

Pharmaceutical Analysis

QUESTION BANK

10 MARKS

1. Discuss the principle & development techniques used in column chromatography Add a note on the adsorbents mobile phase & detection systems in column chromatography.
2. Write a note on development techniques in column chromatography.
3. Describe the preparation, activation of plates & adsorbents used in the TLC & write its application.
4. Define paper chromatography? What are the modes of development of paper chromatography & Enumerate the application of paper chromatography
5. Give a detailed account of principle, classification of Ion-Exchange process in pharmaceutical analysis
6. What are the Ion-Exchange resins? Explain Mechanism of Ion-Exchange process and application of Ion-Exchange chromatography
7. Explain with a neat diagram any three detectors used in Gas Chromatography
8. Describe the construction and working of a Gas Chromatography? Emphasize on the ideal characteristics of stationary phases and mobile phases used in Gas Liquid Chromatography.
9. Describe instrumentation and application of HPLC
10. Describe the principles and application of Electrophoresis
11. Explain various methods of preparing TLC plates and its application.
12. How development is carried out in column chromatography, TLC & Paper chromatography
13. Describe the principle of a Potentiometric titrations? Write the construction and working of a calomel electrode & glass electrode?
14. Give an account of the construction and working of glass electrode? Write the application of potentiometric titrations
15. Describe the construction and working, advantages, disadvantages & application of a Standard Hydrogen Electrode.

16. Explain the theory & the types of Conductometric Titrations.
17. Write the basic principle of a potentiometry .Describe in detail Dead Stop End point techniques.
18. Describe the construction and working of a Double- Beam Recording Dispersive IR Spectrophotometer with its advantages and disadvantages.
19. Outline the working of a double beam recording of UV/Visible spectrophotometer .Name each part of the system & its functioning.
20. Describe the construction and working of Double-Beam UV/Visible spectrophotometer. Mention the advantages of double beam over single beam spectrophotometer
21. a) Derive Beer's & Lamberts Law .b) what are the applications advantages and limitations of Beer's law.
22. Describe the principle and Application of IR Spectroscopy for the following A) Detection of functional group(two example) B) Study of Hydrogen Bonding.
23. Explain the principal instrumentation and factors affecting fluorescence intensity.
24. Describe the Instrumentation and application of HPLC.
25. Explain with the help of a neat diagram, the construction and working of UV/Visible spectrophotometer with special emphasis on the monochromators and detectors present in them.
26. Describe the instrumentation of I.R. Spectrometry
27. How are different samples handled (solid,liquid,and gaseous) in I.R. Spectroscopy
28. List out the sources of UV,Visible spectrophotometers and I.R.Spectrometers
29. What are pharmaceutical application of fluorimetry? How is fluorimetry more sensitive and specific than spectrophotometry.
30. Discuss the phenomenon of fluorescence. Explain the working of fluorimeter with suitable diagram?

QUESTION BANK FOR 05 Marks

1. Explain the term a) HETP b) Retention time c) Theoretical plate d) Retention volume
2. Define HPLC & write a note on detectors present in HPLC
3. Write a note on Guard Column and its significance
4. What are the techniques of separation in HPLC based on a) Principle of separation b) Elution Techniques c) Types of analysis d) Scale of operation
5. What is the principle in a) Normal-Phase Chromatography b) Reverse -Phase Chromatography c) Ion- Exchange Chromatography d) Ion-pair Chromatography.
6. Define chromatography? What are the principles of separations in chromatography
7. Explain the different packing techniques in column chromatography which packing techniques is best and why?
8. Classify adsorbents used in column chromatography with example.
9. Define partition chromatography and write a note on factors affecting column efficiency
10. Write a note on Development Techniques in column chromatography
11. Define Partition chromatography & write a note on Bonded Phase Chromatography
12. Write a note on Frontal Analysis & Bonded Phase Chromatography
13. Describe the preparation activation of plates & adsorbents used in TLC
14. Define paper chromatography? What are the modes of development in paper chromatography
15. Explain two dimensional & Reverse-phase Chromatography
16. Explain various development techniques used in paper chromatography
17. Enumerate the application of paper chromatography
a) alkaloid b) Cardiac glycoside c) Aldehydes or ketones d) proteins.
18. How will you perform quantitative analysis in paper chromatography
19. Compare the principle techniques limitations and application of paper chromatography with electrophoresis.
20. How does the following factors affect separation efficiency a) cross-linking of Resin b) Ion-Exchange Capacity
21. Write a note on factors affecting the separation efficiency of Ion exchange resin

