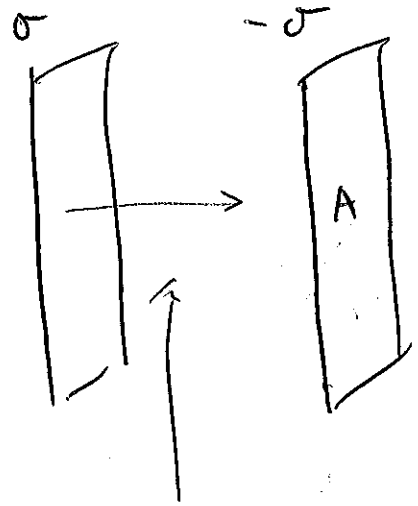
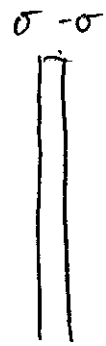
LECTURE AFTER THE EXAM

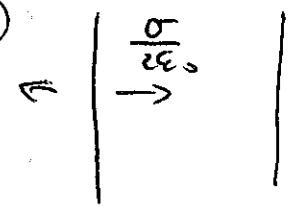


$Q = \sigma A$

INSIDE $E = \frac{\sigma}{\varepsilon_0}$

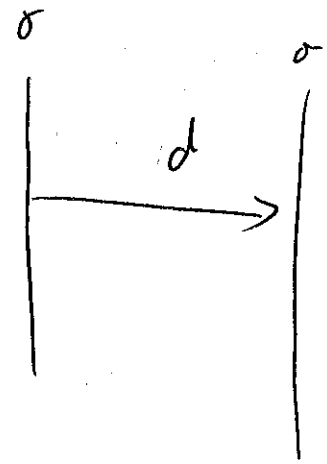


F = ON PLATE



$F = Q E_{PLATE}$

$= Q \frac{\sigma}{2\varepsilon_0}$



$Q = \sigma A$

$F = \frac{\sigma^2 A}{2\varepsilon_0}$

$C = \frac{\varepsilon_0 A}{d}$

$Q = \sigma A$

$F = \frac{\sigma^2 A}{2\varepsilon_0} = \frac{Q^2}{2\varepsilon_0 A}$

WORK DONE TO SEPARATE THE PLATES

$W = F \cdot d$

$= \frac{\sigma^2 A}{2\varepsilon_0} d$

$C = \frac{\varepsilon_0 A}{d} \qquad Q = \sigma A$

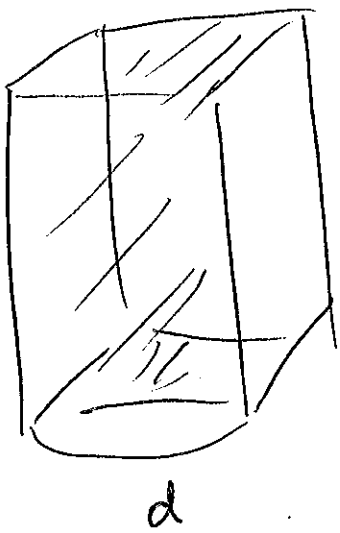
$W = \frac{Q^2}{2\varepsilon_0 A} d = \boxed{\frac{1}{2}\frac{Q^2}{C}}$

ENERGY STORED IN CAPACITOR

$Q = CV$

$= \frac{1}{2} C V^2$

$$\left(E = \frac{\sigma}{\epsilon_0} = \frac{Q}{A\epsilon_0} \right)$$



VOLUME = Ad

ELECTR.

ENERGY / VOLUME

$$u_E = \frac{1}{2}\frac{Q^2}{CAd} = \frac{1}{2}\frac{Q^2}{CAd}$$

$$E = \frac{Q}{A\epsilon_0} \Rightarrow Q = A\epsilon_0 E$$

$$= \frac{1}{2}\frac{A^2\epsilon_0^2 E^2}{C A d}$$

$$\left(C = \frac{\epsilon_0 A}{d} \right) = \frac{1}{2}\frac{\epsilon_0^2 E^2}{Cd}$$

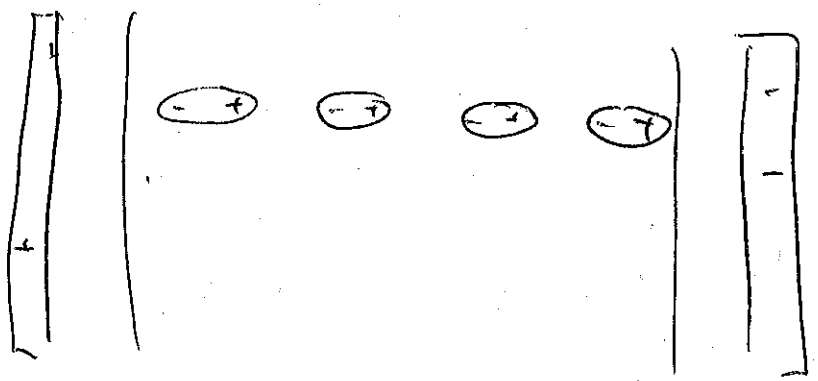
$$= \frac{1}{2}\frac{d\epsilon_0^2 E^2}{\epsilon_0 A d}$$

