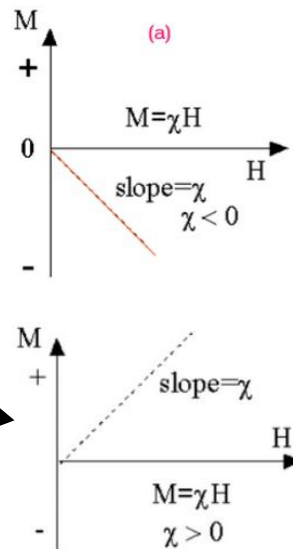


Ismétlés

Mágneses anyagok:

- Diamágnes
- Paramágnes
- Ferromágnes

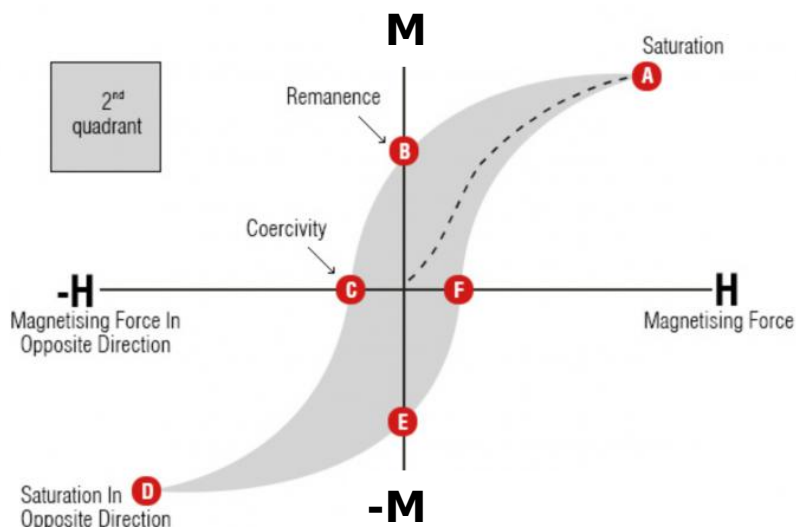


$$\mathbf{B} = \mu_0 \mu_r \mathbf{H}$$

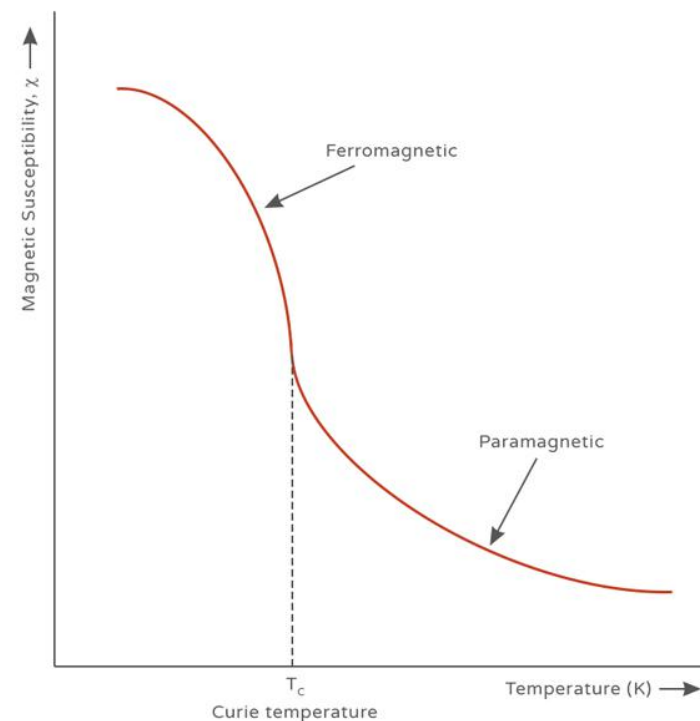
$$\mu_r = 1 + \chi_B$$

$$\mathbf{M} = \chi_B \mathbf{H}$$

Hiszterézis görbe:

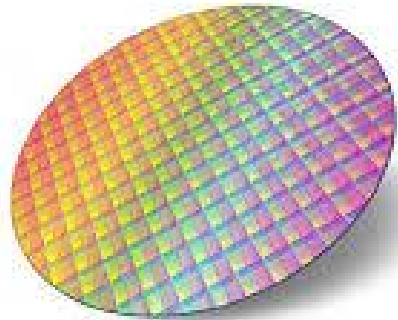
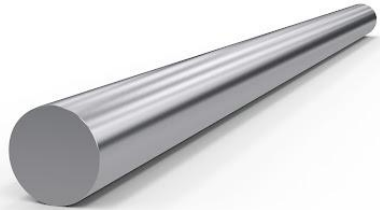


