Electric Fields 3

① $\Sigma F = F_e$

$ma = qE$

$a = \frac{qE}{m} = \frac{(-1.6 \times 10^{-19})(1 \times 10^5)}{9.1 \times 10^{-31}}$

$a = -1.76 \times 10^{16} \text{ m/s}^2$

or

$1.76 \times 10^{16} \text{ m/s}^2$ [Left]

② $a = \frac{qE}{m} = \frac{(-1.6 \times 10^{-19})(3500)}{9.1 \times 10^{-31}}$

$a = -6.15 \times 10^{14} \text{ m/s}^2$

③ $ma = qE$

$E = \frac{ma}{q} = \frac{(1.67 \times 10^{-27})(9.8 \times 10^4)}{(1.6 \times 10^{-19})}$

$E = 0.00102 \text{ N/C}$

or

$1.02 \times 10^{-3} \text{ N/C}$

④ $v_f = v_i + at$

$3 \times 10^6 = 0 + a(1 \times 10^{-6})$

$$a = \frac{3 \times 10^6}{1 \times 10^{-6}} = 3 \times 10^{12} \text{ m/s}^2$$

$$E = \frac{ma}{q} = \frac{(1.67 \times 10^{-27})(3 \times 10^{12})}{1.6 \times 10^{-19}}$$

$$E = 31\,312.5 \text{ N/C}$$

or

$$\boxed{3.13 \times 10^4 \text{ N/C}}$$

⑤ $$E = \frac{ma}{q} = \frac{(2 \times 10^{-3})(3.5 \times 10^3)}{(-25 \times 10^{-6})}$$

$$E = -280\,000 \text{ N/C}$$

or

$$\boxed{2.8 \times 10^5 \text{ N/C [Left]}}$$

⑥ $\Sigma F = F_e$

$ma = qE$

$a = \frac{qE}{m}$

$= \frac{(12\times10^{-6})(480)}{3.8\times10^{-5}}$

$a = 151.579 \text{ m/s}^2$

$d = v_i t + \frac{1}{2}at^2$

$0.02 = \frac{1}{2}(151.579)t^2$

$t = 0.0162\text{s}$ or $\boxed{1.62\times10^{-2}\text{ s}}$

⑦ $a = \frac{qE}{m}$

$= \frac{(-1.6\times10^{-19})(8.4\times10^{3})}{9.1\times10^{-31}}$

$a = -1.477\times10^{15} \text{ m/s}^2$

$v_f^2 = v_i^2 + 2ad$

$0 = (2.4\times10^{6})^2 + 2(-1.477\times10^{15})d$

$0 = 5.76\times10^{12} - 2.954\times10^{15}\,d$

$d = \frac{5.76\times10^{12}}{2.954\times10^{15}}$

$d = 0.00195 \text{ m}$

or

$\boxed{1.95\times10^{-3}\text{ m}}$