

مختصری از تئوری آزمایش:  $V$  ( )

$Q = CV$

:  $R$   $C$

$C = 4\pi\epsilon_0 R$

$\epsilon_0 = 8.85 \times 10^{-12} \text{ A} \cdot \text{sec} / \text{V} \cdot \text{m}$

$V$  (Q)

شرح آزمایش:

$C = \frac{Q}{V}$  مرحله اول:

1kv

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(

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(10nF)

(

/ /

V(kV)	Q (nA.sec)		
	2R=2.5 cm	2R=3 cm	2R=3.5 cm
1.0	1.0	1.5	2.0
2.0	2.0	2.5	3.0
3.0	3.0	4.0	4.5
4.0	3.5	5.5	6.0
5.0	4.5	6.5	7.0

V Q

$Q = CV$

محاسبات:

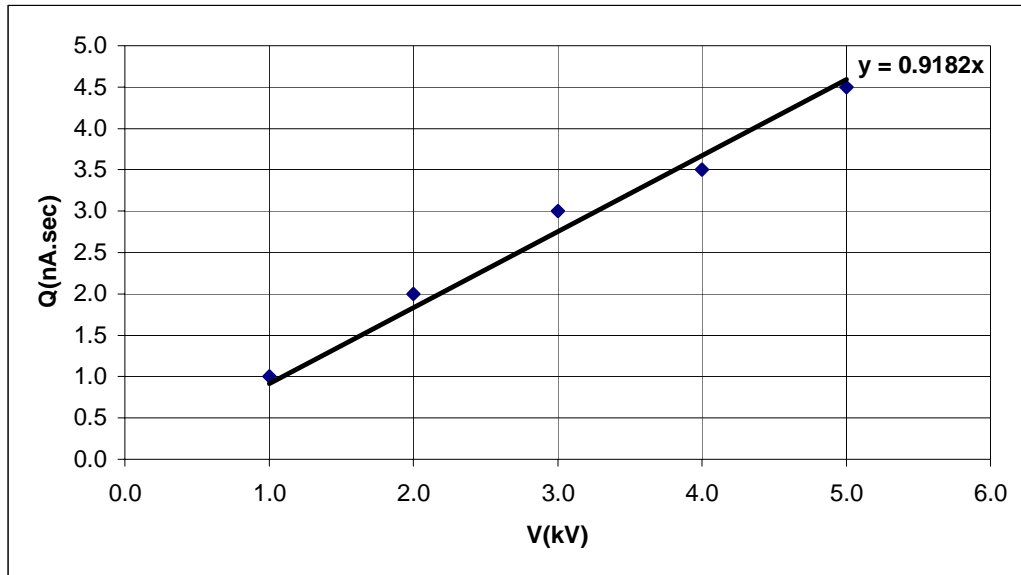
$2R = 2.5cm$

$C = \frac{[xy]}{[xx]}$

$[xx] = 55(kv^2)$

$[xy] = 50.5(nA \cdot sec \times kv)$

$\Rightarrow C = \frac{50.5(nA \cdot sec)}{55(kv)} = 0.91818pF$



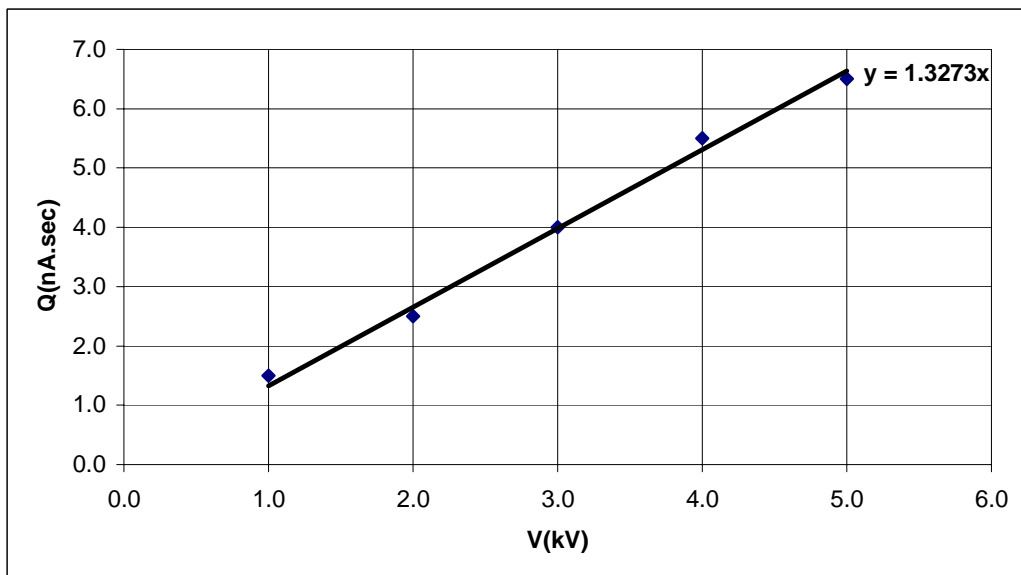
$$2R = 3cm$$

$$C = \frac{[xy]}{[xx]}$$

$$[xx] = 55(kV^2)$$

$$[xy] = 73(nA \cdot sec \times kV)$$

$$\Rightarrow C = \frac{73(nA \cdot sec)}{55(kV)} = 1.327 pF$$



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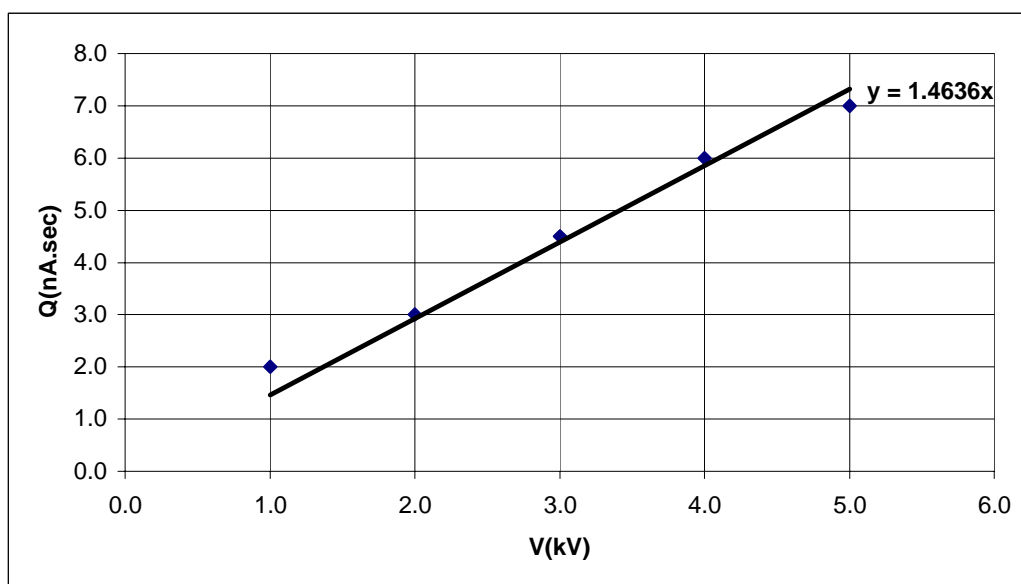
$$2R = 3.5cm$$

$$C = \frac{[xy]}{[xx]}$$

$$[xx] = 55(kv^2)$$