Curie hőmérséklet:

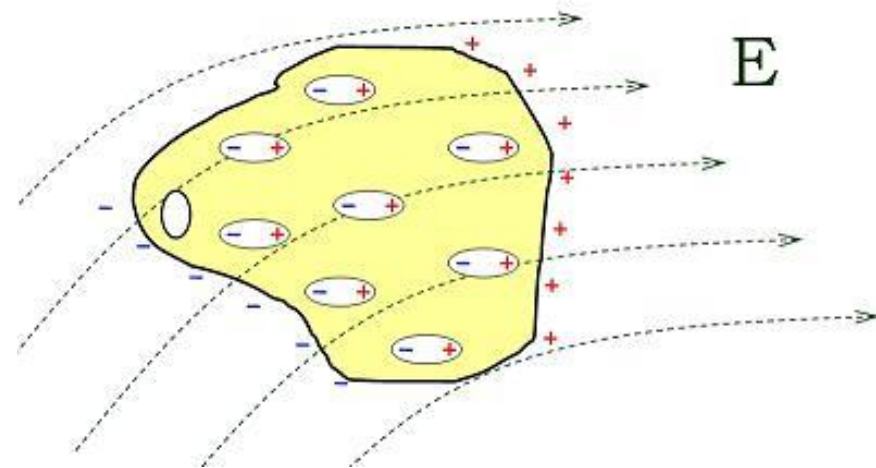
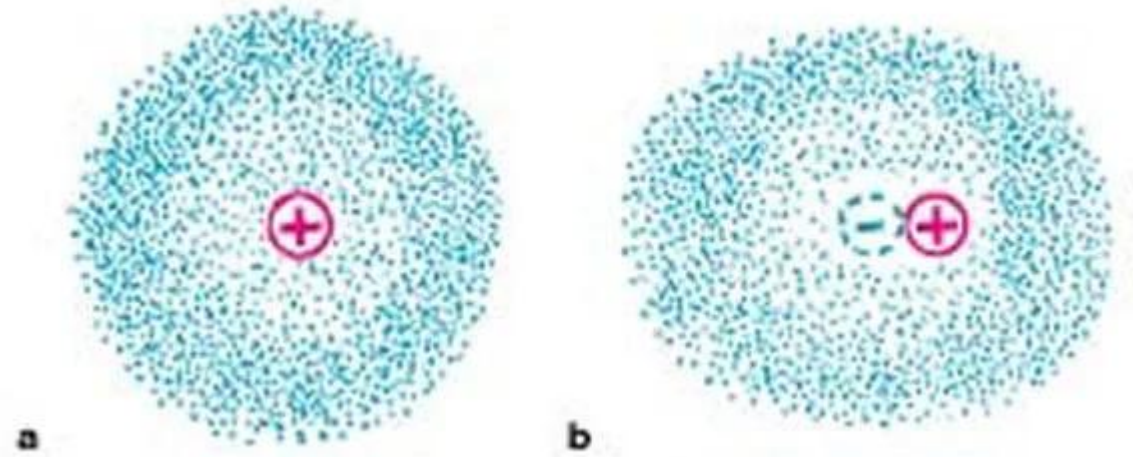
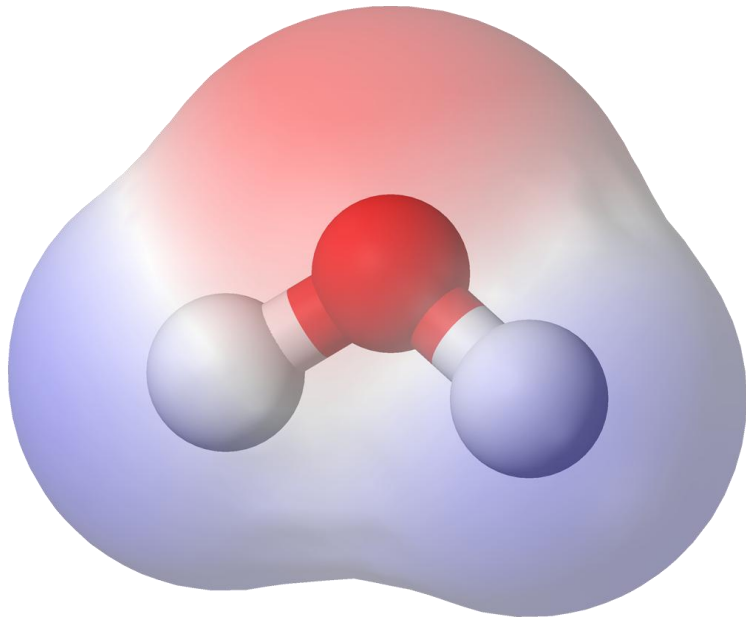




