

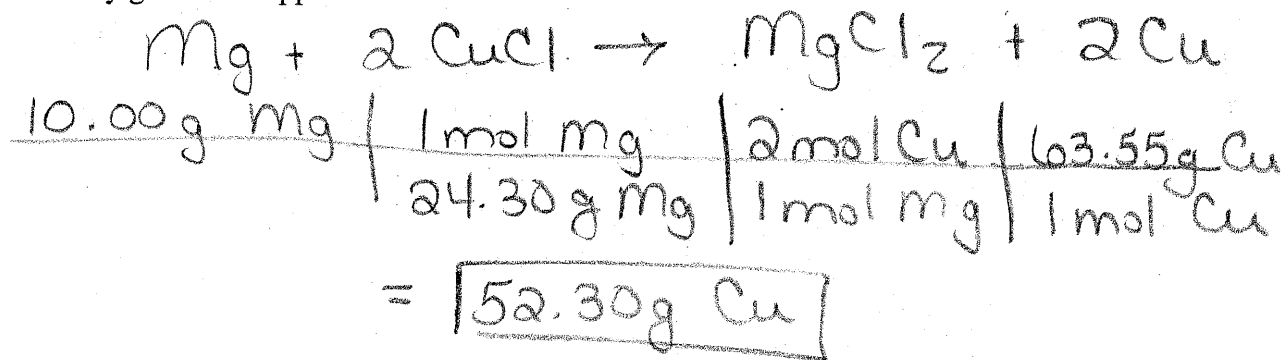
MORE PRACTICE

DIRECTIONS: Read each question carefully. For all calculations you must show your work and record your answers with the correct units and significant figures.

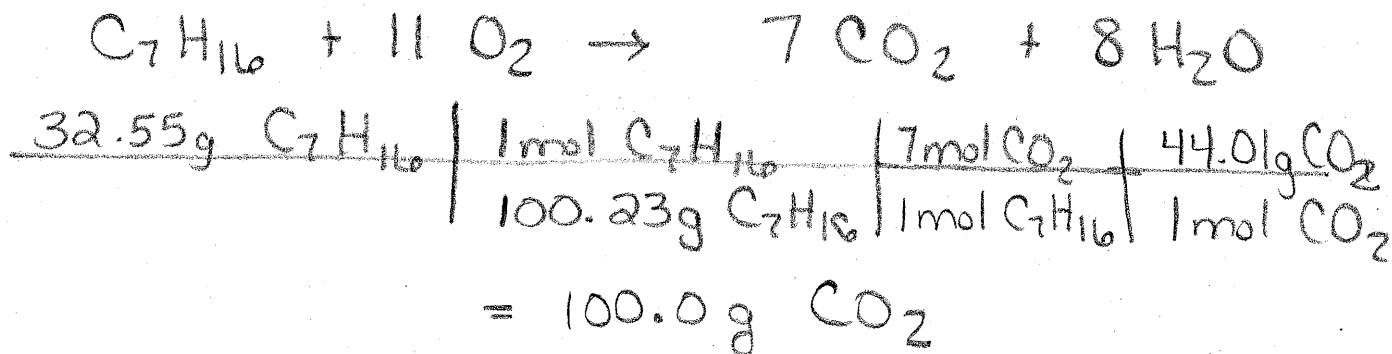
1. If the theoretical yield of Product A is 137 grams and you produce 132.5 grams in lab, what is your percent yield of Product A?

$$\frac{132.5 \text{ g}}{137 \text{ g}} \times 100\% = \boxed{96.7\%}$$

2. Magnesium reacts with copper (I) chloride in a single displacement reaction. If 10.00 grams of magnesium reacts with excess copper (I) chloride solution, how many grams of copper will be formed?

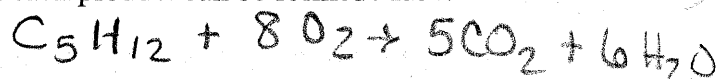


3. When 32.55 grams of heptane (C_7H_{16}) is burned, 93.40 grams of carbon dioxide is formed. What is the percent yield of carbon dioxide?



$$\frac{93.40 \text{ g}}{100.0 \text{ g}} \times 100\% = \boxed{93.40\% \text{ yield}}$$

4. If 21.62 grams of pentane (C_5H_{12}) reacts with 70.15 grams of oxygen gas, which of the reactants is limiting? How many grams of each product can be formed? How many grams of the excess reactant remain?



$$\frac{21.62 \text{ g } C_5H_{12}}{72.17 \text{ g } C_5H_{12}} \left| \frac{1 \text{ mol } C_5H_{12}}{1 \text{ mol } C_5H_{12}} \right| \frac{5 \text{ mol } CO_2}{1 \text{ mol } C_5H_{12}} \left| \frac{44.01 \text{ g } CO_2}{1 \text{ mol } CO_2} \right| = 65.92 \text{ g } CO_2$$

$$\frac{21.62 \text{ g } C_5H_{12}}{72.17 \text{ g } C_5H_{12}} \left| \frac{1 \text{ mol } C_5H_{12}}{1 \text{ mol } C_5H_{12}} \right| \frac{6 \text{ mol } H_2O}{1 \text{ mol } C_5H_{12}} \left| \frac{18.02 \text{ g } H_2O}{1 \text{ mol } H_2O} \right| = 32.39 \text{ g } H_2O$$

