
A) σ → σ* only
B) Chromophore
C) Neutron source
D) Fluorescence

Q23. Bathochromic shift means:
A) Blue shift
B) Red shift
C) No shift
D) Peak split

Q24. IR inactive vibrations show:
A) Dipole change = 0
B) Mass change
C) Pressure change
D) Spin flip

Q25. FTIR advantage mainly from:
A) Prism
B) Michelson interferometer
C) Grating
D) Slitless design only

Q26. Raman scattering is strongest for:
A) Polar bonds
B) Non-polar bonds
C) Ionic solids
D) Metals only

Q27. Fluorescence lifetime is typically:
A) Seconds
B) Minutes
C) Nanoseconds
D) Hours

Q28. AAS uses which source?
A) Deuterium lamp
B) Hollow cathode lamp
C) Tungsten lamp
D) Laser diode

Q29. Self-absorption error occurs in:
A) Emission spectroscopy
B) UV
C) Raman
D) IR

Q30. Hyperchromic effect refers to:
A) Shift in λ
B) Increase in intensity
C) Band splitting
D) Noise spike

Mass Spectrometry & NAA

Q31. Base peak represents:
A) Molecular ion
B) Highest mass
C) Highest intensity
D) First fragment

Q32. Nitrogen rule helps determine:
A) Isotope ratio
B) Odd/even mass
C) Charge state
D) Fragment energy

Q33. EI ionization is considered:
A) Soft
B) Ambient
C) Hard
D) Thermal

Q34. TOF analyzer resolution improves with:
A) Longer flight tube
B) Higher pressure
C) Wider pulse
D) Lower voltage

Q35. In Mass Spectrometry, an isotopic pattern showing M and M+2 peaks in an approximate 3:1 ratio suggests the presence of:
A) Bromine (Br)
B) Chlorine (Cl)
C) Sulfur (S)
D) Silicon (Si)

Q36. Neutron activation analysis measures:
A) Stable isotopes directly
B) Induced radioactivity
C) UV absorbance
D) Magnetic spin

Q37. NAA is highly suitable for:
A) Organic solvents
B) Trace metals
C) Polymers only
D) Gases only

Electrophoresis

Q38. Mobility in electrophoresis depends on:
A) Charge/size ratio
B) Color
C) Density only
D) Temperature only

Q39. SDS-PAGE separates proteins by:
A) Charge. B) Shape
C) Size (MW). D) pI

Q40. Isoelectric focusing separates by:
A) Length. B) pI
C) Hydrophobicity. D) Mass

Q41. Agarose gel is preferred for:
A) Small peptides
B) DNA fragments
C) Lipids
D) Sugars

Q42. The "smiling effect" observed in gel electrophoresis is primarily due to:
A) pH drift during the run
B) Uneven heating across the gel
C) Overloading of the dye
D) Absence of salt in the buffer

Q43. Native PAGE maintains:
A) Denatured state
B) Protein activity
C) Constant MW
D) Zero charge

Q44. Immunoelectrophoresis combines:
A) GC + MS
B) Diffusion + electrophoresis
C) UV + IR
D) LC + TLC

Q45. Zymography detects:
A) DNA
B) Enzyme activity
C) Lipids
D) Metals

Mixed Advanced Concepts

Q46. Plate number (N) is proportional to:
A) H. B) 1/H
C) Flow rate. D) Pressure

Q47. Resolution (Rs) improves when:
A) k decreases to zero
B) α approaches 1
C) N increases
D) Peaks overlap

Q48. Ghost peaks usually arise from:
A) Detector heat
B) Carryover/contamination
C) Low voltage
D) Short column

Q49. Matrix effect is critical in:
A) TLC
B) LC-MS
C) Paper chromatography
D) Distillation

Q50. Hyphenated technique primarily enhances:
A) Speed only
B) Selectivity + identification
C) Color detection
D) Manual accuracy

Answer Key

1-B, 2-B, 3-A, 4-B, 5-D, 6-B, 7-C, 8-B, 9-B, 10-B, 11-C, 12-B, 13-B, 14-C, 15-D, 16-B, 17-D, 18-B, 19-B, 20-B, 21-B, 22-B, 23-B, 24-A, 25-B, 26-B, 27-C, 28-B, 29-A, 30-B, 31-C, 32-B, 33-C, 34-A, 35-B, 36-B, 37-B, 38-A, 39-C, 40-B, 41-B, 42-B, 43-B, 44-B, 45-B, 46-B, 47-C, 48-B, 49-B, 50-B

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