

Spectros Associates Proudly Presents the One Day Short Course

## Infrared Spectral Interpretation II

**Instructor: Dr. Brian C. Smith**

A detailed look at how to tackle the spectra of complex molecules. The course begins with a complete discussion of how molecules absorb infrared radiation, enabling attendees to fully understand the source of the features they see in a spectrum. Then, the spectra of complex molecules such as alkenes, ethers, aldehydes, amides, and amines are pulled apart and analyzed in detail. The course concludes with a detailed examination of the spectra of polymers with complex spectra such as Nylons, acrylates, polyurethanes, and Teflon. Attendees interpret many unknown spectra in class with the help of the instructor to enhance learning. The course is drawn from the 260 page textbook *Infrared Spectral Interpretation* written by the instructor and published by CRC Press.

### **I. How Molecules Absorb Infrared Radiation**

- A. The First Necessary Condition for Infrared Absorbance**
- B. The Second Necessary Condition for Infrared Absorbance**

### **II. Assigning All the Features in a Spectrum**

- A. Fundamental, Overtone, and Combination Bands**
- B. Fermi Resonance**

### **III. Unsaturated Hydrocarbons**

- A. Alkenes:**
  - 1. Substitution Patterns**
  - 2. Distinguishing Cis/Trans Isomers**
- B. Alkynes**

### **IV. Ethers**

- A. Saturated Ethers**
- B. Aromatic Ethers**
- C. The Methoxy Group**

## **V. Complex Carbonyl Molecules**

- A. Aldehydes**
- B. Carboxylic Acids**
- C. Carboxylates (Soaps)**

## **VI. Organic Nitrogen Compounds**

### **A. Amides**

- 1. Structure, Nomenclature, and Bonding**
- 2. Primary Amides**
- 3. Secondary Amides**
- 4. Proteins**

### **B. Amines**

- 1. Distinguishing the Three Types of Amines**
- 2. Methyl Groups Bonded to Nitrogen**

### **D. Nitriles**

### **E. The Nitro Group**

## **VII. Spectra of Polymers with Complex Structures**

- A. Nylons**
- B. Acrylates**
- C. Polyurethanes**
- D. Polycarbonates: Lexan**
- E. Polyimides: Kapton**
- F. Teflon**

**Wrap-up. Time for individual consultations and questions.**