

Spectroscopy

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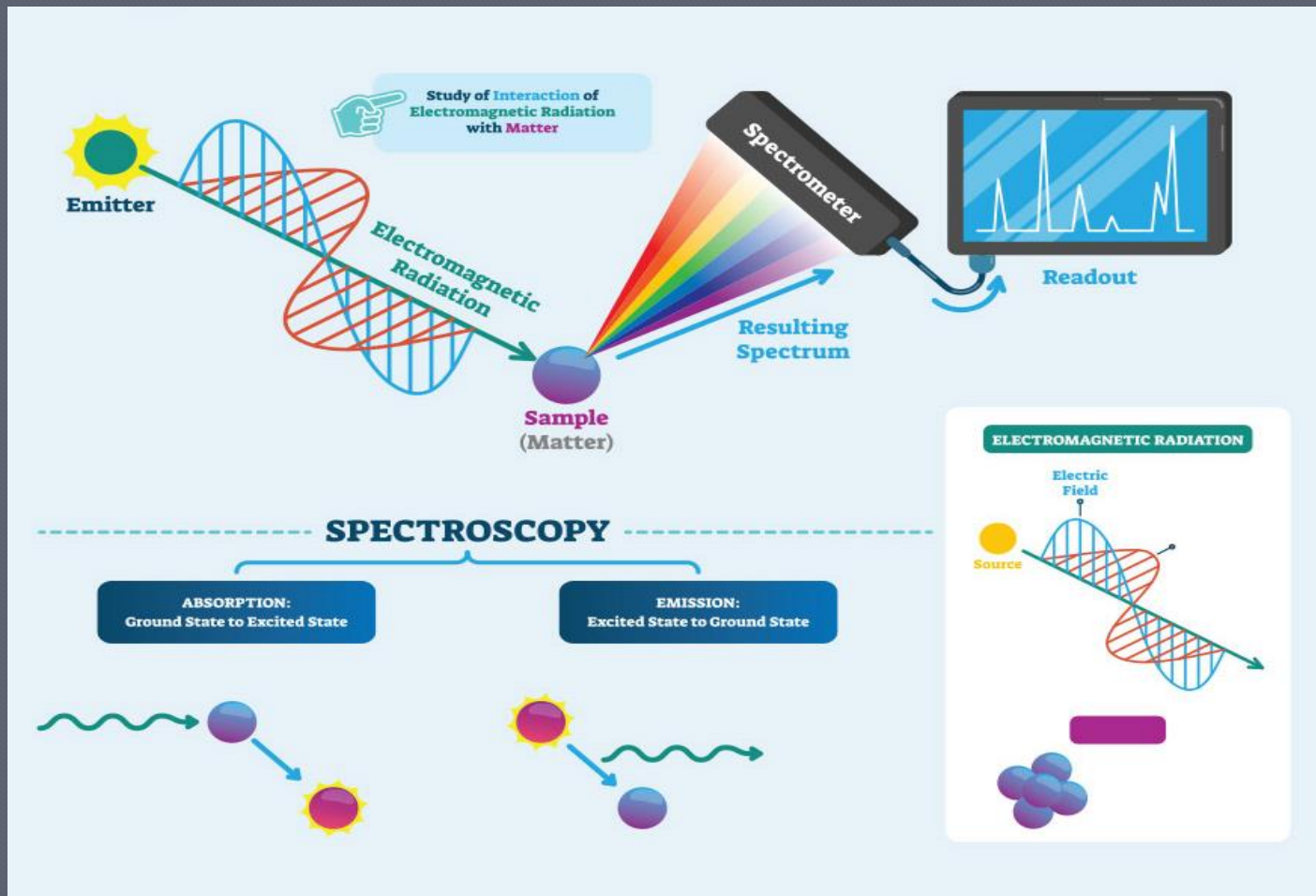
Spectroscopy

Spectroscopy is the study of the interaction between matter and electromagnetic radiation.

spectroscopy originated through the study of visible light dispersed according to its wavelength, by a prism.

It uses the techniques of radiation to obtain information on the structure and properties of matter.

What is Spectroscopy



IMPORTANCE OF SPECTROSCOPY

- It helps in determining the composition, temperature, density, and motion of an object.
- It helps to identify the atoms and molecules in the object.
- The red shift or blue shift (Doppler Effect) in a spectral line tells how fast the object is receding from Earth or coming toward it.

TYPES OF ABSORPTION SPECTROSCOPY

The most common types of waves measured by absorption spectroscopy are

Infrared

Visible

Ultraviolet (UV)

Atomic

X-ray

Each spectrophotometer works using the same techniques.

Spectrophotometers are categorized according to the type of wave being measured.

Basis principles of different types of absorption

Principle of absorption

- Absorption spectroscopy refers to spectroscopic techniques that measure the absorption of radiation, as a function of frequency or wavelength, due to its interaction with a sample.
- The sample absorbs energy, i.e. photons, from the radiating field.
- The technique uses basically the principle that free atoms (gas) generated in an atomizer can absorb radiation at specific frequency.
- Atomic-absorption spectroscopy quantifies the absorption of ground state atoms in the gaseous state .

How is absorption measured?

There are many different approaches for measuring absorption spectra.

- When a beam of light generated from the sample passes through it then detect the intensity of the radiation
- The energy that is then transmitted is used to calculate the absorption.
- Wavelength of maximum absorption (λ_{Max}) the extent to which a sample absorbs light depends upon the wavelength of light.
- The wavelength at which a substance shows maximum absorbance is called absorption Maximum or lamda max.

Note: Value of λ_{max} is important for several reasons.

Basic Instrumentation of Spectrophotometer

