Mixture

Physical Science | Lesson Guide

Kindergarten

Photo Description

This picture shows concrete with lots of colorful rocks and pebbles stuck inside it. The rocks are different sizes, shapes, and colors like brown, red, yellow, and black. Some rocks are big and some are tiny, all mixed together in the gray concrete.

Scientific Phenomena

The anchoring phenomenon here is composite material formation - specifically, concrete as a human-made mixture of different materials. This concrete demonstrates how combining different materials (cement, water, sand, and aggregate stones) creates a new material with different properties than any individual component. The varied rock sizes and types show natural geological diversity, while their incorporation into concrete illustrates how humans use natural materials to engineer solutions for construction needs.

Core Science Concepts

1. Materials and Their Properties: Different rocks have different colors, sizes, and textures, showing that materials can be sorted and described by their observable properties.

2. Mixtures: Concrete is a mixture where we can still see the individual parts (rocks, sand, cement) even though they are combined together.

3. Natural vs. Human-Made Materials: The rocks are natural materials from the Earth, but concrete is a human-made material that uses natural materials.

4. Sorting and Classifying: The various rocks can be grouped by color, size, or shape, introducing basic classification skills.

Pedagogical Tip:

Use actual concrete samples or create "concrete" using playdough and small rocks so students can feel the texture differences and see how individual materials combine to make something new.

UDL Suggestions:

Provide multiple ways for students to explore materials - visual sorting cards, tactile rock samples, and verbal descriptions to accommodate different learning preferences and abilities.

Zoom In / Zoom Out

1. Zoom In: At the microscopic level, the cement paste fills tiny spaces between sand grains and rock pieces, creating chemical bonds that harden over time through a process called hydration.

2. Zoom Out: This concrete is part of larger human infrastructure systems like sidewalks, buildings, and roads that connect communities and provide safe spaces for people to live and travel.

Discussion Questions

1. What different colors and sizes of rocks can you see in this concrete? (Bloom's: Remember | DOK: 1)

2. How do you think the rocks got stuck in the concrete and why don't they fall out? (Bloom's: Analyze | DOK: 2)

3. What would happen if we made concrete with only big rocks or only tiny rocks? (Bloom's: Evaluate | DOK: 3)

4. Where else have you seen concrete being used, and why do you think people choose to use it there? (Bloom's: Apply | DOK: 2)

Potential Student Misconceptions

1. Misconception: "All rocks are the same"
Clarification: Rocks come in many different colors, sizes, and textures because they form in different ways and contain different materials.

2. Misconception: "Concrete is just one material"
Clarification: Concrete is made by mixing several different materials together - cement, water, sand, and rocks.

3. Misconception: "The rocks will fall out of the concrete"
Clarification: The cement acts like a strong glue that holds all the pieces together permanently.

NGSS Connections

- Performance Expectation: K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- Disciplinary Core Ideas: K-2-ETS1.A - A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Crosscutting Concepts: Patterns - Patterns in the natural and human designed world can be observed and used as evidence.

Science Vocabulary

* Concrete: A strong building material made by mixing cement, water, sand, and rocks together
* Mixture: When two or more different things are combined together but you can still see the separate parts
* Properties: The special things about a material like its color, size, or how it feels
* Natural: Something that comes from nature and is not made by people
* Human-made: Something that people create or build using materials

External Resources

Children's Books:
- "From Sand to Glass" by Robin Nelson
- "What Is It Made Of?" by Victoria Parker
- "Rocks and Minerals" by Chris Oxlade

YouTube Videos:
- "Materials Song for Kids" - Educational song about different materials and their properties (https://www.youtube.com/watch?v=oAl5C8gOD0I)
- "How Concrete is Made" by SciShow Kids - Simple explanation of concrete mixing process (https://www.youtube.com/watch?v=CIlCGh4Zc7Y)