22. What is regeneration of a resin? How will you regenerate cation and anion exchange resin
23. Explain with a neat diagram any two detectors used in G.C.
24. Explain the concept of pre-derivatization & post derivatization techniques in Gas – Chromatography with relevant examples
25. write a note on paper electrophoresis
26. What is electrophoresis? Mention their types
27. Describe the principles and application of electrophoresis
28. Write a note on HPTLC.
29. Write a note on instrumentation and application of HPTLC
30. Define Validation? Classify and explain each type in briefs
31. Define & Explain (1) Accuracy (2) Precision (3) Significant figure
32. Describe different steps involved in validation master plan
33. Explain the procedure to calibrate wavelength of UV Instrument
34. Write a note on ICH Guidelines
35. Describe the pharmaceutical water system Validation.
36. Define Validation? Explain types of “process Validation”?
37. What is the principle in potentiometric titration and How is the end point determined in Potentiometric titrations
38. Enumerate the different reference electrodes & Indicators electrodes in potentiometric titrations
39. Explain the principle underlying “Dead- Stop end point technique” and Null point potentiometry.
40. Explain with graphs the methods of potentiometric end point determination
41. With titration curves, describe the principles of Conductometric titrations?
42. Explain with graph, the conductometric titration of a mixture of weak & strong acids with alkali
43. Explain the conductometric titration curve for strong acids against weak base?
44. What is quenching? Explain various types of quenching with suitable examples?
45. What is the number of Fundamental Vibration modes for linear and non-linear molecules containing ‘n’ atoms? Explain how these numbers are obtained
46. What is nebulization? Write a note on types of Burner’s used in Atomic emission spectrometer

47. Depict the different modes of fundamental vibrations in a tri-atomic group (stretching & deformation) by means of a neat sketch for each mode
48. Explain what is meant by allowed transition and forbidden transition of valence electron in absorption spectroscopy
49. Describe the terms fluorescence & phosphorescence. Depict both the phenomena by energy diagram
50. What is flame emission & atomic Absorption spectrometry? How do you estimate the amount of sodium by the above techniques
51. Explain the different modes of fundamental vibrations occurring in IR Spectroscopy
52. What are the factors affecting the fluorescence
53. Write a note on spectrophotometric titration
54. Explain deformation vibrations in IR Spectroscopy
55. What are the effect of solvent & conjugation in UV Spectroscopy
56. Write the structure and chemical name of BMR Reagent. Write the principle involved in the reaction of BMR with Sulphanilamide along with chemical reactions.
57. State & explain the mathematical expression for Beer's & Lamberts Law
58. Explain the term- Red Shift, Blue Shift, hypochromic shift, hyperchromic shift giving suitable examples for each along with λ_{\max} and Σ values.
59. What is chromophore & auxochrome? Give two examples of each term
60. What is the effect of polar & Non-polar solvent on π - π^* transition of alkenes? Give one example of each case with λ_{\max} and Σ values..
61. Depict their energy diagram with respect to sigma bond, π -bond & non-bonding electrons on absorption of UV energy.
62. What are K bands, R-bands, B-bands & E-bands. Give their significance individually
63. Explain why UV/Visible Spectroscopy is widely applicable in pharmacy
64. Give any four Important application of UV & Visible absorption spectroscopy
65. How do you determine the amount of paracetamol in a given tablet according to IP by means of UV using 1cm cell ($a=0.715$ at 257nm)
66. Write a short note on ORD & give its applications.
67. Describe why UV/Visible spectrometry is widely used for assay of a drug sample than other methods.
68. What is the minimum requirements for a molecules to show I.R bands. State selection rule for exhibiting IR Vibrations

69. What are the different sampling techniques for mounting a sample in the form of a solid, thin film, liquid or gas in the beam of IR spectrometer. Type equation here.
70. Why carbon-di-oxide shows some IR bands though the molecule as a whole does not possess any dipole moment?
71. Give approximate stretching wave number values for the following groups C=O, C=N, C=C, C \equiv N.
72. What is the basic requirement for a nucleus to exhibit NMR phenomenon?
73. What are the main advantages of mass spectrometry.
74. Calculate (a) frequency (b) wave number) for the radiation of wavelength 530nm. (c=3 \times 10⁸ m/s)
75. Calculate the wavelength corresponding to a radiation in which the energy of photon 5 \times 10⁻²² J
76. Calculate the frequency of a radiation of wavelength 700nm
77. Give reason why you will get absorption curve rather than peak in Ultraviolet region
78. What are the factors affecting fluorescence and phosphorescence?
79. What is Quenching? Explain various types of quenching with suitable examples?
80. What are self quenching and true quenching
81. Show the relationship between fluorescence intensity and concentration. Describe any four factors that influence fluorescence intensity?

