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Overview of Spectroscopy

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Introduction

study of the absorption and emission of sunshine and other radiation by matter, as associated with the dependence of those processes on the wavelength of the radiation. More recently, the definition has been expanded to incorporate the study of the interactions between particles like electrons, protons, and ions, also as their interaction with other particles as a function of their collision energy.Origins and experimental development. The Romans were already conversant in the power of a prism to get a rainbow of colours . Newton is traditionally considered the founding father of spectroscopy, but he wasn't the primary man of science who studied and reported on the solar spectrum.

Today, the dark bands Fraunhofer observed and their specific wavelengths are still mentioned as Fraunhofer lines, and he's sometimes mentioned because the father of spectroscopy. Throughout the mid 1800's, scientists began to form important connections between emission spectra and absorption and emission lines.

Types of material

Atoms

Atomic spectroscopy was the primary application of spectroscopy developed. Atomic absorption spectroscopy and atomic emission spectroscopy involve visible and ultraviolet . These absorptions and emissions, often mentioned as atomic spectral lines, are thanks to electronic transitions of outer shell electrons as they rise and fall from one orbit to a different . Atoms even have distinct x-ray spectra that are due to the excitation of inner shell electrons to excited states.

Molecules

The combination of atoms into molecules results in the creation of unique sorts of energetic states and thus unique spectra of the transitions between these states. Molecular spectra are often obtained thanks to electron spin states (electron paramagnetic resonance), molecular rotations, molecular vibration, and electronic states. Rotations are collective motions of the atomic nuclei and typically cause spectra within the microwave and millimeter-wave spectral regions. Rotational spectroscopy and spectroscopy are synonymous.

Crystals and extended materials

The combination of atoms or molecules into crystals or other extended forms results in the creation of additional energetic states. These states are numerous and thus have a high density of states.

Applications

There are several applications to spectroscopy within the field of drugs , physics, chemistry, and astronomy. Taking advantage of the properties of absorbance, spectroscopy are often wont to identify certain states of nature.

Cure monitoring of composites using optical fibers.

Estimate weathered wood exposure times using near infrared spectroscopy.

Measurement of various compounds in food samples by absorption spectroscopy both in visible and spectrum.Measurement of toxic compounds in blood samples

Electronic structure research with various spectroscopes.

Radar to work out the speed and velocity of a foreign object

Types of spectroscopy

There are many various sorts of spectroscopy, but the foremost common types used for qualitative analysis include atomic spectroscopy, ultraviolet and visual spectroscopy, infrared spectroscopy, Raman spectroscopy and nuclear resonance .

Conclusion

Using spectroscopy, we will get information on quite source, speed , composition, and temperature, from positions and intensities of lines And database are often made up of Raman spectra to classify and grade normal from cancerous tissue. This database has the potential for real time diagnosis of fresh tissue and may potentially be applied to the OR in vivo.

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