

# MASS SPECTROMETRY DEMO

## INTRODUCTION

Mass spectrometry is an analytical technique that measures mass to charge ratio of charged particles. It is used to determine masses of particles, for determining the elemental composition of molecules. The basic principle relies on the ionization of chemical compounds to generate charged molecules or molecule fragments.

## MASS SPECTROMETRY

The major components of the mass spectrometer consist of the gaseous ion source, mass analyzer, ion transducer and signal processor. A high vacuum is necessary in mass spectrometry because it allows molecules to run through the machine without hitting air molecules. High resolution mass analyzers offer a greater accuracy with less than 5 ppm and 10,000 mass range. Though accuracy is high, the instrument is more expensive. Low resolution is less accurate but also relatively inexpensive.

## Electrospray Ionization- Mass Spectrometry

No experiment or measurement was carried out on the Shimadzu ESI-MS. The chemistry behind the ESI-MS relies on the oxidation and reduction driven by a high voltage power supply. This mechanism is how the ions are formed. Ions travel through what is called a Taylor cone. The ESI is effective and applicable for macromolecules because it overcomes the propensity of these molecules to fragment when analyzed. Soft ionization sources bring large molecular weight compounds into the gas phase, which is why it is called soft.

## Matrix Assisted Laser Desorption/Ionization –MS

No measurement was made on the Maldi-MS. The matrix is used to protect the molecule from being destroyed by the high energy laser. The mechanism of ionization relies on a laser being fired on the matrix, and the matrix's charge is transferred to the analyte. The advantages of the TOF mass analyzer is that it detects extremely high masses, range in (MDa) and fast scanning. MALDI-MS is ideal for biomolecules and proteins. Post source decay analysis is an extension of MALDI/MS that allows one to identify structurally informative fragment ions from decay taking place in the field free region after leaving the ion source. It allows large range biomolecular mass analysis in the weights of 100,000 u. MALDI is a soft ionization technique because of the gaseous state it puts the molecules. It compares

significantly to laser desorption/ionization with no matrix except the intensity that the laser is shot is much greater in the MALDI, which is the reason why the matrix is needed. The matrix is used to protect the high intensity laser.

#### Reference

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