

Introductory Chapter

Introduction to Infrared Spectroscopy

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1. Introduction

1.1 Short history of the technique

Infrared radiation was discovered by Sir William Herschel in 1800 [1]. Herschel was investigating the energy levels associated with the wavelengths of light in the visible spectrum. Sunlight was directed through a prism and showed the well known visible spectrum of the *rainbow colors*, i.e. the visible spectrum from blue to red with the analogous wavelengths or frequencies [2, 3] (see Fig.1).

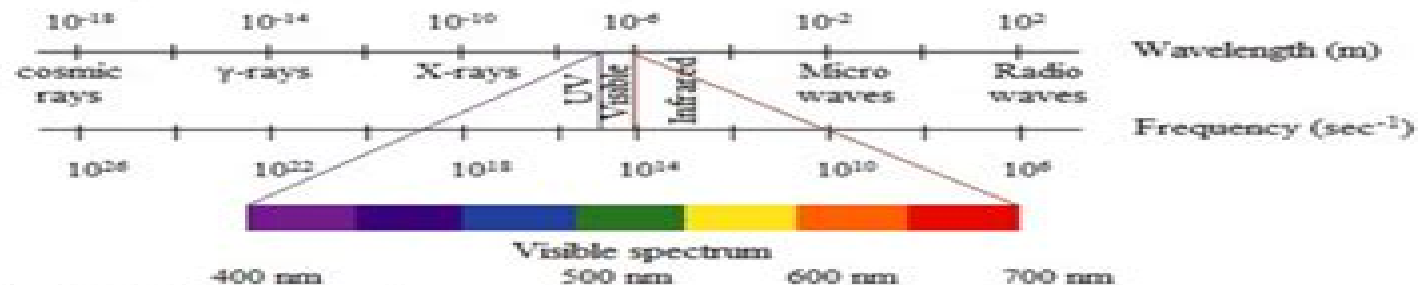


Fig. 1. The electromagnetic spectrum.

Spectroscopy is the study of interaction of electromagnetic waves (EM) with matter. The wavelengths of the colors correspond to the energy levels of the rainbow colors. Herschel by slowly moving the thermometer through the visible spectrum from the blue color to the red and measuring the temperatures through the spectrum, he noticed that the temperature increased from blue to red part of the spectrum. Herschel then decided to measure the temperature just below the red portion thinking that the increase of temperature would stop outside the visible spectrum, but to his surprise he found that the temperature was even higher. He called these rays, which were below the red rays "non colorific rays" or invisible rays, which were called later "infrared rays" or IR light. This light is not visible to human eye. A typical human eye will respond to wavelengths from 390 to 750 nm. The IR spectrum starts at 0.75 μm . One nanometer (nm) is 10^{-9} m. The Infrared spectrum is divided into, Near Infrared (NIRS), Mid Infrared (MIRS) and Far Infrared (FIRS) [4-6].

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