

PROPORTIONS AND PERCENTAGE COMPOSITION

Lab instructions are listed alphabetically. Questions are numbered.
Please answer questions on a separate sheet.

PRELAB:

- Your teacher will demonstrate the use of crucible tongs.
- Set up your Bunsen burner and retort stand (with a ring clamp and clay triangle). Get a crucible and lid.
- Place the lid slightly ajar. Heat the crucible strongly for 1-2 minutes (to burn away contaminants) and then turn off the Bunsen burner to let the crucible cool. Answer questions 1-6 while you wait.

PROPORTIONS QUESTIONS:

- Write chemical formulas for carbon monoxide and carbon dioxide.
- Under what conditions does carbon monoxide usually form?
- Which compound is more dangerous? What does it do that interferes with normal body functions?
- Can you think of other examples where molecules with different proportions have different properties?
- Give definitions for the following: law of definite proportions, law of conservation of mass.
- If a chemical reaction takes place in a sealed container, how will the mass before the reaction compare to the mass after the reaction (i.e. will the mass increase, decrease, stay the same, or will it depend on the type of reaction). Which law applies in this case?

BURNING MAGNESIUM IN AIR

- Get a piece of magnesium ribbon (about 6 cm long).
- Measure and record the mass of your crucible without the lid (press "tare" on the scale and wait for a reading of 0.00. Place the crucible on the scale and wait for a constant mass. Air currents will affect the mass by ± 0.05 so be still while measuring mass. Record all decimals.) Mass of crucible: _____
- Curl the Mg into a loose spiral (㉞), place it in the crucible, and weigh. Mass of crucible + Mg: _____
- Calculate the mass of magnesium used: _____ - _____ = _____
- Place the crucible in the clay triangle with its lid slightly ajar. Heat the crucible gently for 2 minutes and then strongly for 3 minutes. Do not remove the lid. You can start the questions below while you wait.
- Lift the lid to look at the Mg. It should be white and larger than when you started. Ask your teacher for help to determine if the reaction is complete (when complete, lightly fanning the Mg will have no effect).
- Turn the Bunsen burner off and answer the questions below as you wait for the crucible to cool.

PERCENTAGE COMPOSITION QUESTIONS:

- Imagine that in a class there are 12 girls & 16 boys. What is the percentage composition of the class (i.e. what is the percent of boys in the class and what is the percent of girls in the class)?
- Based on the mass of C and O from the periodic table, what should be the mass of CO and CO₂?
- Calculate the % composition of CO, CO₂ (i.e. calculate the % C and % O, by mass, in CO and CO₂).
- In this lab, Mg combines with what? Write the chemical equation for this reaction (see p115 for help).
- Weigh the crucible + product (no lid): _____. Mass of product = _____ - _____ = _____
- The MgO can be dumped into the trash. Clean the crucible with a dry test tube brush (don't use water to clean the crucible - it may crack if you do). Return the crucible and lid to the front of the room. Give your teacher your values for mass of Mg used and mass of product formed.
- Using your measured mass of Mg and your measured mass of MgO calculate the percentage composition of MgO based on your data.
- Calculate the percentage composition of MgO based on the formula (as you did in Q9 for CO). How do your experimental results compare to the theoretical values?
- Do your results disprove the "law of definite proportions" or the "law of conservation of mass"? Explain.