

## Latent Heat Lab Demo Version

Watch the demonstration video and answer the questions. <https://youtu.be/1PcnCWZP710>

You do not perform the lab, just read and study the diagrams of how the lab is set up.

1. Label the following as “slowest”, “medium”, and “fastest”.

\_\_\_\_\_ water vapor molecules

\_\_\_\_\_ frozen water molecules (ice)

\_\_\_\_\_ liquid water molecules

2. When sweat (mostly liquid water) evaporates from your skin, why does this help to cool your body?

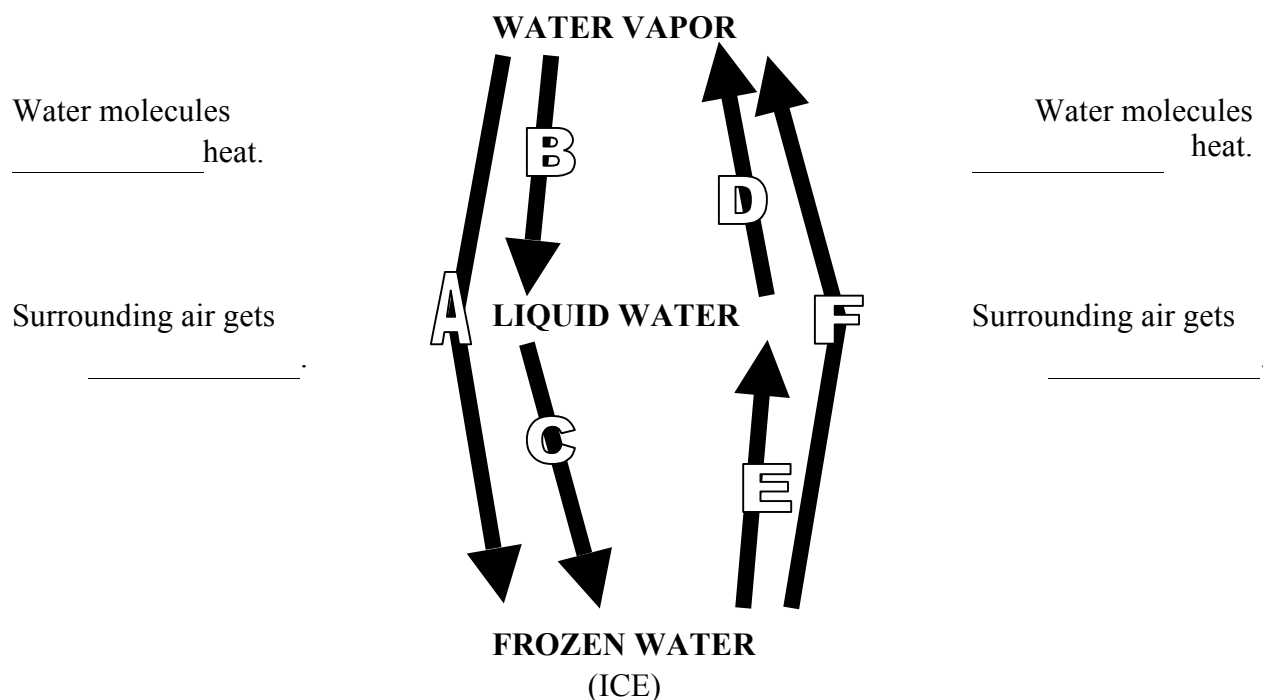
3. What is the normal freezing point of water?

\_\_\_\_\_ F

\_\_\_\_\_ C

4. What is “super-cooled water”?

5. Look at the diagram shown below. Name the phase changes and then fill in the blanks.



### Materials

400 ml plastic beaker, two thermometers, two test tubes, drinking straw

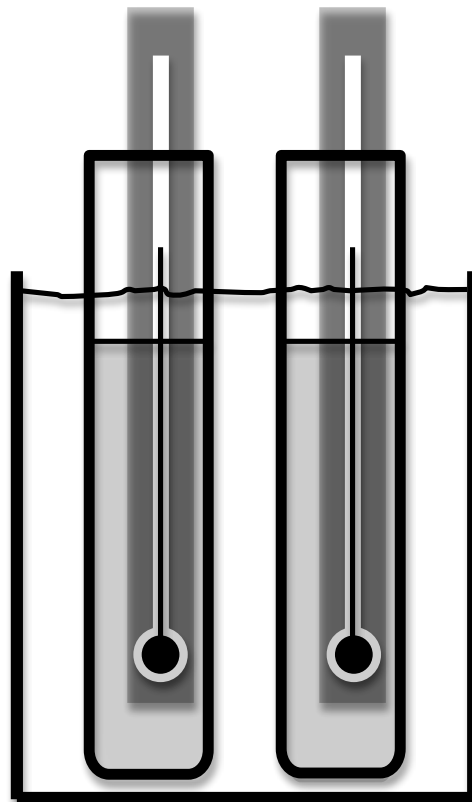
**IMPORTANT:** Rinse the test tubes and the thermometers at a sink before you start.

