

Bay Area Scientists in Schools Presentation Plan

Lesson Name Oobleck

Presenter(s) Soomin Ellie Jung

Grade Level 3

Standards Connection(s) Physical Science: combining substances can create new substances with different properties.

Abstract: What is the difference between physical and chemical change? What are the different properties of matter (solid, liquid, gas)? How does the mixture of substances result in a new substance with a different property? Students will distinguish the differences between different states of matter. Then, they will apply that knowledge to create a hypothesis of how the mixture of different materials can result in new properties. After that, students will apply this new information and look for other examples.

Vocabulary/Definitions:

3 – 6 important (new) words

- Solid
- Liquid
- Gas

Materials:

What will you bring with you?

- Water
- Food coloring
- Ziploc baggies
- Cornstarch
- Stirring device
- Measuring device

What should students have ready (pencils, paper, scissors)?

None

Classroom Set-up: Student grouping, Power/Water, A/V, Light/Dark, set-up/clean-up time needed

Students need to have clear desks.

A whiteboard or chalkboard would be helpful.

A small amount of water is needed for the activity but I can also bring some in a bottle.

Classroom Visit

1. Personal Introduction:

_____ Minutes

Who are you? What do you want to share with students and why? How will you connect this with students' interests and experiences?



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Topic Introduction: _____ 10 **Minutes**

What questions will you ask to learn from students? Big Idea(s), vocabulary, assessing prior knowledge...

Have a jar of marbles and add a smaller substance (maybe sand). Explain how the sand took the empty space the marbles couldn't fill up. How is the jar of marbles different from when the sand was added?

2. Learning Experience(s): _____ 20-25 **Minutes**

What will you do, what will kids do? Demonstrations, hands-on activities, images, games, discussion, writing, measuring... Describe in order, including instructions to kids.

In this activity we will mix a few substances and see what kind of properties they have. How did the different substances mix in order to create a new substance with different properties?

Oobleck activity

Instruction

Rules

Observation

Activity

Clean up

Basic Oobleck Recipe: 2 parts cornstarch: 1 part water

For this activity I will bring a small Ziploc baggie for each student with pre-measured cornstarch and add the water right before the activity.

3. Wrap-up: Sharing Experiences _____ 15 **Minutes**

Discussion:

We will discuss the notes/data we have gathered. First, go ahead and discuss in your group what data you have gathered.

What were the materials we started out with?

What kinds of properties did they have?

What kind of properties does this new substance have?

Why do you think this happened?

Were there any color or temperature changes?

4. Connections & Close: _____ 5 **Minutes**

What else might kids relate this to from their real-life experience? How can they learn more?

Thanks and good-bye! Clean-up.



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Venn diagram to show the difference between chemical and physical change.

What properties go under each category?

Any other ideas?

Matter changes:

Physical change: same substances that can be reversed

Chemical change: new substance formed

Properties of matter:

Solid, liquid, gas

Total 50 – 60 Minutes

Background Information

Why does my Ooze act like that?

Your Ooze is made up of tiny, solid particles of cornstarch suspended in water. Chemists call this type of mixture a colloid.

As you found out when you experimented with your Ooze, this colloid behaves strangely. When you bang on it with a spoon or quickly squeeze a handful of Ooze, it freezes in place, acting like a solid. The harder you push, the thicker the Ooze becomes. But when you open your hand and let your Ooze ooze, it drips like a liquid. Try to stir the Ooze quickly with a finger, and it will resist your movement. Stir it slowly, and it will flow around your finger easily.

Smack water with a spoon and it splashes. Smack Ooze with a spoon and it acts like a solid.

Most liquids don't act like that. If you stir a cup of water with your finger, the water moves out of the way easily--and it doesn't matter whether you stir it quickly or slowly.

Your finger is applying what a physicist would call a sideways shearing force to the water. In response, the water shears, or moves out of the way. The behavior of Ooze relates to its viscosity, or resistance to flow. Water's viscosity doesn't change when you apply a shearing force--but the viscosity of your Ooze does.

Back in the 1700s, Isaac Newton identified the properties of an ideal liquid. Water and other liquids that have the properties that Newton identifies are called Newtonian fluids. Your Ooze doesn't act like Newton's ideal fluid. It's a non-Newtonian fluid.

There are many non-Newtonian fluids around. They don't all behave like your Ooze, but each one is weird in its own way. Ketchup, for example, is a non-Newtonian fluid. (The scientific term for this type of non-Newtonian fluid is thixotropic. That comes from the Greek words thixis, which means "the act of handling" and trope, meaning "change".)

Quicksand is a non-Newtonian fluid that acts more like your Ooze--it gets more viscous when you apply a shearing force. If you ever find yourself sinking in a pool of quicksand (or a vat of cornstarch and water), try swimming toward the shore very slowly. The slower you move, the less the quicksand or cornstarch will resist your movement.

From the Exploratorium: http://www.exploratorium.edu/science_explorer/ooze.html

Follow-up – After Presentation

Suggest students write a letter explaining “How we learned about _____?”

In Spanish: Mateo y Cientina (Lawrence Hall of Science)

http://www.mateoycientina.org/pdfs/comics_span/LHS_3_span.pdf

Worksheets and Activity Ideas and alternative recipes for Oobleck (Thomas Jefferson National Accelerator Facility – Office of Science Education)

<http://education.jlab.org/beamsactivity/6thgrade/oobleck/oobleck.pdf>

Bartholomew And The Oobleck by Dr. Seuss <http://www.amazon.com/Bartholomew-Oobleck-Dr-Seuss/dp/0833542125>