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Chap 2. Multicomponent.

- ① SN on Simultaneous Equation Method.
- ② Absorbance Ratio Method.
- ③ Difference Spectroscopy Method.
- ④ Derivative Spectroscopy Method.

① What is meant by validation. Enlist the validation parameters & describe precision in detail. (4)

② Def. Accuracy

③ What is Precision? Describe the various types of Precision

④ Explain the following terms. ① Limit of Quantification.

② Limit of detection

⑤ Give the Significance of Validating an Analytical method.

⑥ SN on Linear Regression Analysis.

⑦ Why is validation of Analytical Method imp? Give the importance of LOD & LOQ.

⑧ Def Limit of Quantification.

⑨ What is meant by Validation of Analytical methods? List the validation Parameters as per USP.

⑩ Explain Precision Frequency.

Chap 2- Chromatography.

- (1) Explain HETP (2).
- (2) Def. Retention Time.
- (3) Def Gradient Elution.
- (4) Distinguish Between Normal Phase & Reverse Phase (C)
- (5) Def Internal Standard.
- (6) Def Isocratic Elution.
- (7) 2 solvents used as mobile phase in Reverse Phase (C)
- (8) Write with the help of suitable diagram explain the role of flow rate in (C) Analysis using Van-deemter (4).
- (9) What (C) Explain (1) Selectivity Factor
(2) Relative Retention Time
(3) Reverse Phase Chromatography.
- (10) Two Methods to develop chromatogram.
- (11) Classify (C) techniques schematically. Explain any 1 in detail + Justify Advantage of using HPLC as Analytical Method.

Chap 3 - HPLC. (Liquid ^(C))

- (1) Describe the various sampling techniques for liq. (4)
- (2) Draw the diagram of Rheodyne injector in 'LOAD' & 'INJECT' position. Enlist the various types of columns used in HPLC (4) + What is meant by Autosampler
- (3) One HPLC detector which can be used for Analysis of Sugars.
- (4) Enlist the pumps used in HPLC. Describe ^{two} one in detail (4)
- (5) Def. Guard Column.
- (6) One detector for HPLC where simultaneous determination at various wavelengths can be done.
- (7) Name the column for protecting Analytical Column.
- (8) Name the Std. used to improve precision in HPLC Analysis.
- (9) Classify & Enlist detectors used in HPLC. & explain each Type
- (10) Quantification techniques in HPLC.
- (11) Write Note on different Types of detectors used in HPLC. Give 2 Advantages of Photodiode array detector.
- (12) Two Stationary Phases in HPLC.
- (13) Explain Guard Column.
- (14) Bulk Property detector used for HPLC.
- (15) SN on column (C)

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Chap 4 - Gas Chromatography.

- 1) Name a Gas chromatography detector for Halogenated compounds. (1)
- 2) What is Gas GC. Classify Gas GC. Draw a Block diagram of gas GC instrumentation. (4)
- 3) Describe the various types of columns used in Gas GC.
- 4) Name the detector used in gas GC technique, with the help of neat diagram. Discuss any one in detail.
- 5) Describe various types of Gas Chromatography columns based upon distribution of stationary phase.
- 6) SN on columns used in Gas GC.
- 7) Name the technique in GC used for determination of Residual Solvents.
- 8) What are the Advantages & Disadvantages of GC over HPLC. Describe in Brief.

Chap 5. Planar Chromatography. (Paper + TLC + HPTLC)

- • • ① Name 2 visualization techniques in TLC. (1)
- • ② Enlist the various developmental techniques in Papers (1) & describe one in detail. (4)
- ③ Two factors which affect resolution in TLC.
- • ④ Compare & contrast between HPTLC & TLC. Name any two visualisation techniques for TLC.
- ⑤ SN on developmental techniques in Paper (1)
- ⑥ Enlist 6 factors which affects Resolution in TLC. Describe how 2 dimensional TLC is carried with suitable diagrams.
- ⑦ Name & Describe Instrumentation of HPTLC.
- ⑧ 2 types of Paper (1) techniques.
- ⑨ Compare & contrast between Paper (1) & TLC. Name any two coating material for TLC.

Chap 7 - NMR.

