

Mass Spectrometry

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November 2015

1 What is Mass Spectrometry?

Mass spectrometry is an analytical technique that helps identify the amount and type of chemicals present in a sample by measuring the mass-to-charge ratio and abundance of gas-phase ions.

2 Method

In order to measure the characteristics of individual molecules, a mass spectrometer converts them into ions so they can be moved about and manipulated by external electric and magnetic fields. First, a small sample is ionized, usually to cations (negatively charged ions) by loss of an electron. Then, the ions are sorted and separated according to their mass and charge. Finally, the separated ions are measured, and the results displayed on a chart.

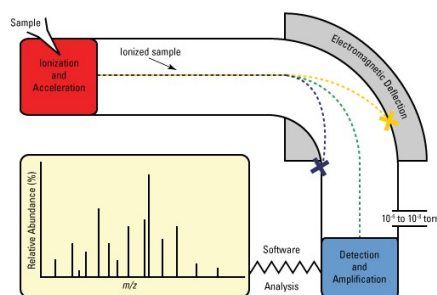


Figure 1: Mass Spectrometer

1. As shown in the diagram above, a sample is placed in the red area labeled Ionization and Acceleration where the sample is ionized.
2. The ions are then separated by use of Electromagnetic Deflection, as seen in the grey area

3. The sample is then detected and amplified in the blue area after which the results are produced and analysed.

3 Applications

Some of the practical applications of Mass Spectrometry are:

1. Measuring nanoparticle size: One can use a MALDI-TOF spectrometer to measure the size of nanoparticles. And once the size of the sphere has been measured, its density can also be calculated.
2. Looking for toxins in toothpaste: In some Chinese toothpastes, a toxic compound known as DEG is sometimes used as a sweetener. The compound is banned, but it is difficult to truly enforce the ban, since toothpaste is very difficult to test. A Chinese scientist, Huanwen Chen, has come up with a way of using mass spectrometry to quickly screen for toxins. Additionally, this mass spectrometry method should also be transferable to testing other viscous liquids found in pharmaceuticals, biotechnology, other foods and chemicals.
3. Looking for pesticides: Douglas Hayward and Jon Wong at the U.S. FDA have developed a mass spectrometry method that can identify multiple compounds at once, hoping to reduce the amount of pesticides that enter the food supply.

4 Bibliography

- "Three Interesting Uses for Mass Spectrometry." Three Interesting Uses for Mass Spectrometry. N.p., n.d. Web. 10 Nov. 2015.
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