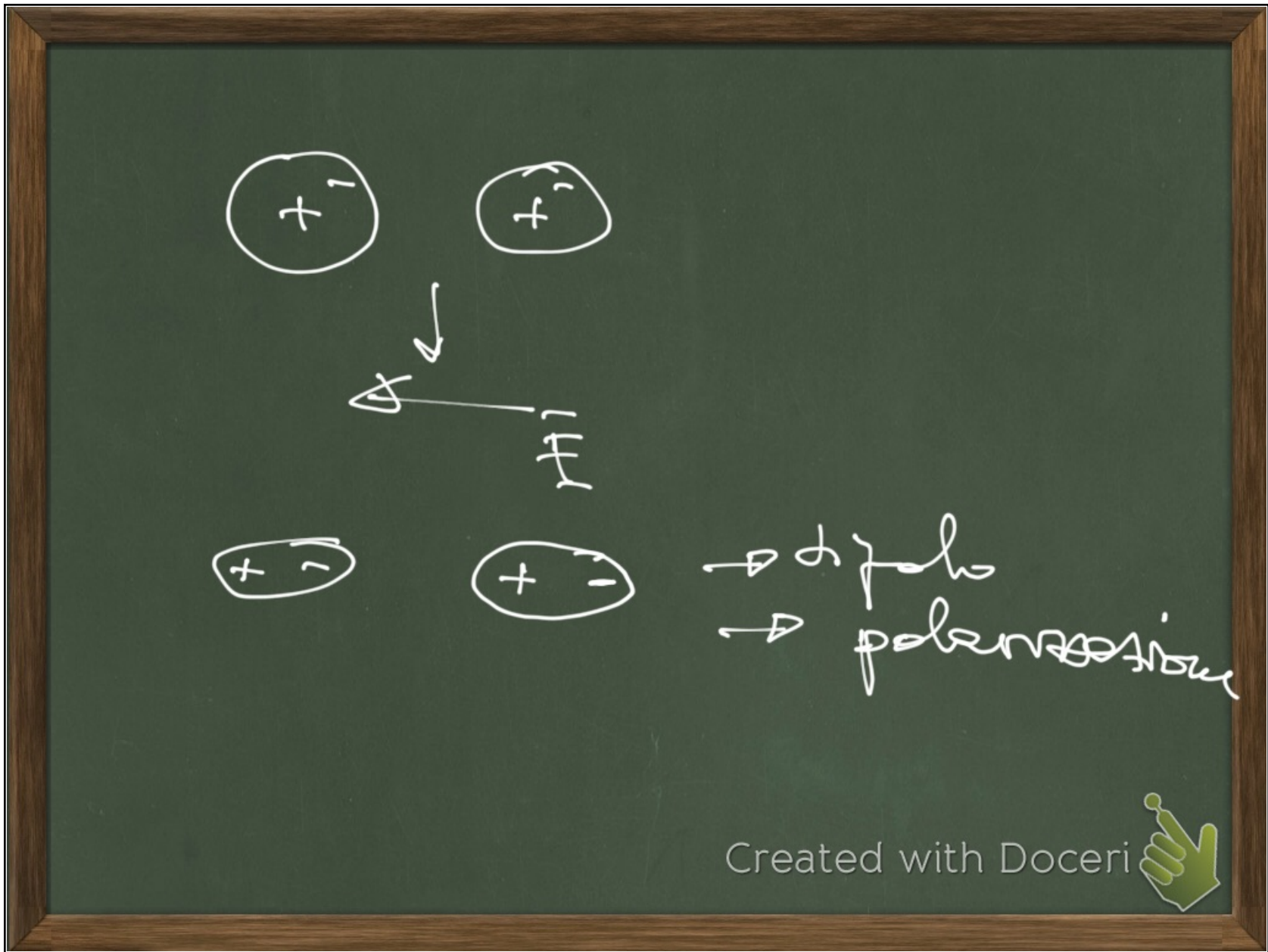


CONDENSATORI

conduttori (metalli)
isolanti
no cariche libere
carica mobile
fatto c.e.l.

