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FACULTAD DE INGENIERÍA
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DEPARTAMENTO DE FÍSICA
FISICA 2
INGA. CLAUDIA CONTRERAS

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Capítulo 21. Carga eléctrica y Campo ~~Eléctrico~~

1/21.4

$m = 10.8\ g$

$m_{AU} = 197\ g/mol$

$N = 79$

a) # Protones

$$10.8\ g \times \frac{1\ mol}{197\ g} \times \frac{6.022 \times 10^{23}\ atm}{1\ mol} \times \frac{79\ p^+}{1\ atm} =$$

Protones $= 2.61 \times 10^{24}\ p^+$

$\#p^+ = 2.61 \times 10^{24}\ p^+$

b) $Q_{neta} = 0 \Rightarrow Q = e^- + p^+$

$0 = e^- + p^+$

$-e^- = p^+$

$\#e^- = 2.61 \times 10^{24}\ e^-$

Carga Positiva $= (\#p^+)(q_{p^+})$

$Q^+ = 4.18 \times 10^5\ C$

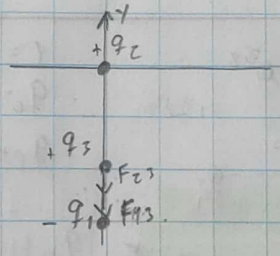
Carga Positiva $= (2.61 \times 10^{24})(1.6022 \times 10^{-19}) = 4.18 \times 10^5\ C$

2/21.19

$q_1 = -1.50\ nC$ $\quad y = -0.6\ m$

$q_2 = +3.20\ nC$ $\quad y = 0\ m$

$q_3 = +5.00\ nC$ $\quad y = -0.4\ m$



$\vec{F}_R = \vec{F}_{13} + \vec{F}_{23}$

$$F_{13_y} = \frac{k|q_1||q_3|}{r_{13}^2}$$

$$F_{13_y} = \frac{k(1.50n)(5n)}{(0.2)^2} = 1.69 \times 10^{-6}\ N\ (-\hat{j})$$

$$F_{23_y} = \frac{k(3.20n)(5n)}{(0.4)^2} = 8.97 \times 10^{-7}\ N\ (-\hat{j})$$

$F_{ex} = 0$ y $F_{ey} = (1.69 \times 10^{-6} + 8.97 \times 10^{-7}) = 2.59 \times 10^{-6}\ (-\hat{j})$

$|F_R| = 2.59 \times 10^{-6}\ N.$

Dirección $= (-\hat{j})$.

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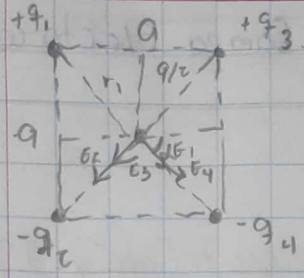

$r_1 = r_2 = r_3 = r_4 = r$

$r = \sqrt{(q/2)^2 + (q/2)^2} = q\sqrt{2}$

$\text{Sen}\,\alpha = \text{Sen}\,45 = \sqrt{2}/2$

Por Simetria $\vec{E}_x = 0$

$\vec{E} = \dfrac{K q}{r^2}$

$\vec{E}_0 = \vec{E}_1 + \vec{E}_2 + \vec{E}_3 + \vec{E}_4$

$\vec{E}_0 = \vec{E}_{1y} + \vec{E}_{2y} + \vec{E}_{3y} + \vec{E}_{4y}$

$\vec{E}_0 = 4\vec{E}_{1y}$

$\vec{E}_{1y} = \dfrac{K q}{r^2}\,\text{Sen}\,45 = \dfrac{K q}{q^2/2}(\sqrt{2}/2)(-\hat{j})$

$\vec{E}_{1y} = \dfrac{K q \sqrt{2}}{q^2}(-\hat{j}) \Rightarrow \vec{E}_0 = 4\dfrac{K q \sqrt{2}}{q^2}(-\hat{j})$

$$|\vec{E}_0| = \frac{4 K q \sqrt{2}}{q^2}(-\hat{j})$$

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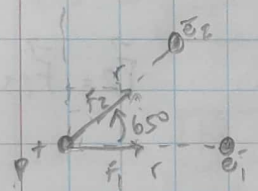