- ① Why does Splitting occur in H-NMR Spectroscopy? Explain with a suitable Explan. - 4)
- ② What is meant by spin-spin coupling in H-NMR Spectroscopy. Explain with Eg.
- ③ Explain Magnetic Equivalence in NMR spectroscopy.
- ④ One detector used in ^{NMR} spectrometer.
- ⑤ Name internal standard used in NMR spectroscopy
- ⑥ SN on H-NMR spectroscopy.
- ⑦ SN on factors influencing chemical shift values
- ⑧ Explain Basic information obtained from H-NMR Spectra with suitable Eg. for each.
- ⑨ Explain NMR as an imp. Analytical tool.
- ⑩ SN on instrumentation & Pharmaceutical Applications in NMR.
- ⑪ Two Solvents used in HNMR.
- ⑫ Define chemical shift & explain spin-spin splitting in HNMR. Spectroscopy.
- ⑬ How many types of protons are present in the following compound. Name them as a, b, c, etc.
 $\text{CH}_2=\text{CH}-\text{Cl}$. & Give PMR Spectrum of compound.
- ⑭ Explain H₁-NMR.
- ⑮ What is Coupling Constant? Write in Brief the factors affecting the coupling cons
- ⑯ SN on chemical shift.
- ⑰ SN on Theory & Applications of NMR Spectroscopy
- ⑱ Give 2 Eg. of Solvents used in NMR.
- ⑲ SN on spin-spin coupling.
- ⑳ SN on Chemical Ionisation in MS.

Chap 8 - Mass Spectrometry

- ① list out various ionisation techniques in mass spectrometry. Explain any one ionisation technique in detail.
- ② Discuss Chemical Ionisation in Mass Spectroscopy. Give its advantage & Disadvantage.
- ③ SN on Mass Analysers.
- ④ Name any 2 soft ionisation techniques used in Mass Spectrometry.
- ⑤ Enlist Mass Analysers used in Mass spectrometry. Explain any 1 in detail.
- ⑥ SN on Fragmentation in Mass Spectrometry.
- ⑦ SN on Rearrangement in MS Fragmentation.
- ⑧ Explain Mass Spectrum (2 mark).
- ⑨ Name mass spectrometer Based on Velocity focusing.
- ⑩ With diagrams explain working of Dempster MS. Mass Spectrograph.
- ⑪ Discuss Fragmentation Pattern of Ketones & 1° Alc.
- ⑫ Def. Molecular Ion.
- ⑬ Def Metastable Ions; Mass Spectrum
- ⑭ SN on ~~list~~ Ionisation techniques in Mass Spectrometry
- ⑮ SN on McLafferty Rearrangement
- ⑯ Name the Peak in mass spectroscopy generally with Highest m/e value.
- ⑰ List out various ionisation techniques in MS. Explain 2 ionisation technique in detail.

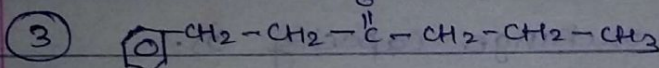
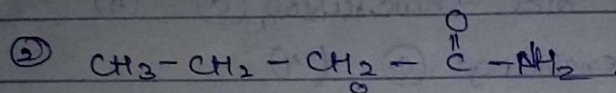
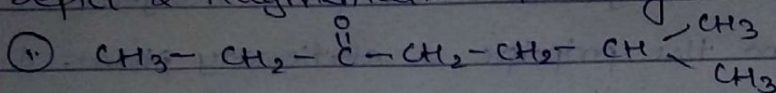
Chap 9 - Hyphenated Techniques

1. SN on LC-MS technique.
2. Give significance of Hyphenated Technique.
Explain in Brief any one interface used in LCMS.
3. Two Interfaces used in LCMS.
4. Two carrier gases used in GC-MS.
5. Write Note on Instrumentation of LC-MS.
Write applications of LCMS.
6. Give carrier gases used in GC-MS.
7. Justify the needs for Hyphenated techniques.
Explain in brief LC-MS technique.
8. Discuss Advantages of GC-MS technique over LC-MS. Explain in Brief GC-MS technique.
9. What are Hyphenated techniques? Describe the interfaces of any one of them in detail.
10. Enlist 4 Interfaces used in LC-MS. Explain 2 in detail.

