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Fourier Transform-Infrared Radiation: Sampling Techniques

Transmission Sampling Technique

Transmission sampling technique on FTIR is a common technique for collection of the infrared spectra. Methods for applying this technique usually involves the sample being situated inside a sample holder then placed directly into the path of the infrared beam to be scanned. FTIR sampling by transmission can also be considered noncomplicated as it does not necessarily use sophisticated sampling accessories. Aside from this, other benefits from this technique include its compatibility with automated sampling and microsampling techniques such as IR Microscopy.

Qualitative analysis of a sample is possible since transmission techniques have been employed and documented for many years. Spectral libraries containing transmission spectra are plentiful and are often applied mostly for qualitative analysis. Not only qualitative analysis, transmission technique can be also applied for quantitative applications. Most measurement using this technique adhere to the Beer-Lambert law. This law is a widely used as it provides a mathematical relationship between infrared radiation absorbed by the variable and the sample concentration. Beer-Lambert law states that absorbance has a linear relationship to the concentration of a sample. Actual measurement are generated in percent transmittance which are converted in real time to absorbance by all modern FTIR instrumentation.

The only drawback to this technique is the type of sample to be analyzed. If the sample is too thick to be measured, then it needs to undergo some processings before important data can be collected. The usual samples that utilize transmission technique are liquids and pastes since they are the easiest samples to run.

Analyzing a solid sample requires mixing the sample with an IR transparent material (usually KBr) and pressing a pellet. The mixing in UPV laboratory makes use of a specialized mortar and pestle, however mixing is best done ShakIR accesory which prodeces a fully mixed and pulvurized sample in a very short amount of time. For a gas sample, analyzing this type of sample uses a unique form of transmission sampling where the identified sample can be in a mixture of different gases. At high spectral resolution, most gas are identified and quantified. This is so because absorbance bands can be selected within the spectrum.

In general, transmission sampling by FTIR gives a good means for indentifying and quantifying samples. However, sample preparation and type of sample used are important factors to be considered when using this technique.