Contents

List of arrangement of setup for motion of electron in a uniform electric field

- Horizontal parallel plates
- Potential difference
- Beam of electron

Expression for electric field intensity in motion of an electron in a uniform electric field

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

Expression for force on each electron in motion of an electron in uniform electric field

$$F = eE$$

Change in vertical component of velocity in motion of electron in uniform electric field

Changes

Change in horizontal component of velocity in motion of electron in uniform electric field

Does not change

Derivation of time period of the motion of electron in motion in uniform electric field

- $$x = vt + \frac{1}{2}0t^2$$
- $$x = vt$$
- $$t = \frac{x}{v}$$

Expression for time in motion of electron in uniform electric field

$$t = \frac{x}{v}$$

Derivation for expression of vertical distance in motion of electron in uniform electric field

- $$y = 0t + \frac{1}{2}a_y t^2$$
- $$y = \frac{1}{2}a_y t^2$$
- $$y = \frac{1}{2}\frac{F}{m}t^2$$
- $$y = \frac{1}{2}\frac{eE}{m}t^2$$
- $$y = \frac{1}{2}\frac{eV}{md}(\frac{x}{v})^2$$

Expression of vertical displacement in motion of electron in uniform electric field

$$y = \frac{1}{2}\frac{eV}{md}(\frac{x^2}{v^2})$$

Derivation for vertical velocity in in motion of electron in uniform electric field

- $$v = 0 + a_y t$$
- $$v = \frac{F}{m}t$$
- $$v = \frac{eE}{m}\frac{x}{v}$$

Expression for vertical velocity of electron in motion of electron in uniform electric field

$$v_y = \frac{eE}{m}\frac{x}{v}$$

Expression for resultant velocity of electron in motion of electron in uniform electric field

$$v' = \sqrt{v^2 + \frac{eE}{m}\frac{x}{v}^2}$$

Derivation of angular deflection in motion of electron in uniform electric field

- $$\tan\theta = \frac{v_y}{v_x}$$
- $$\theta = \tan^{-1}\frac{v_y}{v_x}$$
- $$\theta = \tan^{-1}\frac{eEx}{mv^2}$$

Expression for angular deflection in motion of electron in uniform electric field

$$\theta = \tan^{-1}\frac{eEx}{mv^2}$$

Derivation for total kinetic energy in motion of electron in uniform electric field

- $$E_f = \frac{1}{2}m(v^2 + \frac{eEx}{mv})^2$$
- $$E_f = \frac{1}{2}m(\frac{v^4 + (eEx)^2}{m^2v^2})$$
- $$E_f = \frac{1}{2}m(\frac{v^4 + (eEx)^2}{m^2v^2})$$
- $$E_f = \frac{1}{2}\frac{v^4 + (eEx)^2}{mv^2}$$

Expression for total kinetic energy in motion of electron in uniform electric field

$$E_f = \frac{1}{2}\frac{v^4 + (eEx)^2}{mv^2}$$

Relation of kinetic energy gained by a charged particle with respect to mass

Inversely proportional