

# MASS SPECTROMETRY

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27 October 2015

## 1 What is mass spectrometer?

Mass Spectrometer is originally an analytical tool from chemistry technique and apparently it is used to identify the amount or which type of chemicals present in a sample by measuring its masses. However, in term of Physics, it's a way or a tool to measure the masses and relative concentrations of atoms and molecules to create the use of magnetic force on a moving charged particle.

Perhaps for Mass Spectrometer, there are many processes that the mass needs to be sufficiently functioned. For instance, it has to go through ionization, accelerating voltage speed and lately reach toward velocity selector section. Specifically, it would go from the ionization, acceleration and lately selection of single velocity particles. The ions eventually move into a mass of spectrometer area where the radius of the path and its position on the detector.

### 1.1 How a mass spectrometer work?

If something is moving and you subject it to a sideways force, instead of moving in a straight line, it will move in a curve - deflected out of its original path by the sideways force.

Suppose you had a cannonball travelling past you and you wanted to deflect it as it went by you. All you've got is a jet of water from a hose-pipe that you can squirt at it. Frankly, its not going to make a lot of difference! Because the cannonball is so heavy, it will hardly be deflected at all from its original course.

But suppose instead, you tried to deflect a table tennis ball travelling at the same speed as the cannonball using the same jet of water. Because this ball is so light, you will get a huge deflection.

The amount of deflection you will get for a given sideways force depends on the mass of the ball. If you knew the speed of the ball and the size of the force, you could calculate the mass of the ball if you knew what sort of curved path it was deflected through. The less the deflection, the heavier the ball.

## 2 What is circular path from magnetic field?

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.

## 3 Velocity Selector role in Mass Spectrometer.

A velocity selector is used with mass spectrometers to select only charged particles with a specific velocity. Clearly, it makes use of a geometry where opposing electric and magnetic forces match for a specific particle speed. Through it, its undeflected only those particles with the selected velocity.

$$v = \frac{E}{B}$$

$$r = \frac{mv}{qb} = \frac{mE(s)}{qBB(s)}$$