Electricity Investigation Kit Instructions

HOME SCIENCE TOOLS
THE GATEWAY TO DISCOVERY

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Electricity Kit Contents

This kit contains the following items:

1 solar cell, 1.5 volt, 0.1 amp, represented by symbol
1 motor, 1.5 to 6 volt DC, 0.1 amp minimum,
with propeller, represented by the symbol
2 D-size batteries, represented by the symbol
2 D-size battery holders
1 3.7 volt light bulb and socket, represented by symbol
1 switch, located on the light base, represented by symbol
15 feet of 22 or 24 gauge wire, represented by symbol
1 bolt, for an electromagnet
1 6 ohm, 5 watt resistor, represented by symbol
1 1 ohm, 5 watt resistor, represented by symbol
1 blocking diode, represented by symbol

Introduction

Electricity is a form of energy made up of oppositely charged particles called electrons and protons. If the charged particles are at rest it is called **static electricity**. If the charged particles are moving it is called **dynamic electricity**. Positive electricity occurs when the positively charged (+) **proton** is the energy form. When the negatively charged (-) **electron** is the energy form it is called **negative electricity.** We will explore **dynamic negative electricity** in this study.

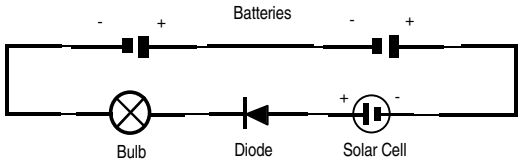
1. Build your battery charger circuit. Make sure the solar cell is in direct sunlight. Is it working? How can you tell?

2. Put the diode in different places in the circuit. Is it still working? How can you tell?

Forming Conclusions

What can you conclude about the flow of electrons from a battery? Do you have enough information now to state a principle or truth?

Did your battery charger work? How did you test it? Can you state a truth about solar cells or battery chargers? Did your circuit look something like the one below?



The light bulb in this circuit can be used to verify the current is flowing and the battery charger is working.

Electromagnet

Observing and Gathering Data

You can make a magnet by wrapping wire around a steel bolt and then running a current through the wire by connecting the wire to a battery. The current passing through the wire creates a **magnetic field**. This type of magnet is called an **electromagnet**.

You can measure the magnetic pull of small electromagnets by counting the number of pins or small nails that the magnet can pick up.

Thinking About It and Predicting

Will wrapping more wire coils around a bolt change the strength of the electromagnet? How will batteries in parallel affect the strength of an electromagnet? How will batteries in series affect the strength of an electromagnet? Write down your predictions and design a series of experiments to test your predictions and answer these questions.

Experimenting

1. Make your electromagnet by wrapping a long piece of wire (about 5 feet) very tightly around the bolt. Keep your coils smooth and even.

2. Remove about a ½ inch of insulation from the wire ends of the electromagnet.

4. Remove about a ½ inch of insulation from the wire ends of the electromagnet.

5. Conduct the experiments you designed. Be sure to use pins or small nails to test the strength of the magnets you make. Record your findings carefully.

Forming Conclusions

Which electromagnet was strongest? How much stronger was the electromagnet made with two batteries in a series than the electromagnet with only one battery? How much stronger was the electromagnet with more wire coils? How much more wire did you use? What is the relationship between length of wire and electromagnet strength? What is the relationship between electromagnet strength and number of batteries used? Can you state any principles or laws about electromagnets or electrical currents from your experiments?

Further Study

You can accurately measure the current (amps), voltage (volts), and resistance (ohms) in each circuit you made in this study using a device called a multi-tester. For advanced study, consider purchasing a multi-tester to measure and calculate the parameters of these and other electric circuits. You will then be better prepared to build more complex circuits.

End of Sample