

## Chem Catalyst:

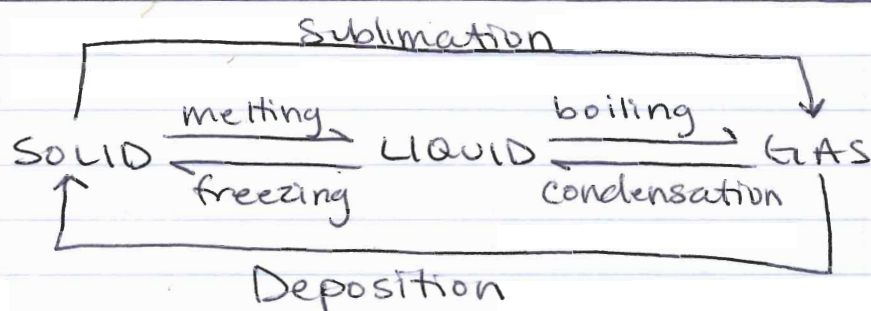
Q: What is happening to the water?

Q: Why is the temp. of the water  $212^{\circ}\text{F}$ , not  $350^{\circ}\text{F}$ ?

Suppose you put a pot of water on the stove on "high" ( $\sim 350^{\circ}\text{F}$ ). After the water boils for 10 minutes the temp. of the water is  $212^{\circ}\text{F}$ .

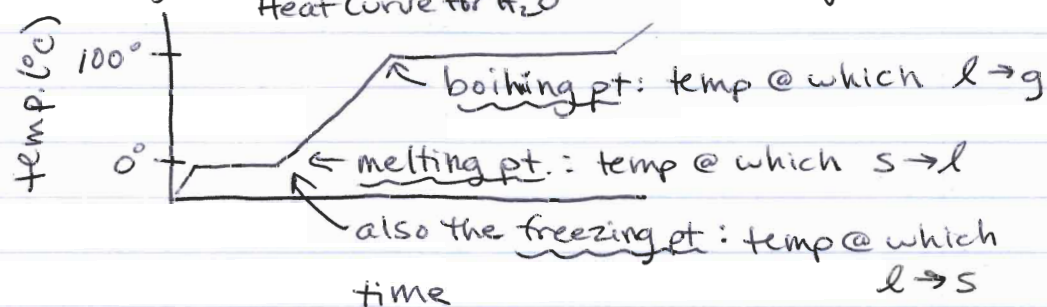
## Notes:

• Review of Phase Changes:



• What are Heating Curves?

• graphs that show how temperature changes as a substance changes phases



196

**Processing the data:**

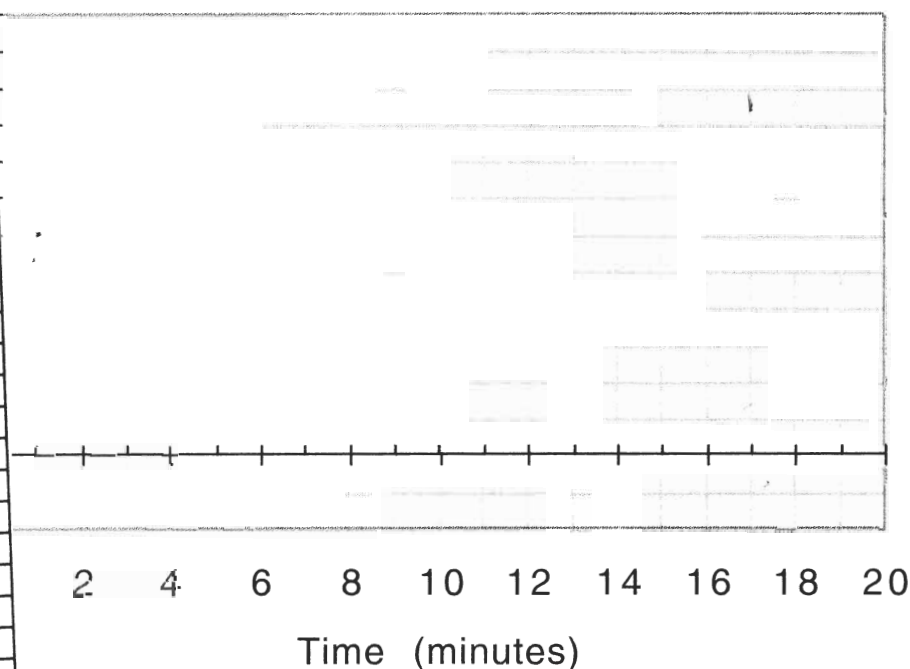
1. Make a graph with temperature on the y axis and time on the x axis.
2. On the graph, label the areas where the following phase or phases are present: solid, both solid and liquid, liquid, both liquid and gas.  
temperature at which ice melts and the temperature at which water boils (melting point and boiling point of water).