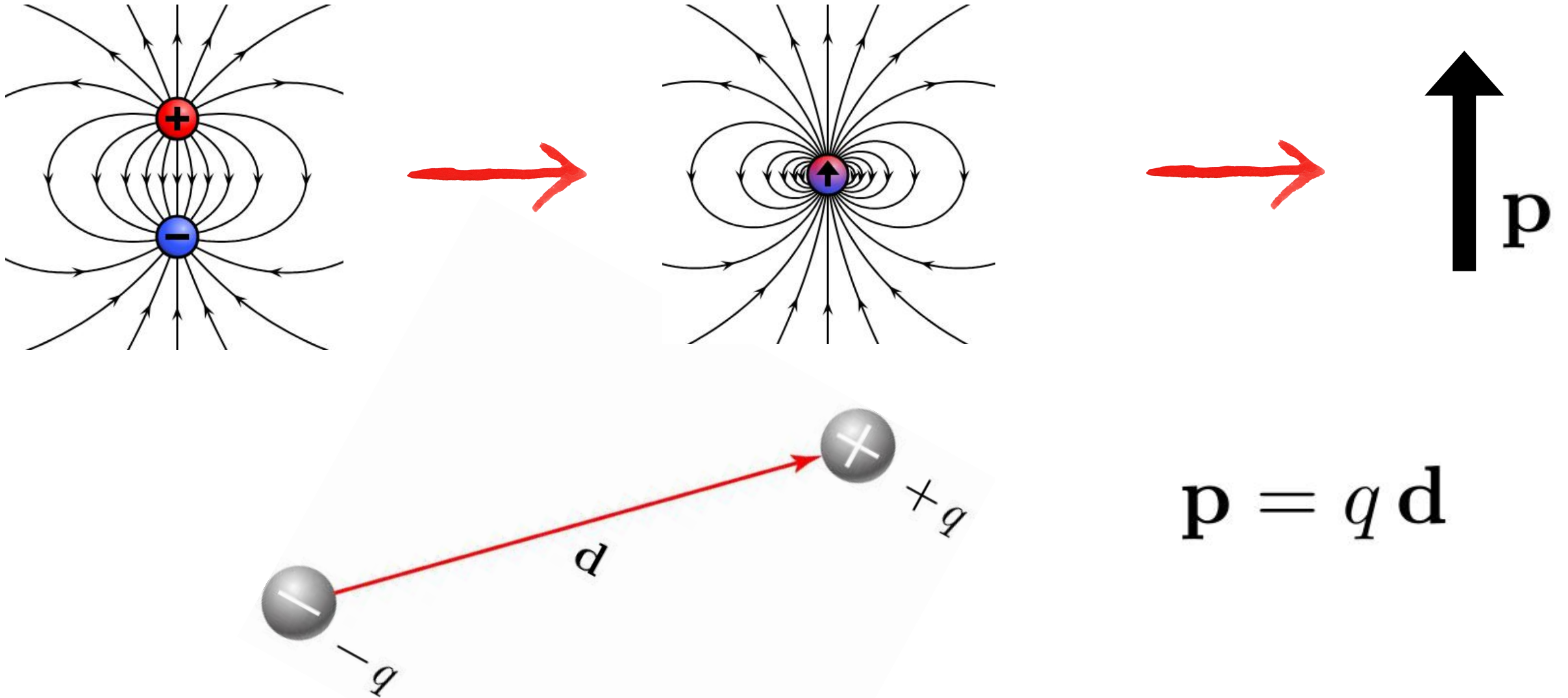
Anyagok elektromos tulajdonságai



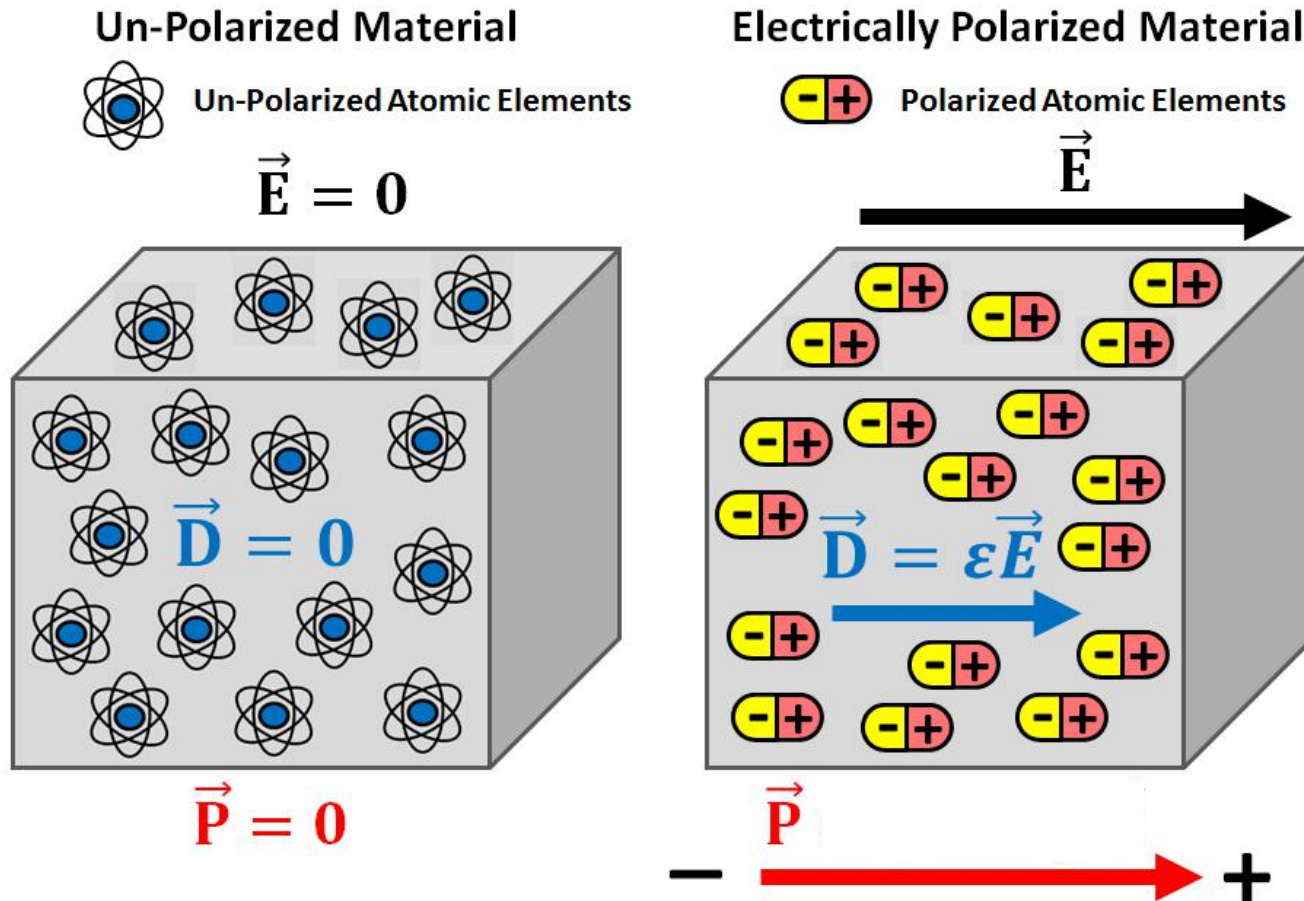
Polarizáció



Elektromos dipólus(momentum)



Polarizáció



$$\mathbf{P} = \frac{\Delta \mathbf{p}}{\Delta V} = \frac{\Delta(q \mathbf{d})}{\Delta V} = \mathbf{d} \frac{\Delta q}{\Delta V} = \mathbf{d} \rho_k$$

