

LAB: Energy and Phase Changes in Water

Name _____

INTRODUCTION: As water changes phase (physical state), heat energy is either being **released** by the water (*freezing* and *condensing*) or **absorbed** by the water (*melting* and *vaporizing*). The heat absorbed or given off during a phase change is called *latent heat*. Studying these phase changes helps us understand the flow of energy through the environment, especially in the troposphere.

Which absorbs more heat energy - water melting or water vaporizing?

Which releases more heat energy - water freezing or water condensing?

While melting ice in a pot of water, does the temperature of the mixture increase, decrease or stay the same?

Can ice be different temperatures, or is it always 0°C?

PURPOSE: We will observe temperature changes as heat is added to ice water until it vaporizes. We will compare the relative amounts of heat absorbed by the water during melting and vaporizing.

PROCEDURE:

1. **You must wear goggles during this experiment.**
2. Pre-heat a warming plate at its highest setting.
3. Fill a pot with 500ml of crushed ice and 100ml of cold water.
4. Insert a 100°C thermometer so that it never touches the sides of the pot.
5. Stir the mixture vigorously during the entire procedure.
6. When the hot plate is fully hot, and when the mixture reaches its lowest temperature, place the pot on the hot plate. Continue stirring.
7. Record the temperature of the mixture on the graph every 30 seconds
8. Note when the melting begins, when it is completely melted, and when the water begins vaporizing vigorously.

QUESTIONS:

1. According to your graph, the temperature increased the most when the ice was (MELTING / MELTED).

2. According to your graph, the temperature increased the least when the ice was (MELTING / MELTED).

3. After the water started to boil, the rate of temperature change _____.

4. Before the temperature began its rapid rise, the energy being added was being used to _____.

5. After the temperature started its rapid rise, the energy being added was used to _____.

6. Once the water began to vaporize, the energy being added was used to _____.

7. Another word for the potential energy that is gained or lost from a material as it changes phase is _____.

8. Compare the amounts of energy added during melting and vaporizing. Which required more energy?

CONCLUSION: A) Explain what happens to heat energy added to ice as it melts (see question #4).

B) Explain what happens to heat energy added to liquid water (see question # 5).

