

Fundamentals of Atomic Absorption Spectroscopy

Course general description:

Atomic Absorption Spectroscopy (AAS) is an analytical technique used to determine the concentration of specific metallic elements in a sample. It works on the principle that free atoms in the gaseous state absorb light at specific wavelengths, which corresponds to electronic transitions within the atom. AAS is widely used in environmental analysis, pharmaceuticals, food safety, and industrial quality control due to its high sensitivity, accuracy, and ease of use.

Audience:

This course is intended for the following individuals:

- Beginner Analysts in the field of Atomic Absorption Spectroscopy to provide them with a solid foundation.
- Experienced Analysts in the field of Atomic Absorption Spectroscopy to provide them with a refresher.

Course Objectives

The course will provide exposure to the advances in the field of Atomic Absorption Spectroscopy to the experienced analyst and both basics and practical aspects to beginners. Wide coverage is given to fundamental concepts of laboratory operations and the day to day laboratory operations.

Upon completion of the course trainees will be able to:

Explain briefly the principle of operation of an Atomic Absorption Spectrometer.

- Know the difference in operation principle of AAS and AES.
- Use of nitrous oxide as oxidant in some applications.
- What are the advantages of using Electrodeless discharge lamps over Hollow cathode lamps as light sources for analyzing some elements.
- Know the advantages of double beam over single beam operation.
- Know the role of a flow spoiler or an impact bead in the spray chamber.
- Explain the benefits of each over the other.
- Know the role of a monochromator in the AAS
- Understanding deuterium background correction and what are its limitations.
- Know the benefits of graphite furnace analysis over flame analysis.
- What are the limitations in analysis of analysis of volatile elements such as As, Sn, Pb,Sb ,etc
What alternate sample treatment option is commonly used for such analysis

Course duration:

5 days

Course location:

Dubai

Course contents:

Day-1

- Pre-test
- Scope of Spectroscopic Analysis
- Sample collection
- Sample preservation
- Sample preparation
- Glossary of AAS terms

Day-2

- Flame AA Theory (Basic Principles and Concepts)
- Safety PRECAUTIONS IN THE USE OF AA
- Definition of terms used in AAS
- A Hardware overview
- Graphite Furnace Atomic Absorption Spectroscopy (GFAAS)

Day-3

- Hydride Generation Atomic Absorption Spectroscopy (HGAAS)
- Flame Atomization
- Operation & Optimization
- Analysis Considerations

Day-4

- Components of an AAS
- Setup and Optimization
- Flame Processes and Interferences

Day-5

- Various Interference Correction Techniques
- Routine Maintenance and Troubleshooting
- Post-test

Methodology:

- 50% lectures & concepts
- 10% Videos
- 10% Case studies
- 10% Exercises
- 10% Discussions
- 10% Software (if applicable or examples)

Course code: (TLAB003)