



Secondary School Density Experiment

Watch Video: <https://www.youtube.com/watch?v=CbaZnsEkiX4>

The first step in wastewater treatment is called **Primary Sedimentation or Clarification**, in which the process of **floatation and sedimentation** is used. In this experiment we will examine the concept of **density** and why things sink and float.

Why do objects that are the same size sometimes have different weights? The answer has to do with their **density**. An object's **density** is determined by comparing its mass to its volume.

If you compare a rock and a cork that are the same size (they have equal volume), which is heavier? The rock is, because it has more mass. The rock is **denser** than the cork then, because it has more mass in the same volume - this is due to the atomic structure of the elements, molecules, and compounds that make it up.

Liquids have **density**, too. Some liquids have the same **density** as water and will mix into a water solution. You can perform an experiment to learn about **density** with various liquids and solids to observe **density**. We will use various items that simulate wastewater and observe the behavior of the solids and liquids in water.

What You Need:

A large glass or plastic see-through jar with a lid that will hold at least 2 cups of water. If you are missing any of the ingredients, just use what you have. You will still be able to observe what happens to the ingredients you use.

Suggested ingredients and quantities	Write down what you used below
2 cups water	
½ teaspoon used Coffee grounds	
½ teaspoon ground up breakfast cereal	
½ teaspoon pet food	
1 piece toilet paper	
¼ teaspoon baking soda	
2 Tablespoons cup cut up plastic	
½ teaspoon ammonia	

1 teaspoon vegetable oil	
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Instructions:

Float or Sink? Determine density and buoyancy by taking the following steps:

1. Fill the jar with at least 2 cups of water, mix in all ingredients, put the lid on and vigorously shake the jar. Write some observations about what happens to the ingredients when they are shaken. Does the oil mix in? What happens to the toilet paper? Write complete sentences below.

2. Go to page 3. Draw a picture of the mixed in ingredients in the box labeled Drawing #1. What do you see? Label the ingredients within the jar.
3. Write a hypothesis in complete sentences below. Be sure to include all of the items you used in your experiment and how you think they will behave after 20 minutes.

What will happen as the items in the water settle after 20 minutes?

- Which items will float?
- Which items will sink?
- Will some items sink and float?
- Which items will dissolve?

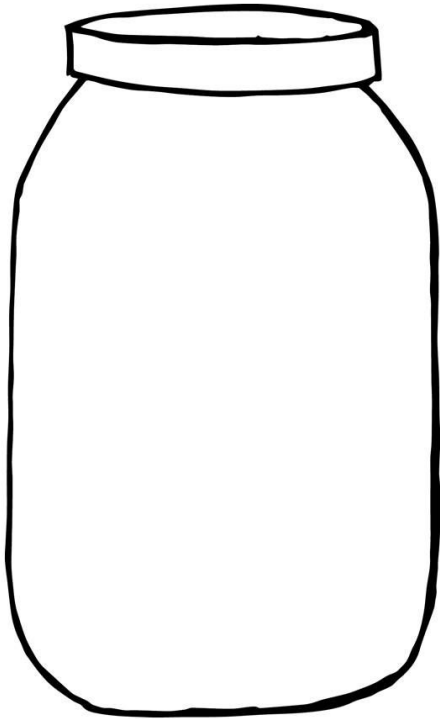
I predict that after 20 minutes _____, _____, _____ will float to the top of the water, _____, _____, _____ will settle out to the bottom of the tank, and _____, _____, _____ will stay mixed in the water.

4. Wait 20 minutes or longer, allowing the ingredients to settle. Go to page 3 again and draw a picture of the jar in the box labeled Drawing #2. What has floated, what sunk? Was your hypothesis accurate? Write what happened below.

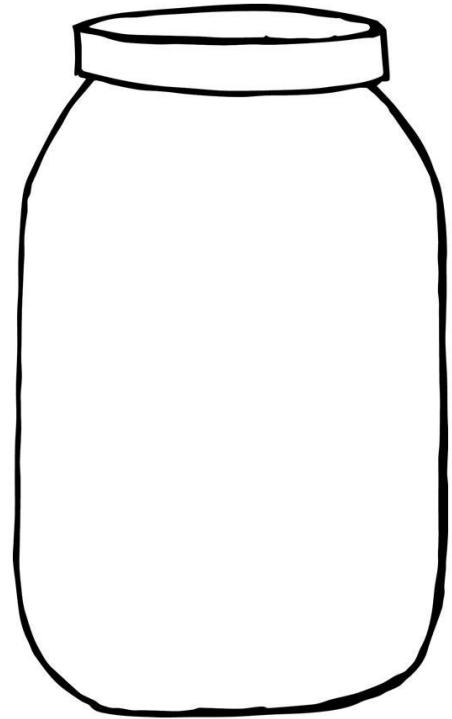
Conclusions:

5. Were your predictions right? Did the items sink and float when you expected them to? Were the liquid ingredients like ammonia and oil more, or less **dense** than water? Why do you think they acted the way they did?

Drawing #1 immediately after shaking the jar



Drawing #2 after 20 minutes



Instructions: Be sure to draw the line where the water is, and label all the ingredients in the jar.

6. Make a list of items that go down the toilet or sink. Write a paragraph about these items. How do you think the things that are put down the drain or toilet behave when they are **settled or floated** in the **Primary Sedimentation** process of wastewater treatment? Explain the benefits of **Primary Sedimentation** for the wastewater treatment process, and why it is important to do it at the beginning of the treatment process.
