

SPS5 - Students will compare and contrast the phases of matter as they relate to atomic and molecular motion.

a. Compare and contrast the atomic/molecular motion of solids, liquids, gases, and plasmas.

**Learning Target:** I will be able to explain, demonstrate, and annotate the changes in molecular motion and structure of solids, liquids, gases, and plasmas once heat is added or taken away by completing a phase change lab and constructing phase change diagrams.

Phase Change Lab



Materials: Beaker, Ice, Water, Thermometer, Graph paper, hot plate

Task: Observe and record data on the phase change of ice to water to steam

Predictions:

- 1) What will happen to the molecular structure of the water as heat is added?
- 2) What happen to the physical properties of ice as heat is added?
- 3) Are you adding or subtracting energy during this experiment?

Procedure:

- 1) Pour about 75 ml of water into the beaker

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- 2) Place 5 ice cubes into the water and record the temperature of the water \_\_\_\_\_
- 3) Place the water on the hot plate.
- 4) Turn the hot plate up to highest level.
- 5) Record the temperature of the water every 30 seconds for 15 more minutes. KEEP THE THERMOMETER IN THE BEAKER OF WATER WHEN YOU ARE TAKING THE TEMPERATURE. DO NOT, I REPEAT DO NOT TAKE THE THERMOMETER OUT TO TAKE THE TEMPERATURE OF THE WATER. DOING THAT WILL INVALIDATE YOUR DATA RESULTS!!!
- 6) Use graph paper to prepare a line graph comparing time versus temperature. Time will go on the X-axis and temperature will go on the Y-axis.

Answer the following questions:

- a) What was the initial temperature of the water? \_\_\_\_\_ Celsius
- b) What was the highest temperature that the water reached? \_\_\_\_\_ Celsius
- c) What was the temperature of the water as the ice was melting? \_\_\_\_\_ Celsius
- d) What were the phase changes that you were observing? (liquid to gas, liquid to solid, solid to liquid, gas to liquid, etc.)
- e) Can you explain the temperature change (or lack of temperature change) as the ice was melting? As the water was heating up?
- f) Describe the physical changes you observed and the energy associated with those changes.

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| Time | Temperature of Water | Time  | Temperature of Water |
|------|----------------------|-------|----------------------|
| :30  |                      | 8:00  |                      |
| 1:00 |                      | 8:30  |                      |
| 1:30 |                      | 9:00  |                      |
| 2:00 |                      | 9:30  |                      |
| 2:30 |                      | 10:00 |                      |
| 3:00 |                      | 10:30 |                      |
| 3:30 |                      | 11:00 |                      |
| 4:00 |                      | 11:30 |                      |
| 4:30 |                      | 12:00 |                      |
| 5:00 |                      | 12:30 |                      |
| 5:30 |                      | 13:00 |                      |
| 6:00 |                      | 13:30 |                      |
| 6:30 |                      | 14:00 |                      |
| 7:00 |                      | 14:30 |                      |
| 7:30 |                      | 15:00 |                      |

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