

CHAPTER OVERVIEW

6: Atomic Spectroscopy

Learning Objectives

After completing this unit the student will be able to:

- Compare and contrast the advantages of flame, furnace and inductively coupled plasma atomization sources.
- Justify why continuum radiation sources are usually not practical to use for atomic absorption spectroscopy.
- Describe the design of a hollow cathode lamp and justify the reasons for a hollow cathode configuration and low pressure of argon filler gas.
- Devise an instrumental procedure to account for flame noise in atomic absorption spectroscopy.
- Devise an instrumental procedure to account for molecular absorption and scatter from particulate matter in atomic absorption spectroscopy.
- Describe three possible strategies that can be used to overcome the problem of nonvolatile metal complexes.
- Devise a procedure to overcome excessive ionization of an analyte.
- Devise a procedure to account for matrix effects.

It is likely that most people studying chemistry have seen a demonstration where a solution of a metal salt was sprayed into a Bunsen burner and gave off a color that depended on the particular metal in the salt. Metal salts are used to create the different colors observed in firework displays. Analysis of the emission from the flame using a device called a spectroscope would further show the characteristic line emission spectrum of the metal species. The atomic emission observed in the flame involves a process whereby the metal ions in the salt are converted into neutral, excited atoms. These atoms then emit electromagnetic radiation corresponding to valence electron transitions.

[6.1: Introduction to Atomic Spectroscopy](#)

[6.2: Atomization Sources](#)

[6.2A: Flames](#)

[6.2B: Electrothermal Atomization – Graphite Furnace](#)

[6.2C: Specialized Atomization Methods](#)

[6.2D: Inductively Coupled Plasma](#)

[6.2E: Arcs and Sparks](#)

[6.3: Instrument Design Features of Atomic Absorption Spectrophotometers](#)

[6.3A: Source Design](#)

[6.3B: Interferences of Flame Noise](#)

[6.3C: Spectral Interferences](#)

[6.4: Other Considerations](#)

[6.4A: Chemical Interferences](#)

[6.4B: Accounting for Matrix Effects](#)

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