

Heating flammable liquids and solids in test tubes

For using Bunsen burners and especially use of different flames, see *CLEAPSS Student Safety Sheet 92*.

For heating non-flammable liquids and solids, see *CLEAPSS Student Safety Sheet 93*.

For handling hot liquids in beakers, see *CLEAPSS Student Safety Sheet 95*.

Heating flammable liquids

For example, when extracting chlorophyll from leaves.

- Wear eye protection.
- If possible, use a wide-diameter test tube (boiling tube).
- Add an anti-bumping granule ('boiling chip') before starting to heat.
- **Do not heat directly over a naked flame.** Instead, stand the test tube in a beaker half-filled with freshly-boiled water from a kettle.
- (If necessary, boil the water in the beaker using a roaring flame; then extinguish the flame before the flammable liquid is put into the hot water. *Also, see below*)
- It is always better to allow the apparatus to cool down before removing the test tube but this can take a long time.
- If necessary, use a test tube holder or a piece of folded paper carefully placed around the top of the test tube, and slowly and carefully lift the test tube out of the hot water into a test tube rack.



Heating flammable (organic) solids

For example, heating wax or salol for cooling curves.

Do not heat the wax or salol directly over a naked flame. The tube will be heated quickly and locally to a very high temperature. If a 'spirit' thermometer is used, the spirit vaporises and the glass explodes under the increase in pressure. In addition, the boiling tube may break and the contents catch fire.

- Wear eye protection.
- Use a test tube or boiling tube. Test tubes contain less solid and so take a shorter time for the contents to melt and cool. (It took 6-7 minutes for the wax to melt in the boiling tube on the right.)
- Do not have the test tube more than half full of wax or salol.
- Fill a 250 ml beaker half full with hot water from a kettle.
- (If necessary, boil the water in the beaker using a roaring flame; then extinguish the flame before the flammable solid is put into the hot water. *Also see below*.)
- After the activity is completed allow the equipment to cool as much as possible.
- If necessary, use a test tube holder or a piece of folded paper carefully placed around the top of the test tube, and slowly and carefully lift the test tube out of the hot water into a test tube rack.



If you have to heat the water with a Bunsen burner (ie, not a kettle)

- At the end of the activity, first get the beaker onto the heat-resistant mat, (see *CLEAPSS Student Safety Sheet 95*).
- Then remove the boiling tube using a good test tube holder, as described above.

This method of heating takes about the same time to melt the wax as using water boiled in a kettle and so offers no real advantage.

Note that a thermometer standing in a beaker on a tripod has a high risk of being knocked over.

