
MASS SPECTROMETER

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October 27, 2015

1 PHYSICAL PRINCIPLES

In physics, mass spectrometer is an analytical instrument in which can measure the masses and relative concentrations of atoms and molecules. Which ions, produced from a sample, are separated by electric or magnetic fields according to their ratios of charge to mass. In physics, mass spectrometer is an analytical instrument in which can measure the masses and relative concentrations of atoms and molecules. Which ions, produced from a sample, are separated by electric or magnetic fields according to their ratios of charge to mass.

Mass spectrometry works by ionizing chemical compounds to generate charged molecules or molecule fragments and measuring their mass-to-charge ratios. In other words you do ionization, acceleration, and selection of a single velocity particles, the ions move into a mass spectrometer region where the radius of the path and thus the position on the detector is a function of the mass. The bigger mass the molecule has the faster it will fall down back to the spectrometer and on the opposite if the mass of the molecule is lighter it will make a bigger radius and come back slower.

If a charge moves into a magnetic field with direction perpendicular to the field, it will follow a circular path. The magnetic force, being perpendicular to the velocity, provides the centripetal force

1.1 CALCULATION

Radius of path produced by magnetic field:

$$r = \frac{mv^2}{qvB} = \frac{mv}{qB}$$

If the velocity v is produced by an accelerating voltage V

$$\frac{1}{2}mv^2 = qV$$

1.1.1 (WHY WE USE MASS SPECTROMETER)

Mass spectrometer is used for all kinds of chemical analyses ranging from environmental analysis to analysis of petroleum products, trace metal and biological materials. It also is being used for carbon dating and other radioactive dating processes. Mass spectrometer is used for all kinds of chemical analyses ranging from environmental analysis to analysis of petroleum products, trace metal and biological materials. It also is being used for carbon dating and other radioactive dating processes.

2 SOURCES

<http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/maspec.html>

<http://www.jeolusa.com/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=285Command=CoreDownload&2TabId=320>

https://en.wikipedia.org/wiki/Mass_spectrometry