Question carrying two marks

1. What are the general requirements for doing a separation by column chromatography
2. Enumerate various types of chromatography
3. What is migration parameters
4. What is TLC & Write the principles of separation in TLC
5. What are the general requirements in TLC techniques
6. Define TLC & name the stationary phases used in TLC
7. What is the difference between silica gel H,G,GF ?
8. Define Chromatography & Rf values
9. Name the different grades of alumina
10. Describe the preparation of plates & adsorbents used in TLC
11. For silica gel G, in what ratio it is mixed with water for making slurry for use in TLC
12. What is the thickness of adsorbents layer in a) analytical TLC b) preparative TLC
13. How is activation of TLC plates done?
14. Why activation of TLC plates necessary. How TLC plates stored
15. What is edge effect in TLC ? To avoid edge effect what must be done in TLC
16. Enumerate four adsorbents and four mobile phases used in TLC
17. Give a specific spray reagent to detect the following compounds by TLC a) sulphaniamide
i. b) amino acids c) alkaloid d) phenols
18. Define paper chromatography ? which type of paper is normally used ; Hydrophilic/hydrophobic
19. Enumerate the application of paper chromatography
20. Explain Radial Chromatography
21. What is an ion-exchange resin? Give an example of natural resin a) Cation b) Anion
22. Which portion of resin contains exchangeable sites
23. Which function group can be present in a) weak Cationic exchange resin b) Strong Cationic exchange resin c) weak and strong anionic exchange resins
24. What is cross linking, rigidity & swelling of ion exchange resin?
25. How is the efficiency of an ion-exchange resin measured?
26. What are the requirements for a compound to be analysed by Gas- Liquid Chromatography
27. Give example of carrier gas used in G.L.C.

28. Under what conditions Gas-Solid Chromatography is preferred over Gas- Liquid Chromatography.
29. Write a note on Guard Column & its Significance.
30. What is C₁₈ or ODS? What is its use in Chromatography
31. How will you check the presence of impurities in HPLC & What is internal standard
32. What is potentiometry ? How is potential (emf) is measured
33. What is Indicator electrode & reference electrode give examples
34. What is the relationship between emf & pH.
35. What are the advantages of glass electrode & saturated Calomel electrode.
36. Name the factors which affect potential of a solution.
37. What are auto titrimeters? What is the principle of operation?
38. What is dead stop end point techniques? How this techniques is applied in the determination of water
39. What is null point potentiometry
40. Explain the significance of dead-stop end point potentiometry.
41. What is Coductometry, Resistance,
42. What is relationship between resistance & conductivity
43. What is relationship between conductivity & Specific conductivity
44. Define Specific Conductance & Equivalent conductance
45. What is the principle in Amperometric Titrations
46. How is the potential selected in Amperometric titrations
47. What are the advantages of Amperometric titrations over potentiometry/ conductometry?
48. What is the principle in polarographic analysis ?
49. What is $E^{1/2}$ (Half Wave potential)
50. What is diffusion current, residual current, migration current ,polarographic maxima.
51. Why is DME used? What are the advantages ?
52. What changes in the molecules occur when the following is passed a) UV/Visible radiation b) I.R radiation
53. Principle involved in a grating & prism monochromators
54. How are the primary & secondary filters selected in fluorimetry assay?
55. How do you detect the aromaticity of an unknown sample by means of its UV absorption spectrum.

56. Explain why the intensity of π - π^* transition is more than that of n- π^* transitions.
57. Define transmittance & absorbance in spectrometry
58. Reasons for Deviation of Beer's law
59. Principle involved in Grating & Prism monochromators
60. Write various ranges of electromagnetic spectrum
61. Define Red & Blue Shift with example
62. What are stepwise & Gradient elutions?
63. Importance of Finger prints region in IR Spectroscopy
64. Define filters and monochromators
65. What is natural frequency of vibration & mention different types of vibrations
66. What is the effect of conjugation & cross conjugation on λ max
67. What is Stoke's & Anti-stoke's fluorescence
68. A solution of P-nitro phenol in water is yellowish but its solution in dilute NaOH
69. Is intense yellow. Explain why the color deepens in the latter case.
70. What is the source for UV & Visible radiations ? How is monochromaticity obtained in both case
71. Which is the common detectors in UV absorption spectrometry & outline its functioning
72. What are the three types of fundamental motions of a molecules?
73. What are the methods of solvent degassing
74. Define & explain "Quality Assurance".?