

5th Grade - Lesson 2.3

Name: _____

Activity Sheet

Using Color to Identify an Unknown Liquid

Date: _____

Safety: Wear safety goggles and be sure to follow all safety instructions given by your teacher. Wash your hands after completing the activity.

ACTIVITY

Question to investigate:

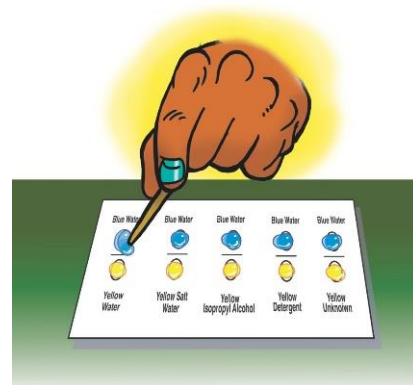
Can you identify an unknown liquid based on how different liquids interact and mix with water?

Materials

- Water in cup (blue)
- Water in cup (yellow)
- Isopropyl “rubbing” alcohol (70%) in cup (yellow)
- Detergent solution in cup (yellow)
- Salt water in cup (yellow)
- 5 Droppers (4 labeled droppers from the previous activities + 1 additional)
- 5 Small cups (4 labeled cups from the previous activities + 1 additional)
- Crayons or colored pencils
- Toothpicks
- Paper towels

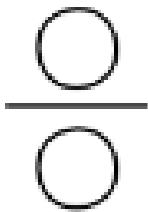
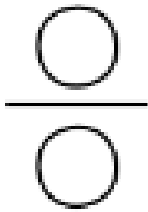
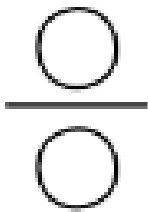
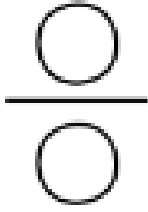
Procedure

1. Add several drops of each yellow liquid and blue water to the labeled circles on the chart to completely fill each circle. Depending on the size of the droppers, you may need to add about 5 drops or more.
2. Use a toothpick to pull the blue water toward the yellow water. It may take a few tries to get the liquids to join. As soon as the two drops meet, lift the toothpick away and discard it. Watch the two drops combine on their own. Do not stir.
3. Use colored pencils to draw what the combined yellow and blue liquids look like as they interact and mix. Also write a description of your observations.
4. When the drawings and captions are complete for the first pair of liquids, combine the second pair of liquids, make a drawing, and record your observations. Continue testing the remaining known liquids in this way.



WHAT DID YOU OBSERVE?

1. Use colored pencils to make drawings of what your combined liquids looked like. Also use the space to write a short description of what you noticed when the drops came together.

Draw what the drops looked like when they joined together.	Describe how the drops combined.
<p>Blue Water</p>  <p>Yellow Water</p>	<p>Colors do not combine completely. A region turns green in the middle, while the ends of the merged liquids remain the original yellow and blue.</p>
<p>Blue Water</p>  <p>Yellow Salt water</p>	<p>Colors combine almost immediately as evidenced by the quick change to green throughout.</p>
<p>Blue Water</p>  <p>Yellow Rubbing alcohol</p>	<p>The yellow and blue liquids appear to “shake” for a time as they combine.</p>
<p>Blue Water</p>  <p>Yellow Detergent solution</p>	<p>Colors combine at a medium rate and result in a more spread-out area of light green.</p>

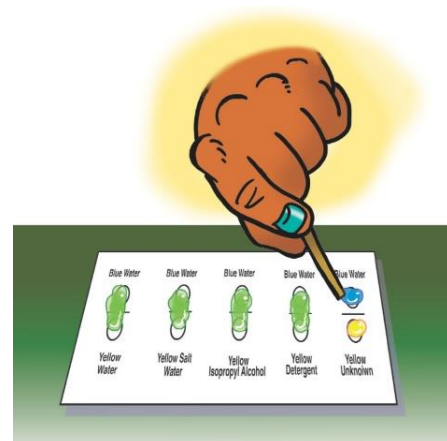
Identifying the unknown liquid

Procedure

1. To figure out the identity of the unknown yellow liquid, test the unknown with blue water, just like you did in the first part of the activity with the known liquids.
2. Compare the way the unknown liquids interact and mix to the drawings and captions you recorded on the Activity Sheet for the known liquids.

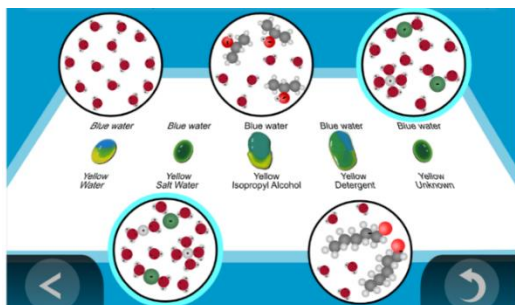
2. What do you think is the identity of the unknown liquid?

Water



EXPLAIN IT WITH ATOMS & MOLECULES

3. You saw illustrations of the molecules of the different liquids. Why do you think the liquids acted differently when they were mixed with water?



The liquids are made up of different ions and molecules. These have their own sizes, shapes and positive and negative charges. Water molecules interact with them differently, so they look different when mixed with water.

TAKE IT FURTHER

When you mixed rubbing alcohol and water, you may have observed a “shaky” motion or movement of the liquids right where they touched and mixed. Here’s another unexpected effect of the interaction of alcohol and water.

Materials

- Disposable plastic plate
- Water
- 1 teaspoon of Isopropyl “rubbing” alcohol 70% in cup
- Cotton swab
- Aluminum foil (about 2 cm long and 1 cm wide)

Procedure

1. Fill a plastic plate with water.
2. Take the piece of aluminum foil and fold it so it is like an “L”. This is your “boat”.
3. Place the aluminum foil on the surface of the water so it floats.



4. Dip one end of the cotton swab into the rubbing alcohol. Bring the dipped end of the swab very close to the water, near the aluminum foil boat, but do not touch the water. Does the boat move? Record your observations in the chart.
5. Very lightly touch the water near the boat and see if the boat moves. Record your observations in the chart.
6. Pick up your boat and very gently lower it into the cup of rubbing alcohol so that just the bottom touches the alcohol.
7. Lift the boat up and place it on the surface of the water in the center of the plate. Record your observations in the chart.



What happens when you:	Record your observations.
Bring the cotton swab with rubbing alcohol very close to the aluminum boat and water?	The boat moves away from the cotton swab.
Touch the water with the cotton swab and rubbing alcohol?	The boat very quickly moves away from the cotton swab.
Touch the bottom of the boat in rubbing alcohol and then put the boat in the water?	The boat zooms around in circles.

4. How do you think rubbing alcohol molecules might be interacting with water molecules on the surface of the water to cause the movement of the boat?

Maybe the alcohol molecules come off the cotton swab and move over the surface of the water, pushing the boat.