Static Electricity

Physical Science | Lesson Guide

2nd Grade

Photo Description

A big blue balloon sits above colorful confetti pieces on a dark table. Small white pieces stick to the bottom of the balloon. The confetti has many colors like red, yellow, green, and blue scattered around.

Scientific Phenomena

This image demonstrates static electricity as an anchoring phenomenon. When the balloon is rubbed against hair, fabric, or another surface, it gains an electric charge through friction. This charge creates an invisible electric field around the balloon that can attract lightweight objects like small pieces of paper or confetti. The white pieces clinging to the balloon show how oppositely charged objects are drawn together, while some confetti on the table may have been repelled if it carried the same charge as the balloon.

Core Science Concepts

1. Static Electricity Generation: Friction between two materials can transfer electrons, creating an electric charge on objects.

2. Attraction and Repulsion: Objects with opposite charges attract each other, while objects with the same charge push away from each other.

3. Electric Fields: Charged objects create invisible areas of influence around them that can affect other nearby objects.

4. Material Properties: Some materials hold electric charges better than others, and lightweight materials are more easily affected by static forces.

Pedagogical Tip:

Use the "I Notice, I Wonder, It Reminds Me Of" thinking routine when first showing students this image. This helps activate prior knowledge and generates authentic questions for investigation.

UDL Suggestions:

Provide multiple ways for students to demonstrate their understanding: drawing their observations, using body movements to show attraction/repulsion, or creating simple comic strips showing the balloon's "invisible power" affecting different objects.

Zoom In / Zoom Out

Zoom In: At the atomic level, electrons are moving from one material to another during friction. When you rub the balloon, electrons jump from your hair to the balloon's surface, leaving your hair with fewer electrons (positive charge) and the balloon with extra electrons (negative charge).

Zoom Out: Static electricity is part of the larger electromagnetic force that governs much of our world - from lightning in thunderstorms to how our electronic devices work. The same principles that make confetti stick to this balloon also explain why socks cling together in the dryer and why you sometimes get shocked when touching a doorknob.

Discussion Questions

1. What do you think would happen if we brought another charged balloon near this one? (Bloom's: Predict | DOK: 2)

2. Why do you think some pieces of confetti are sticking to the balloon while others stay on the table? (Bloom's: Analyze | DOK: 3)

3. How could we test whether the balloon's "power" works on different materials like feathers, coins, or paper clips? (Bloom's: Create | DOK: 3)

4. What other times have you noticed objects sticking to things when they shouldn't? (Bloom's: Remember | DOK: 1)

Potential Student Misconceptions

1. "The balloon is magnetic" - Students often confuse static electricity with magnetism. Clarification: Static electricity works on many materials, while magnets only attract certain metals like iron.

2. "The balloon has glue or is sticky" - Students may think there's a physical adhesive. Clarification: The attraction is caused by invisible electric forces, not sticky substances.

3. "Only balloons can do this" - Students might think this is unique to balloons. Clarification: Many materials can build up static charge through rubbing, including plastic combs, wool socks, and even your own body.

NGSS Connections

Performance Expectation: 2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Disciplinary Core Ideas:
- 2-PS1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature
- K-PS2.A Pushes and pulls can have different strengths and directions

Crosscutting Concepts:
- Cause and Effect Simple tests can be designed to gather evidence to support or refute student ideas about causes
- Patterns Patterns in the natural world can be observed and used as evidence

Science Vocabulary

* Static electricity: An electric charge that builds up on objects and can make them stick together or push apart
* Friction: The rubbing of two things together that can create heat or electric charge
* Attract: When objects pull toward each other like magnets or charged materials
* Repel: When objects push away from each other
* Charge: The amount of electricity that builds up on an object
* Electrons: Tiny particles that carry electric charge and can move between objects

External Resources

Children's Books:
- Static Electricity by David Dreier
- The Magic School Bus and the Electric Field Trip by Joanna Cole
- Oscar and the Bird: A Book About Electricity by Geoff Waring

YouTube Videos:
- "Static Electricity for Kids" - Simple experiments demonstrating static electricity with balloons and everyday objects: https://www.youtube.com/watch?v=yc2-363MIQs
- "Bill Nye Static Electricity" - Engaging explanation of how static electricity works with fun demonstrations: https://www.youtube.com/watch?v=LQWLVbkYMrc