

Grade 7 Science Tutorial

Lesson 3: Generation of Electricity

1. Introduction to Electricity

Electricity is an essential part of our daily lives. Many devices and appliances we use depend on electricity to function, such as lights, fans, and mobile phones. Understanding how electricity is generated and used helps us appreciate its significance and manage its consumption efficiently.

2. Sources of Electricity

Electricity is generated from different sources. These can be categorized based on their method of generation:

1. **Chemical Sources:** Electricity is produced through chemical reactions in cells and batteries.
 - Examples: Dry cells, car batteries, alkaline cells.
 2. **Mechanical Sources:** Electricity is generated by the movement or rotation of components.
 - Examples: Bicycle dynamo, electric generators.
 3. **Solar Sources:** Electricity is produced by converting sunlight into energy.
 - Example: Solar panels.
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3. Chemical Sources of Electricity

Chemical Cells and Batteries

- **Dry Cell:** A common source of electricity in torches and clocks. It contains chemicals that generate electricity through reactions.
 - Key Components: Zinc casing (negative terminal), carbon rod (positive terminal), and electrolytes.
- **Car Battery:** A lead-acid accumulator that provides a larger amount of electricity and is rechargeable.

Activity: Examining a Dry Cell

- **Materials Needed:** Used dry cells, hacksaw, gloves.
- **Steps:**
 1. Carefully cut the dry cell longitudinally.

2. Observe and identify the chemicals inside.
 3. Dispose of the contents safely under supervision.
- **Observation:** Dry cells contain chemicals like manganese dioxide and ammonium chloride.
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4. Mechanical Sources of Electricity

Dynamos

- **How They Work:** Electricity is generated by moving a magnet near a coil of wire, creating an electromagnetic field. This process is called electromagnetic induction.
- **Examples:** Bicycle dynamos, generators in hydropower stations.

Activity: Building a Simple Dynamo

- **Materials Needed:** Insulated copper wire, bar magnet, galvanometer.
 - **Steps:**
 1. Wrap the wire around a cylindrical tube to form a coil.
 2. Move the magnet through the coil.
 3. Observe the movement of the galvanometer needle.
 - **Conclusion:** The movement of the magnet generates electricity in the coil.
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5. Solar Sources of Electricity

Solar Panels

- Made of solar cells, which convert sunlight into electricity using semiconductors like silicon.
- **Applications:** Powering calculators, toys, and even homes.

Activity: Testing a Solar Panel

- **Materials Needed:** Solar panel, motor, torch bulb.
 - **Steps:**
 1. Connect the motor to the solar panel.
 2. Expose the panel to sunlight and observe the motor turning.
 3. Cover the panel and observe the motor stop.
 - **Observation:** Solar panels generate electricity only in the presence of light.
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6. Types of Current

1. **Direct Current (DC):** Flows in a single direction, generated by batteries and cells.
2. **Alternating Current (AC):** Changes direction periodically, generated by power stations and dynamos.

Activity: Understanding Current Types

- **Materials Needed:** Dynamo, LED bulbs, milliammeter.
 - **Steps:**
 1. Connect the dynamo to the LEDs and observe the behavior.
 2. Switch terminals and observe the changes.
 - **Conclusion:** AC causes the LEDs to alternate in brightness, while DC maintains steady brightness.
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7. Advantages and Challenges of Electricity Sources

- **Advantages:**
 - Renewable sources like solar energy are sustainable.
 - Batteries are portable and convenient.
 - **Challenges:**
 - Batteries contain toxic chemicals that can harm the environment if not disposed of properly.
 - Renewable sources depend on weather conditions.
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Practice Questions

Fill in the Blanks

1. Electricity generated by moving magnets near coils is called _____.
2. A solar panel is made of _____ cells.
3. The negative terminal in a dry cell is the _____ casing.
4. A car battery generates electricity using _____ acid.

Short Questions

1. Name two sources of electricity and give an example of each.
2. What is the role of chemicals in a dry cell?
3. Describe how a dynamo generates electricity.

4. List two advantages of using solar panels.

Multiple-Choice Questions

1. Which of the following is not a chemical source of electricity? a. Dry cell b. Solar panel c. Car battery d. Button cell
2. The current that flows in a single direction is: a. AC b. DC c. Both AC and DC d. Neither
3. Which component is used in solar panels to convert sunlight into electricity? a. Zinc b. Silicon c. Copper d. Carbon

Essay Questions

1. Compare the generation of electricity in a dynamo and a solar panel.
 2. Discuss the environmental impacts of improper battery disposal.
 3. Explain the difference between direct and alternating currents, with examples.
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Key Takeaways

- Electricity is generated from chemical, mechanical, and solar sources.
- Chemical cells rely on reactions, dynamos use motion, and solar panels use light.
- Proper disposal of batteries is crucial to reduce environmental harm.
- AC and DC currents have distinct characteristics and uses.