Name _____

$$2\,H_{2(g)} + O_{2\,(g)} = 2\,H_2O_{(g)}$$

The first step to any stoichiometry problem is to balance the equation!
Balance the above equation before solving the problems below.

1. What is the molar ratio of hydrogen gas to oxygen gas needed for the synthesis of water? 2 : 1
2. If 10 moles of hydrogen gas are reacted with an excess of oxygen gas, how many moles of water vapor will be produced? 10 mol H_2O
3. If 10 moles of hydrogen gas are reacted with an excess of oxygen gas, how many moles of oxygen gas are used in the reaction? 5 mol O_2
4. If 10 moles of oxygen gas react with an excess of hydrogen gas, how many moles of water vapor will be produced? 20 mol H_2O
5. If 6 moles of water vapor are produced, how many moles of hydrogen gas were used in the reaction? 6 mol H_2
6. If 6 moles of water vapor are produced, how many moles of oxygen gas were used? 3 mol O_2

7. If 2.00 **grams** of hydrogen gas are reacted with an excess of oxygen gas, what **mass** of water will be produced?

$$2.00\text{ g } H_2 \left| \frac{1\text{ mol } H_2}{2.016\text{ g } H_2} \right| \frac{2\text{ mol } H_2O}{2\text{ mol } H_2} \left| \frac{18.015\text{ g}}{1\text{ mol } H_2O} \right| = 17.9\text{ g } H_2O$$

8. If 2.00 **grams** of hydrogen gas are reacted with an excess of oxygen gas, what mass of oxygen gas was used in the reaction?

$$2.00\text{ g } H_2 \left| \frac{1\text{ mol } H_2}{2.016\text{ g } H_2} \right| \frac{1\text{ mol } O_2}{2\text{ mol } H_2} \left| \frac{31.998\text{ g } O_2}{1\text{ mol } O_2} \right| = 15.9\text{ g } O_2$$

$$2\ H_{2(g)} + O_{2\,(g)} = 2\ H_2O_{(g)}$$

9. If 10.0 **grams** of water vapor are produced in the reaction, how many **grams** of **hydrogen gas** were used in the reaction?

$$\frac{10.0\text{ g } H_2O}{1} \left| \frac{1\text{ mol } H_2O}{18.015\text{ g } H_2O} \right| \frac{2\text{ mol } H_2}{2\text{ mol } H_2O} \left| \frac{2.016\text{ g}}{1\text{ mol } H_2} \right| =$$

10. If 10.0 **grams** of water vapor are produced in the reaction, how many **grams** of **oxygen gas** were used in the reaction?

$$\frac{10.0\text{ g } H_2O}{1} \left| \frac{1\text{ mol } H_2O}{18.015\text{ g } H_2O} \right| \frac{1\text{ mol } O_2}{2\text{ mol } H_2O} \left| \frac{31.998\text{ g } O_2}{1\text{ mol } O_2} \right| = \boxed{8.88\text{ g } O_2}$$

11. If 3.00 grams of oxygen gas were consumed in the reaction, how many grams of hydrogen gas were used?

$$\frac{3.00\text{ g } O_2}{1} \left| \frac{1\text{ mol } O_2}{31.998\text{ g } O_2} \right| \frac{2\text{ mol } H_2}{1\text{ mol } O_2} \left| \frac{2.016\text{ g } H_2}{1\text{ mol } H_2} \right| = .378\text{ g } H_2$$

12. If 3.00 grams of oxygen gas were consumed in the reaction, how many grams of water vapor should have been produced?

$$\frac{3.00\text{ g } O_2}{1} \left| \frac{1\text{ mol } O_2}{31.998\text{ g } O_2} \right| \frac{2\text{ mol } H_2O}{1\text{ mol } O_2} \left| \frac{18.015\text{ g } H_2O}{1\text{ mol } H_2O} \right| = \boxed{3.38\text{ g } H_2O}$$

Answers:

1) 2:1
2) 10 moles H_2O
3) 5 moles O_2
4) 20 moles H_2O
5) 6 moles H_2
6) 3 moles O_2
7) 17.9 g H_2O
8) 15.9 g O_2
9) 1.12 g H_2
10) 8.88 g O_2
11) 0.378 g H_2
12) 3.38 g H_2O