

Exam Date & Time: 07-Sep-2021 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

Manipal Academy of Higher Education, Manipal MPharm Theory End-Semester Examinations.

Advanced Instrumental Analysis [PCH-MPA201T]

Marks: 75

Duration: 180 mins.

SECTION - A

Answer all the questions.

Answer the following (10 marks x 5 = 50 marks)

- 1) What is Chemical shift and Coupling constant? Explain the factors affecting Chemical Shift and Coupling constant. (7)
 - A)
 - B) What is the difference between APT and DEPT? Give a representative spectra for each. (3)
- 2) Explain the principle and methodology involved in 2D NMR technique. (6)
 - A)
 - B) List out the differences between HSQC and HMQC and also the features of HMBC technique along with a spectra. (4)
- 3) Explain the Woodward Fieser rules for Conjugated Dienes and polyenes. Calculate the lambda max for following compounds. (10)
 - a) (2Z, 4Z) -4-Chlorohexa 2, 4 diene-3- amine
 - b) 1, 2 dicyclohexylideneethane.
- 4) Write the principle of flash chromatography. With an appropriate schematic diagram explain different parts of flash chromatography. (5)
 - A)
 - B) Drawing a schematic diagram of LC-MS explain continuous flow model and Peak trapping method. (5)
- 5) Discuss with suitable example fragmentation pattern of alcohols in electron impact ionisation. (7)
 - A)
 - B) Explain isotopic ion peaks in mass spectra (3)

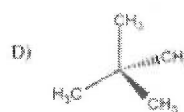
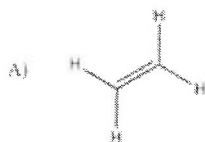
SECTION - B

Answer all the questions.

Answer the following (5 marks x 5 = 25 marks)

- 6) The following have one H1 NMR peak. In each case predict approximately where (1.5)

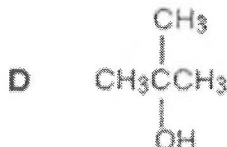
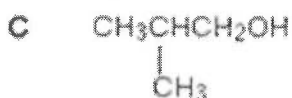
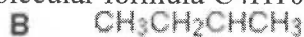
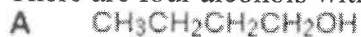
A)



this peak would be in a spectra

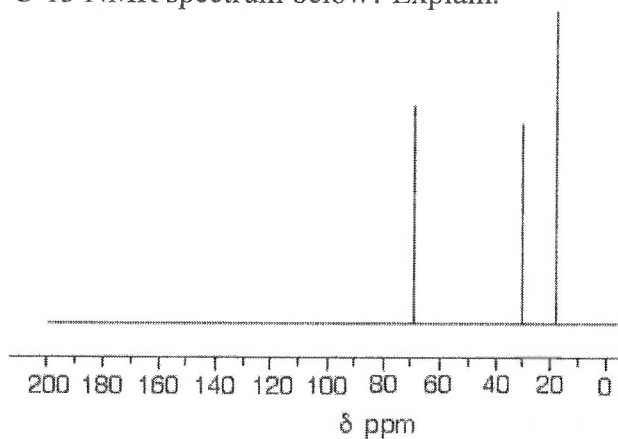
B)

There are four alcohols with the molecular formula $C_4H_{10}O$.



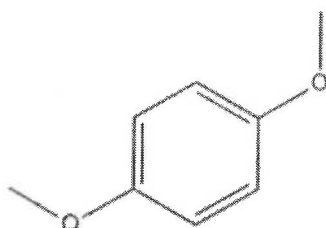
Which one produced the

$C-13$ NMR spectrum below? Explain.



(2)

C)



(1.5)

Predict how many signals the following molecule would have? Sketch the spectra and estimate the integration of the peaks.

- 7) How hydrogen bonding and ring size affecting the carbonyl stretching vibration? Explain with suitable example. (5)
- 8) Draw a diagram of LC-MS and explain MALDI and APPI. (5)
- 9) Classify and explain ion exchangers used in ion exchange chromatography. (5)
- 10) Explain five chiral stationary phases used with chemical features. (5)

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