

Chapter 13: Mass spectrometry and Infrared spectroscopy

Learning Objectives:

1. Be able to predict the fragmentation patterns expected to arise in the mass spectrum of alkanes, alkyl halides, ethers, alcohols, and ketones.
2. Be able to describe what happens to a compound in a mass spectrometer
3. Be able to use the mass spectrum of a compound to find the molecular mass, and to help identify the structure of a compound.
4. Be able to describe what happens to a compound when it absorbs infrared radiation.
5. Be able to use a chart of functional group IR absorptions, and to help identify the structure of a compound.
6. Be able to use result from elemental analysis to deduce the number of carbon, hydrogen, and nitrogen in the molecular formula.*

* Supplemental material, not included in the textbook

Sections to be covered (in the order of delivery):

- 13.1 Mass Spectrometry
- 13.2 The Mass Spectrum – Fragmentation
- 13.3 Isotope in Mass Spectrometry*
- 13.4 Determination of Molecular Formulas: High-Resolution Mass Spectrometry
- 13.5 Fragmentation at Functional Groups*
- 13.6 Spectroscopy and the Electromagnetic Spectrum
- 13.7 Infrared Spectroscopy
- 13.8 Characteristic Infrared Absorption bands*
- 13.9 The Intensity of Absorption bands
- 13.10 The position of Absorption bands
- 13.11 C-H Absorption Bands
- 13.12 The Shape of Absorption Bands*
- 13.14 Infrared Inactive Vibrations
- 13.15 Identifying Infrared Spectra*

* Sections that will be focused

Recommended additional problems

32, 45, 46, 50, 51, 54