

Measurement of: FTIR (Fourier Transform Infrared) spectrum or simply FTIR Analysis.

Equipment: Perkin Elmer Spectrum BX-500 FTIR system.

Property Measured: By interpreting the infrared absorption spectrum, the chemical bonds (functional groups) in a molecule or molecular structure of materials, whether organic or inorganic can be determined.

Photograph (small size):



Basic Principle: This technique works on the fact that bonds and groups of bonds vibrate at characteristic frequencies. A molecule that is exposed to infrared rays absorbs infrared energy at frequencies which are characteristic to that molecule i.e. those frequencies where the infrared light affects the dipolar moment of the molecule. Thus monatomic (He, Ne, Ar, etc) and homopolar diatomic (H_2 , N_2 , O_2 , etc) molecules do not absorb infrared light. During FTIR analysis, a spot on the specimen is subjected to a modulated IR beam. The specimen's transmittance and reflectance of the infrared rays at different frequencies is translated into an IR absorption plot consisting of reverse peaks. The resulting FTIR spectral pattern is then analyzed and matched with known signatures of identified materials in the FTIR library.

IR absorption information is generally presented in the form of a spectrum with wavelength or wavenumber as the x-axis and absorption intensity or percent transmittance as the y-axis. Transmittance, T , is the ratio of radiant power transmitted by the sample (I) to the radiant power incident on the sample (I_0). Absorbance (A) is the logarithm to the base 10 of the reciprocal of the transmittance (T).

$$A = \log_{10} \frac{1}{T} = -\log_{10} T = -\log_{10} \frac{I}{I_0} \quad (1)$$

Capabilities: This spectrometer allows us to collect spectra in mid-IR, far-IR and near-IR spectral ranges. The spectrum BX contains a CDRH Class II Helium Neon (HeNe) laser, which

emits visible, continuous wave radiation at a wavelength of 633 nm and has a maximum output power of less than 1mW.

The recording abscissa range of this instrument is 400-4000 cm^{-1} . Each spectrum was collected with 64 scans co-added at 4 cm^{-1} resolution. The normal operation mode of this spectrometer is temperature stabilized. The spectrometer utilizes continuous dynamic alignment to ensure exceptional high-resolution line shapes.

Sample Requirement: Either Solution samples (very diluted), Thin Films and Powder samples.