

NAME:

HONORS CHEMISTRY

SECTION:

Multistep Stoichiometry Problems

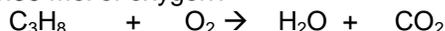
A General Process for Problem Solving

1. List what you know. <ul style="list-style-type: none"><li>• Is the equation balanced?</li><li>• What are you solving for?</li><li>• Possible mole ratios?</li><li>• gfm?</li></ul>	2. Set up the problem. <ul style="list-style-type: none"><li>• Keep close eye on units</li><li>• Include "mole-mole" bridge</li><li>• All factors should cancel out to give units of answer</li></ul>	3. Estimate and calculate. <ul style="list-style-type: none"><li>• Is the answer reasonable?</li><li>• Use significant figures</li><li>• Report appropriate units</li></ul>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------

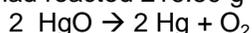
1. The mineral magnesite contains magnesium carbonate,  $\text{MgCO}_3$ . Magnesite can be decomposed with heat to form magnesium oxide,  $\text{MgO}$ , and carbon dioxide. How many moles of magnesium oxide would be formed from the reaction of 20.1 kg of magnesite?



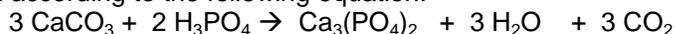
2. Propane,  $\text{C}_3\text{H}_8$ , burns in oxygen to produce carbon dioxide and water. What mass of propane could be combusted by 8.35 mol of oxygen?



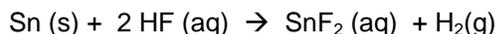
3. Oxygen,  $\text{O}_2$ , was discovered by Joseph Priestley in 1774 when he decomposed mercury (II) oxide,  $\text{HgO}$ , into its constituent elements by heating it. How many moles of oxygen could Priestley have produced if he had reacted 216.59 g of mercury (II) oxide?



4. Limestone ( $\text{CaCO}_3$ ) will react with most acids to form a calcium salt, water, and carbon dioxide. Determine the grams of water produced if 0.651 moles of calcium carbonate are allowed to react with phosphoric acid according to the following equation.



5. Tin (II) fluoride, also known as stannous fluoride, is added to some dental products to help prevent cavities. How many moles of tin (II) fluoride can be made from 55.0 g of hydrogen fluoride,  $\text{HF}$ , if there is plenty of tin?



6. When aluminum is heated in oxygen, aluminum oxide is formed. What mass of the oxide can be obtained from 25.0 g of the metal? (Hint: start with a balanced equation!)

7. When steam (hot water) is passed over iron, hydrogen gas and iron (III) oxide are formed. What mass of steam would be needed to react completely with 100.0 g of iron?
  
8. How much ammonium hydroxide is needed to react completely with 75.0 g of copper (II) nitrate in a double displacement reaction?
  
9. How much copper metal can be obtained by the single replacement reaction between copper (I) nitrate and 30.0 g of iron metal?  $\text{CuNO}_3 + \text{Fe} \rightarrow \text{Fe}(\text{NO}_3)_2 + \text{Cu}$
  
10. What mass of sulfuric acid ( $\text{H}_2\text{SO}_4$ ) will be needed to react completely with 35.5 g of ammonia ( $\text{NH}_3$ ) in the production of ammonium sulfate?
  
11. What mass of chlorine gas will be needed to react completely with 85.8 g of potassium iodide in a single replacement reaction?  $\text{Cl}_2 + \text{KI} \rightarrow \text{I}_2 + \text{KCl}$
  
12. How many grams of carbon dioxide can be obtained from the reaction of sulfuric acid,  $\text{H}_2\text{SO}_4$ , with 100.0 g of calcium carbonate?

<b>Answers</b>	
1.	238 mol MgO
2.	73.7 g propane
3.	.50000 mol $\text{O}_2$
4.	11.8 g $\text{H}_2\text{O}$
5.	1.37 moles $\text{SnF}_2$
6.	47.2 g
7.	48.20 g
8.	28.0 g
9.	68.3 g Cu
10.	102 g
11.	18.3 g $\text{Cl}_2$
12.	43.96g $\text{CO}_2$