

## Investigating Phase Changes

### Determining the Melting/Freezing Point of a Substance

#### Introduction:

Matter can exist in three phases: solid, liquid and gas. When a substance is changing from one phase to the next, a phase change is occurring. During this unique moment, both phases of matter can exist at the same time. While this is occurring, the temperature of the substance remains constant even though energy is still being added. This lab is designed to allow you to witness this event taking place and help you to understand what the energy is doing to the substance during a phase change.

#### Materials:

Paradichlorobenzene (PDB)  
Beaker of Boiling Water  
Beaker of Room Temperature Water  
Test Tube Clamps  
Thermometer  
Stopwatch

Use a ruler to measure and record the height of the PDB in your test tube.

Height of PDB:      Hot \_\_\_\_\_ cm      Cold \_\_\_\_\_ cm

#### Directions: *Record all data in the spaces provided*

1. Place test tube of PDB into the boiling water.
2. When the PDB becomes a liquid, place the thermometer into the test tube full of PDB.
3. Measure the temperature of the PDB.
4. When the PDB reaches 90 °C, remove the test tube full of PDB and place the test tube into the beaker containing room temperature water.
5. Measure and record the temperature every 30 sec., until the PDB reaches 35 °C

Please be careful with the thermometer for it will freeze in the PDB.

#### Part 2

1. Place the test tube full of PDB back into the boiling water beaker.
2. Measure and record the temperature every 30 sec., until the PDB reaches 90 °C

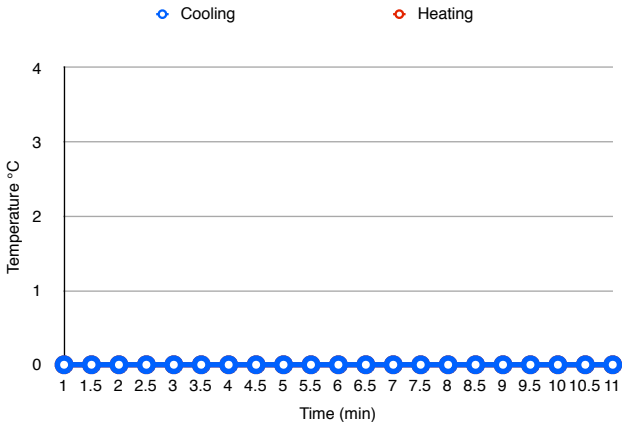
\*Remove the thermometer from the PDB. Rinse and clean the thermometer. Return the test tube full of PDB back to the room temperature.

To add data to the graph

\* Click on the graph, and then click on the inspector. Choose the tab "edit data"

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### Analysis and Conclusion

1. How did the height of the PDB in the test tube change as it was heated?

Answer here

2. How does the change in height indicate a change in density?

Answer here

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3. What is the melting/freezing point of the PDB? How did you come up with this conclusion?

Answer here

4. As the PDB was melting, heat was being added to it but the temperature did not rise. Where did the heat energy go?

Answer here

5. If we were to use twice as much PDB, how would the results be different? Would the melting/freezing point be at a different temperature? Explain.

Answer here