



**Title: Oily Experiments**

By Bonnie Jason

**Theme:** 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.

**Duration:** 45 minutes

**Age Range:** 6<sup>th</sup>-10<sup>th</sup> Grade

**Materials:**

- Sample of real crude oil
- Vegetable oil
- Black tempera paint
- Water
- Various containers or basins (2 per group)
- Paper towel or rags
- Fur scraps
- Feathers
- Sand
- Gravel/pebbles
- Shells
- Pieces of wood
- Seaweed
- Grass
- Newspapers
- Old shirts/aprons
- Whiteboard or posterboard
- Dry erase markers or colored markers
- Worksheet
  - Oil and Water Worksheet
- 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:**

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

**Introduction:**

Begin by passing around a 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.

**Activities & Procedures:**

Have students put on old shirts or aprons. Divide students into groups of 3-5. Place 2 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. 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.

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.

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. Have each group hypothesize what will happen to these items once they are submerged in the water and in the oily water. They should record their hypotheses on the worksheet. 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.

Ask each group to choose one way of changing the characteristics of 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.?

### **Evaluation:**

Assess worksheet hypotheses, data, and analysis for completeness, accurate work, and comprehension of the concepts. Because the characteristics of items available to you will vary, use common sense and your own observations to evaluate student observations about the oil and characteristics of natural materials when dipped in oil and water. Observe student cooperation, participation, and adherence to safety guidelines during group work.

## Oil and Water Worksheet

Use at least 3 words to describe how crude oil looks:

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Use at least 3 words to describe how crude oil smells:

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### Measuring the spill:

Time Elapsed	<i>Diameter OR Length and Width</i>			Area
0 seconds				
30 seconds				
1 minute				
2 minutes				
3 minutes				

Calculate area by

- multiplying Length x Width OR
- dividing Diameter/2 to get radius and plugging this value into the equation  $area = \pi \times radius^2$  (multiply radius by itself and then by 3.14)

Use at least 3 words to describe how the water feels:

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Use at least 3 words to describe how the water and oil mixture feels:

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## Materials in Oil

Record your predictions about how each material will react to being dipped in water and the water/oil mixture.

<p><b>I predict that (material) _____ will:</b></p> <p>_____</p> <p>when dipped in the water and will:</p> <p>_____</p> <p>when dipped in the oil and water mixture.</p>
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<p><b>I predict that (material) _____ will:</b></p> <p>_____</p> <p>when dipped in the water and will:</p> <p>_____</p> <p>when dipped in the oil and water mixture.</p>
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<p><b>I predict that (material) _____ will:</b></p> <p>_____</p> <p>when dipped in the water and will:</p> <p>_____</p> <p>when dipped in the oil and water mixture.</p>
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<p><b>I predict that (material) _____ will:</b></p> <p>_____</p> <p>when dipped in the water and will:</p> <p>_____</p> <p>when dipped in the oil and water mixture.</p>
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**Then, conduct the experiments. Look and feel the materials closely after you dip them in the water and the oil/water mixture. Record your observations here.**

**The (material) \_\_\_\_\_ became:**  
\_\_\_\_\_  
when dipped in the water and became:  
\_\_\_\_\_  
when dipped in the oil and water mixture.

**The (material) \_\_\_\_\_ became:**  
\_\_\_\_\_  
when dipped in the water and became:  
\_\_\_\_\_  
when dipped in the oil and water mixture.

**The (material) \_\_\_\_\_ became:**  
\_\_\_\_\_  
when dipped in the water and became:  
\_\_\_\_\_  
when dipped in the oil and water mixture.

**The (material) \_\_\_\_\_ became:**  
\_\_\_\_\_  
when dipped in the water and became:  
\_\_\_\_\_  
when dipped in the oil and water mixture.

## Changing Oil

What are you going to do to change the oil?

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Make a hypothesis about how the oil will change:

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Why do you think the oil will change in these ways?

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Conduct your experiment. How did the oil actually change?

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## **Oily Experiments Standards**

Science As Inquiry and Process: Students develop an understanding of the processes and applications of scientific inquiry.

### **SA1**

Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments

The student demonstrates an understanding of the processes of science by:

[6, 7, 8, 9] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating

[6] SA1.2 collaborating to design and conduct simple repeatable investigations

Concepts of Physical Science: Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.

### **SB1**

Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior.

The student demonstrates understanding of the structure and properties of matter by:

[7] SB1.1 using physical properties (i.e., density, boiling point, freezing point, conductivity) to differentiate among and/or separate materials (i.e., elements, compounds, and mixtures)

SB3 Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.

The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by:

[6] SB3.1 recognizing that most substances can exist as a solid, liquid, or gas depending on temperature



*[7] SB3.1 recognizing that most substances can exist as a solid, liquid, or gas depending on the motion of their particles*

*[8] SB3.1 exploring changes of state with increase or decrease of particle speed associated with heat transfer*

Science and Technology: Students develop an understanding of the relationships among science, technology, and society.

SE1

Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by:

[6] SE1.1 recognizing that technology cannot always provide successful solutions for problems or fulfill every human need