Finding the formula of magnesium oxide

Aims

Magnesium reacts with oxygen when it is heated in air. Magnesium oxide is produced in this reaction and the mass of the solid substances increases. You can work out the mass of oxygen which combines with magnesium if you know:

- the mass of magnesium at the start, and the mass of magnesium oxide at the end.

You can then use these masses to work out the formula of magnesium oxide.

Apparatus

Eye protection	Pipe-clay triangle	Small piece of sandpaper
Heat-resistant mat	Crucible and lid	Digital balance, ±0.01 g
Tripod	Tongs	
Bunsen burner	10 cm magnesium ribbon	

Method

1. Weigh the empty crucible with its lid. Write the mass in a table.
2. Clean the piece of magnesium ribbon with sandpaper, then coil it loosely around a pencil.
3. Put the magnesium ribbon into the crucible and put the lid on.
4. Weigh the crucible, lid, and magnesium together. Write the mass in your table.
5. Put the crucible onto the pipe-clay triangle. Heat gently for about a minute, then heat strongly. Use the tongs to lift the lid carefully a little every minute to allow air inside. Continue heating until the reaction has finished (the magnesium will glow at first, then turn powdery and grey-white).
6. Turn the Bunsen burner off. Allow the crucible to cool for a few minutes.
7. Reweigh the crucible with its lid and contents. Write the mass in your table.

Results

Objects	Mass /g
Crucible + lid (step 1)	
Crucible + lid + magnesium (step 4)	
Crucible + lid + product (step 7)	

crucible and lid
magnesium
pipe-clay triangle
tripod
HEAT
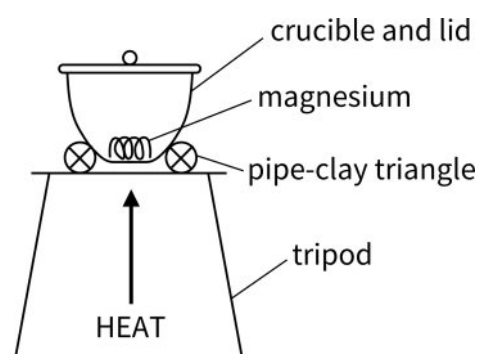
Analysis

1. Calculate the mass of magnesium used (step 4 – step 1).
2. Calculate the mass of oxygen used (step 7 – step 4).
3. Calculate the amounts in mol of magnesium and oxygen used.
4. Use the amounts to deduce the empirical formula of magnesium oxide. You will probably find that the formula has a complicated number in it, so round this off to 1 decimal place.

$$\text{amount (mol)} = \frac{\text{mass (g)}}{A_r}$$

Evaluation

The accepted formula for magnesium oxide is MgO. How close did you get?

Explain why your experimental formula may be different from this formula.