

Atomic absorption spectrometry (AAS) is an easy, high-throughput, and inexpensive technology used primarily to analyze compounds in solution. As such, AAS is used in food and beverage, water, clinical, and pharmaceutical analysis. It is also used in mining operations, such as to determine the percentage of precious metal in rocks.

What is atomic absorption spectrometry?

Atomic absorption spectrometry (AAS) detects elements in either liquid or solid samples through the application of characteristic wavelengths of electromagnetic radiation from a light source. Individual elements will absorb wavelengths differently, and these absorbances are measured against standards. In effect, AAS takes advantage of the different radiation wavelengths that are absorbed by different atoms.

In AAS, analytes are first atomized so that their characteristic wavelengths are emitted and recorded. Then, during excitation, electrons move up one energy level in their respective atoms (figure 1) when those atoms absorb a specific energy.

As electrons return to their original energy state, they emit energy in the form of light (figure 2). This light has a wavelength that is characteristic of the element. Depending on the light wavelength and its intensity, specific elements can be detected and their concentrations measured.

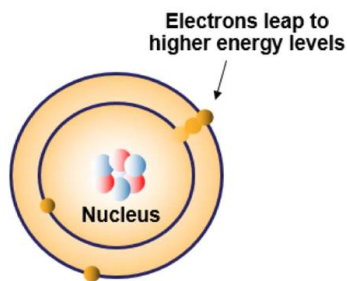


Figure 1. Excitation of an atom.

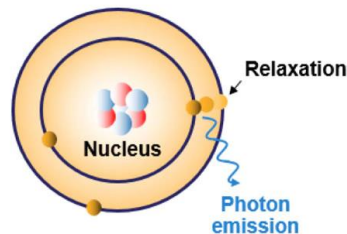


Figure 2. Relaxation and photon emission of an atom.

AAS has an unlimited number of applications and is still a popular choice for uncomplicated trace elemental analysis. Flame atomic absorption spectrometry (FAAS) is widely accepted in many industries, which continue to utilize the unique and specific benefits of this technology. Graphite furnace atomic absorption spectrometry (GFAAS) is an established technology for measuring elements at parts per billion (ppb or ng/l) concentrations with incredibly low sample volumes.

In this section, you will:

- Understand the systems and technology that drive atomic absorption spectrometry
- Learn which solid and liquid samples can be analysed by AAS and the requirements of good sample preparation and introduction
- Recognize and correct for factors that interfere with accurate data analysis