$$[xy] = 80.5(nA \cdot sec \times kv)$$

$$\Rightarrow C = \frac{80.5(nA \cdot sec)}{55(kv)} = 1.464 pF$$

:  $\epsilon_0$ 

$R(cm)$	$C(pF)$
1.25	0.918
1.50	1.327
1.75	1.464

$$: \epsilon_0 = \frac{1}{4\pi} a$$

$$a \quad V \quad C$$

$$.C = 4\pi\epsilon_0 R$$

$$a = \frac{[xy]}{[xx]}$$

$$[xx] = 6.875(cm^2)$$

$$[xy] = 5.7(pF \times cm)$$

$$\Rightarrow a = \frac{5.7(pF \times cm)}{6.875(cm^2)} = 8.291 \times 10^{-11} \frac{F}{m}$$

$$\Rightarrow \epsilon_0 = 6.598 \times 10^{-12} \frac{F}{m}$$

مرحله دوم:

50cm × 50cm

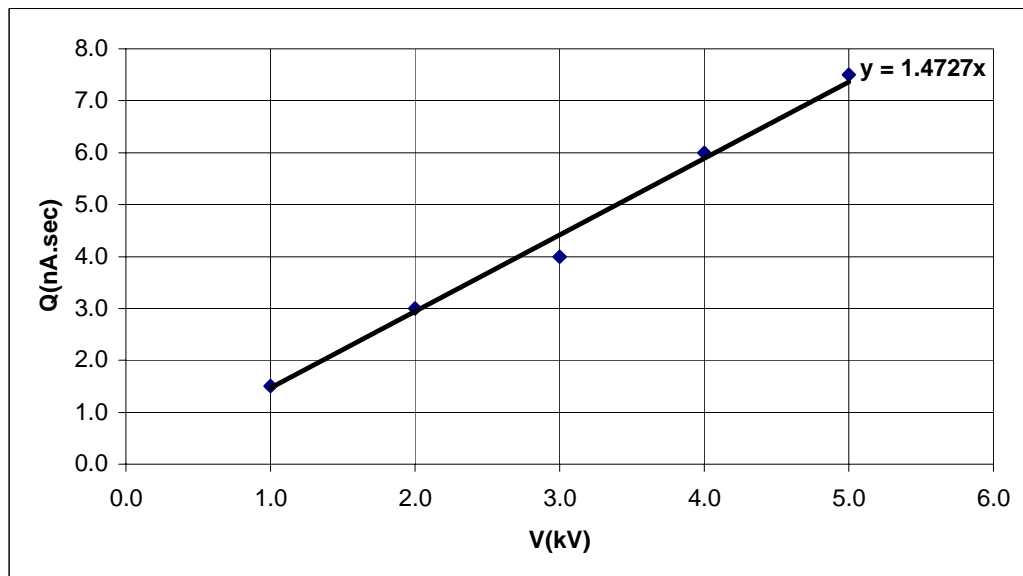
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V(kV)	Q(nA.sec)
1.0	1.5
2.0	3.0
3.0	4.0
4.0	6.0
5.0	7.5

$$C = \frac{[xy]}{[xx]}$$

$$\left. \begin{array}{l} [xx] = 55(kv^2) \\ [xy] = 81(nA \cdot sec \times kv) \end{array} \right\} \Rightarrow C = \frac{81(nA \cdot sec)}{55(kv)} = 1.473pF$$



d(cm)	Q(nA.sec)
1.0	9.0
3.0	8.0
5.0	7.0
7.0	6.5
9.0	6.5
11.0	6.0
13.0	5.8
15.0	5.5
17.0	5.5
19.0	5.5

d(cm)	C(pF)
1.0	1.80
3.0	1.60
5.0	1.40
7.0	1.30
9.0	1.30
11.0	1.20
13.0	1.15
15.0	1.10
17.0	1.10
19.0	1.10

$C$  :  $d$ 