

j11e2

continuity  $\frac{\partial \rho}{\partial t} + \nabla \cdot \mathbf{J} = 0$

for conductor,  $\mathbf{J} = \sigma \mathbf{E}$

$$\frac{\partial \rho}{\partial t} + \sigma \nabla \cdot \mathbf{E} = 0$$

$$\frac{\partial \rho}{\partial t} + \frac{\sigma \rho}{\epsilon_0} = 0 \rightarrow \rho(t) = \rho_0 e^{-\frac{\sigma}{\epsilon_0} t}$$

a.  $\frac{\partial \rho}{\partial t} = 0 \rightarrow \frac{\sigma \rho}{\epsilon_0} = 0 \rightarrow \rho = 0.$

b. \*

c.

$$\tau = \frac{\epsilon_0}{\sigma}$$