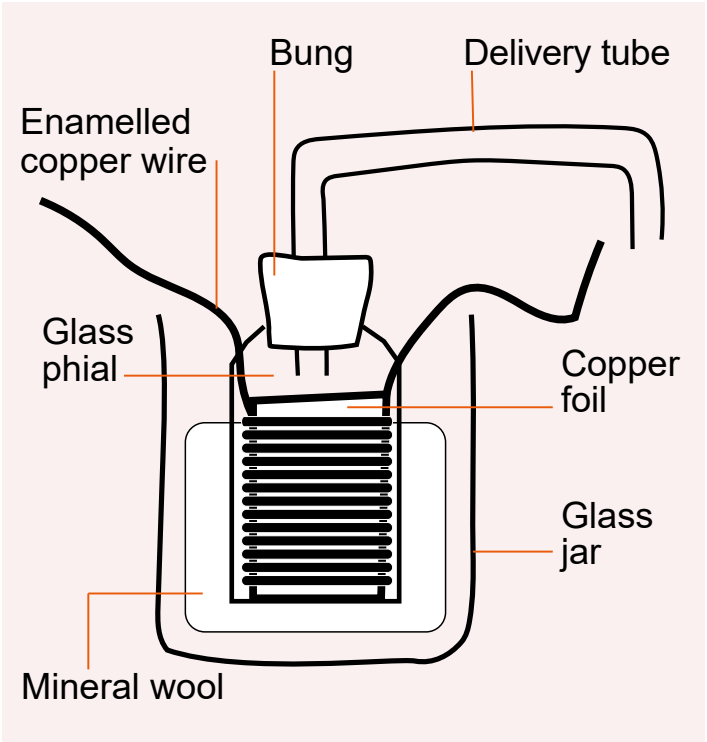
KS3 and KS4 lesson notes

Chemistry: How to build a microscale heater

This information sheet is designed to be used with the KS3 and KS4 chemistry lesson – plants and aromatics. We recommend that you build the microscale heater prior to the lesson. It takes 20–30 minutes and requires materials that can be found in most school science departments. We recommend that students carry out the activities in groups of 2–4, so several heaters will be needed. You will need:

- 10cm x 4cm piece of copper metal foil
- Heavy-duty scissors
- 7ml glass vial with bung and glass delivery tube
- Elastic band
- 3m of 0.45mm (26SWG) enamelled (insulated) copper wire
- Matches
- Sandpaper or wire wool
- Mineral wool
- 30ml jar (such as a mini jam jar)



Instructions

1. Cut out a 10cm x 4cm piece of copper foil. Draw horizontal lines 1cm from each long edge. Draw vertical lines in 0.5cm intervals.
2. Cut along the small vertical lines with heavy-duty scissors as far as the horizontal lines.
3. Wrap the foil loosely around the glass vial. Hold it in place temporarily using an elastic band.
4. Fold some of the bottom flaps of foil under the base of the bottle to hold it in place. Leave three or four flaps unfolded.
5. Wrap 3m of enamelled copper wire around the copper foil, leaving about 8cm of wire free at each end. The copper coil is your heating element.
6. Fold over the upper foil flaps and the remaining lower flaps to keep the wire coil in place.
7. Wrap the heater in mineral wool and place it in the jar with the loose wire ends sticking out.
8. Using a match, burn the ends of the wire to remove some of the enamel insulation. Rub the ends with sandpaper or wire wool to allow electrical contact. Ensure that the exposed wires are not touching each other, or the copper foil.
9. The glass vial can now be removed from the copper foil in preparation for activity 1.

This experiment is included with thanks to the European Journal for Science Teachers and the Science in School Website.