

Nama : Laila Merenda

NPM : 2013022026

Prodi : Pendidikan Fisika (B)

2. Pemecahan kasus Muatan Listrik

- 1) Seorang remaja putri menggunakan cincin yang terbuat dari Perak ($^{107.9}_{47}\text{Ag}$) dan dilapisi emas ($^{197}_{79}\text{Au}$) 0,8 gram. Massa cincin tersebut 5 gram. Berapa jumlah elektron dalam cincin remaja putri tersebut.

Pengelakan

$$N = 4,29 \cdot \frac{6,02 \cdot 10^{23} \text{ atom/mol}}{107,9 \text{ g/mol}} + 0,8 \text{ g} \cdot \frac{6,02 \cdot 10^{23} \text{ atom/mol}}{197 \text{ g/mol}}$$

$$N = 2,34 \cdot 10^{22} \text{ atom} + 0,24 \cdot 10^{22} \text{ atom}$$

$$N = 2,58 \cdot 10^{22} \text{ atom}$$

Atom Ag mempunyai 47 elektron atom Au mempunyai 79 elektron

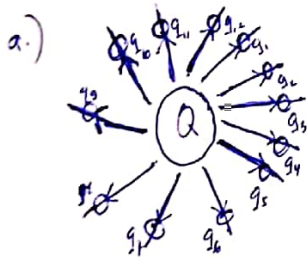
Maka jumlah kedua atom tersebut adalah $47 + 79 = 126$ elektron

Jumlah Medan total Q yaitu : $Q = (2,58 \times 10^{22} \text{ atom}) (126 \text{ elektron/atom}) (1,60 \times 10^{-19} \text{ C (elektron)})$
 $Q = 5,2 \times 10^5 \text{ C}$

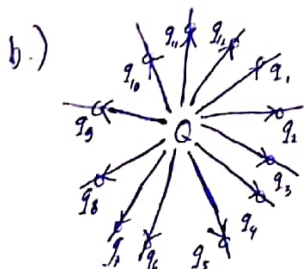
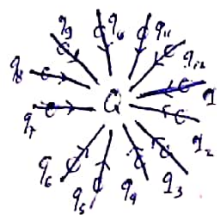
Jadi, Untuk massa cincin 5 gram mempunyai muatan $5,2 \times 10^5 \text{ C}$

hal ini berarti dalam massa cincin 5 gram terdapat $\frac{5,2 \times 10^5}{1,6 \times 10^{-19}} = 3,25 \times 10^{34}$ elektron

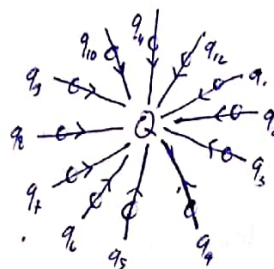
2. Gambar gaya listrik



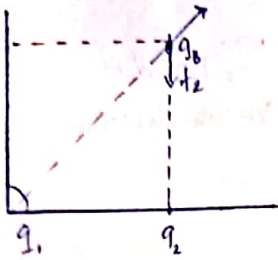
c.)



d.)



e) $q_1 = 25 \text{ Mc} \rightarrow (0,0)$
 $q_2 = -10 \text{ Mc} \rightarrow (4,0)$
 $q_0 = 10 \text{ Mc} \rightarrow (4,3)$



$$\vec{f} = q_0 k \left\{ \frac{q_1}{r_1^2} \vec{r}_1 + \frac{q_2}{r_2^2} \vec{r}_2 \right\}$$

$$\vec{f} = 10 \cdot 9 \times 10^{10} \left(\frac{25}{25} \left(\frac{4\vec{i} + 3\vec{j}}{5} \right) + \frac{10}{16} (\vec{i}) \right)$$

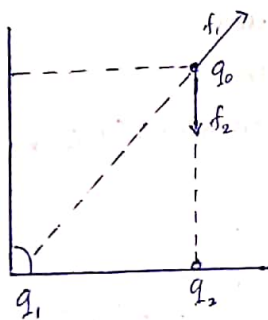
$$\vec{f} = 10 \cdot 9 \times 10^{10} \left(\frac{100}{125} + \frac{10}{16} (\vec{i}) + \frac{75}{125} \vec{j} \right)$$

$$\vec{f} = 9 \times 10^{11} (1.42\vec{i} + 0.6\vec{j})$$

$$f = 9 \times 10^{11} \sqrt{(1.42)^2 + (0.6)^2}$$

==

f.) $q_1 = 25 \text{ Mc} \rightarrow (0,0)$
 $q_2 = -15 \text{ Mc} \rightarrow (4,0)$
 $q_0 = 20 \text{ Mc} \rightarrow (4,3)$



$$\vec{f} \cdot q_0 k = \left(\frac{q_1}{r_1^2} \vec{r}_1 + \frac{q_2}{r_2^2} \vec{r}_2 \right)$$

$$= 20 \cdot 9 \times 10^9 \left(\frac{25}{25} \left(\frac{4\vec{i} + 3\vec{j}}{5} \right) + \frac{10}{16} (\vec{i}) \right)$$

