

A dielectric is inserted between the plates of a capacitor. The system is then charged and the dielectric is removed. The electrostatic energy stored in the capacitor is

1. greater than
2. the same as
3. smaller than

it would have been if the dielectric were left in place.

A parallel-plate capacitor is attached to a battery that maintains a constant potential difference V between the plates. While the battery is still connected, a glass slab is inserted so as to just fill the space between the plates. The stored energy

1. increases.
2. decreases.
3. remains the same.

Which of the following statements are true? (choose all that apply)

1. The charges in a dielectric cannot move freely.
2. A dielectric cannot be charged.
3. The surface charge on an uncharged dielectric is always zero.
4. The potential difference across a dielectric is always zero.

Consider inserting a slab of dielectric material is inserted between the plates of a charged capacitor. The electric field in the dielectric is

1. largest near the positively charged plate.
2. the same everywhere.
3. largest near the negatively charged plate.

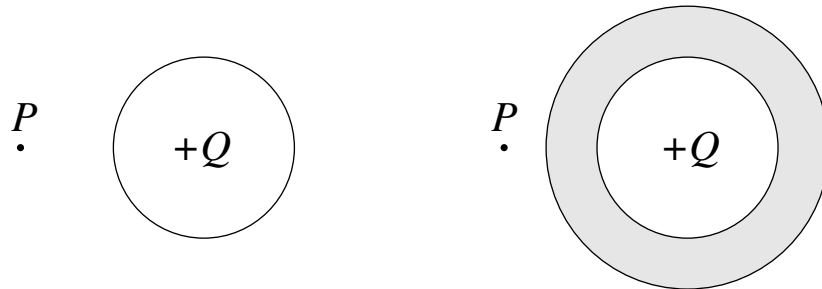
A parallel plate capacitor is charged to a potential difference of 100 V and disconnected from the source. A slab of dielectric is then inserted between the plates. Which of the following changes?

1. the potential difference
2. the capacitance
3. the charge on the plates
4. 1 and 2
5. all of the above
6. none of the above

Two experiments are carried out with a parallel plate capacitor (*a*) The capacitor is charged to a potential difference of 100 V, disconnected from the source, and then a slab of dielectric is inserted between the plates. (*b*) The capacitor is connected to a battery which maintains a potential difference of 100 V between the capacitor plates and then a slab of dielectric is inserted between the plates. In which experiment does the final configuration have the largest capacitance?

1. experiment (*a*)
2. experiment (*b*)
3. both the same
4. need more information

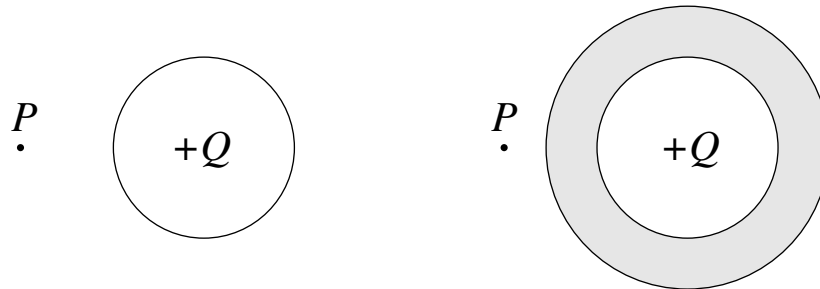
A metallic sphere carrying a charge $+Q$ is surrounded by an insulating material.



Compared to what it was without the insulator, the electric field at point P is now

1. larger.
2. unchanged.
3. smaller.
4. depends on the dielectric constant of the material.

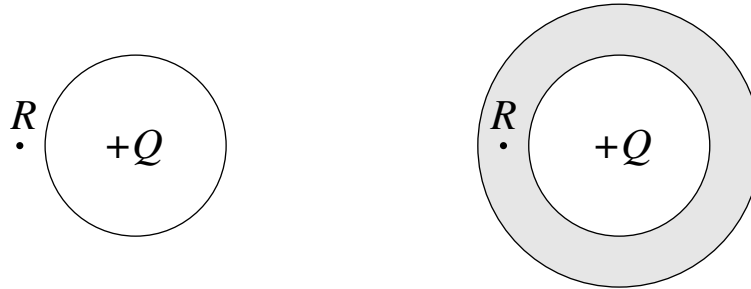
A metallic sphere carrying a charge $+Q$ is surrounded by an insulating material.



Compared to what it was without the insulator, the potential at point P (relative to zero at infinity) is now

1. larger.
2. unchanged.
3. smaller.
4. depends on the dielectric constant of the material.

A metallic sphere carrying a charge $+Q$ is surrounded by an insulating material.



Compared to what it was without the insulator, the electric field at point R inside the insulation is now

1. larger.
2. unchanged.
3. smaller.
4. depends on the dielectric constant of the material.

A dielectric is inserted between the plates of a fully-charged capacitor that is connected to a battery. The dielectric completely fills the space between the plates. Compared to what it was before the dielectric was inserted, is the electric field between the plates

1. larger?
2. the same?
3. smaller?