

# **Improving Your Gas Chromatographic Analyses: Understanding and Optimizing Gas Chromatographic Separations and Injections**

Course Title: "Improving Gas Chromatographic Analyses: Understanding and Optimizing Separations and Injections to Save Time and Money"

Instructors: Frank L. Dorman, Jack W. Cochran

Affiliation: Penn State University, Juniata College, Restek Corporation

Course Date: Thursday May 20, 2010

Start Time: 8:00 AM

End Time: 4:30 PM

Course Description:

Users of GC and GC-MS systems would often like to improve their separations and also speed up their analyses. In order to accomplish this, a more thorough understanding of how the separation occurs, and what can be changed to make improvements is needed. Many analyses can benefit from both faster analysis time and increased resolution, but it is not as simple as merely increasing the temperature ramp rate. This course will begin with in-depth discussions as to the mechanisms of separation, and also the operation of common injection techniques. We will then wind up with optimization strategies and apply these to real sample analyses, targeting environmentally-relevant separations.

Target Audience:

This course will present a blend of practical theoretical and applied separations instruction. We will cover both the underlying theory and also the implementation of this material into the commercial laboratory setting. The instructors will welcome questions and problems from the audience, and we will have a question and answer session at the end of the course. Beginning practitioners through advanced users will benefit from the course material. We suggest that the attendees have at least a minimum of hands-on experience with GC and or GC-MS analysis. Please email instructors with topics of interest for Q and A session at [frank.dorman@restek.com](mailto:frank.dorman@restek.com) and [jack.cochran@restek.com](mailto:jack.cochran@restek.com)

Course Outline:

- 1.) The Separation Process

- a. Column-related variables
- b. Achieving Analyte Separation
- 2.) Separation Optimization
  - a. Choosing Your Starting Conditions
  - b. Optimization Refinements
- 3.) The Injection
  - a. Understanding the Splitless Injector
  - b. Split Injectors
  - c. Large Volume Splitless Injection
- 4.) Advanced Applications
  - a. Multidimensional GC
  - b. Emerging Contaminants
  - c. QuEChERS Extractions
  - d. Others to be determined by attendee input

Instructors Biographies:

Frank L. Dorman is currently an Associate Professor at Penn State University in the Forensic Science Program. He also has a joint appointment as a Research Professor at Juniata College. Frank's academic research areas include both fundamental and applied separations science focusing on GC and HPLC techniques. Prior to full-time academic employment, Frank was the Director of Technical Development for Restek Corporation where he was responsible for technical collaborations and new product development. Frank was also employed in a commercial environmental laboratory following his graduate education as a senior chemist in a variety of capacities. Frank is interested in sample preparation techniques, emerging contaminant analysis, multidimensional chromatography, mass spectrometry, and separation processes of liquid and gas-phase separations.

Jack W. Cochran is currently the Director of New Business and Technology for Restek Corporation after working for LECO Corporation as the Director for Separation Science for 7 years with their GC- and GCxGC-time-of-flight mass spectrometers. Formerly he worked at the Illinois Hazardous Waste Research and Information Center and the U.S.

Environmental Protection Agency in Oklahoma doing analytical method development for environmentally significant compounds such as PCBs, chlorinated dioxins and furans, PAHs, explosives, etc. in air, water, sediment, tissue, soil, and other types of samples. His analytical interests include novel sample preparation and cleanup methods such as QuEChERS and dispersive solid-phase extraction for pesticides in food, GCxGC with new capillary column stationary phases, time-of-flight mass spectrometry, novel GC injection techniques, and vacuum-outlet GC.