$r = 1.5 \times 10^{-10}\ m$

$q_{e^-} = -1.60 \times 10^{-19}\ C$

$q_{p^+} = 1.60 \times 10^{-19}\ C$

$F = \dfrac{|q_{e^-}|\,|q_{p^+}|}{r^2}$

$F = \dfrac{|q e^-|\,K}{r^2} = \dfrac{K(1.60\times10^{-19})^2}{(1.5\times10^{-10})^2} = 1.024 \times 10^{-8}\ N$

$F_{1y} = 0$

$F_{1x} = F\cos 0^\circ = F = 1.024 \times 10^{-8}\ N$

$F_{2y} = F_2 \text{Sen}\,65 = (1.024\times10^{-8})\,\text{Sen}\,65 = 9.28 \times 10^{-9}\ N$

$F_{2x} = F_2 \cos 65 = (1.024\times10^{-8})\cos 65 = 4.33 \times 10^{-9}\ N$

$F_y = 9.28 \times 10^{-9}\ N$

$F_x = 1.024\times10^{-8} + 4.33\times10^{-9}$

$F_x = 1.46 \times 10^{-8}\ N$

$F = \sqrt{F_x^2 + F_y^2} = \sqrt{(1.46\times10^{-8})^2 + (9.28\times10^{-9})^2} = 1.73 \times 10^{-8}\ N$

$\theta = \tan^{-1}\left(\dfrac{9.28\times10^{-9}}{1.46\times10^{-8}}\right) = 32.44^\circ$

$F = 1.73 \times 10^{-8}\ N$

$\theta = 32.4^\circ$ ↗

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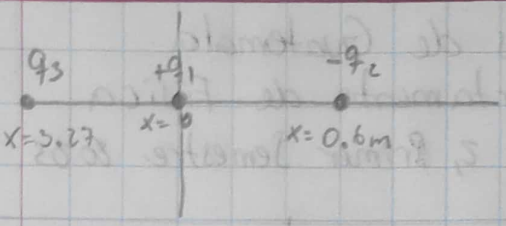

$q_1 = 2.50\ \mu C$ $\quad F =$

$q_2 = +3.50\ \mu C$

$r_{23} = r_{13} + 0.6$

$r_{23} = 3.27 + 0.6$

$r_{23} = 3.87\ m$

$F = F_{13} + F_{23}$

$0 = F_{13} + F_{23}$

$|F_{13}| = |F_{23}|$

$$\frac{k|q_1||q_3|}{r_{13}^2} = \frac{k|q_2||q_3|}{r_{23}^2}$$

$$\frac{|q_1|}{r_{13}^2} = \frac{q_2}{r_{23}^2}$$

$$\frac{|q_1|}{|q_2|}(r_{23})^2 = r_{13}^2$$

$$\sqrt{\frac{|q_1|}{|q_2|}}(r_{13}+0.6) = r_{13}$$

$$r_{13} = \sqrt{\frac{q_1}{q_2}}(r_{13}) + \sqrt{\frac{|q_1|}{|q_2|}}(0.6)$$

$$r_{13} - \sqrt{\frac{|q_1|}{|q_2|}}(r_{13}) = (0.845)(0.6)$$

$$r_{13}(1 - 0.845) = (0.845)(0.6)$$

$$r_{13} = \frac{(0.845)(0.6)}{1-0.845}$$

$r_{13} = 3.27\ m$

$x_{13} = -3.27\ m$

$x_{23} = 3.87\ m.$

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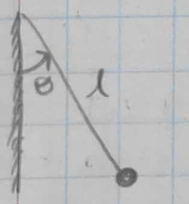
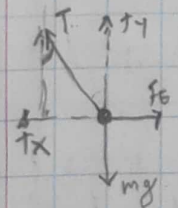


$\theta = 17.4°$

$m = 12.3\ g$

$l = 28.6\ cm$

$q = -1.11\ \mu C$



$\Sigma F_y = 0$

$T_y - mg = 0$

$T_y = mg$

$T\cos\theta = mg$

$T = \frac{mg}{\cos\theta}$

$\Sigma F_x = 0$

$F_E - T_x = 0$

$F_E = T_x$

$F_E = T\sin\theta$

$T = T$

$F_E = \frac{mg}{\cos\theta}(\sin\theta)$

$F_E = mg\tan\theta$

$F_E = (12.3\times10^{-3})(9.8)\tan(17.4)$

$F_E = 0.0378\ N$

$F_E = |q|E$

$\frac{F_E}{|q|} = E$

$E = \frac{0.0378}{1.11\ \mu C} = 3.4\times10^4\ N/C$

$E = 3.4\times10^4\ N/C\ (-\hat{i})$