**Phase Data Table**

ice cubes were placed  
and placed onto a hot  
digital thermometer is used  
the temperature over time as  
water is heated.

Temp (°C)	Time (min)	Phase
-20	0	solid
-7	0.5	solid
0	1	solid/liquid
0	2	solid/liquid
0	3	solid/liquid
21	4	liquid
48	5	liquid
70	6	liquid
97	7	liquid
100	8	liquid/gas
100	9	liquid/gas
100	10	liquid/gas
100	11	liquid/gas
100	12	liquid/gas
100	13	liquid/gas
100	14	liquid/gas
100	15	liquid/gas

**Heating curve of Water: Temperature vs. Time**



**Answer the following questions:**

1. Describe your graph. *like steps*
2. How warm can an ice cube get? Explain.  
*0°C, any higher it melts*
3. The boiling point of water is 100°C. What do you think the boiling point of a substance tells you?  
*how hot it can get before it turns to a gas*

**Making Sense:**

Why do you think the graph is not a straight line?

(2/8)

# The Heat is On



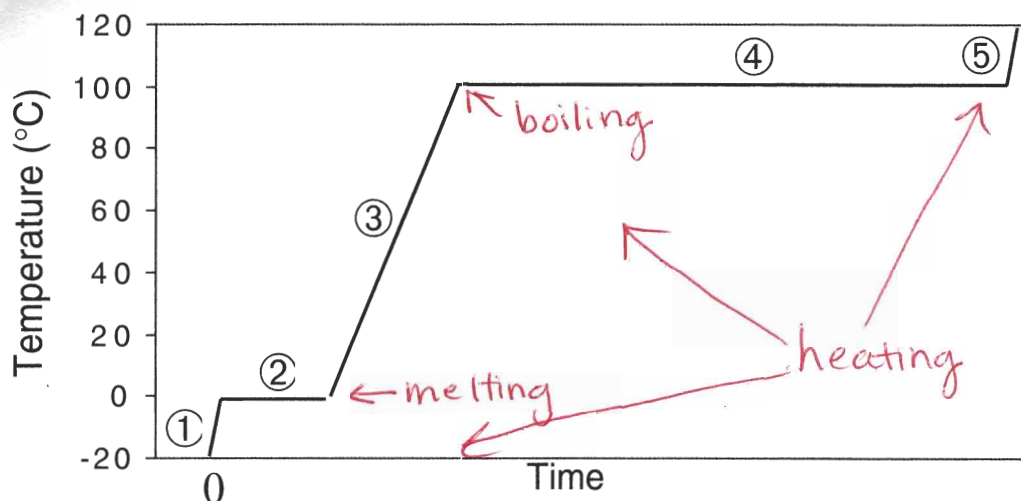
Name: \_\_\_\_\_

Period: \_\_\_\_\_ Date: \_\_\_\_\_

**Purpose:** This lesson processes the heating curve of water in greater detail, examining what is happening at each stage.

## Heating curve of water

A graph of the heating curve for water is shown below. The graph is not to scale but it is drawn to emphasize differences in the amount of time required for each of the 5 steps.