Chap 10. Structure Elucidation (UV + NMR + Mass).

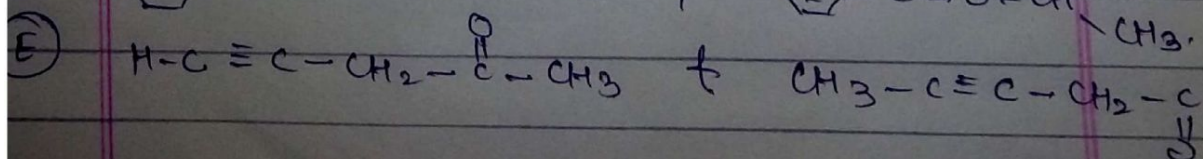
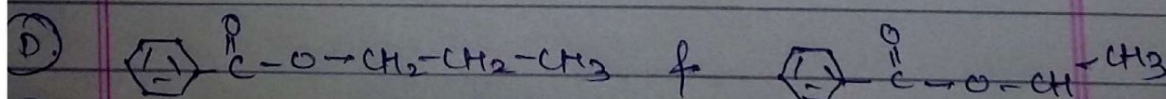
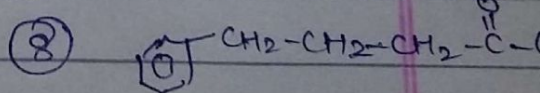
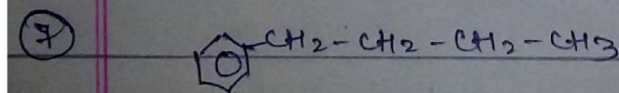
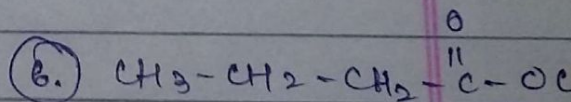
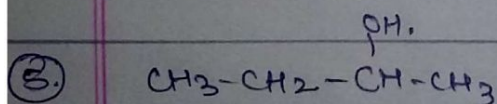
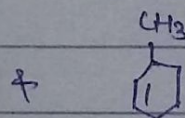
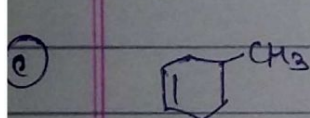
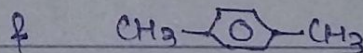
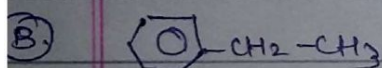
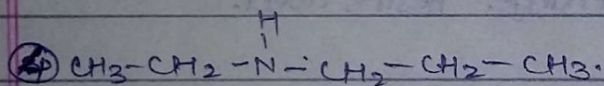
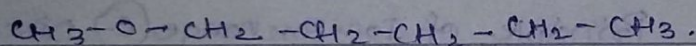
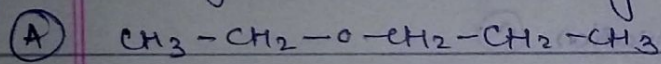
① List out various separation technique in class mass sp

Depict a Fragmentation Pathway in mass spectrum.



→ Give the splitting pattern for $-\text{CH}_2-$ Proton in Ethyl Bromide.

→ Distinguish Between using one spectral technique.



Chap 6. Ion Exchange.

- 1) Name 1 functional grp for weak cation exchange resins. (1)
- 2) Explain the principle of Ion pairs chromatography & state two pharmaceutical applications of same. (4) Pg 983.
- 3) One commonly used ion-pair Reagent. (1) Pg. 98.
- 4) Describe the principle & stationary phase, & mobile phase used in Size - Exclusion (C) (4) Pg 98
- 5) Discuss ion-exchange (C) (4)
- 6) Explain Ion-exchange capacity (2).
- 7) Distinguish Between Ion Pairs & Ion exchange (C)
 - w/ principle & column used,
 - w/ stationary phase & Reverse Phase, used.
- 8) SN on Size - Exclusion (C)
- 9) Explain Gel Permeation (C)
- 10) Give the Principle of Ion-Exchange (C) Discuss various types of Ion-Exchange Resins used.