

Principle of Electromagnetic Spectrometer



Article Overview

An electromagnetic spectrometer works by dispersing light into its constituent wavelengths and measuring the intensity of each wavelength to analyze the properties of matter.

Basic Principle

An electromagnetic spectrometer operates on the principle of spectrometry, which involves the interaction of light with matter to extract information about the matter's properties. Light behaves both as a wave and as particles called photons, and when photons interact with atoms or molecules, they can be absorbed or emitted, causing transitions between energy states. The energy difference between these states corresponds to specific wavelengths of light, which the spectrometer measures to determine the composition, structure, or other properties of the sample.

Key Components and Function

- **Light Source:** Provides the electromagnetic radiation that will interact with the sample. This can range from ultraviolet to infrared depending on the spectrometer type.
- **Collimator:** Shapes the light into a parallel beam to ensure accurate dispersion and measurement.
- **Monochromator (Prism or Diffraction Grating):** Disperses the incoming light into its constituent wavelengths, separating it into a spectrum.
- **Detector:** Measures the intensity of light at each wavelength and converts it into a...

Article Content

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4.7: NMR Spectroscopy

Nuclear magnetic resonance spectroscopy (NMR) is a widely used and powerful method that takes advantage of the

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Spectroscopy: Introduction, Principles, Types and Applications

Introduction Electromagnetic Radiation Types of Spectroscopy Principles of Absorption Spectroscopy Applications of Spectroscopy Reference and Sources Also Read
Absorption spectroscopy is based on law known as Beer-Lambert law. When electromagnetic radiations pass or fall onto homogeneous medium, some amount of light is reflected, some amount is absorbed and remained is transmitted. Absorption spectroscopy is governed by two laws i.e., Lambert's law and Beer's law, in the combined form it is known as Beer-Lambert law. Absorption spectroscopy is based on law known as Beer-Lambert law. When electromagnetic radiations pass or fall onto homogeneous medium, some amount of light is reflected, some amount is absorbed and remained is transmitted. Absorption spectroscopy is governed by two laws i.e., Lambert's law and Beer's law, in the combined form it is known as Beer-Lambert law. Lambert's law: It states that when monochromatic light passes through a transparent medium, the intensity of transmitted light decreases exponentially as the thickness of absorbing material increases. See more New content will be added above the current area of focus upon selection See more on microbiologynotes Reviews: 1 Published: Dec 21, 2020 Author: Adarsh Pandey ScienceDirect

Electromagnetic Spectroscopy - an overview - ScienceDirect

Electromagnetic spectroscopy is based on a three-stage process - excitation, excited-state lifetime and emission. This phenomenon

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Absorption spectroscopy

Absorption spectroscopy is spectroscopy that involves techniques that measure the absorption of electromagnetic radiation, as a

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Introduction to spectroscopy | Resource | RSC Education

Explain the principles of a range of spectroscopic techniques including infrared (IR), ultraviolet-visible (UV-vis) and nuclear magnetic

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Spectroscopy | Definition, Types, & Facts | Britannica

Spectroscopy, study of the absorption and emission of light and other radiation by matter, as

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UV-Vis Spectroscopy: Principle, Parts, Uses, Limitations

UV-Vis Spectroscopy or Ultraviolet-visible spectroscopy or Ultraviolet-visible spectrophotometer (UV-Vis) is also

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Introduction to spectroscopy | Resource | RSC Education

Get back to basics with this primer on the principles of spectroscopic techniques, including infrared (IR), ultraviolet-visible (UV-vis)

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How does an electromagnetic wave spectrometer work?

Explore how electromagnetic wave spectrometers function, their key applications, and the underlying physics in this

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Basic Principles of Spectroscopy | Springer Nature Link

Spectroscopy deals with the production, measurement, and interpretation of spectra arising from the interaction of

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Module 1: Fundamentals of Spectroscopy

The two NMR spectrometers you will use have RF frequencies of 15 MHz and 300 MHz. Calculate the magnetic field strength in each

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EM waves and the electromagnetic spectrum

Learn about and revise electromagnetic waves, their uses and dangers, and the absorption and emission of radiation with GCSE

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Spectroscopy: Introduction, Principles, Types and Applications

Introduction Spectroscopy is a scientific technique used to study the interaction between matter and electromagnetic

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3 Optical spectrometry: principles and instrumentation

Optical spectroscopy takes its name from the fact that the difference in energy between respective orbitals corresponds to the energy

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Module 1: Fundamentals of Spectroscopy

Module 1: FUNDAMENTALS OF SPECTROSCOPY It's amazing how much we can learn about molecules and materials by shining

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Spectroscopy Explained: Definition, Types, and Uses

Spectroscopy is a fundamental technique used in both physics and chemistry to study how matter interacts with electromagnetic

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Spectroscopy

Spectroscopy deals with the study of the electromagnetic spectrum produced by matter when interacting or emitting electromagnetic

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Electromagnetic Spectroscopy

Electromagnetic spectroscopy is defined as the study of interactions between electromagnetic radiation and matter, focusing on the

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The Electromagnetic Spectrum Video Series

This unique NASA resource on the web, in print, and with companion videos introduces

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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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Spectroscopy

Spectroscopy - Molecular, Absorption, Emission: A molecule is a collection of positively charged atomic nuclei

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Spectroscopy

Spectroscopy is the field of study that measures and interprets electromagnetic spectra as it interacts with matter. In narrower

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13.7: Spectroscopy and the Electromagnetic Spectrum

The electromagnetic spectrum Electromagnetic radiation, as you may recall from a previous chemistry or physics class, is composed

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Electromagnetic Spectrum: The Backbone of Spectroscopy

Discover the intricacies of the electromagnetic spectrum and its pivotal role in spectroscopy, highlighting its diverse

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How Do Spectrometers Work? Spectrometer vs. Spectrophotometer

Most optical spectrometers operate over the UV, visible, and infrared (or near-infrared) regions of the electromagnetic spectrum.

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Electromagnetic radiation | Spectrum, Examples,

Electromagnetic radiation, in classical physics, the flow of energy at the speed of light

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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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12.5: Spectroscopy and the Electromagnetic Spectrum

Collectively, they make up the electromagnetic spectrum, shown in Figure 12.5.1. The electromagnetic spectrum is arbitrarily

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