AP Stoichiometry Practice Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Block \_\_\_ Date \_\_\_\_\_\_\_\_\_\_

Write out the balanced chemical equation to answer the following:

1. In a single displacement reaction between 43.6g of aluminum and concentrated hydrochloric acid, how many grams of hydrogen gas can be produced?
2. In a decomposition reaction, ammonium nitrate decomposes into nitrogen, oxygen, and water. How many mL of water can be produced if you begin with 1205.7g of ammonium nitrate?
3. How many grams of carbon dioxide are produced from the combustion of 43.7g of propane (C3H8) in your space heater?
4. How many grams of sodium hydroxide would be required to produce 75.0g of precipitate from a double displacement reaction between sodium hydroxide and excess magnesium nitrate?
5. If you have 13.5g of aluminum and 46.8g of oxygen, how much aluminum oxide could you theoretically produce in a synthesis reaction?
6. How many grams of hydrochloric acid could be produced from a reaction between 219.5g of chlorine and 300.9g of hydrobromic acid?
7. If you performed the reaction from #6 and collected 120.1g of HCl, what is your percent yield? Percent error?
8. Tying it all together: You perform a reaction between 15.6 g of ethyl ethanoate (C4H8O2) and excess water in the presence of heat. After studying ester hydrolysis (yeah, you’re smart) you predict two products were created: ethanol (C2H6O) and ethanoic acid (C2H4O2).
   * 1. Write a chemical equation for the reaction performed.

After performing the reaction, you separate the homogenous mixture via distillation & condensation. The separation yields 3 samples that have unique boiling points.

* + 1. Explain this observation and discuss whether or not it agrees with the reaction prediction from part a.

Each individual sample is analyzed for mass and %composition. The results are below.

|  |  |  |
| --- | --- | --- |
| **Sample** | **Mass (g)** | **%Composition** |
| **1** | 8.15 | 52.14% C, 13.13% H, 34.73% O |
| **2** | 10.63 | 40.00% C, 6.71% H, 53.29% O |
| **3** | 45.66 | 11.19% H, 88.81% O |

* + 1. Explain and discuss whether or not both data columns agree with the reaction prediction from part a. Use calculations to support your answer.
    2. Assuming the predicted products were correct, determine the percent yield of ethanol and ethanoic acid.