TG-IR

The combination of a Thermogravimetric Analyzer (TGA) with an Infrared Spectrometer (TG-IR) is the most common type of Evolved Gas Analysis (EGA) in use today. By heating a sample on the TGA, a sample will release volatile materials or generate combustion components as it burns. These gases are then transferred to the IR cell, where the components can be identified. Because of its ability to detect functional groups, IR analysis allows greater understanding of the processes seen in the TGA.

The PerkinElmer TL8000 transfer line is a state-of-the-art system for TG-IR. Unlike simpler systems that simply move the gas to the TGA, the TL8000 is designed to make sure every component evolved in the TGA is transported to the IR.

Advantages of this System Include:

- Insulated heated transfer line with replaceable SilcoSteel® liner
- Heated zero-gravity-effect 'ZGCell' gas cell for the PerkinElmer FT-IR instrument incorporating automatic accessory identification, low volume, and efficient sample area purging
- Control unit incorporating a mass flow controller, particle filters, flow smoothing system, independent transfer line and gas cell temperature controllers, and vacuum pump with exhaust line
- Automatic triggering of IR data collection from the Pyris™ Software
- Spectrum Timebase™ Software for time resolved experiments

This design translates into some distinct advantages giving better data and greater ease-of-use:

- Constant gas flow giving optimum separation between time-resolved peaks
- Reduced mixing of IR signals
- No accumulations of heavy components in the IR cell due to ZGCell design
- Automatic importation of TGA data in Timebase Software

The TL8000 can be used to connect any of the PerkinElmer TGA/STA instruments to any of our FT-IR's. This offers you a range of options in terms of price and performance to fit your needs.

The TG-IR system is ideally suited for applications where one wants to identify materials evolved on heating, like residual solvents in pharmaceuticals, component identification in the analysis of plastics or rubbers, or the study of the combustion products from burning a sample. An example of the data one can get is shown below from a sample of switchgrass, a material being studied in North America as a possible source of biofuels.

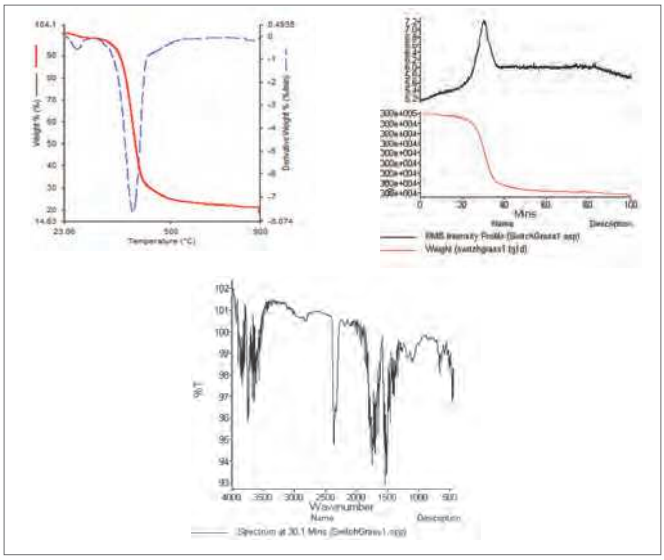

Figure 1. The data from the TGA run (top left) is transferred automatically to the Timebase Software and compared to the Gram Schmidt plot (top right). From this data, we can examine regions of interest as shown in the lower center image.

As you can see in the TGA, there is a small weight loss at low temperature and then a much larger one at approximately 250 °C corresponds to the burning of the organic matter. This data is imported into the Timebase Software where it can be compared to the total absorbance curve and the area of interest selected for analysis. Here we select 30 minutes in the midst of the burn and look at the spectra of the evolved gases.