

Mass Spec

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1 Introduction

There are three parts: accelerator, velocity selector and the circular motion part. Apply a voltage to accelerate the charge. Then the charge enters a region with both a magnetic field and a uniform electric field. Only those charges with certain velocity can go straight through undeflected. The positive Q can go undeflected the magnetic force and the electric force are equal and opposite. Therefore, they cancel each other. The voltage goes to the right and the B Field goes inward, so that they are perpendicular to each other. The two forces have to be both equal in magnitude and opposite in direction. According to the right hand rule, the magnetic force goes up. Thus, the electric force goes down. Since the q is positively charged, it must go to the same direction as the Electric force. Thus, the electric field goes down. There are only one uniform magnetic field. There is no electric force to cancel magnetic force, which leads the positive q does a circular motion. According to the right hand rule, the magnetic force goes up. Thus the positive q will curve up exactly a half circle until hits the screen.(?)

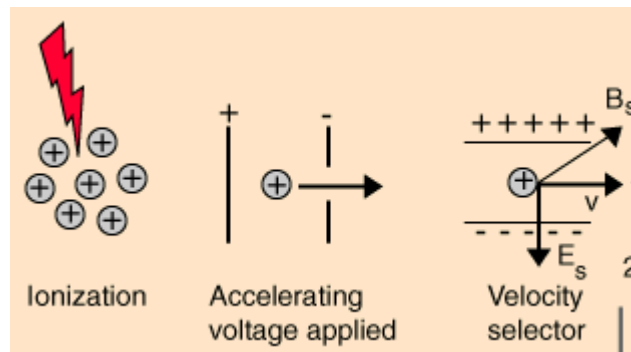


Figure 1: 1

2 FORMULA

$$Ek(gain) = Ep(loss)$$

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

$$F = qvb = \frac{mv^2}{r}$$

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

$$\frac{q}{V} = \frac{V}{rb}$$

3 References

<https://www.youtube.com/watch?v=55bGJ396EA8>

[http : //hyperphysics.phy - astr.gsu.edu/hbase/magnetic/maspec.html](http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/maspec.html)