Challenging Changes

Problem: How does heat energy effect states of matter

INTRODUCTION

Matter comes in three basic forms: solids, liquids and gasses. Heat energy causes the particles that make up matter to move faster or slower. This heat energy can cause matter to change its state.

The first change of state we will look at is when a solid changes to a liquid. This is called melting if heat energy is added, or freezing if heat energy is removed. Pure water melts and freezes at 0 degrees C. If heat is added it melts, if removed it freezes.

The second change of state or phase is from a liquid to a gas. If heat energy is added this is called either boiling or evaporation. If the heat energy is removed, this is called condensation. In the case of water, when heat energy is being added to liquid water it causes the molecules to fly out forming water vapor and steam.

Procedure

I. **Setup**
   a. Put your goggles on.
   b. Fill the 400ml beaker with 100ml water
   c. Add ice until the beaker measures 250ml

II. **Temperature Readings**
   a. Take a temperature reading before putting the beaker on the burner.
   b. Take the temperature reading in the middle of the ice water mixture.
   c. Make sure you stir the sample well before taking your readings.

III. **Heat the sample.**
   a. Light your alcohol burner.
   b. Place the beaker on the ring stand.
   c. Every 2 minutes, take a temperature reading and place info on your data table.
   d. On Day 1, we will heat the water & ice combination to approximately 60 degrees.
   e. On Day 2, we will heat the water from 60 degrees to boiling.

IV. **Observations**
   a. Record under OBSERVATIONS when
      i. Ice present
      ii. All ice melted
      iii. Just water present
      iv. First bubbles appear (little bubbles)
      v. When first bigger bubbles rise to the surface
      vi. When water is boiling fast
      vii. When water vapor is present.

V. **GRAPH**
   a. Plot the temperature vs the time on the graph and connect the points in a smooth curve
   b. Also mark the following events
      i. Last time ice was present
      ii. Water started to boil

Changes Lab Name _____ Per _____

Essential Question _____

Time	Temp C	Observations	Time	Temp	Observations
0			15		
1			16		
2			17		
3			18		
4			19		
5			20		
6			21		
7			22		
8			23		
9			24		
10			25		
11			26		
12			27		
13			28		
14			29		

1.Which state of matter are the particles the most energetic

2. How does heat energy effect the movement of the water molecules

3.What happens to the form of matter during a change of state

4.What happens to the temperature of the water a

5.What happens to the temp as long as ice is present (Rise Lowers Stays fairly constant)

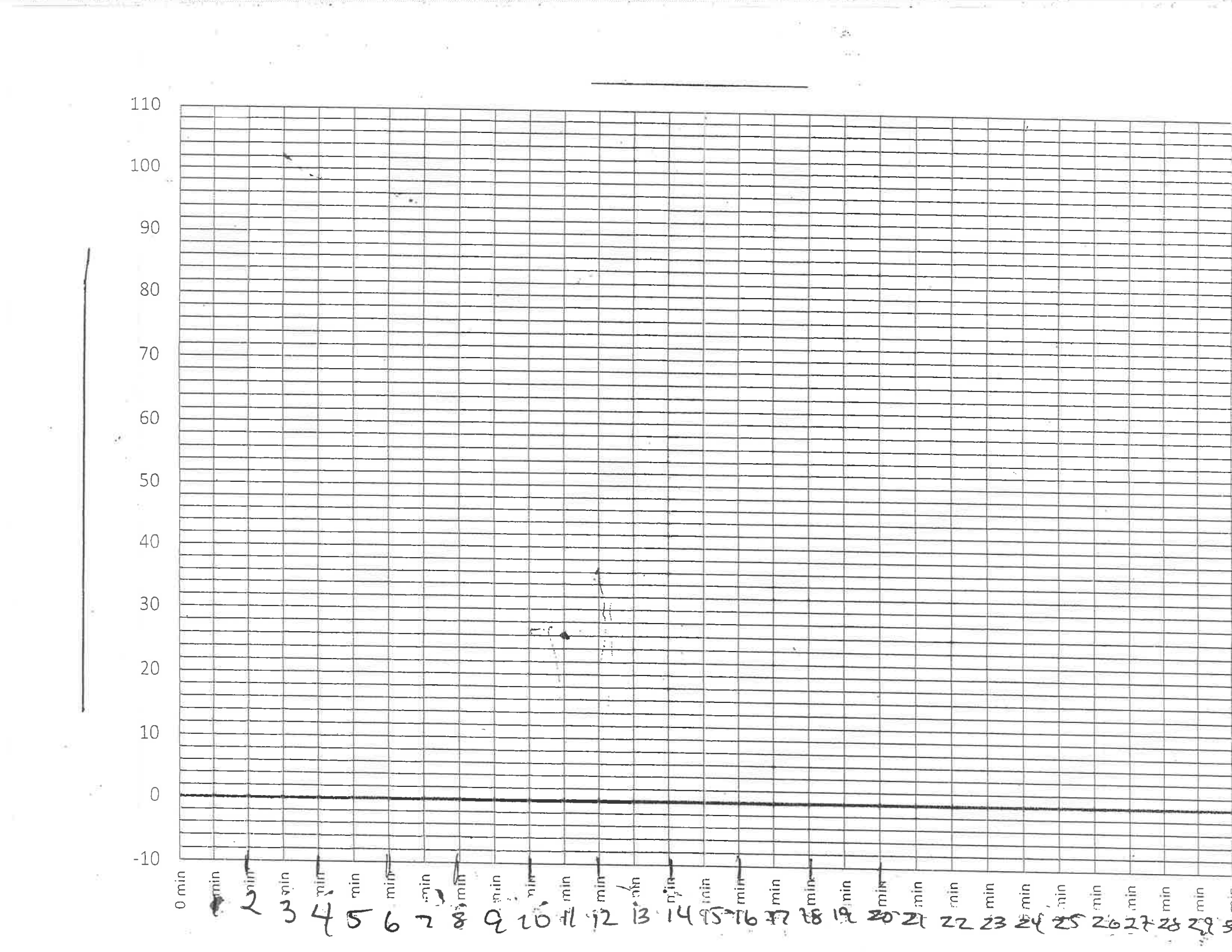
6. What happens to the temp once all the ice is melted?? Look at your graph

7.What is boiling and what temp does water boil at

8. What is happening to the motion of the molecules as heat energy is added to the liquid

9. What happens to the temp once the water starts to boil?

10. What is the hottest you can get pure water at sea level?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