

Working principle of a metal spectrometer



Article Overview

Metal spectrometers analyze the elemental composition of metals by exciting atoms and measuring the emitted light or ions to identify and quantify each element.

Optical Emission Spectrometry (OES) for Metals

The most common type of metal spectrometer is the Optical Emission Spectrometer (OES), also called an Arc/Spark OES instrument. It works by exploiting the fact that each element emits light at unique wavelengths when energized, creating an atomic “fingerprint.” The process involves several key steps:

- **Sample Preparation:** The metal surface is cleaned and flattened to remove oxides and ensure consistent results.
- **Electrical Excitation:** A high-voltage spark or arc is applied between the metal sample and a counter electrode, generating temperatures above 10,000°C. This vaporizes surface atoms and excites their electrons.
- **Light Emission:** Excited electrons return to lower energy states, emitting photons at element-specific wavelengths.
- **Optical Dispersion & Detection:** The emitted light is collected and passed through a diffraction grating or prism, separating it into its component wavelengths. Detectors measure the intensity of each wavelength, which correlates with the concentration of each element.
- **Data Analysis:** The spectrometer software converts the detected light intensities into quantitative elemental composition, often down to parts per million (ppm)....

Article Content

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the mass spectrometer

THE MASS SPECTROMETER This page describes how a mass spectrum is produced using a mass spectrometer. In fact, there are

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Mass Spectrometry Explained: Principle, Steps & Uses

Discover how mass spectrometry identifies and analyzes molecules. Learn its principle, parts, step-by-step process, and

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Atomic Absorption Spectrophotometer (AAS) Guide

Understanding the Principle of Atomic Absorption Spectroscopy How Does an Atomic Absorption Spectrophotometer

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Reveal How XRF Spectrometers Work for Accurate Metal Detection

elemental analysis Core Working Principle of XRF Spectrometers At the heart of every XRF spectrometer is the

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Spectrometer

Optical emission spectrometers (often called "OES or spark discharge spectrometers"), are used to evaluate metals to determine the

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What is a Spectrometer and How Does it Work?

This article will explore the key principles of spectrometry, how spectrometers work, and

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Spectrometer

The metal atoms are then excited by a transfer of energy from the gas, thereby producing radiation at a very specific wavelength.

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Portable Metal Analyzer

The SPECTROPORT portable arc spark spectrometer is ideal for many applications in the metal

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Arc Spark OES

The principle of the analysis method of SPECTRO's portable and mobile metal analyzers is optical emission spectroscopy (arc spark

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Optical spectrometer

Grating spectrometer schematic Internal structure of a grating spectrometer: Light comes from left side and diffracts on the upper

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How the Mass Spectrometer Works

How a mass spectrometer works If something is moving and you subject it to a sideways force, instead of moving in a straight line, it

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Optical Emission Spectroscopy Overview | OES | Hitachi High-Tech

Optical emission spectroscopy, or OES, is a well trusted and widely used analytical technique used to determine the

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How Does a Spectrometer Work? An In-Depth Guide

The working principle of a spectrometer is based on the interaction between light and matter, which can be absorbed,

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Understanding Spectrometers: The Silent Guardians of Metal Quality

Understanding the working mechanism of an OES spectrometer helps demystify both its value and its precision. The

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Atomic Absorption Spectroscopy

Atomic absorption spectroscopy (AAS) is a high-precision elemental analysis technique for the quantitative determination of metals in

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Material analysis

A spectrometer works as follows: a spark is placed on a sample of the steel alloy causing a plasma gas to occur. This gas is

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Optical Emission Spectroscopy | SPECTRO Analytical

Optical emission spectroscopy using arc and spark excitation (Arc Spark OES) is the preferred method for trace metal analysis to

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The Working Principle of a Mass Spectrometer

This blog posts outlines the working principle of a mass spectrometer including the components within the instrument

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What Is Mass Spectrometry? Principles, Methods & Application ...

How a Mass Spectrometer Works, Types of Instrumentation and Interpreting Mass Spectral Data Mass spectrometry

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Optical Emission Spectrometry

Optical emission spectrometry OES is a common elemental analysis technique for metals and alloys. Obtain rapid elemental analysis

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Atomic Absorption Spectrophotometry (AAS): Principles,

Explore atomic absorption spectrophotometry (AAS) principles, instrumentation and applications, with comparisons to

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Mass spectrometry

Mass spectrometry (MS) is an analytical technique that is used to measure the mass-to-charge ratio of ions. The results are

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Spectrochemical Analysis | Metal Casting Resources

Spectrochemical analysis is used to determine the arrangement of atoms and electrons within molecules of chemical

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Optical Emission Spectrometer | OES Analysis,

Navigate the realms of Optical Emission Spectrometry (OES) / AES with Metal Power

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What is a Spectrometer and How Does it Work?

The basic working principle of a spectrometer involves the interaction of light with matter.

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Metal Analysis by Optical Emission Spectroscopy - IspatGuru

Metal Analysis by Optical Emission Spectroscopy Optical emission spectroscopic techniques originated in experiments

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How do mass spectrometers work?

How does a mass spectrometer work? There are numerous different kinds of mass spectrometers, all working in

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What Is Atomic Absorption Spectroscopy? Principles & Technique

Atomic absorption spectroscopy is an analytical technique used for trace metals analysis. What is atomic absorption spectroscopy

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Atomic Absorption Spectroscopy Principles and Applications

In this article, we explore atomic absorption spectroscopy, what is is, how it works, strengths and limitations and the

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How Do Spectrometers Work? Spectrometer vs. Spectrophotometer

Spectrometers can be designed and built using a number of different configurations. An alternative configuration is a standalone

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Spectrometer

They work by reflecting the light off the angled grating surface, causing the wavelengths to be dispersed through constructive

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How Does a Spectrometer Work? An In-Depth Guide

A spectrometer works by shining light onto a sample and analyzing the light that interacts with the material. This

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Metal Testing & Analysis

For precious metals analysis, such as jewelry or dental alloys, also non-destructive SPECTRO XRF spectrometers are used for

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Reveal How XRF Spectrometers Work for Accurate

It works by exposing a sample to primary X-rays, which excite the atoms inside and cause

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How Does A Mass Spectrometer Work?

Mass Spectrometer for all other A-Level and Advanced Higher If you're studying Chemistry A-Level syllabus other

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Metals Analysis by Atomic Spectroscopy

Introduction Atomic spectroscopy comprises an important set of analytical techniques. The results of atomic spectroscopy

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What is a Spectrometer and How Does it Work?

X-ray Spectrometer: This spectrometer uses X-rays to investigate the composition of

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Principle of Optical Emission Spectrometry

Optical emission spectrometry involves applying electrical energy in the form of spark generated between

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How Do Spectrometers Work? Spectrometer vs. Spectrophotometer

If the spectrometer has a large spectral range, it may also have filters to stop higher order light from reaching the sensor. Most

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Atomic Absorption Spectrophotometry (AAS): Principles,

AAS is based on the principle that free atoms in the ground state absorb light of specific wavelengths. This selective

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Spectrometer

Spectrometer An XPS spectrometer A spectrometer (/ spɛk'trɒmɪtər /) is a scientific instrument used to separate and measure

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