

The formula of a chemical compound is, in general, the only property of a compound that distinguishes it from all other compounds.* Each compound consists of a constant proportion of each element in the compound, and the elements are always combined with the same percentage of each element. In this experiment you will determine the percentage of oxygen and simplest formula for the compound magnesium oxide. The computer will aid in the determination of the percentage of oxygen:

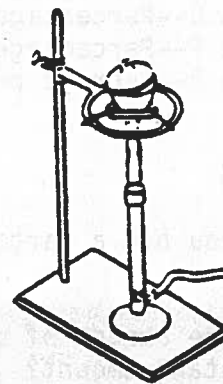
- The computer will provide the mass of oxygen for data sheet lines F and L.
- The computer will provide a completed data sheet to be compared with your data sheet.
- All masses for trial 2 will appear on the computer screen for a minute after you measure the mass of any item of trial 2.

EQUIPMENT

crucible with cover	ceramic cooling pad
ringstand with ring	steel wool
clay triangle	water
laboratory burner	stirring rod
crucible tongs	dropping pipette
35 cm magnesium ribbon	

PROCEDURE

- Measure the mass of a clean, dry crucible and cover to .01 g accuracy on your balance and again on the computer balance.
- Obtain a piece of clean magnesium, Mg, ribbon, approximately 35 cm long. If the surface of the ribbon is not bright, scrape off all adhering film with fine steel wool. Clean ribbon with a paper towel.
- Measure the mass of the crucible, lid, and magnesium on your balance and also on the computer balance.
- Set up apparatus as shown.
- Heat the crucible gently for about 4 minutes, and then increase the heat by lowering the crucible down onto the hot tip of the inner cone of the burner flame. Heat for an additional 3 minutes.
- Using your tongs with great care, tilt the lid of the crucible and heat for 8 more minutes.



*As is very often the case, there are exceptions to this generalization. Such compounds are called isomers.

~~7. Discontinue heating, cover the crucible, and allow the crucible to cool. Before proceeding, visually inspect the contents of the crucible. If it is obvious that there is unreacted magnesium in the crucible, it will be necessary to repeat the strong heating cycle before continuing.~~

8. The solid contents of the crucible are mixed products of the controlled reaction between magnesium and oxygen and nitrogen gases present in air. When the mixed products react with water, a single magnesium containing product is formed, which will, in turn be converted into magnesium oxide.
9. Using a medicine dropper, add only enough distilled water to the crucible to cover the mixed product. Heat the system gently and observe the odor of any vapor that is formed.
10. Allow crucible to cool, then measure the mass of the crucible, lid, and magnesium oxide.
11. Repeat this procedure for trial 2.
12. Record all data.

CALCULATIONS

1. Calculate the mass of oxygen gained in each trial.
2. Calculate the percent of oxygen in each trial.
$$\% = (\text{mass of oxygen} / \text{total mass of MgO}) \times 100$$
3.
$$\% \text{ of error} = (\text{accepted \% of oxygen} - \text{lab \% of oxygen}) / \text{accepted \% of oxygen} \times 100$$

Accepted % of oxygen is calculated from compound formula and molecular masses.

For grading purposes only enter these values into the computer via the keyboard (values from data sheet):

Line M--Percentage of oxygen--trial 1, item 7
Line N--Percentage of magnesium--trial 1, item 8
Line O--Percentage of oxygen--trial 2, item 9
Line P--Percentage of magnesium--trial 2, item 10
Line R--Average percent error--oxygen, item 11

QUESTIONS

1. If you had a large percent of error, what could account for this error?
2. Is the amount of oxygen in magnesium oxide always the same, a constant amount?
3. Where did the oxygen come from that combined with the magnesium? Could other gases have combined with the magnesium?

Name _____

Balance # _____ Group # _____

COMPOSITION OF A COMPOUND

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Date _____ Period _____

Computer
ItemStudent
Value

Trial 1:

A Mass of crucible & lid

1 

B Mass of crucible, lid & Mg

2

C Mass of magnesium

D Mass of magnesium oxide, crucible & lid

3 

E Mass of magnesium oxide

F Mass of oxygen

Trial 2:

G Mass of crucible & lid

4

H Mass of crucible, lid & Mg

5

I Mass of magnesium

J Mass of magnesium oxide, crucible & lid

6 

K Mass of magnesium oxide

L Mass of oxygen

Calculations:

M Percentage of oxygen (trial 1)

7

N Percentage of magnesium (trial 1)

8

O Percentage of oxygen (trial 2)

9

P Percentage of magnesium (trial 2)

10

Q Percentage of oxygen (theoretical)

R Average percent error--oxygen

11



Balance check only. Wait for the correct mass to be shown on the computer screen.



Information only. Check the screen to see if there are tips on your lab process.