

Grade Level/Course: Grade 8 Physical Science
Lesson/Unit Plan Name: Liquid Density Column: Sink or Float?
Rationale/Lesson Abstract: This is a lesson on floating and sinking of liquids, with a demonstration using various liquid examples. A density column can be created in class and shown to students. Students will see that floating and sinking are due to differences in density and is independent of mass, amount (volume) or viscosity. Assessment includes handout with practice on sinking and floating.
Timeframe: 35-45 minutes
Standard(s): 8. All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept: d. <i>Students know</i> how to predict whether an object will float or sink.

Instructional Resources/Materials:

Graduated cylinder. 100mL is okay, but larger cylinders are easier for class to see.

Liquids to use for examples:

- Water
- Oil—one or more types: motor oil, mineral/baby oil, vegetable oil, etc.
- Rubbing alcohol
- Karo's Corn Syrup
- Molasses (or honey)
- Dish soap

Food coloring (optional—to aid visibility for water or alcohol)

Turkey baster (optional—to help keep liquids from splashing when added)

Optional video—from Steve Spangler Science, shows several more substances layered together, and solids in between the liquids:

http://www.youtube.com/watch?v=-CDkJuo_LYs

Assessment handout included below.

Densities of Some Common Liquids	
Liquid	Density (g/mL)
Water	1.0
Rubbing Alcohol	0.8
Corn Syrup	1.4
Molasses	1.4
Honey	1.4
Motor Oil	0.9
Mineral Oil	0.8
Corn Oil	0.9

Activity/Lesson:

WARM UP:

Ashley has three liquids that she wants to pour into a jar—water, oil, and honey. Her friends all had different ideas about what might happen.

Marcus said, “I think the three liquids will all mix together.”

Mona said, “They will probably be in layers. Oil on top, then water, then honey on the bottom.

Maria said, “Honey is the thickest. It will be at the bottom. Oil is almost as thick, so it will be in the middle. Water is thinnest, so it will be at the top.”

Michael said, “It depends on how much of each liquid. Whatever is the most will sink to the bottom.”

Which of her friends do you agree with most?

Why?

LESSON & DEMO:

Be sure to practice before class!

Take the graduated cylinder, and pour in about $\frac{1}{4}$ full of water.

The water may be lightly colored for better classroom visibility.

Ask students to predict: “What will happen if oil is added to the water in the cylinder—Will it float? Sink? Mix in together?”

Pour in the oil, watch it float to the top.

Additional oils may be demonstrated as well.

“Why does it float?”

Now use a liquid that is more dense than both water and oil, like honey, molasses, or corn syrup. Ask the students: “Predict the result of adding the new liquid: Float? Sink? Mix?”

Pour in the molasses. Watch it sink.

“Why does it sink?”

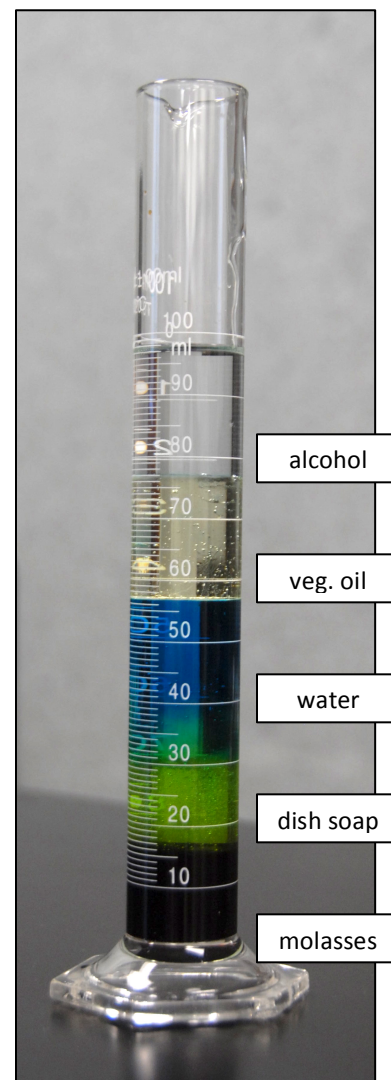
Other liquids may be added as well. A turkey baster may be used if liquids are mixing, or not forming distinct layers. Or they may be poured slowly down the side of the cylinder. **Be sure to practice before class!**

Ask students to predict:

“What do you think would happen if we doubled the amount of alcohol (or oil, or whatever is least dense) at the top?”

“Would that make it sink to the bottom? Down one layer? Mix in? Stay at the top?”

