Name _____

$$Mg_{(solid)} + O_{2\,(gas)} \rightarrow MgO_{(solid)}$$

1. Balance the equation above.
2. If you start with 4.00 moles of Mg, how many moles of magnesium oxide will be produced?
3. How many atoms are in one **molecule** of oxygen gas (O_2)?
4. If you start with 5.0 moles of magnesium, how many moles of O_2 will be needed to completely react with the magnesium?
5. If 3.00 moles of oxygen gas (O_2) are consumed in the reaction, how many **moles** of magnesium (Mg) were used in the reaction?
6. What is the molar ratio of Mg to O_2 needed for the synthesis of MgO?
7. If you begin with **1.00 mole** of magnesium (Mg), what **theoretical yield** of magnesium oxide (MgO) can be produced?
8. If you begin with 3.00 grams of magnesium, what is the **theoretical yield** of magnesium oxide that can be produced?
9. If you begin with 3.00 grams of magnesium, what **mass** of oxygen gas will be required to completely react with the magnesium?
10. When a strip of magnesium is burned in the air, should it lose mass or gain mass during the reaction? Why?

Name Key

$$2\,Mg_{(solid)} + O_{2\,(gas)} \rightarrow 2\,MgO_{(solid)}$$

(24.305 g/mol Mg; 31.998 g/mol O_2; 40.304 g/mol MgO)

1. Balance the equation above.

2. If you start with 4.00 moles of Mg, how many moles of magnesium oxide will be produced? 4.00 mol

3. How many atoms are in one **molecule** of oxygen gas (O_2)? 2 atoms

4. If you start with 5.0 moles of magnesium, how many moles of O_2 will be needed to completely react with the magnesium? 2.5 mol O_2

5. If 3.00 moles of oxygen gas (O_2) are consumed in the reaction, how many **moles** of magnesium (Mg) were used in the reaction? 6.00 mol Mg

6. What is the molar ratio of Mg to O_2 needed for the synthesis of MgO? 2 : 1

7. If you begin with **1.00 mole** of magnesium (Mg), what **theoretical yield** of magnesium oxide (MgO) can be produced?

$$\frac{1.00\ mol\ Mg}{1.00\ mol\ Mg} \left| \frac{1.00\ mol\ MgO}{1\ mol\ MgO} \right| \frac{40.304\ g\ MgO}{1\ mol\ MgO} = 40.304\ g\ MgO$$

40.3 g MgO

8. If you begin with 3.00 grams of magnesium, what is the **theoretical yield** of magnesium oxide that can be produced?

$$\frac{3.00\ g\ Mg}{24.305\ g\ Mg} \left| \frac{1\ mol\ Mg}{2\ mol\ Mg} \right| \frac{2\ mol\ MgO}{1\ mol\ MgO} \left| \frac{40.304\ g\ MgO}{1\ mol\ MgO} \right. = 4.97\ g\ MgO$$

9. If you begin with 3.00 grams of magnesium, what **mass** of oxygen gas will be required to completely react with the magnesium?

$$\frac{3.00\ g\ Mg}{24.305\ g\ Mg} \left| \frac{1\ mol\ Mg}{2\ mol\ Mg} \right| \frac{1\ mol\ O_2}{1\ mol\ O_2} \left| \frac{31.998\ g\ O_2}{1\ mol\ O_2} \right. = 1.97\ g\ O_2$$

10. When a strip of magnesium is burned in the air, should it lose mass or gain mass during the reaction? Why?

gain mass because oxygen (O_2) is ~~adding~~ bonding to the Mg