

Oct. 23-24, 2007, Montreal, Canada

**LC-MS 2-day Course:**

**!!! Understanding Atmospheric Pressure Ionization LC/MS and LC/MS/MS- Theory, Applications and Problem Solving !!!**

**Instructor:** Dr. Robert D. Voyksner (LCMS Limited)

Dr. Voyksner's research in mass spectrometry has resulted in over 230 publications and presentations, primarily in the area of HPLC/MS. He has served on the Board of The American Society For Mass Spectrometry (ASMS) and is currently on the organization committee for the Montreux LC/MS Symposium. He has organized the 1995,1999 and 2003 Montreux LC/MS Symposia and will be the organizer for the 2007 meeting. He is on the editorial board for the Journal of Chromatography and is Adjunct Professor at the University of North Carolina at Chapel Hill, School of Pharmacy and the North Carolina State University, School of Veterinary Medicine. Dr. Voyksner has taught over 80 courses on LC/MS and CID interpretation during the past 15 years for ASMS, ISSX, PBA, HPCE, various other HPLC/MS focused meetings and contracted corporate venues.

Dr. Robert D. Voyksner received his Ph.D. at the University of North Carolina at Chapel Hill in 1982. He went on to be employed at Research Triangle Institute from 1983-2001 as the director of the mass spectrometry facility. He is now the President of LCMS Limited, in Durham, NC. His work now focuses on technological advancements in LC/MS, offering research services to the pharmaceutical and biotech industry in order to aid in solving unique problems using LC/MS and also offers training services in LC/MS and MS/MS interpretation instrumentation.

**Course Description:**

This 2-day course is designed to introduce the student to liquid chromatography/ mass spectrometry (LC/MS) and it's capabilities to solve real world problems related to pharmaceutical and biochemical analysis. This beginner to intermediate level lecture course will cover fundamental and practical information for using electrospray and atmospheric pressure chemical ionization LC/ MS. Practical information regarding sample preparation, adapting LC conditions for LC/MS, developing LC separations for LC/MS, the coupling various modes of chromatography (e.g. reverse, normal, size exclusion, affinity, ion pair, and ion exchange), with column diameters ranging from 0.05 to 4.6 mm, to the LC/MS interface, qualitative data interpretation, quantitation using LC/MS, and trouble shooting the LC/MS method and instrumentation. The course will have problem sets in LC/MS methods development, spectral interpretation and quantitation to emphasize learned material.

**Who should Attend:** The course is designed for researchers who have the responsibility for developing LC/MS methods, operating LC/MS instrumentation and for interpreting and reviewing the data generated by LC/MS and LC/MS/MS. This course would be a benefit to a new comer to LC/MS as well as to an established scientist, by expanding their knowledge of the capabilities of LC/MS in areas such as pharmaceutical, biochemistry, industrial, environmental and proteomics research.

Due to the nature of the course, which involves a continuous interaction instructor-student, the number of participants is limited to only 30.

**Key Topics you will learn about:**

- Understanding the ionization processes in LC/MS.
- Apply the various ionization processes toward real world variables that need to be controlled and optimized.
- Develop a systematic methodology for developing and optimizing LC/MS methods, including sample preparation, LC separation and MS analysis for real world samples.
- Learn about the capabilities of various separation methodologies and mass analyzer technologies.
- Learn about the latest developments in LC/MS (e.g. chips, ion trap and quadrupole-TOF configurations).

**How you will benefit from the course:** The course is focused to benefit researchers working in LC/MS, improving your understanding and use of the technique in order that you can apply the knowledge learned to your own work and thus:

- Optimize sensitivity
- Improve specificity
- Develop methods for real world matrices
- Identify compounds from MS and MS/MS spectra
- Improve understanding of variables in quantitative determinations
- Choose appropriate sample preparation and separation conditions
- Save time and frustration by learning tricks and tips
- Choose the appropriate LC/MS instrumentation for the desired application

## **Course Outline:**

### **Introduction Into LC/MS**

- LC separations
- Mass analyzers
- Interfacing LC to MS

### **Electrospray, APCI and APPI sources**

- Theory of Ionization
- Ionization in Solution
- Nebulization and Desolvation
- Ion Evaporation
- Gas Phase chemistry
- Sample and Solution Considerations
- Sample pH
- Solvents
- Buffer/Additives
- Understanding ion suppression
- Flow Rate
- Electrospray Spray Chamber Hardware Configurations
- Sample Introduction (orthogonal needle configuration)
- Electrospray, APCI, and APPI Interfaces
- When Electrospray Ionization Fails
- Adduct Formation
- Sample Consideration
- APCI
- APCI Solution Considerations
- APPI

### **On-Line LC/MS:**

- Hardware Considerations for the Coupling of the LC to MS
  - Reverse Phase Separation
  - Ion Pair Separations
  - Normal Phase Separation
  - Other Modes - Ion Exchange, monolithic columns
- High Throughput Analysis
- Capillary Separations (CEC, Capillary Electrophoresis, and Capillary LC)
- Considerations when developing a LC/MS method or making a method LC/MS compatible
  - Mobile Phase Considerations
  - Columns

- Solvents
- Buffers/pH
- Flow Rates
- What to Do When Incompatibilities Exist Between LC and MS
- Mobile Phase compatibilities
- Post Column Addition
- Starting Over: Developing a New Separation

#### **Introduction to the Interpretation of Electrospray Mass Spectra:**

- Generation of Structural Information by Tandem MS
- Hardware Configuration
- CID Energies and Transmission
- Generation of Structural Information in Electrospray Transport Region
- Hardware Configuration
- CID Energies and Transmission
- Comparison to MS/MS
- Interpretation of Low Molecular Weight Compounds –Mechanisms of CID fragmentation and problems highlighting the mechanism.

#### **LC/MS Quantitation:**

- Method Validation
- Calibration
- Internal Standards
- Sources of Error
- Issues in GLP assays and instrument validation

#### **Sample Preparation for LC/MS:**

- Techniques of Solid Phase, Liquid-Liquid, Ultrafiltration, Immunoaffinity, Column Switching, On-Column Concentration

#### **Future Trends**

- Ion Traps
- Time of flight MS and q-TOF
- Chip based techniques

#### **Summary/Concluding Remarks:**

Method Development Problems to Review Materials Covered in Course.

#### **Cost of LC-MS Course:**

Registration fee per person.....\$990.00 + GST + QST

**Registration fee includes Course Binder, Course Certificate, Continental Breakfast, Lunch and Refreshments**

**INTERESTED? You can register the courses by sending email to us at [lcms\\_registration@cvq.ca](mailto:lcms_registration@cvq.ca).**