Inquiry Approaches

This activity is intended for students in grades 7-10. Accordingly, the inquiry questions span several levels of difficulty. Questions asked and the depth of the expected answers will vary depending on the grade.

Initial Inquiry

What are examples of charged particles?

Electrons and protons are charged particles. Electrons have a negative charge and protons have a positive charge.

What happens when two charged particles are placed next to each other?

If the particles are both positive or both negative, they will repel each other. If one particle is positive and the other is negative, they will attract.

What happens to a charged particle when it is placed in an electric field?

When a charged particle is placed in the field, the particle will respond to the electric potential of the field. The field exerts a force on the article and will move the particle to a position of lower potential.

Experimental Procedure Inquiry

What happens as the radially held tube is moved further away from the generator ?

The fluorescent tube will become dimmer as it is moved away from the generator. If it is moved far enough away, it will not light up at all.

What happens when two hands hold the fluorescent tube? Why?

Two sections of the tube light up. The section closest to the generator will be the brightest, as it has the greater potential difference.

Why do the aluminum pie plates fly off of the generator?

The generator sphere and the pie plates will accumulate negative charge. Since negatively charged objects repel each other, the pie plates are repelled and fly off. However, as the force between the negatively charged plates and the sphere is not great enough to repel the entire stack at once, they fly off one at a time.

Would the activity work with an incandescent light bulb? Why or why not?

No. Fluorescent light bulbs contain a gas and light up when a potential difference excites the gas. Incandescent light bulbs light up when they are connected to a closed circuit with a potential difference. When there is no closed circuit for the current to move through, the filament will not light up.

In-Depth Inquiry

What is the relationship between *r*, the distance of a charged particle from the electric field source and *F*, the force of the field on the particle?

The force on a particle due to a field is equal to the charge of the particle multiplied by the strength of the electric field at a distance *r.* As the distance between the charged particle and the electric field source increases, the force, *F*, decreases at the rate of r^2.

How far away from the electric field would a charged particle need to be for the force of the field on the particle to be zero?

The force exerted on the particle is zero only if the particle is placed infinitely far away from the field. However, the force on the particle can become so small that it is negligible if the particle is placed at a large enough distance.