

## Creating a Mystery Bottle (For children ages 4-8)

This simple and fun experiment illustrates the properties of three liquids: oil, water, and food coloring.

| 30 – 40 minutes |

### Skills Developed:

- Hypothesizing
- Observing
- Experimenting
- Measuring
- Using scientific process

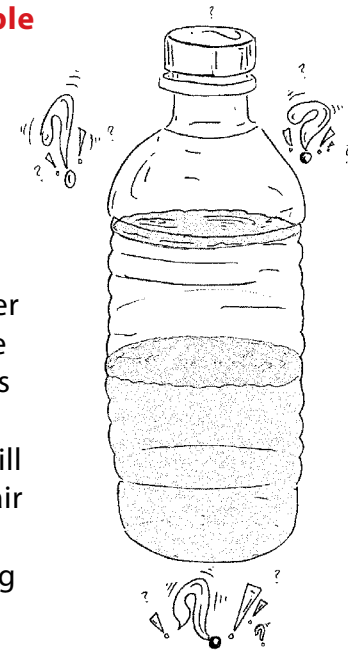
### Materials Needed:

- 3-4 clean, clear plastic water bottles
- A bottle of vegetable oil
- Two 8 oz. measuring cups
- 2 funnels
- Food coloring
- Water
- Newspaper or a plastic cloth
- Paper towels and sponges

### What's the Science?

This experiment examines liquids that mix, and those that don't. Water and food coloring mix with each other, forming a **solution**. Water is the **solvent**, and the coloring is the **solute**. When a solute dissolves, the particles spread evenly through the solvent in a process called **diffusion**. Liquids that mix are called **miscible** (miss-ible) liquids.

**Immiscible** (im-miss-ible) liquids are ones that don't mix together. If immiscible liquids, such as water and oil, are combined, no matter how hard they are shaken, water, the heavier (or denser) liquid will settle to the bottom and oil, the lighter (or less dense) one will rise to the top. Trying to mix the two together will create various types of bubbles: air and oil bubbles that are rising to the top, and water bubbles, falling to the bottom.



## Getting Ready:

Prepare a Mystery Bottle using one measuring cup and funnel for oil, the other for water. Measure 2-4 oz. of water, add 1-2 drops of food coloring, and pour into the bottle. Use the other cup and funnel to measure 2-4 oz. of oil. Pour it into the bottle. Screw the top on tightly.

Cover a table with newspaper or plastic cloth. Store materials out of sight to preserve the "mystery." Keep paper towels or a sponge nearby for cleanup.

## Activity:

1. Ask your daughter to make discoveries by first observing, then rolling, shaking, and turning the mystery bottle upside down. Talk about what happens with each movement. A 6-8 year old child can open the bottle to smell or touch the liquid. Ask:
  - What can you tell me about the bottle?
  - How do you think this was made? Could we make one of these?
2. Let your daughter make her own mystery bottle using one measuring cup and funnel to add water and 1-2 drops of food coloring. She can add an additional color, but too many colors will make it muddy brown. Ask:
  - What happened when the food coloring went into the water?
  - What happened when you added a second color?
  - Tell me about what you are discovering.

3. Have her use the other measuring cup and funnel to add oil to the colored water and ask her to describe what she sees.
4. Encourage her to experiment, turning the bottle upside down, shaking it, and rolling it around. Ask her to describe her discoveries:
  - What happens when you shake the bottle?
  - What happens if you let it settle for a while?
  - What happens if you hold the bottle upside down?
5. Guide her to the conclusion that oil will always separate from water and, being the lighter liquid, will rise to the top.

## Additional activities for different age-levels:

### 4 year olds

Ask your child to use sight, smell, and touch to explore small containers of oil and water before making a mystery bottle. Encourage her to talk about her observations. Place drops of each liquid on various surfaces, such as paper towels, wax paper, or newspaper. Observe and compare the results. Discuss the differences she observes.

Try some color mixing with drops of food color in the water (red + blue=purple; blue + yellow=green; red + yellow=orange).

*Activities for different age-levels (con't)*

### **5-6 year olds**

Have your child use her senses to explore small containers of oil and water. Ask her to describe what she discovers and how the liquids are different and similar. Help her record her discoveries through drawings, dictation, or, if she is ready, writing.

Add other liquids, such as vinegar or syrup, to the experiment. Make mystery bottles using different combinations of miscible and immiscible liquids — vinegar, water, and food coloring, or syrup and oil.

### **7-8 year olds**

Explore different combinations in creating the mystery bottle. Try mixing the food coloring and oil before making the bottle, or changing the sequence of adding liquids. Based on the observations, ask her to make a second bottle in a different way and record the results in writing and with illustrations.

## **If Your Child Has a Disability**

All the activities can be done with children with a wide range of disabilities by making some modifications. You are the best judge of what those modifications might need to be, but here are some suggestions that have worked well.

### **For a child who is blind or visually impaired:**

Use extra food coloring if your child can identify strong colors. Explore the oil and water through touch prior to introducing the bottles. Use different kinds of containers for each liquid so that your child can differentiate them by the container. Provide clear verbal descriptions of each step of the experiment.

### **For a child who is deaf or hard of hearing:**

Review ASL and English (or child's native language) vocabulary words and concepts, such as "shake," "liquid," "mixture," and "measure." Have your daughter draw what she observes in the experiment.

### **For a child who is physically disabled:**

Transfer the food coloring to larger squeeze bottles for easier grasping and greater control. Use measuring cups with curved or crooked handles. Your child can use her arms, a mouth stick, or other device to knock the bottle over and roll it around. If your child is non-verbal, ask questions that she can respond to with "yes" or "no" or a gesture: Did you notice the bubbles? Were they at the top? In the middle?

### **For a child who has learning/emotional disabilities:**

Transfer the food coloring to larger squeeze bottles for easier grasping and greater control. Review all of the vocabulary words used in the activity, such as "shake," "liquid," "mixture," and "measure." Create a step-by-step word/picture chart illustrating the experiment.



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**Science:  
It's a Girl  
Thing!**