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The diagram illustrates a sequence of three states, each enclosed in a vertical bracket. The first state has four '+' signs. The second state has two '+' signs and two '-' signs. The third state has one '+' sign and three '-' signs. Arrows indicate a progression from the first to the second state, and from the second to the third state. Above the second state, there is a crossed-out arrow pointing left and a crossed-out arrow pointing right, with the letter 'E' written below them. In the center, the text $E = \emptyset$ is written. To the right of the states, the text reads: "interms cond. ∴ E=0" and "Q. soln in super.". A green hand icon is at the bottom right.

$$V = \frac{Q}{4\pi\epsilon_0 R_{\text{eff}}}$$

$$\oint \vec{D} \cdot d\vec{A} = Q$$

$$\oint \frac{Q}{r} dA = V$$

$$C_{\text{sphere}} = 4\pi\epsilon_0 R$$

$$C_{\text{plate}} = \frac{\epsilon_0 A}{d}$$

$\frac{Q}{V} = C$ capacitor

Diagrams: A sphere with positive charges (+) on the left and negative charges (-) on the right, with arrows indicating the electric field. A parallel plate capacitor with a positive plate (+) and a negative plate (-).

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The image shows a hand-drawn diagram of a circuit on a chalkboard. The circuit consists of a battery at the top with two cells, a capacitor in the middle, and a voltmeter labeled 'V' at the bottom. The voltmeter is connected in parallel with the capacitor. To the right of the circuit, the energy stored in a capacitor is given by three equivalent formulas: $W = \frac{CV^2}{2} = \frac{QV}{2} = \frac{Q^2}{2C}$. Below these formulas, the energy density $u = \frac{\epsilon_0 E^2}{2}$ is written and circled. In the bottom right corner, there is a watermark that says 'Created with Doceri' next to a green hand icon.

The chalkboard contains three diagrams illustrating the properties of a dielectric in a capacitor:


- Top Diagram:** A parallel plate capacitor with a dielectric (red hatched area) between two plates. The left plate is marked with '+' signs, and the right plate is marked with '-' signs. A double-headed arrow below the dielectric indicates its thickness h .
- Middle Diagram:** A graph showing the electric field E (red line) and potential V (white line) across the capacitor. The electric field is zero in the metal plates and constant in the dielectric. The potential is zero in the metal plates and increases linearly in the dielectric. Dashed lines indicate the boundaries of the dielectric.
- Bottom Diagram:** A microscopic view of a dielectric material, showing a yellow hatched area between two plates, with an arrow pointing from the text 'polarisierbar' to it.

Handwritten equations and text on the right side of the board:

$$E_0 = \frac{V_0}{\epsilon_0} \quad V_0 = \frac{q_0}{C_0} = E_0 h$$

$$V = E_0 (h - s)$$

metallo: stromlos
 → dielektrikum!
 isolant
 polarisierbar

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C. con dielettrica' co: $V_x = \frac{V_0}{\kappa}$


$\kappa = \frac{V_0}{V_x} \geq 1$ $V_{\kappa} = E_{\kappa} h$

$E_{\kappa} = \frac{E_0}{\kappa} = \frac{\sigma_0}{\epsilon_0 \kappa} = \frac{\sigma_0}{\epsilon}$

