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Technical Note a Glimplse of Spectrocsopy

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Abstract – Spectroscopy since its origin has developed into a powerful tool. We can't imagine a world without spectroscopy. It has helped us in many ways. Spectroscopy has enriched our knowledge about the world, changed our life and opened up an entirely new and most important area of research. Even a common man know and is benefited by light display boards, LED based equipment's, laser printer, MRI etc. The list is very long. All these things are outcome of spectroscopic studies.

Keywords: Spectroscopy, Spectroscopic Technique

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INTRODUCTION

Spectroscopy is basically the study of interaction of electromagnetic waves with matter. It has started with the study of sunlight spectrum by prism. When it was established that the light is electromagnetic wave and the term spectrum includes entire region from microwaves to cosmic rays and De Broglie gave dual nature theory which attached wave nature to particles like electron and protons the field of spectroscopy widened and reached to the study of electron and neutron diffraction.

THE TECHNIQUE

Spectroscopy involves mainly three things viz 1. Source of excitation 2. Prism or grating spectrometer 3. Detector. Depending on the nature of the electromagnetic radiation used such as microwave, infrared, visible, ultraviolet, X ray, gamma ray, the spectroscopy is called by that name. It is broadly classified into two categories emission spectroscopy and absorption spectroscopy. The emission spectroscopy gives the knowledge about properties of the source. The source emitting light is in atomic state, so the information obtained is about atomic structure of the source material.

When a suitable sample material is placed in the path of electromagnetic radiation, a part of the radiation is absorbed. Then analysis of the emergent light provides the information about the sample material, and the spectroscopy is termed as absorption spectroscopy.

When absorption in the sample is negligible. It scatters the incident light we call it scattering experiment .For example in Raman scattering we get information about the molecule of the substance, and the spectroscopy is termed as molecular spectroscopy.

Likewise other scattering experiments with source other than electromagnetic radiation such as electron, neutron, and positron are also tried and each revealed useful information about the matter. Thus the purview of spectroscopy has increased.

DISCUSSION

What we study by scattering experiments. The nature of scattered radiation as a function of intensity, frequency, angle of incidence, composition of material and physical conditions around the material. It has many applications in almost all aspects of life and research. Yet another field is Nuclear Magnetic Resonance spectroscopy. It gives the information about the magnetic properties of the nuclei. Thus the field of spectroscopy is classified on this basis into a number of spectroscopic studies. The materials under study may vary from solid, liquid, gas to living tissues.

Modern developments in the field of spectroscopy involves laser spectroscopy, photoelectron spectroscopy, positron annihilation spectroscopy, scanning electron microscopy etc. Laser spectroscopy gives the information about the dynamics of the the material at small intervals of time. By the spectroscopic study of the radiation coming from stars and planets we know about the composition and other properties of the heavenly bodies. Recently developed AFM and STM are able to give the surface structure of the substance and nanomaterials.

CONCLUSION

Thus we see that the spectroscopy has been useful not only in providing the information about the composition of the molecule, atom, nuclei, planets, stars, crystals, nanomaterials, surfaces and their

properties, but it has also been utilized for medical diagnosis, cure, industrial purpose and research purpose.