

Electrical Encounters (Grades 3-5) Pre-Visit Activities

Vocabulary List and Student Definitions (elementary level)

- **Energy:** the ability or power to do work or make an effort.
- **Electricity:** a form of energy, caused by the movement of free electrons.
- **Potential Energy:** stored energy.
- **Kinetic Energy:** moving energy.
- **Static Electricity:** the building up of an electric charge (energy) that is unable to move until an object is brought into its electric field.
- **Current Electricity:** electric charges (energy) in motion, or streams of moving electrons.
- **Conductor:** an object or material that allows electricity or heat to pass through it.
- **Insulator:** an object or material that prevents electricity or heat to pass through it.

Teacher Background and Supporting Information

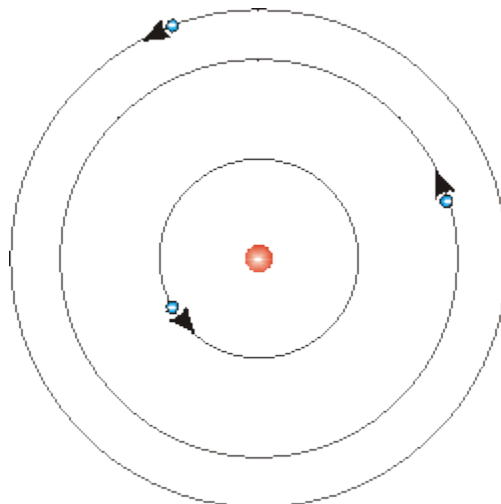
1. What is energy?
 - a. **Energy** causes things to happen. It is the ability to do work or make an effort. There are many forms of energy.
 - i. Heat or thermal energy
 - ii. Chemical energy (example: Food)
 - iii. Light or radiant energy
 - iv. Mechanical
 - v. Electrical
 - vi. Nuclear
 - b. Two types:
 - i. Stored energy is called **potential energy**.
 - ii. Moving energy is called **kinetic energy**.
 - c. All **matter** is made up of **atoms**, the building blocks of the universe. All matter has energy. Whether matter is moving or not, it has energy.
 - d. Atomic structure - All atoms are made of:
 - i. protons (p^+) carry a positive charge
 - ii. neutrons (n^0) carry no charge
 - iii. electrons (e^-) carry a negative charge
 1. **Electrons** move easily from one atom to another. We call these free electrons.
2. How does energy do work?
 - a. The First Law of Thermodynamics (or Law of Energy Conservation) states that "Energy cannot be created nor destroyed, it can only change forms". We observe this in many ways.
 - i. Energy in food: Food is full of nutrients that provide us with energy. Before we eat a slice of our favorite pizza we can say the slice is storing energy. Once we eat and digest the pizza that stored energy is transformed into moving energy that allows us to do all of our daily activities – walk, run, talk, sit in a chair, breathe, think, etc
 - ii. Talking on the phone: When we talk on the phone, our voices

are transformed into electrical energy, which passes over wires or transmitted through the air (cell phones). The phone on the other end changes the electrical energy into sound energy through a speaker.

3. What is electrical energy?
 - a. **Electricity** is a form of kinetic or potential energy, caused by the movement of free electrons.
 - b. When there is a build up of electrons in one place, we have electric energy.
 - c. As electrons easily move from one atom to another, it creates a current, or flow, of electricity. Electricity is the result of the movement of electrons.
 - d. Two Types of Electricity:
 - i. **Static:** means stationary. Static electricity is the building up of a charge (energy) that can't go anywhere until an object is brought into its electric field.
 - a. Lightning
 - ii. **Current:** electric charges (energy) in motion, or streams of moving charges.
 - a. Electronic devices, automobiles, lighting in our homes

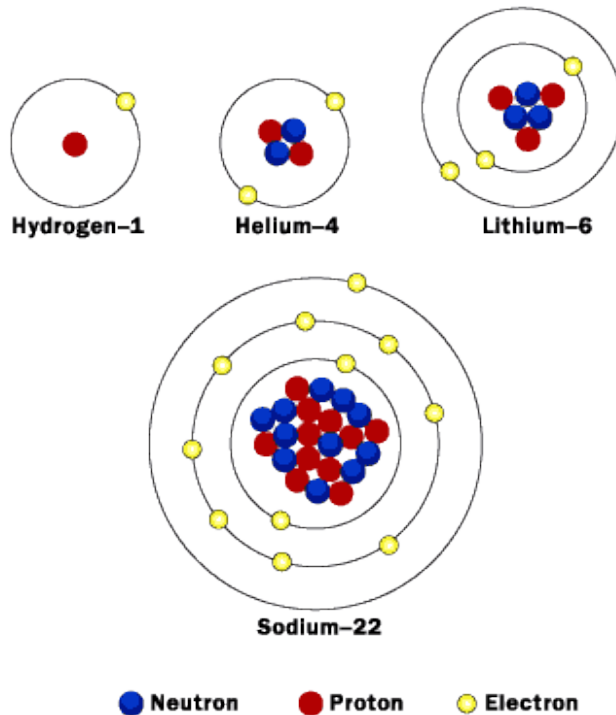
Student Activities

1. Ask students to brainstorm examples of energy.
 - a. How do we use energy in our bodies? Homes?
 - b. Then, have students complete the energy handout to understand that energy comes in many forms (see following pages).
2. Read: [Energy Makes Things Happen](#) by Kimberly Burbaker to gain a better understanding of what energy is and where it is used.
 - a. At the end of the book there are two simple and fun activities to expand student understanding. Try them!
3. Student will make a model of an atom to help visualize the different particles.
 - a. Provide each student with an 8" x 11" sheet of construction paper or cardstock.
 - b. Draw a small ring in the center of the paper, followed by a larger ring and another, like the diagram below:



- c. Use modeling clay and have students make several pea-sized pieces of three different colors. One color will represent the electrons of the atom, a second color will represent the protons, and a third color will represent the neutrons.
- d. Students will place the protons and neutrons in the center of the smallest ring, making the nucleus of the atom.
 - i. Example: A Helium atom has 2 protons and neutrons (see picture below).
 - ii. They will then place 2 electrons on the surrounding rings.
 - a. The electrons on the outermost ring (outer shell) are considered free electrons because they easily jump from atom to atom.
 - b. The number of protons and electrons should be equal.

Isotopes of Hydrogen, Helium, Lithium and Sodium



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Name _____

Where does each object below get energy? Write your answer in the blank.