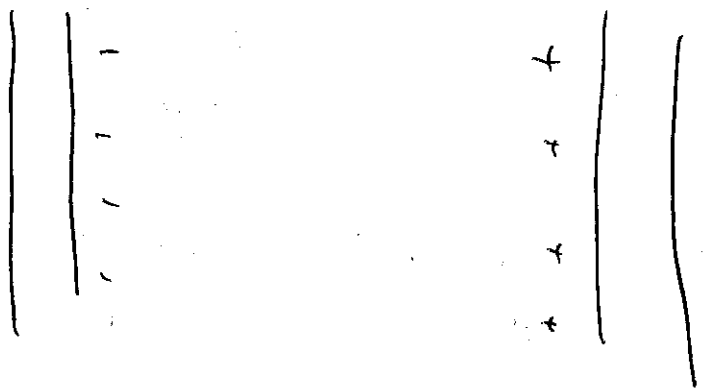
$$\boxed{u_E = \frac{1}{2}\epsilon_0 E^2}$$

DIELECTRICS

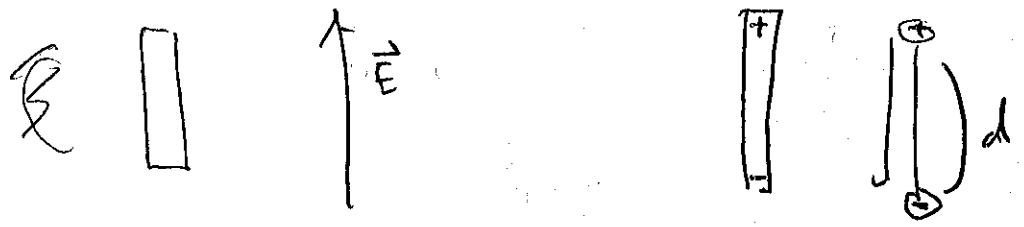
NON CONDUCTING MATERIAL

RUBBER, GLASS, WAXED PAPER.





$\vec{P}$ =



$q\vec{d}$: DIPOLE MOMENT

$\vec{P}$: DIPOLE MOMENT / VOLUME

LINEAR DIELECTRICS

$$\vec{P} = \varepsilon_0 \chi_e \vec{E}$$

χ_e ELECTRIC SUSCEPTIBILITY

AIR

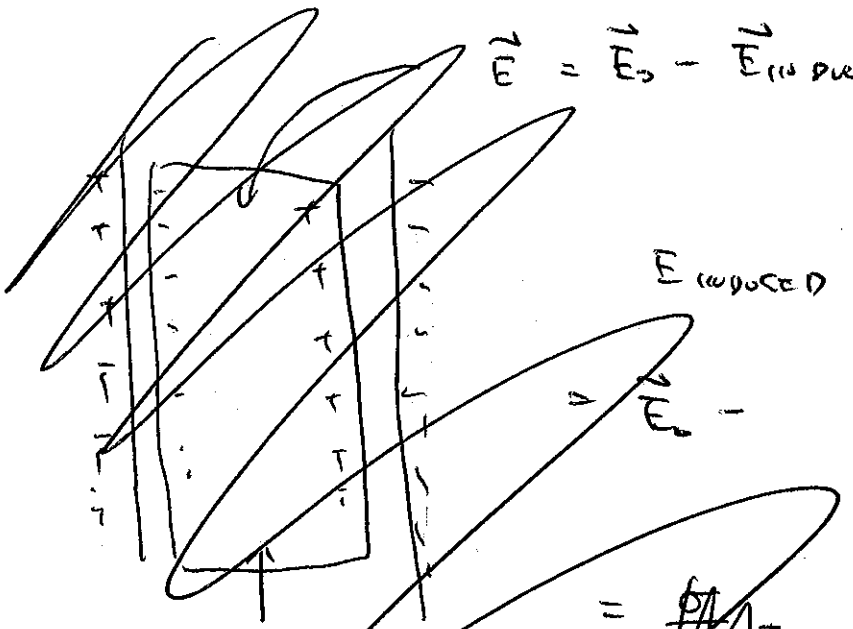
$$\vec{D} = \varepsilon_0 \vec{E} + \varepsilon_0 \chi_e \vec{E}$$ DISPLACEMENT

$$\vec{D} = \varepsilon_0 (1+\chi_e) \vec{E}$$

$$\varepsilon = \varepsilon_0 (1+\chi_e)$$

$$k = 1 + \chi_e = \frac{\varepsilon}{\varepsilon_0}$$

ε DIELECTRIC CONSTANT



$\vec{E} = \vec{E}_0 - \vec{E}_{\text{INDUCED}}$

E_{INDUCED}

$= \vec{E}_0 -$

$=$

$\vec{P} = \varepsilon_0 \chi_e \vec{E}$

$\vec{E}_{\text{INDUCED}} =$

$\varepsilon =$ 1 VACUUM

AIR 1.055

WATER 80.4

HCN 158 (0°C)

SiO_2 2.9