

Mass spectrometry

Essays

Physics period 11

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1 Introduction

According to my research on the network and book, like Wikipedia, atomic physics(Chinese book) and the other website and IB physics book support.I know that the mass spectrometry is the Atomic measurement equipment which ionize the atomic and add the speed, then it have some the kinetic energy , the it will spin in the magnetic field, and use the formula to calculate the mass of ions.

2 Mass spectrometry's theory

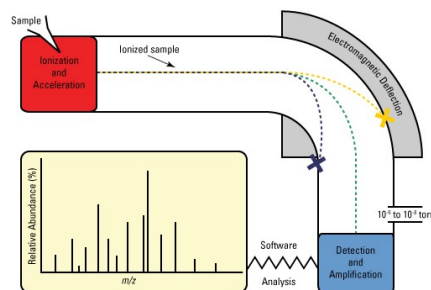


Figure 1: Mass spectrometry in begin

That is the Origin mass spectrometry, and it the mass spectrometry is the Atomic measurement equipment which ionize the atomic and add the speed,in this time it will sift the current which have the B to support it to go straight , then these current will be faster and faster in this system, then have enough

the kinetic energy to use for spectrometry, the it will spin in the magnetic field, because it loss the frame to hold them, it will do Curvilinear motion because Coulomb force,and it can drive in the curving tube and to show the spectrometry, because it already have the different in the tube, the have the different radian to move and have the different track, finally they will at the different place to stop. In this process, we can use the formula to calculate the mass of ions and other physics data and we can know that what's the atom is, and to describe or compare it.

3 Mass spectrometry's formula

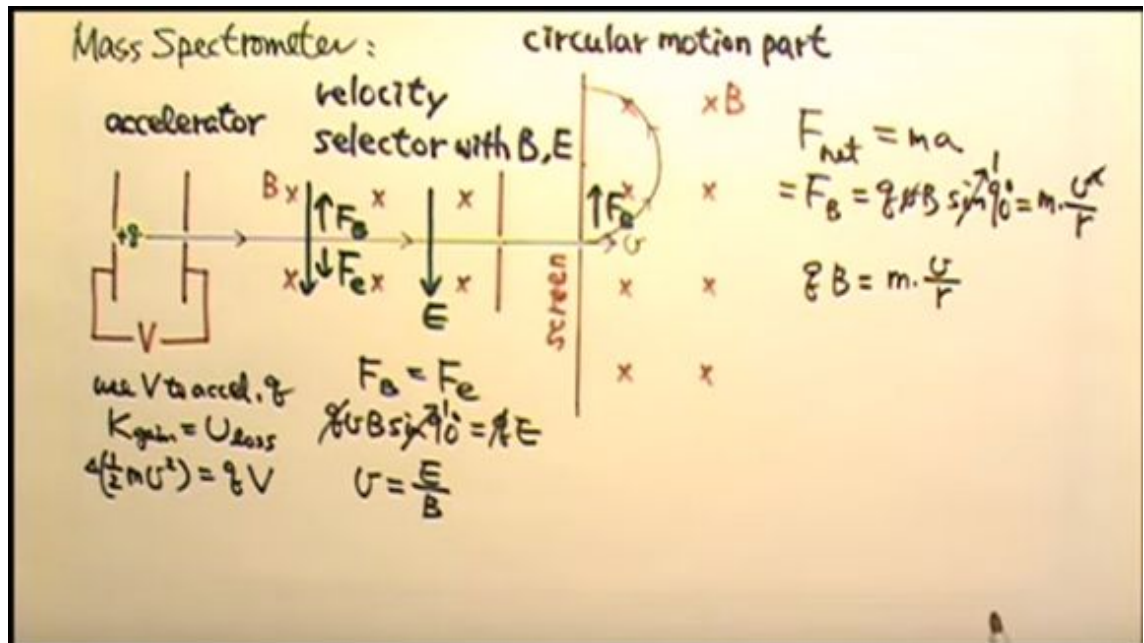


Figure 2: Mass spectrometry's formula research

Mass analyzers separate the ions according to their mass-to-charge ratio. The following two laws govern the dynamics of charged particles in electric and magnetic fields in vacuum:

$$\mathbf{F} = Q(\mathbf{E} + \mathbf{v} \times \mathbf{B})$$

Particle across the accelerating electric field:

$$\frac{1}{2} m v^2 = qV$$

Particle across the velocity-selector, because it's uniform motion, we know:

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

Because Newton second rule. We have function:

$$qB = m \frac{v}{r}$$

4 Mass spectrometry's application

Isotope ratio MS: isotope dating and tracing: specialization of mass spectrometry.

Trace gas analysis: variants of chemical ionization dedicated for trace gas analysis of air.

Atom probe: instrument to map the location of individual atoms.

Protein characterization: application of mass spectrometry to the study of proteins.

Space exploration: space missions to measure the composition of plasmas.