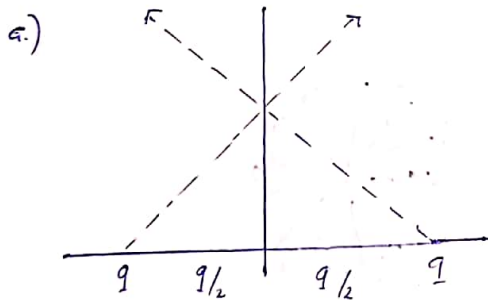
$$= 20 \cdot 9 \times 10^9 \left(\frac{100}{125} + \frac{10}{16} (\vec{i}) + \frac{75}{125} \vec{j} \right)$$

$$= (-18 \times 10^{10}) (1.42\vec{i} + 0.6\vec{j})$$

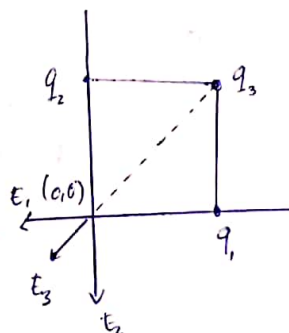
$$\vec{f} = 18 \times 10^{10} [(1.42)^2 + (0.6)^2]^{1/2}$$

==

g) Gambar kasus Medan Listrik



b.) $q_1 (4,0) = 2c$
 $q_2 (0,3) = 5c$
 $q_3 (4,3) = 10c$
 Medan listrik pada titik $(0,0)$



↓

$$\Rightarrow \text{Medan oleh } q_1 \vec{E}_1 = \frac{1}{4\pi\epsilon_0} \frac{2}{16} (\vec{j})$$

$$\text{Medan oleh } q_2 \vec{E}_2 = \frac{1}{4\pi\epsilon_0} \frac{2}{9} (\vec{i})$$

$$\begin{aligned} q_3 \vec{E}_3 &= \frac{1}{4\pi\epsilon_0} \frac{10}{25} \left(\frac{4}{5} \vec{i} + \frac{3}{5} \vec{j} \right) \\ &= \frac{1}{4\pi\epsilon_0} \left(\frac{40}{125} \vec{i} + \frac{30}{125} \vec{j} \right) \end{aligned}$$

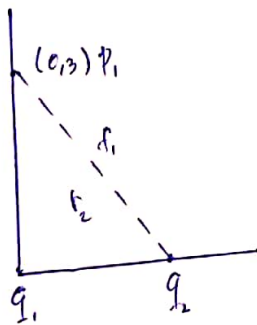
$$\begin{aligned} \text{Medan total } \vec{E} &= \frac{1}{4\pi\epsilon_0} \left[\left(\frac{5}{9} + \frac{40}{125} \right) (\vec{i}) + \left(\frac{2}{9} + \frac{30}{125} \right) (\vec{j}) \right] \\ &= \frac{1}{4\pi\epsilon_0} \sqrt{(0,44)^2 + (0,8)^2} \\ &= 8,35 \times 10^2 \text{ N/C} \end{aligned}$$

2. Kasus Potensial Listrik

$$2.) q_1 (0,0) = -5 \mu\text{C}$$

$$q_2 (4,0) = 10 \mu\text{C}$$

Hitung Medan listrik titik (0,3)



$$\begin{aligned} \Rightarrow V &= \frac{kq_1}{r_1} + \frac{kq_2}{r_2} \\ &= 9 \cdot 10^9 \left(\frac{5}{3} + \frac{10}{4} \right) \\ &= 3,75 \times 10^7 \frac{\text{dynecm}}{\mu\text{C}} \end{aligned}$$

$$3.) q_1 (0,0) = 25 \mu\text{C}$$

$$q_2 (4,0) = -15 \mu\text{C}$$

$$q_0 (4,3) = 20 \mu\text{C}$$

Carilah pada titik (0,3)

