

24.6 conductors in electrostatic equilibrium

1. A spark occurs at the tip of a metal needle if the electric field strength exceeds $3 \cdot 10^6 \text{N/C}$. This is the field strength at which the air breakdowns.

Calculate the minimum surface charge density for producing a spark.

2. Which of the following may be a conductor at equilibrium?

Hint: What are E and ρ inside a conductor?

3. A hollow conducting sphere of has an inner radius R_{in} and an outer radius of R_{out} . The sphere has a net charge of $+10\mu\text{C}$ in the material (or body). There's a $+2\mu\text{C}$ point charge at the cavity center.

- (a) Which of the following is the correct equilibrium charge configuration?

- (b) Calculate the surface charge density on the inner surface η_{in}

- (c) ... on the outer surface η_{out}

- (d) What's \vec{E} outside the sphere? *Hint: No need to calculate anything here.*

- (e) ... in the conductor's material?

- (f) ... inside the cavity?

4.

read 25.1 25.2

1. (Review) What is a conservative force? Write 1-3 sentences and refer to 1-2 equations. Give an example as part of your explanation.

2. 10.1 from the workbook.

3. (Review) A 10kg runaway grocery cart runs into a spring with spring constant 250 N/m and compresses it by 2.0cm. What was the speed of the cart just before it hit the spring?

Knight 10.19. answer: 3 m/s

4. Read 25.2

(a) Write down the most important equation in this section.

(b) For every term in this equation: give its name and SI unit. If it's a constant, give its value.

(c) Write one or two full sentences describing what this equation says.