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**Rising Water**

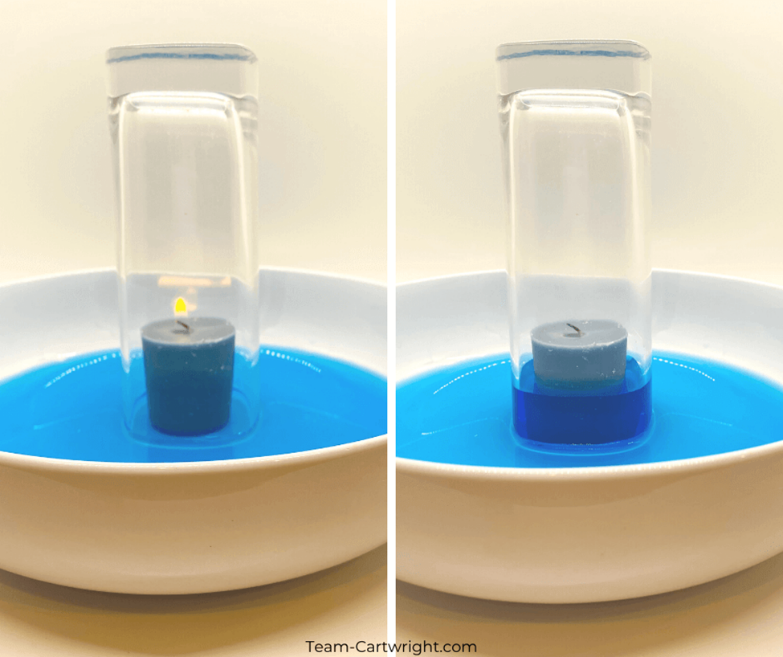


**K-2**

# **Materials:**

* Glass or Jar
* Small Votive Candle
* Shallow Dish
* Water
* Food Coloring (Optional)
* Matches or Lighter

# **Instructions:**

1. Take a shallow dish and fill it with water. You want just enough to cover the bottom
2. If you want, add food coloring to the water. This just makes it easier to see and is fun, so totally optional.
3. Place your small votive in the middle of the dish.
4. Light the candle, then quickly place the empty glass over the flame, touching the water. Now wait while the candle burns out.
5. Watch as the water rises up into the glass!

# **The Science:**

There are two main components of this experiment that cause the water to rise, a physical component and a chemical component. These two components work together to make this experiment happen.

# **The Chemical Component:**

 The candle burning creates a chemical reaction. The flame burns both the paraffin (candle wax) and the oxygen under the glass. This reaction uses up oxygen and creates water and carbon dioxide as a result. Twice as much oxygen is burned than carbon dioxide produced, so the volume of air in the glass decreases.

(Note the total amount of matter in the jar remains the same. Conservation of matter tells us this. But some molecules are larger than others and take up more space in terms of volume.)

# **The Physical Component:**

The physical component is why the water level in the glass doesn’t rise as soon as the candle is covered. The candle warms the air, and this increases the air volume inside the glass. When the candle burns out (because all the oxygen is used up), the temperature cools quickly. This temperature decrease means the volume also decreases, which lets the water rise to fill up that space. This is called Charles’s Law.

Charles’s Law tells us that the ratio of volume to temperature must remain the same, so if one goes down the other goes down too.

**The Big Picture:**

These two parts of the experiment work together. Both the volume change and temperature also affect the pressure in the system we created. When temperature decreases (the physical component) and the size of the matter decreases (the chemical component), the pressure of the gas inside the glass decreases too.

This lower pressure inside means the water can rise as well. This is explained by the Ideal Gas Law.

The idea of air pressure can be a bit challenging for young children to understand. It isn’t something they can clearly see, so that makes sense. But they can understand something changing size, in other words when volume changes.

If the air inside the glass takes up less space, it makes sense for the water to fill in that space and rise inside the glass.