Accurate Characterization of Polymers and Additives in Personal Care Products and Packaging by Fast-Scanning IR

Problem

You can't buy anything today without a package. Think about it. Blister packs, cello wraps, shrink wraps, barrier bags, vapor films, UV-blocking films, heat-blocking films, tinted plastics, filled polymers, biodegradable bags, structural plastics, laminated films, moisture barrier films ….. ad infinitum (literally).

Industries that manufacture plastics or utilize plastics need to characterize these plastics. Classical physical and optical tests, or chromatographic techniques (many of them have been standard methods for years), have the potential to be slow, inaccurate due to operator error, or very expensive. Spectroscopic procedures have been accepted techniques for many years, but changes in technology have all but eliminated the economical, reliable and classic instruments from the market.

Principle

Infra-red spectroscopy has been utilized over the years to generate a tremendous database of information from the unique "fingerprint" that *all* organic molecules and functional groups have in the IR spectrum. Samples can be scanned either in *transmission* as thin, clear films or by *reflectance* using an ATR accessory. Both the major polymer composition and any of the additives used in manufacturing can be qualitatively identified and then quantitatively measured relative to commonly standard reference films.
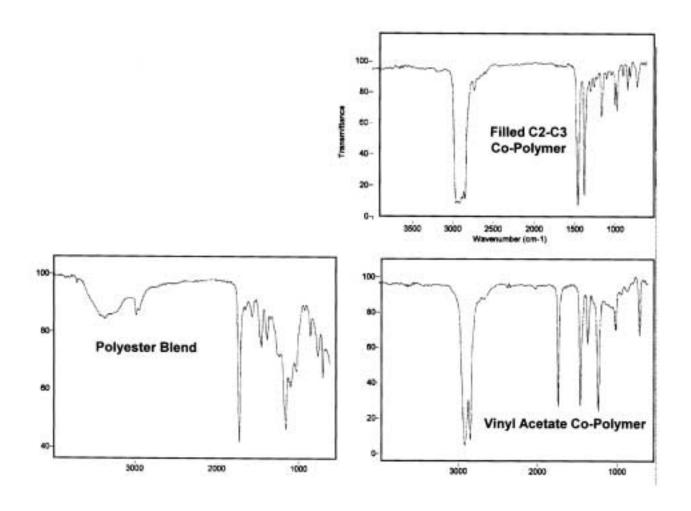
Practice

Any polymer sample can be scanned on the Buck Scientific M500 IR Spectrometer using a Thin-Film Holder for transmission, or by making an accurate thin film from a thick film or pellet. It can also be done by cutting the sample to fit the Model 59 Vertical ATR accessory for reflectance measurements.

The spectrum is processed by GRAMS/IR Software and compared to either "spectral libraries" for identification and competitive product analysis, or to standard films for quantitative assay. Initial sample preparation may require a few minutes, and the final results can be printed out in under 5 minutes!

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SIC: 211, 222, 226, 228, 229, 265, 267, 278, 281, 289, 308

Thin-film and Filled Polymer Materials by Fast Scan IR using KRS-5 ATR Accessory and Buck M500/GRAMS®

Three typical polymer materials scanned by reflectance ATR using the Model 59 Vertical ATR with a KRS-5 crystal. Using the GRAMS/IR software with advanced spectral manipulations, data can be formatted into a wide variety of presentations.