$\epsilon = \epsilon_0 \kappa$

permittività
dielettrica

costante
dielettrica

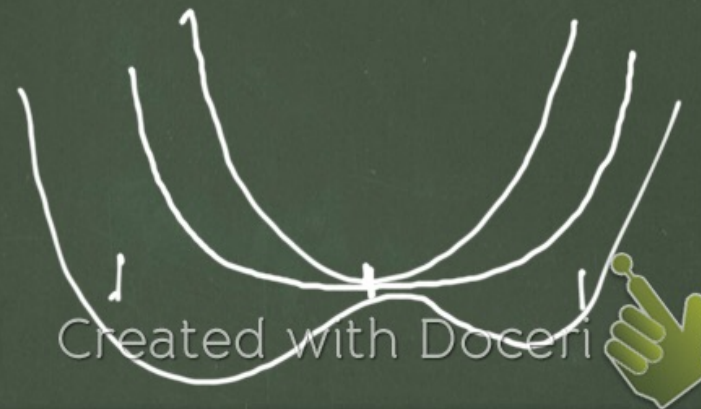
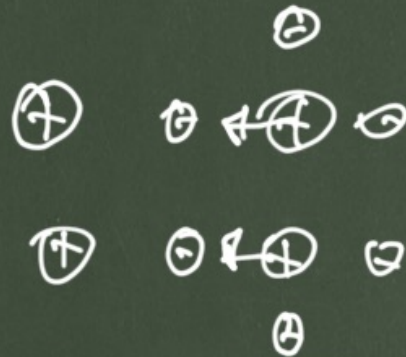
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$$\kappa_{\text{acqua}} = 80$$

$$\kappa_{\text{silicio}} = 12$$

$$\kappa_{\text{vetro}} \approx 2 \div 3$$

$$\kappa_{\text{Ferroelectrici}} \sim 1000$$



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$$C_0 = \frac{Q_0}{V_0}$$

$$C_k = \frac{Q_0}{V_k} = k \frac{Q_0}{V_0} = k C_0$$

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$$W_0 = \frac{C_0 V_0^2}{2} \Rightarrow W_k = \frac{C_k V_k^2}{2} = \frac{k C_0 V_0^2}{2k^2} \frac{\text{cm}^3}{\text{cm}^3}$$

$\frac{+1}{+1} \frac{+2}{-1}$

se cond. scanario de fonte energia

$$= \frac{C_0 V_0^2}{2k} = \frac{W_0}{k}$$

se $V = V_0$ constante

$$W = \frac{k C_0 V_0^2}{2} \text{ energia}$$

\rightarrow condica $Q_0 \rightarrow Q_k = k Q_0$




$$\Delta E = E_0 - E_k = \frac{\sigma_0}{\epsilon_0} - \frac{\sigma_0}{k\epsilon_0} = \frac{k-1}{k} \frac{\sigma_0}{\epsilon_0}$$

$$E_k = E_0 - \Delta E = \frac{\sigma_0}{\epsilon_0} - \frac{k-1}{k} \frac{\sigma_0}{\epsilon_0} =$$

$$= \frac{1}{\epsilon_0} \left(\sigma_0 - \frac{k-1}{k} \sigma_0 \right) \quad \chi = k-1$$

$$= \frac{1}{\epsilon_0} \left(\sigma_0 - \sigma_p \right) \quad \left(k = 1 + \chi \right)$$


$$= \frac{\sigma_0 - \sigma_p}{\epsilon_0} \quad \rightarrow \text{Susceptibility}$$