Add more of the lowest-density liquid to the column. Watch it remain at the top of the column. Emphasize that floating and sinking are independent of the amount (volume), or the mass, and depends only on the density of the substance.



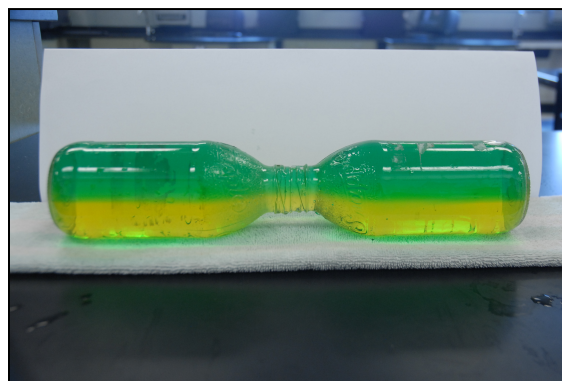
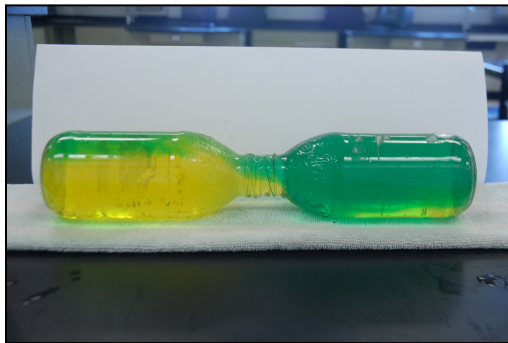
Activity/Lesson continued:

Optional:

You can even make a column with hot water (less dense) and cold water (more dense).

Or use fresh water (less dense) and salt water (more dense).

This can also be accomplished by filling identical bottles with the two types of water, joining the mouths together, and laying them on their sides, as shown:

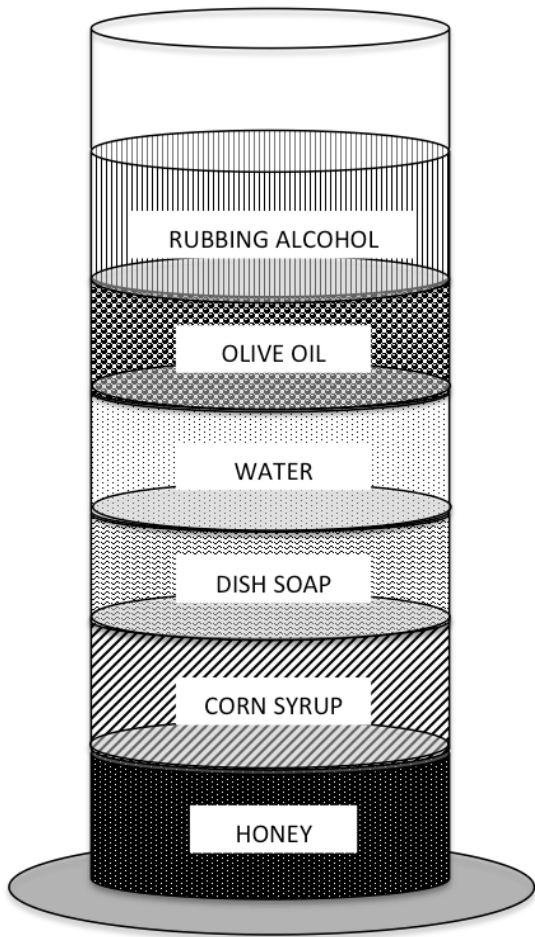


Assessment:

Handout with practice below:

SINK OR FLOAT?

Use the diagram to answer questions #1-5.



1. Which liquid in the diagram is the most dense?

2. How do you know that liquid is the most dense?

3. How many liquids in the cylinder are less dense than water?

4. Which is more dense, olive oil or corn syrup?

5. What do you think would happen if the amount of rubbing alcohol at the top were doubled?

6. Water has a density of 1.00 g/mL. Which of the liquids in the table to the right would float on top of water?

Liquid	Density
Chloroform	1.49 g/mL
Alcohol	0.79 g/mL
Gasoline	0.67 g/mL

Type of Wood	Density
African Teakwood	0.98 g/mL
Balsa	0.14 g/mL
Cedar	0.55 g/mL
Ironwood	1.23 g/mL

7. What type of wood sinks in water?

8. If block of wood has a mass of 49 g and a volume of 50 mL, what kind of wood is it?

9. Wood from a balsa tree has a density of 0.14 g/mL. If an entire balsa tree, with a mass of 2,000 kg, fell into a lake, would it float or sink?

10. Why? _____
