Practical LC/MS

(An Introduction to API LC/MS Techniques)

I. HPLC AND MASS SPECTROMETRY: INSTRUMENTATION AND PRINCIPLES

1. Practical LC/MS – Background / Introduction.
2. HPLC Columns – The Basics of Chromatographic Theory.
3. Single Quadrupole API Mass Spectrometry – Ionization and Mass Analysis.
4. Tandem Mass Spectrometry - MS/MS.

II. MASS SPECTROMETRY 101

5. Molecules and molecular weights.
6. Ions, Masses and Resolution.
7. Matrix Effects.
8. LC/MS Issues that are Important.
9. LC/MS System Components.

III. ATMOSPHERIC PRESSURE CHEMICAL IONIZATION (APCI)

10. APCI – How are the Ions Formed?
11. Acid / Base Interactions.
12. Features of APCI – Gas Phase Ion Formation.
13. Questions / Problem Solving.

IV. ELECTROSPRAY INTRODUCTION

14. The Electrospray Process / The Mechanism of Electrospray.
15. Ion Spray - Pneumatically-Assisted Electrospray.
16. Nanoelectrospray – Nanoliters Per Minute Liquid Flows.
17. Questions / Problem Solving.

V. ELECTROSPRAY LC/MS OF LARGE MOLECULES

18. Multiply Charged Ions / Detection of Non-Covalent Complexes / Nanoelectrospray of RNase A and Ligands.
19. Questions / Problem Solving.

VI. ELECTROSPRAY OF SMALL MOLECULE COMPOUNDS

20. Review of Electrospray Basics – The Spray and Liquid Flow Rates.
21. Small Molecule Examples – Using Tandem Mass Spectrometry.
22. Matrix Effects – Suppression of Ionization Issues.
23. Questions / Problem Solving.

VII. SAMPLE PREPARATION FOR LC/MS

24. Objectives and Types of Extractions – A Variety of Issues.
25. Liquid-Liquid and Solid-Phase Extractions – In 96-Well Format.
26. On-Line Extractions – SPE, Affinity and Ultra filtration.

VIII. QUALITATIVE ANALYSIS

27. Structure Determination – Collision-Induced Dissociation.
28. Types of Fragmentation – Single Bond Cleavages and Rearrangements.
29. CID Mass Spectra / Questions and Problem Solving.

IX. QUANTITATIVE ANALYSIS BY LC/MS/MS

30. Basic Principles of Quantitative Analysis – Errors and Measurements.
31. The Internal Standard – Its Importance.
32. The Standard Curve / Questions and Problem Solving.

X. METHOD VALIDATION

33. Bioanalytical Method Validation – Industry Guidelines.
34. The Role of QC's / Additional Validation Experiments / Crystal City Updates

XI. RECENT DEVELOPMENTS

35. Time of Flight Mass Spectrometry – QTOF Benefits.
36. APPI and TurboChromatography / Chip-Based Nanoelectrospray.
37. Linear Ion Traps, FTMS and FAIMS – New Technology Developments.
38. DART / Ion Mobility & UPLC / Questions and Problem Solving.