Refer to the drawing to answer the following questions.

1. For each of the five stages shown on the graph, list what phase or phases are present:

Stage One: *solid*  
 Stage Two: *solid/liquid*  
 Stage Three: *liquid*

Stage Four: *liquid/gas*  
 Stage Five: *gas*

2. Label where each of the following is happening on the graph: melting, boiling, heating.  
 3. Describe what is happening at Steps 2 and 4 on the graph where the temperature does not change for a period of time.

*phase change*

4. What is happening when the line is slanted?

*temp of water increases*

5. At what point on the graph is all of the ice gone? *above 0°C*  
 6. At what point on the graph is all of the liquid gone? *above 100°C*



7. If you have more than one phase of water present what does it tell you about the temperature of the water?

temp is not changing

8. If you have only one phase of water present what do you know about the temperature of the water?

temp is changing

- ~~9.~~ What patterns do you see in the heating curve?

- ~~10.~~ Do you think other heating other substances and plotting temperature vs. time would result in a similar pattern or heating curve? Why or why not?

- ~~11.~~ Look at the graph from the previous class. For the same amount of water, does it take more heat to melt ice, or to boil water completely. Explain your thinking.

### **Making sense question**

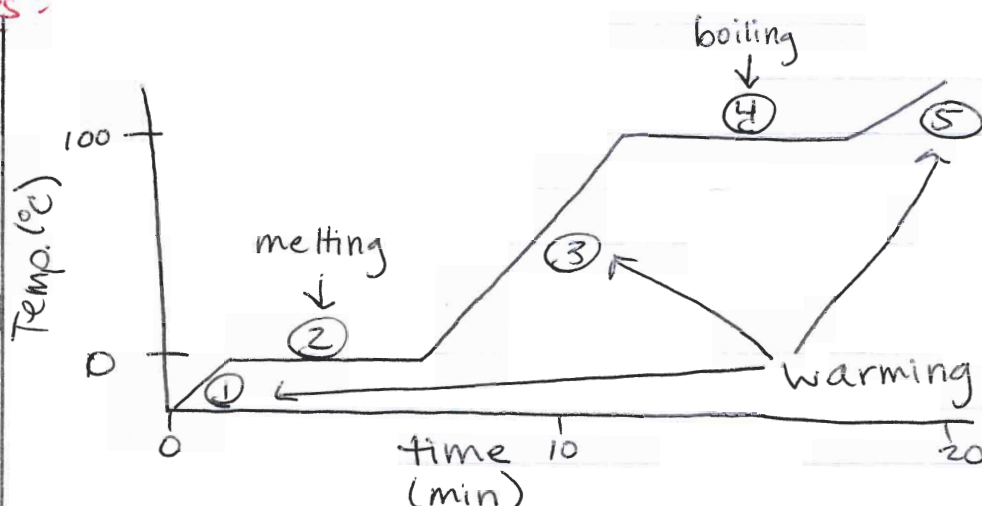
Explain in your own words what you think the difference is between heat and temperature.

### **If you finish early:**

Look at the graph from the previous class. Does it takes more *time* to increase the temperature of 10 grams of ice or 10 grams of liquid water by 10°. Explain your answer.

## Making Sense Notes:

• What is the difference btwn heat & temp?



- Heat: is a form of energy
  - when a substance is "heated", energy is going into the substance
  - 2 outcomes of heating:
    - ① substance changes phase (flat parts of graph)
    - ② substance changes temp. (steep parts)
  - \* it takes more heat (energy) to boil than melt a substance
    - takes more energy to make them move as fast as gas molecules
  - alt. definition of heat: the transfer of energy btwn 2 objects due to temp. differences
    - moves from ↑ temp. to ↓ temp.
  - measured in Joules (J) or Calories (C)
- Temperature: a scale that measures the speed of molecules in random motion
  - used to measure heat/energy of molecules