Reading Chemical "Fine Print": The Key to Exploiting Nature's Isotopic Complexity

Alan G. Marshall
Ion Cyclotron Resonance Program, National High Magnetic Field Lab, Tallahassee, FL 32310-4005
Department of Chemistry and Biochemistry, Florida State University, Tallahassee, FL 32306

Most mass analysis relies on "nominal" mass accuracy (i.e., to within 1 Da). However, more and more applications are based on much more accurate mass measurement. Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS) offers 10-100 times higher mass resolving power than other mass analyzers.

High mass resolving power ($m/\Delta m_{50\%} > 500,000$ over a wide mass range) offers two major advantages. First, it becomes possible to separate complex mixtures without prior chromatographic or gel separation. Second, elemental composition may be determined from accurate (to <1 ppm) mass measurement alone for unknown molecules up to ~1,000 Da. Examples from environmental, petrochemical, analytical, and biological (especially proteomics and lipidomics) problems will be presented, including world records for mass resolution.

**South American Petroleum Crude Oil**

17,000+ Compositional Distinct Components Resolved by High Resolution 9.4 Tesla Electrospray FT-ICR MS

**Negative Ions**

- 6,118 resolved components

**Positive Ions**

- 11,127 resolved components

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