Determining the Empirical Formula of Magnesium Oxide
adapted from Nuffield/RSC

Apparatus

- Goggles
- Bench mat
- Tripod
- Bunsen burner
- Pipe-clay triangle
- Crucible and lid
- Tongs
- 10cm length of magnesium ribbon
- Small piece of emery or sandpaper
- Digital balance

Method

1. Cut a piece of magnesium about 10-15 cm long. If it is looking tarnished or black then clean it using the emery paper.

2. Place the clean, dry crucible and lid on a clay triangle on a ring on a ring stand and heat strongly with a Bunsen burner for 5 minutes to remove any volatile material. Allow the crucible to cool.

3. Weigh the crucible with the lid (mass 1) and then with the magnesium twisted into a loose coil inside the crucible (mass 2).

   The magnesium should be placed as much at the bottom of the crucible as possible.

4. Set up the Bunsen burner on the heat resistant mat with the tripod. Place the pipe clay triangle over the tripod, ensuring that it is secure. Place the crucible containing the magnesium in the pipe clay triangle and put the lid on.

5. Light the Bunsen burner and begin to heat the crucible. It is best to start with a gentle blue flame, but you will need to use a roaring flame (with the air hole fully open) to get the reaction to go.

6. Once the crucible is hot, gently lift the lid with the tongs a little to allow some oxygen to get in. You may see the magnesium begin to flare up. If the lid is off for too long then the magnesium oxide product will begin to escape. **Don't let this happen.**

7. Keep heating and lifting the lid until you see no further reaction. At this point, remove the lid and heat for another couple of minutes. Replace the lid if it appears that you are losing some product.

8. Turn off the Bunsen burner and allow the apparatus to cool.

9. Re-weigh the crucible with lid containing the product (mass 3).

10. Heat the crucible again for a couple of minutes and once again allow to cool. Repeat this step until the mass readings are consistent. This is called ‘heating to constant mass.’
Data Collection
Record all your data and your observations. Note the precision of any apparatus you have used.

Calculations
Show all workings including all units and labels. Be sure your significant figures are correct. Use the following molar masses:

- magnesium = 24.305 g mol\(^{-1}\)
- oxygen = 15.999 g mol\(^{-1}\)

- Determine the mass of oxygen that has reacted.
- Neatly plot the mass of magnesium and the mass of oxygen on the graph provided.
- Using the masses that you have recorded, determine the Empirical Formula of Magnesium Oxide.

Analysis of Results
- What is the expected formula for magnesium oxide?
- How does your result compare to the expected formula?
- How does your result compare to others in the class?
- List three experimental factors that could affect the final result. How could the experimental method be adapted to provide a more accurate result?

To hand in
- Safety Considerations
- Raw data and observations (DCP)
- Calculations (DCP)
- Conclusion and Evaluation, incorporating the points made above (CE)