$$\mathbf{P} = \epsilon_0 \chi_E \mathbf{E}$$

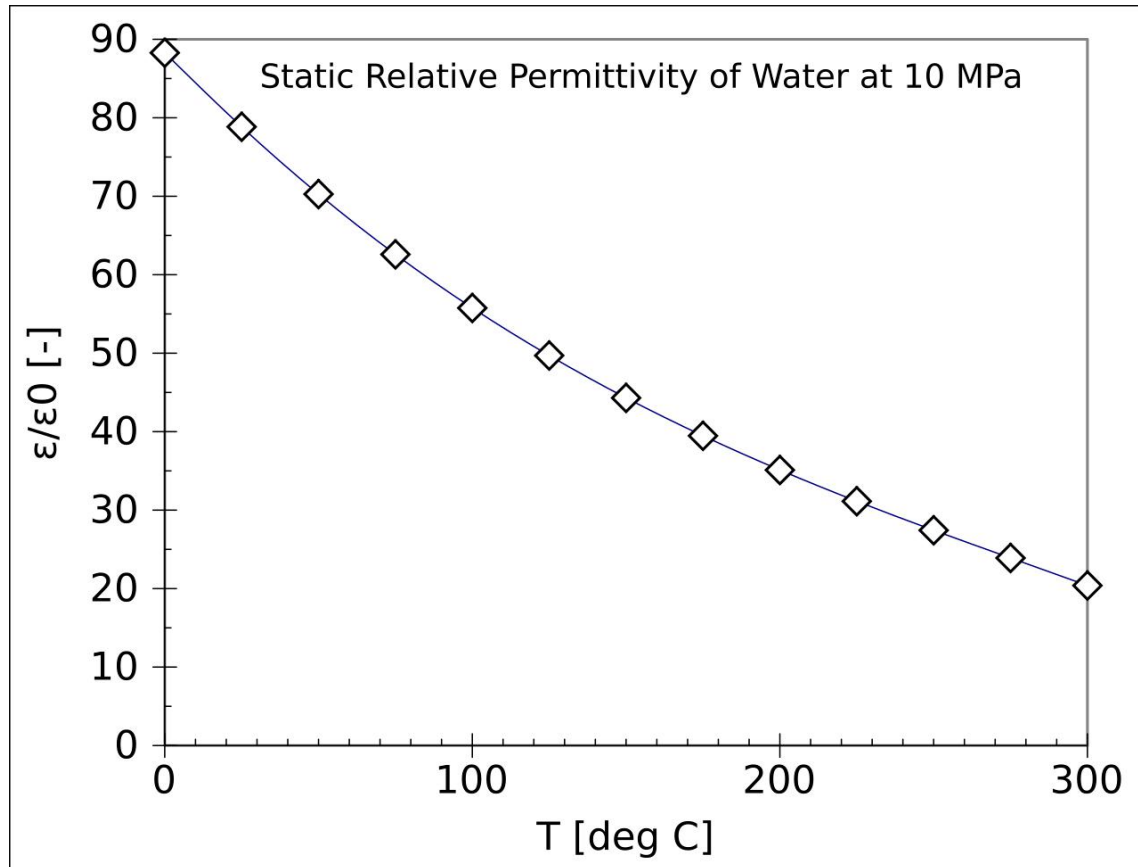
Elektromos eltolás

$$\mathbf{D} = \varepsilon_0 \mathbf{E} + \mathbf{P} = \varepsilon_0 \mathbf{E} + \varepsilon_0 \chi_E \mathbf{E} = \varepsilon_0 (1 + \chi_E) \mathbf{E}$$

$$\oiint \mathbf{P} \, d\mathbf{A} = -Q_k \longrightarrow \nabla \cdot \mathbf{P} = -\rho_k$$

$$\nabla \cdot \mathbf{D} = \nabla \cdot (\varepsilon_0 \mathbf{E}) + \nabla \cdot \mathbf{P} = \rho - \rho_k = \rho_{szabad}$$

Dielektrikum



Relative permittivities of some materials at room temperature under 1 kHz

Material	ϵ_r
Vacuum	1 (by definition)
Air	$1.000\,589\,86 \pm 0.000\,000\,50$ (at STP, 900 kHz), ^[1]
PTFE/Teflon	2.1
Polyethylene/XLPE	2.25
Polyimide	3.4
Polypropylene	2.2–2.36
Polystyrene	2.4–2.7
Carbon disulfide	2.6
BoPET	3.1 ^[2]
Paper, printing	1.4 ^[3] (200 kHz)
Electroactive polymers	2–12
Mica	3–6 ^[2]
Silicon dioxide	3.9 ^[4]
Sapphire	8.9–11.1 (anisotropic) ^[5]
Concrete	4.5
Pyrex (glass)	4.7 (3.7–10)
Neoprene	6.7 ^[2]
Natural rubber	7
Diamond	5.5–10