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Mechanical engineering

Using the concept of Newton's second law of motion, describe the magnitude and direction of the acceleration of an electron being put horizontally into a closed space with a uniform field being directed upward.

Newton's second law of motion states that "the acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force and inversely proportional to the mass of the object". On entering the field, there is a vertical downward force acting on the electron. This is due to the fact that the force of the electron acts in a direction opposite to the electric field. The force magnitude is given by $F = Eq$, where E is the electric field strength and q is the electron charge. The magnitude of the acceleration can be gotten using Newton's second law as net force acts lengthwise. Therefore,

$F = ma$ where m = mass, f = force, a = acceleration

$$a = \frac{F}{m} = \frac{Eq}{m}$$

$$* \quad a = \frac{Eq}{m}$$

Acceleration moves in the same direction with the force hence from the 2nd law, force is directly proportional to acceleration.

2 Describe electric field and current with respect to charges

The electric field is the region around a charge where another charge can experience the electric force. If the test charge is positive, the electric field direction and force then would be the same and vice versa. The electric field is an example of vector quantities assigned with each point in space. This is called a vector field. Hence, if an electric field exists within a conductor, the field exerts a force on every charge in a conductor, causing the free charges to move. This explains the theory

Q/ electric current flow i.e it is the flow of electric charge.

$$\vec{E} = \frac{\vec{f}}{q}$$

$\vec{E}$ = electric field

$\vec{f}$ = force

q = charge on the electron.