

Experiment 5 solids and liquids



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Abstract: The purpose of this experiment is to determine the boiling point of a liquid and the melting point of a solid. We also were able to observe the difference between boiling and melting point **Experiment and Observation:** We used isopropyl alcohol and set up an experiment to observe the boiling point. We set up a second experiment using acetamide to determine the melting point of it. We repeated the second experiment two additional times to determine the melting point and get an average. We then determined percent error.

Section 2: Analysis-

- It is important to know the melting points and boiling points because they are physical properties of the object. This means specific compounds have specific melting and boiling points. Therefore you can identify a substance if you determine the melting point and the boiling point. Also you are able to measure the purity of a mixture using melting point tests.
- In order to determine the melting point of a substance whose melting point was higher than 100 degrees Celsius you would use oil or glycerol just to achieve a higher temperature so you can run measurements at those high temperatures. Melting point can be measured very precisely at least for pure compounds.

- Adding more crystals in the capillary tube would cause there to be errors in the experiment. If too many crystals were added, it would cause the melting point to be too high, or for there to be too wide of a melting point range.
- There are several factors that could cause errors to occur while performing this experiment. For instance, most errors come from heating the sample too fast. A heating rate of 1 to 2 degrees per minute is will give good results. If you go any faster than five degrees per minute it will probably yield you poor

results. Too much or too little sample can lead to errors as well. Lastly, the sample should be firmly packed in the bottom of the tube to insure efficient heat transfer; if it is packed too loosely it could also cause errors.

Section 3: Discussion, Results and Conclusions In this experiment we examined additional physical properties of liquids and solids. Two of the more important physical properties of pure substances are the boiling point and the melting point. The boiling point of a liquid is the temperature at which that liquid is converted to a gaseous state. Boiling point is formally defined as the temperature at which the vapor pressure of the liquid becomes equal to the pressure at the surface of the liquid.

The boiling point of a liquid can change if the pressure at the liquid's surface changes. Since pure substances have a distinct boiling point, boiling points are sometimes used to determine the purity of substances. The melting point is the temperature at which a solid is converted to liquid. This is an important property of solids. The melting point of solids, like the boiling point of liquids, is often used for the identification of substances.

The first part of the experiment we were looking for boiling point. To start the experiment we placed about one milliliter of isopropyl alcohol in a test tube. We then attached a thermometer to the outside of the test tube insuring that it was even with the bottom of the test tube. We then placed a capillary tube inside the test tube. We then placed the whole assembly inside of a beaker filled with warm tap water. We then placed the beaker on the wire rack with a burner underneath. We heated it until the bubbles were continuous from the capillary tube. We then shut off the burner and recorded

when the last bubble emerged from the capillary tube which occurred at 81 degrees Celsius.

The last part of the experiment was observing the melting point of acetamide. We used gloves, because acetamide is a carcinogen. We inserted the powder into a capillary tube. We insured that it covered 2 mm of the end of the tube. We then attached the filled capillary tube to a thermometer and made sure that it aligned with the end of the tube. We prepared a water bath using a beaker and warm tap water just as we did in the first experiment and placed it over the burner.

We observed the acetamide melting and noted the temperature at which it melted then immediately extinguish the burner. We let the acetamide cool and return to crystal form and repeated the experiment two more times and recorded the temperature each time. The melting points were as follows: 86 degrees Celsius, 82 degrees Celsius and 78 degrees Celsius. The percent error was 1%.