Observing Density of Gases and Liquids

Background
You have learned about the density of gas, and how it is affected by temperature change. You may have observed this through videos and/or a teacher demonstration prior to this lab. In this lab you will investigate how liquids can also be affected by temperature change. This will help you understand temperature changes in the real-world, such as in ocean currents, and natural hot springs.

Pre-lab Questions
1. In your own words describe the meaning of convection.

2. Give an example of how you experience convection in your daily life.

3. Explain how hot air and cold air are different.

Materials (per group)
- Fish tank almost filled to capacity with water
- Food coloring
- Baby food jar
- 2 straws
- Hot glue (for teacher use only)
- Hot water
- Stopwatch

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow the teacher’s instructions for cleanup of materials and disposal of chemicals.
**Procedure**
1. Fill your convection jar (baby food jar) to capacity with warm water and add several drops of food coloring.
2. Cover the jar with its lid (the lid should also have 2 secured straws attached to it, prepared by your teacher). Make sure the straws are also filled with water—if not add more warm water to them so it is at maximum capacity.
3. Place the jar gently on the bottom of the fish tank. Start your stopwatch.
4. Carefully watch what happens, focusing on the color changes throughout the containers.
5. Record your observations at the time increments described in the table below.

**Observations**

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 seconds</td>
<td></td>
</tr>
<tr>
<td>2 minutes</td>
<td></td>
</tr>
<tr>
<td>5 minutes</td>
<td></td>
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</tbody>
</table>

**Analysis**
1. How is heating a gas similar to heating a liquid? How are they different? Use examples from what you learned today to support your answer.

2. If you could see the tiny particles that make up a gas or a liquid, how would cold particles be different than warm particles? Use a sketch to help your explanation.

3. Can *convection* be helpful to you? Explain why or why not.