DREAM. BUILD. BECOME.

ACE METAL FOUNDATIONS

By IACMI

Kinetic Sand

MATERIALS

SAND

KINETIC SAND

MEASURE

MIX

Kinetic Sand

Prior Knowledge

To ensure success, students should be able to count small quantities (up to 10 -12) with support, follow simple, step-by-step instructions, and communicate observations. No prior experience with kinetic sand or materials science concepts is required.

Kinetic Sand

Lesson Overview

In this activity, students will learn some of the basics of material science in a hands-on manner by making their own kinetic sand. Kinetic sand is a special kind of engineered sand that feels soft and squishy, instead of dry and crumbly like beach sand. When you squeeze kinetic sand, it sticks together. When you release pressure on it, it falls apart slowly. This means that kinetic sand can be formed into solid shapes while still being able to flow through your fingers like sand.

Vocabulary

Material: What something is made of (example: sand, water, wood, and dirt are all materials)

Mix: To put things together and stir them so they become one

Measure: To use tools to make sure we have the right amount of something

Shape: The way something looks or is formed

Composite: A material made by combining two or more different materials so they work better together

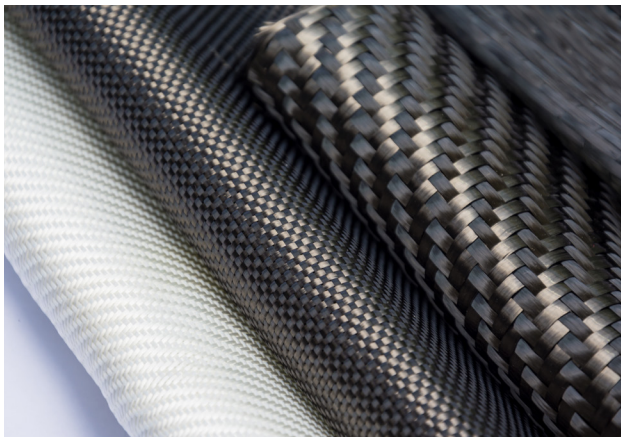

Figure 1: Composite materials combine two or more materials to create a stronger, lighter, or more durable product, such as carbon fiber.

Figure 2: Brick, concrete, wood, and rebar are materials used to provide different strengths for construction.

Kinetic Sand

The Foundations of Understanding Changes in Matter

Material science is when we learn about stuff; how it feels, what it does, and what happens when we mix it with other things. Today we are going to be material scientists while making kinetic sand.

What is kinetic sand? Kinetic sand is a type of sand that can:

- Hold its shape when you squeeze it
- Fall apart slowly when you let it go
- Act like both a solid and a liquid. When you hold it or press it, it stays together like a solid. But when you let it fall or move, it flows like a liquid.

To make kinetic sand, we will be using three materials:

- Sand – Sand is made of tiny pieces called grains. By itself, sand falls apart and feels dry.
- Cornstarch – Cornstarch helps things stick together just a little. It helps the sand grains "hold hands."
- Oil – Oil coats the sand so the grains can slide. This makes the sand smooth and keeps it from sticking to our hands.

When sand, cornstarch, and oil work together, they become a composite — a material made by combining different materials to create something more useful than each one would be on its own.

When we mix these ingredients, something new happens. The sand becomes soft, can be shaped, and does not feel dry. By combining our ingredients and mixing them together, we can create a new material that behaves in a new way.

Figure 1: Sand is a natural material made of tiny pieces of rock, minerals, and shells.

Figure 2: Cornstarch is a material made from the starch found in corn kernels.

Kinetic Sand

Materials

Materials Supplied in Kit

Per Student

- Craft sand (4 tablespoons)
- Cornstarch (2 teaspoons)
- Oil (1 teaspoon)
- 1 spoon
- 1 paper bowl

Shared

- [5] 1 Tablespoon scoops
- [5] 1 teaspoon scoops

Activity Directions

Step 1: Prepare

Each student will need:

- A bowl
- Sand, cornstarch, and oil
- A spoon

Step 2: Measure the Sand

- Scoop 4 tablespoons of sand (the big scoop)
- Level each scoop before adding it to your bowl

Step 3: Add the Cornstarch

- Scoop 2 teaspoons (the smaller scoop) of cornstarch
- Add it to the sand in your bowl

Step 4: Mix the solids

- Use your spoon to mix the sand and the cornstarch together

Kinetic Sand

Activity Directions Continued

Step 5: Add the oil

- Measure 1 teaspoon of oil
- Carefully pour it into your bowl

Step 6: Mix

- Use your spoon to mix everything together again
- Stir until the oil spreads throughout the sand

Step 7: Use your hands, observe, play

- When the mixture gets thick, use your hands
- Squeeze and knead the sand until it is soft and moldable

Discussion Prompts or Reflection

- Does the sand feel different before and after we mix it?
- What happens when you squeeze the sand?
- What helped the sand stick together?
- What do you think would happen if we added more oil or more sand?

Variations and Enrichment

- To minimize mess, consider breaking students up into groups of 5. Have one group come to a "mixing area" at a time, while the other students are given another task to complete. This could ensure that the teacher can pour the oil for every student efficiently, while minimizing spills. It also allows for all measuring spoons to be used at once without awkward wait times.
- If a batch feels too dry, add small amounts of additional oil.
- If a batch feels too greasy, add small amounts of additional sand.

Kinetic Sand

Foundation Exploration

- **Builders** use their knowledge of different materials, including concrete, sand, and water, to build stronger buildings and roads.
- **Chefs** use their knowledge of ingredients and their properties to mix ingredients to make food that is soft, sticky, fluffy, or crunchy.
- **Toy designers** choose materials so that toys are safe, soft, stretchy, or squishy.
- **Artists** use clay, paint, sand, and other materials to create art with different textures.
- **Materials engineers** study how different materials behave when they are mixed, shaped, or changed. They help create new materials with special properties.
- **Construction workers** mix and use materials like sand, cement, and water to build sidewalks, bridges, and buildings.
- **Product designers** choose the right materials to make everyday items like shoes, furniture, and tools work well and feel right.
- **Manufacturing workers** combine materials and follow steps to make products used every day.
- **Scientists** study how materials change when they are mixed together, heated, or cooled.
- **Composite technicians** work with materials that are combined to make stronger, lighter, or more useful products. They help make parts for things like cars, airplanes, boats, sporting goods, and even wind turbine blades.