

## A Brilliant Deduction Application

### Problem:

How do you determine the empirical formula for the compound magnesium oxide?

### Materials:

crucible with cover  
clay triangle  
metric balance  
Bunsen burner  
magnesium ribbon  
distilled water  
ring stand and clamp  
eyedropper  
scissors  
tongs

### Hazard Warning:

Magnesium is highly combustible. Wear safety goggles for this entire experiment. Do not look directly into the crucible due to strong ultraviolet light produced when magnesium ribbon burns.

### Procedure:

1. Before beginning, read through the entire procedure and prepare a data table that will hold the required data.
2. From your instructor obtain a piece of clean magnesium ribbon approximately 20 cm long. Cut the magnesium ribbon into 1 cm pieces and add them to an empty, pre-weighted crucible. Record the mass of crucible and contents.
3. With the apparatus provided, gently heat the covered crucible and contents for 2-3 minutes. Gradually increase the heat intensity and, using your tongs, tilt the crucible cover. Continue strong heating for 6-8 minutes. Discontinue heating and allow the crucible and contents to cool to room temperature.
4. Make sure that the crucible has cooled to room temperature. Using an eyedropper, add only enough distilled water to cover the contents. Heat the system. Carefully observe the odor of any vapor that is formed. When the water has evaporated, add a little more water and repeat the careful heating process until all the water has again evaporated. Then heat strongly for another 2 minutes.
5. Allow the crucible and contents to cool. Determine the mass of the crucible and contents (magnesium oxide).

Summing Up:

1. What is the mole ratio of the atoms of magnesium and oxygen that are combined in the final product? Show all of the calculations necessary to make this determination.
2. What is the simplest chemical formula for magnesium oxide?

## A Brilliant Deduction: Data Sheet

Procedure 2: Weigh before heating

Crucible, lid, Mg = \_\_\_\_\_  
Crucible and lid = - \_\_\_\_\_  
Mass of Mg = \_\_\_\_\_

Procedure 5: Weigh after heating

Crucible, lid, oxide = \_\_\_\_\_  
Crucible, lid = - \_\_\_\_\_  
Mass of oxide = \_\_\_\_\_

Summing Up #1:

Mass of Oxygen = Mass of oxide – Mass of Mg

X mole Mg = \_\_\_\_\_ g Mg x  $\frac{1 \text{ mole Mg}}{24 \text{ g Mg}}$  =

X mole O = \_\_\_\_\_ g O x  $\frac{1 \text{ mole O}}{16 \text{ g O}}$  =

:to get mole ratio divide both mole values by the smaller =

Summing Up #2: Values in mole ratio can be rounded to whole numbers and used as subscripts in the chemical formula.