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Perspective

Modern Methods of Mass Spectrometry

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DESCRIPTION

The term spectrograph became part of the international scientific vocabulary by 1884. Early spectrometry instruments that measure the mass-charge ratio of ions are called mass spectrographs, which are instruments that record the spectrum of mass values on a photographic plate. The beam of ions is redirected to the phosphor screen unless the mass spectroscope resembles a mass spectrograph. Mass spectroscope configuration was used in early instruments when the effects of adjustments were to be observed quickly. Once the device is properly adjusted, the photographic plate is inserted and exposed. Although the direct brightness of the phosphor screen was replaced by indirect measurements with the oscilloscope, the term mass spectroscope continued to be used. The use of the term mass spectroscopy is now discouraged because of the potential for confusion with light spectroscopy. Mass spectrometry is often abbreviated as mass-spec or MS.

Modern methods of mass spectrometry

Modern methods of mass spectrometry were developed by Arthur Jeffrey Dempuster and F.W. Aston was formed in 1918 and 1919, respectively. The sector mass spectrometers, called coulotrans, were developed by Ernest O. Developed by Lawrence and used to isolate isotopes of uranium during the Manhattan Project. Callatron mass spectrometers were used for uranium enrichment at the Oak Ridge, Tennessee Y-12 plant, founded during World War II. In 1989, Hans Dehmelt and Wolfgang Paul were awarded half the Nobel Prize in Physics for their development of the ion trap technique in the 1950s and 1960s. In 2002, the Nobel Prize in Chemistry was awarded to John Bennett Fenn for his development of Electrospray Ionization (ESI) and his application to ionization of cochineal and biological macrophages, especially proteins, for the development of Soft Laser Dehydration (SLD).

Mass Spectrometry (MS) is an analytical technique used to measure the mass-to-charge ratio of ions. The results are displayed as the mass spectrum, the plot of intensity as a function of the mass-to-charge ratio. Mass spectrometry is used in many different fields and is applied to pure samples and complex compounds. The mass spectra is the plot type of the ion signal as a function of the mass-to-charge ratio. This spectra is used to identify the elemental or isotopic signature of the model, the mass of cells and molecules, and to describe the chemical identification or structure of molecules and other chemical compounds.

In a typical MS process, a sample in solid, liquid, or gaseous form is ionized, for example by bombardment with a beam of electrons. This means that some molecules of the sample can be broken down into positively charged fragments or positively charged without breaking down. These ions (fragments) are then separated according to their mass-charge ratio, for example by accelerating them and subjecting them to an electric or magnetic field: ions of the same mass-charge ratio are deflected by the same amount. . Ions are detected by a mechanism capable of detecting charged particles, such as an electron coefficient. The results are displayed as a spectrum of signal intensity of the ions identified as the function of the mass-to-charge ratio. The atoms or molecules in a sample can be identified by the known mass (e.g. the total atom) of the identified mass or by interconnected by a distinctive fragmentation pattern.

Mass spectrometry has both qualitative and quantitative uses. These include determining unknown compounds, determining the isotopic composition of the elements in the molecule, and determining the structure of the compound by observing its decomposition. Other uses include calculating the amount of compound in a sample or studying the basics of gas phase ion chemistry (chemistry of ions and neutrals in a vacuum). MS is now commonly used in analytical laboratories to study the physical, chemical, or biological properties of a wide variety of compounds.

As an analytical technique it has a variety of advantages: increased sensitivity over many other analytical methods because the analyzer, as a mass-charge filter, minimizes background interference, with excellent specificity, molecular weight information about characteristic fragmentation samples, molecular weight information, to detect unknowns or to confirm the presence of suspicious compounds Information, tentatively fixed chemical data.

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