$$\frac{70.15 \text{ g } O_2}{32.00 \text{ g } O_2} \left| \frac{1 \text{ mol } O_2}{1 \text{ mol } O_2} \right| \frac{5 \text{ mol } CO_2}{8 \text{ mol } O_2} \left| \frac{44.01 \text{ g } CO_2}{1 \text{ mol } CO_2} \right| = 60.30 \text{ g } CO_2$$

$$\frac{70.15 \text{ g } O_2}{32.00 \text{ g } O_2} \left| \frac{1 \text{ mol } O_2}{1 \text{ mol } O_2} \right| \frac{6 \text{ mol } H_2O}{8 \text{ mol } O_2} \left| \frac{18.02 \text{ g } H_2O}{1 \text{ mol } H_2O} \right| = 29.63 \text{ g } H_2O$$

O_2 is limiting \therefore you can form 60.30g CO_2 + 29.63g H_2O

$$\frac{70.15 \text{ g } O_2}{32.00 \text{ g } O_2} \left| \frac{1 \text{ mol } O_2}{1 \text{ mol } O_2} \right| \frac{1 \text{ mol } C_5H_{12}}{8 \text{ mol } O_2} \left| \frac{72.17 \text{ g } C_5H_{12}}{1 \text{ mol } C_5H_{12}} \right| = 19.78 \text{ g needed}$$

5. If 9.04 grams of Tin (Tin is a transition metal) reacts with oxygen to form 11.48 grams of a certain tin oxide, what is the formula for the tin oxide? What is the charge on the tin ion? 1.84g remain



If 9.04g Sn react w O_2 to form 11.48g of a tin oxide this means 2.44g Oxygen is used

$$\frac{9.04 \text{ g } Sn}{118.71 \text{ g } Sn} \left| \frac{1 \text{ mol } Sn}{1 \text{ mol } Sn} \right| = 0.0762 \text{ mol } Sn$$

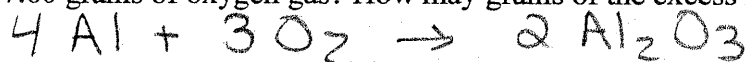
$$\frac{2.44 \text{ g } O_2}{32.00 \text{ g } O_2} \left| \frac{1 \text{ mol } O_2}{1 \text{ mol } O_2} \right| = 0.0763 \text{ mol } O_2$$

\therefore Sn : O_2 is 1:1



The charge on Tin is +4

6. What is the theoretical yield of aluminum oxide when 21.60 grams of aluminum reacts with 17.60 grams of oxygen gas? How many grams of the excess reactant will remain?



<u>21.60g Al</u>		1 mol Al		2 mol Al ₂ O ₃		101.96g Al ₂ O ₃
		26.98g Al		4 mol Al		1 mol

<u>17.60g O₂</u>		1 mol O ₂		2 mol Al ₂ O ₃		101.96g Al ₂ O ₃
		32.00g O ₂		3 mol O ₂		1 mol

= 40.81g Al₂O₃

O₂ is limiting - 37.39g Al₂O₃ = 37.39g Al₂O₃
is theoretical yield

<u>17.60g O₂</u>		1 mol O ₂		4 mol Al		26.98g
		32.00g		3 mol O ₂		1 mol = 19.79g needed

- 21.60
 - 19.79

 1.81g Al
 remain

7. How many grams of oxygen are needed to react with 17.40 grams of butane (C₄H₁₀)? How many grams of carbon dioxide and water can be formed? Check your answers by comparing the total grams of reactants and the total grams of products.



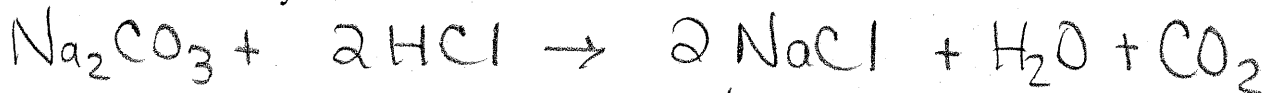
<u>17.40g C₄H₁₀</u>		1 mol C ₄ H ₁₀		13 mol O ₂		32.00g O ₂
		58.14g C ₄ H ₁₀		2 mol C ₄ H ₁₀		1 mol = 62.25g O₂

<u>17.40g C₄H₁₀</u>		1 mol C ₄ H ₁₀		8 mol CO ₂		44.01g
		58.14g C ₄ H ₁₀		2 mol C ₄ H ₁₀		1 mol = 52.68g CO₂

<u>17.40g C₄H₁₀</u>		1 mol C ₄ H ₁₀		10 mol H ₂ O		18.02g H ₂ O
		58.14g C ₄ H ₁₀		2 mol C ₄ H ₁₀		1 mol = 26.96g H₂O

17.40g + 62.25g = 52.68g + 26.96g
 79.65g = 79.64g close

8. How many grams of sodium chloride will be formed when 2.4 grams of sodium carbonate reacts with excess hydrochloric acid?



<u>2.4g Na₂CO₃</u>		1 mol Na ₂ CO ₃		2 mol NaCl		58.44g
		105.99g Na ₂ CO ₃		1 mol Na ₂ CO ₃		1 mol NaCl

= 2.6g NaCl