Name _____ Period _____

Chemistry of the Earth Lab 6 – Stoichiometry of the S'more Reaction 50 Points

Lab Introduction

Cooking and preparation of food is among the oldest forms of a chemical reaction. In the most basic form cooking can be symbolized by the following reaction:

Ingredient A + Ingredient B → Food AB

When obtaining ingredients for the reaction above one of the reactants (A or B) is often only found in quantities greater than needed for the reaction, while others are more limited in amount. In all reactions, the reactant that *limits* how much food can be made is known as the *limiting reactant*, while the other reactants are in *excess*, having more than needed. Likewise, the amount of each reactant, commonly measured in mass or volume, is a ratio to other parts of the reaction. This ratio is a direct relationship to the mol used in most chemical reactions.

The S'more reaction uses the following reactants:

ME: Marshmallows GK: Graham Crackers CH: Chocolate

The balanced reaction to produce the S'mores is given below:

$6ME + 2GK + 2CH \rightarrow 1\ S'more\ (Me_6GK_2CH_2)$

Your goal in this lab is to produce the maximum number of S'mores based on the reactant (molar) ratios shown above (6ME:2GK:2CH:1S'more). The reaction will be accomplished by using heat to chemically change the marshmallows using a combustion reaction, the completing the reaction by assembling the rest of the reactants to produce the final S'more product.

Procedure

1. Obtain a bag containing of base reactants to complete the S'more reaction, place contents on a paper towel on table.
2. Count the number of particles of each reactant and write on the data table
3. Use the reactant ratio (*6ME:2GK:2CH:1S'more*) to determine the limiting reactant between the GK and CH reactants;
4. Obtain additional GK or CH along with enough ME to complete the maximum number of S'more products;
5. Complete the reaction by warming up the ME on the burner with a long toothpick until the reaction completes (*do not burn the ME reactants*), then assemble the S'more products;
6. Enjoy the products of the reaction.

Lab Safety

1. The flame burner is hot when on. Always assume a burner will be hot;
2. Use caution when heating the marshmallows on the burner as they can become very hot;
3. Never eat or drink any reactants or products in lab without prior teacher permission.

Data

Number (count) of Each Reactant in Bag

Reactant	Count Reactant ME		Count Reactant GK		Count Reactant CH	
Limiting or Excess						
Extra Reactants	Extra ME Needed*		Extra GK Needed*		Extra CH Needed*	

*Only one (ME, GK, or CH) should be added. Number of S'mores should not exceed 2 total

Lab Questions

Define Limiting Reactant	Define Excess Reactant
In this lab which reactant was limiting?	In this lab which reactant was excess?

Based on the Pre-Lab discussion, why is cooking considered a Chemical Reaction?	How was the ratio of ME, GK, and CH similar to the molar ratio from reactions?