**What are the particles doing? Using Kinetic Molecular Theory to help explain observations**

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Partner\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Recall: Kinetic molecular theory (KMT) and its main assumptions:**

1. All matter is made of tiny \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. All particles are in constant random \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. The motion of particles is related to their temperature/energy. As temperature increases, particles move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Particles in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are packed very close together. In a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ they have some freedom of movement, and in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ they are very far apart.

Tasks: Complete task 1 and task 2 with your partner. **These do not need to be completed in order.**

**Task 1:**

**Question**– what happens to a gas when it cools down or heats up?

**Hypothesis:** If a gas is heated it will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, if a gas is cooled it will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Materials:** balloon, string, ruler, beaker of hot water, beaker of ice water

**Procedure:**

1. Blow up the balloon so that it is about the size of your two hands clasped together. Use a string to measure around the fattest part of the balloon. Record your measurement.
2. Put the balloon into the hot water. Push it under but do not burn yourself. Once it has been in the water for a couple of minutes pull it out and quickly repeat your measurement with the string. Record your measurement.
3. Put the balloon into the ice water. Push it under and hold it under for a couple of minutes. Again, remove it and quickly measure and record its size using the string and ruler.

**Task 2:**

**Question:** How does the movement of particles differ in liquids of different temperatures?

**Hypothesis:** If a liquid is hotter, the particles will move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If a liquid is cooler, the particles will move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Materials**: food colouring, 100mL graduated cylinder, 150 mL beaker, thermometer, ice water, kettle, beaker of room temperature water, timer

**Procedure:**

1. Use your graduated cylinder to measure 100mL of ice water. Pour the water into your beaker.
2. Measure and record the temperature in your data table. Take the thermometer out of the beaker.
3. As one partner drops a single drop of food colouring into the water, the other partner starts the timer. DO NOT STIR!!! Stop when the water is a uniform colour. Try to be consistent in your judgement of “uniform colour”.
4. Pour your coloured water down the drain the repeat steps 1-3 with at least three other water temperatures. You will need to mix hot/cold/room temperature water to achieve different temperatures.

**Data**

|  |  |
| --- | --- |
| Temperature (°C) | Time for colour to completely mix (seconds) |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Analysis/Conclusion:** Explain your observations from task 1 and task 2 using kinetic molecular theory. Your explanation should be legible, be written in complete sentences, and include reference to the motion of the particles.