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EXPERIMENT 6: Freezing Points--Graphing of Data

PURPOSE:

The subject experiment is designed to illustrate two main concepts. First, the process of freezing a substance is to be investigated by studying the temperature of a liquid or solid as a function of the length of time that liquid or solid is held within a test tube that is itself held within a beaker of ice. Second, to better understand the useful procedure of graphing experimental data, the experimentally observed temperature and time data are to be plotted to produce a graphical representation of the freezing process.

PROCEDURE:

Important points to note during procedure:

1. Use only clean and dry equipment.
2. Read and record all temperatures to the nearest 0.1°C

Steps in experiment:

1. To the indicated position on the ring stand, clamp the 18 X 150 mm test tube.
2. Assemble the slotted cork and thermometer into the correct configuration in the test tube.
3. Obtain and pour 10.0 ml of glacial acetic acid into the ring stand mounted test tube and adjust the temperature of the acetic acid to approximately 25°C.
4. Position a 400 ml beaker that is filled with an ice-water mixture under the clamped test tube.
5. Record a temperature for the acetic acid that corresponds to a 0.0-minute reading and then lower the clamped test tube into the ice bath so that all of the acetic acid is below the surface of the ice water.
6. With constant stirring by motion of the thermometer, record the temperature of the acetic acid every 30 seconds. Stop stirring when crystals begin to form within the acetic acid.
7. Continue recording the temperature at 30 second intervals until a total of 15 minutes has elapsed. To maintain a constant ice bath temperature, the ice water is occasionally stirred.
8. Place the test tube, with the thermometer still within the acetic acid, in warm water to melt the frozen acetic acid. Keep this liquid for additional experiments.
9. Weigh 0.450 g of benzoic acid and place the benzoic acid into the acetic acid containing test tube from above. Stir the acetic acid-benzoic acid mixture until the benzoic acid dissolves.
10. Using a fresh ice bath, repeat steps four through 7 for the acetic acid-benzoic acid mixture.