



Oily Experiments

Grade Level: 6-10
Length: 45 Minutes
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NGSS Standards

MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MS-PS1-1 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

Crosscutting Concepts

Cause & Effect Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

Scale, Proportion, & Quantity In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

Overview

Oil has unique characteristics that make it both useful for people and dangerous to ecosystems.

Objectives

- Students will examine the basic characteristics of oil.
- Students will identify how oil affects a variety of materials.
- Students will understand how the characteristics of oil make it difficult to clean up and dangerous for ecosystems.

Materials

- Sample of Real Crude Oil or Oily Residue from Oil Spill (substitute: Heavy Weight Motor Oil)
- Vegetable Oil
- Black Basic Craft Oil Paint
- Water
- Various Containers or Basins (2 per group)
- Paper Towel or Rags
- Fur Scraps (faux or real)
- Feathers (craft or real)
- Sand
- Gravel/Pebbles
- Shells
- Pieces of Wood
- Seaweed
- Grass
- Newspapers
- Old Shirts/Aprons

Crosscutting Concepts (cont'd)

Stability & Change For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.

Related Resources

Worksheets Oil and Water

Pair With Critter Clean-Up Lesson; Sheen-Oil-Mousse Lesson

Notes

Materials (continued)

- Whiteboard or Posterboard
- Dry Erase markers or Colored Markers
- Worksheet: Oil and Water
- Science Notebooks
- Pencils
- Ruler
- Stopwatch
- Tablespoons

Background

Without an understanding of the properties of oil and water it is difficult for students to understand how oil can affect an ecosystem and why it is difficult to clean up an oil spill. This activity allows students to feel, smell, see, and manipulate oil and oily materials. Students then discover the effects of oil on a variety of materials. This activity works very well in conjunction with “Critter Clean-Up” and “Sheen-Oil-Mousse.” In fact, the oily water from the tubs can be saved for use in the “Critter Clean-Up” activity.

Preparation

1. Set up outside. If not possible, use old newspapers to cover the floor.
2. Mix vegetable oil and black oil paint and beat well to create pretend crude oil students can safely work with.

Introducing the Lesson

Ask students, what are some things that come to mind when you think of oil? Are there some different kinds of oil you can think of? What makes these oils different, and where do they come from?

Hold up a vial with a small amount of crude oil in it. Pass around the vial with a small amount crude oil in it. Open the vial just a bit and allow students to smell a small whiff of the oil. Ask students to describe what the oil smells and looks like. List their words on the board. Pass out the worksheet to each student and have them record the smell and look of crude oil.

Ask students to think to themselves for 1-2 minutes, pair with another student to discuss their thoughts, and then discuss as a larger group the following questions:

- Did you picture crude oil when you thought of oil a few minutes ago? How is what you pictured similar or different?
- Is crude oil something that you use every day?
- What types of products and everyday materials do you think might be made with crude oil?

As you discuss as a whole class, show them some objects in the classroom or nearby that are petroleum products, such as plastic bottles, synthetic jackets, phones, etc. You can also bring in additional products, like mineral oil, motor oil, gasoline, paraffin candles, petroleum jelly, etc.

Explain that in order for all of these things to be produced, the crude oil has to be removed from the ground and transported to a place to be refined. This is when accidents like oil spills can happen. Tell students that in a moment, they are going to look at one example of a really big oil spill, but it's pretty common for oil to get into the environment every day. Ask them to think about ways that these items might accidentally get into the environment. (This might include things like litter, improper disposal, small leaks around boats or houses, etc.) Now explain that they are going to simulate some of what happens when crude oil or other forms of liquid petroleum oil are spilled in a marine environment.

Activity

1. Have students put on old shirts or aprons.
2. Divide students into groups of 3-5. Place two basins of water near each small group. Explain that their right hand will go only in the water basin, and that their left hand will go only in the oily basin.
3. Give each group some of the oil/tempera mixture, a tablespoon, and a ruler. Have someone from each group drop a tablespoon of oil into the water. Have the group measure the approximate diameter of the spill (if approximately circular) or length and width of the spill (if more rectangular) and record on their worksheet. Measure the spills again at 30 seconds, 1 minute, 2 minutes, and 3 minutes.
4. Ask each student to place one hand in each container and swish it around. Have them describe how it feels. List all of their descriptive words on a poster or

whiteboard, under the appropriate headings “oil and water” or “water.” Have students wash and dry their hands and complete the second part of their worksheet.

5. Give each group some of the following items to submerge in each of their basins: shells, feathers, pieces of wood, fur scraps, sand, gravel, pebbles, seaweed, grass, or anything else you can think of.
6. Have each group hypothesize what will happen to these items once they are submerged in the water and in the oily water. Allow students to investigate the changes that occur in the texture of these materials. Again, ask students to describe how they feel and look, and have them record their observations in the worksheet.
7. Ask each group to choose one way of changing the oil by adding ice cubes, hot water, or soap, or by mixing the tub. Have the groups form (and record on their worksheet) a hypothesis about how the oil will change. Have students complete the experiment and record their observations.

Wrap-up

Discuss whether or not the hypotheses were supported by the experiment results. How would students expect ecosystems to be affected by oil? How might some of the characteristics of oil be affected by changes in temperature, weather, etc.?

Go back to your list of common petroleum products and synthetic materials. Ask students to consider how the properties of these products make them both useful for people and potentially harmful to ecosystems and communities. Provide an example from your own life.

Assessment

Ask students to identify one synthetic material that comes from natural resources that they use regularly in their lives. In their science notebooks or on a piece of paper, ask students to write or draw this synthetic material and describe the natural resource(s) it comes from. Have them list at least three ways that the material can positively impact societies and at least three ways that the material can negatively impact societies. Students who successfully meet the performance expectation will clearly identify a synthetic material they use, its correct natural resource origin, and describe at least three ways each the material positively/negatively impacts societies.

Pair With

- Critter Clean Up Lesson
- Sheen-Oil-Mousse Lesson