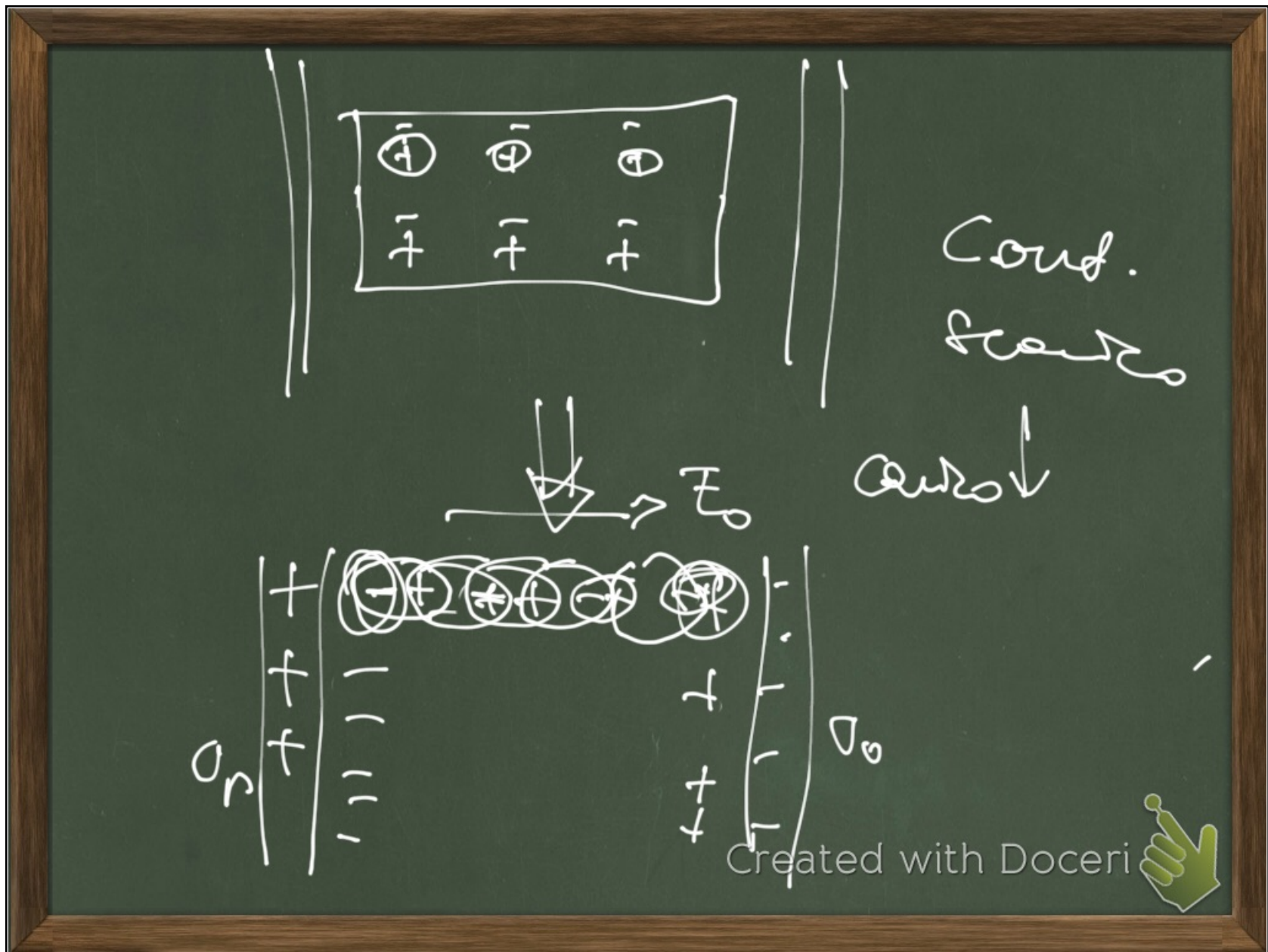
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$$\begin{array}{c|c} + & - \\ + & - \\ + & - \\ + & - \end{array}$$

$$\begin{array}{c|c} + & - \\ + & - \\ + & - \\ + & - \end{array}$$

σ_p σ_0 $\sigma_p < \sigma_0$

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The diagram on the chalkboard illustrates a cell with various organelles. A large oval represents the cell membrane. Inside, there are several smaller circles representing organelles. Arrows point from the organelles towards the cell membrane, indicating a process like osmosis or diffusion. To the left and right of the cell are vertical lines with tick marks, possibly representing a scale or a membrane barrier.

Below the diagram, the following mathematical expressions are written:

$$P_i = \frac{P_i}{\sum P_i}$$

$$P = \sigma_P$$

The text "Created with Doceri" is visible in the bottom right corner of the chalkboard, accompanied by a green hand icon.

$$E = \frac{\sigma_0 - \sigma_p}{\epsilon_0} = E_0 - \frac{\rho}{\epsilon_0} = E_0 - \frac{\epsilon_0 \chi E}{\epsilon_0}$$

$$E = \frac{E_0}{\kappa}$$

$$E = E_0 - \chi E$$

$$\sigma_p = \frac{\chi}{\kappa} E_0$$

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