1. Have your instructor fill your beaker with cold, salty slush. Set the beaker aside. Get two test tubes.  
**REMINDER:** Rinse them out (do not dry them). Add cool tap water to two test tubes until they are about 2/3 full.
  2. Get two thermometers. **REMINDER:** Rinse them off (do not dry them). Place one thermometer into each test tube. Set the test tubes into the slush as shown below.
  3. Monitor the temperatures of the water in the test tubes. After 5-10 minutes, the temperatures in the test tubes should be way below the freezing point. When the temperature reaches  $-5^{\circ}\text{C}$  you are ready to go on to the next steps. Leave the thermometers in the tubes as you do the steps #4 and #5 below.
  4. Carefully take **ONE** of the test tubes out of the slush and use a drinking straw to squeeze a small amount of snow into the tube. Observe what happens to the water AND the temperature, and then describe it in the space below. Use sentences!
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5. Do the same thing with the other tube. **PAY CLOSE ATTENTION TO THE TEMPERATURE** during the 30 seconds after you drop the snow in. Describe (sentences) what happened.
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**DO NOT DISTURB!**

**You might cause the water to freeze before it becomes super-cooled.**



When you are finished, rinse the tubes and thermometers off and put them back. Empty the slush back into the plastic box so that it can be used again next period. Answer the questions on the next two pages.

1. How cold did the water in the tube(s) get before you dropped the snow into it? \_\_\_\_\_ C

Did the water in the test tube(s) become “super-cooled” when you dropped the snow into it? \_\_\_\_\_

2. What happened to the temperature of the thermometer in the test tube as the water froze?  
Circle one.

a. The thermometer got warmer because the water molecules released heat.

b. The thermometer got colder because the water molecules absorbed heat.

3. Why did this happen? Circle one.

a. Water molecules absorb heat from their surroundings as they changed from liquid to solid.

b. Water molecules release heat to their surroundings as they changed from liquid to solid.

4. As winds force very humid air up the western slopes of mountains in northwestern Montana, the air is cooled by expansion, causing clouds to form. As vapor changes to solid cloud crystals, the water molecules would . . . (circle one)

a. absorb heat from their surroundings, making the air colder

**HINT:** Diagram on  
First page may help.

b. release heat to their surroundings, making the air warmer

5. As rain falls through very dry air, much (or all) of the rain may evaporate. As this falling rain evaporates the water molecules . . . (circle one)

a. absorb heat from their surroundings as liquid changes to vapor

b. release heat to their surroundings as liquid changes to vapor

6. When a hard frost is expected, orange growers may spray their trees with water to keep the oranges from freezing. As the water freezes, the ice provides insulation for the fruit within. As the water freezes, this helps to prevent the fruit from freezing because water molecules . . . (circle one)

a. absorb heat from their surroundings (air, etc.) as they change from liquid to ice

b. release heat to their surroundings (air, etc.) as they change from liquid to ice

7. A psychrometer, which is used to measure relative humidity, consists of a wet-bulb and a dry-bulb thermometer. As water molecules evaporate from the wet bulb the water molecules \_\_\_\_\_ (absorb/  
release) heat, causing the wet-bulb to become  
\_\_\_\_\_ (warmer/colder) than the dry bulb.

8. TV weather broadcasters occasionally say that a storm has “lots of energy”. Why does a storm that contains an abundance of water vapor have “lots of energy”? Circle the correct answer.

- a. The storm generates heat as a result of friction between water molecules and the ground.
- b. The presence of water molecules in the air makes the air go faster.
- c. The water molecules in the air absorbed heat in order to evaporate from the ocean.

9. Circle the three phase changes listed below that would release heat into the air.

liquid water changes to vapor

ice changes to liquid

vapor changes to liquid liquid

frost changes to vapor

water changes to ice

vapor changes to frost

10. Consider the phase change listed in question #10 above. Complete the statement below by circling the correct choice.

Water molecules release heat into the air if they change. . . (Circle one.)

- a. from a phase where they are going slower to a phase where they are going faster
- b. from a phase where they are going faster to a phase where they are going slower