

Safety Precautions

- Protective eyewear approved by your institution must be worn at all time while you are in the laboratory.
- Thermometers are often fitted with rubber stoppers as an aid in supporting the thermometer with a clamp. Inserting a thermometer through a stopper must be done carefully to prevent breaking of the thermometer, which might cut you or might release mercury if you are using a mercury thermometer. Your instructor will demonstrate the proper technique for inserting your thermometer through the hole of a rubber stopper. Glycerine is used to lubricate the thermometer and stopper. Protect your hands with a towel during this procedure.
- The red liquid used as the temperature-sensing fluid in some thermometers is flammable. If a red-liquid thermometer breaks, extinguish all flames in the vicinity. Mercury is used in some thermometers. Mercury is poisonous and may be absorbed through the skin. Its vapor is toxic. If mercury is spilled from a broken thermometer, inform the instructor immediately so that the mercury can be removed. Do not attempt to handle spilled mercury yourself.
- The liquids used in this experiment are flammable. Although only small samples of the liquids are used, the danger of fire is not completely eliminated. Keep all liquids away from open flames.
- The liquids used in this experiment may be toxic if inhaled or absorbed through the skin. The liquids should be disposed of as indicated by the instructor. Do not pour them down the drain.
- *Caution:* Oil is used as the heating fluid in the Thiele tube used for the determination of boiling point. Hot oil may spatter if it is heated too strongly, especially if any moisture is introduced into the oil from glassware that is not completely dry. The oil may smoke or ignite if heated above 200°C. The oil should be completely transparent, with no cloudiness: if the oil appears cloudy, ask the instructor to replace the oil.

Apparatus/Reagents Required

Thermometer and clamp, several beakers, Thiele tube, melting-point capillaries, glass tubing 5–6 mm in diameter, burner and rubber tubing, file, scissors, medicine dropper, unknown sample for boiling-point determination, ice

Procedure

Record all data and observations directly in your notebook in ink.

A. Calibration of the Thermometer

Fill a 400-mL beaker with ice, and add tap water to the beaker until the ice is covered with water. Stir the mixture with a stirring rod for 30 seconds.

Clamp the thermometer to a ringstand so that the bottom 2–3 inches of the thermometer is dipping into the ice bath. Make certain that the thermometer is suspended freely in the ice bath and is not touching either the *walls* or the *bottom* of the beaker.