

## CHAPTER OVERVIEW

### 12: NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

#### Learning Objectives

After reading this chapter and completing ALL the exercises, a student can be able to

- explain how  $^1\text{H}$  NMR spectrometers work - refer to section 12.1
- interpret chemical shifts of  $^1\text{H}$  NMR spectra as they relate to shielding and deshielding - refer to section 12.2 and 12.14
- explain the delta scale of  $^1\text{H}$  NMR spectra - refer to section 12.3
- recognize equivalent protons within an organic compound - refer to section 12.4
- correlate functional group structural features with chemical shifts - refer to section 12.5
- determine the proton ratio from  $^1\text{H}$  NMR spectra peak integration data - refer to section 12.6
- explain and interpret spin-spin splitting patterns in  $^1\text{H}$  NMR spectra - refer to section 12.7
- explain and interpret spin-spin splitting patterns in  $^1\text{H}$  NMR spectra - refer to section 12.8
- describes examples of some uses of  $^1\text{H}$  NMR spectroscopy - refer to section 12.9
- explain how  $^{13}\text{C}$  NMR spectrometers work - refer to section 12.10
- interpret the chemical shifts of  $^{13}\text{C}$  NMR spectra to determine the structural features of organic compounds - refer to section 12.11 and 12.14
- explain how DEPT (distortionless enhancement by polarization transfer) is used to determine the number of hydrogens bonded to each carbon - refer to section 12.12
- describes some uses of  $^{13}\text{C}$  NMR spectroscopy - refer to section 12.13

[12.1: Theory of Nuclear Magnetic Resonance \(NMR\)](#)

[12.2: NMR Spectra - an introduction and overview](#)

[12.3: Chemical Shifts and Shielding](#)

[12.4:  \$^1\text{H}\$  NMR Spectroscopy and Proton Equivalence](#)

[12.5: Functional Groups and Chemical Shifts in  \$^1\text{H}\$  NMR Spectroscopy](#)

[12.6: Integration of  \$^1\text{H}\$  NMR Absorptions- Proton Counting](#)

[12.7: Spin-Spin Splitting in  \$^1\text{H}\$  NMR Spectra](#)

[12.8: More Complex Spin-Spin Splitting Patterns](#)

[12.9: Uses of  \$^1\text{H}\$  NMR Spectroscopy](#)

[12.10:  \$^{13}\text{C}\$  NMR Spectroscopy](#)

[12.11: Chemical Shifts and Interpreting  \$^{13}\text{C}\$  NMR Spectra](#)

[12.12:  \$^{13}\text{C}\$  NMR Spectroscopy and DEPT](#)

[12.13: Uses of  \$^{13}\text{C}\$  NMR Spectroscopy](#)

[12.14: More NMR Examples](#)

[12.15: Sample NMR Spectra](#)

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