Limiting Reactant Lego Activity

PLEASE DO NOT WRITE ON THIS SHEET!

Materials: White (W) Legos, Red (R) Legos, Blue (B) Legos, Yellow(Y) Legos

A chemical reaction can only occur when there is enough of each reactant present (according to the chemical equation) for the reaction to occur. When one of the reactants is completely used up the reaction will stop. When the reaction stops it is possible that either all of the reactants are used up or some of the reactants may remain unreacted. If there are any reactants remaining they are called excess reactants. Based on the amount of product produced we can determine the amount of reactant consumed and the amount of any reactant in excess.

This activity will familiarize you with the concept of limiting reactants using combinations of colored Legos in place of chemicals. In each case given in the chart assume that a synthesis reaction takes place where the combination of Legos given react to produce one product represented by connecting all of the Legos together. For each combination of Legos create as many product "molecules" as possible from your set of Legos. For each combination write out the balanced Synthesis reaction, determine which reactant(s) get(s) used up, which reactant(s) is/are in excess, the amount of product that is formed and the amount of each excess reactant.
Finally, answer the three questions below.

(1) Assume each White Lego has a mass of 2.00 g and each Red Lego has a mass of 1.50 g. If you have 12.00 g of white Legos and 7.50 g of red Legos how many grams of product are formed in combination 1 in the chart?

(2) For the reaction: $2Na\ (s) + Cl_2(g) \rightarrow 2NaCl\ (s)$
If the reaction starts with 2 moles Na and 2 moles Cl_2, which reactant is used up and which reactant is in excess? How many moles of NaCl are formed? How many moles of excess reactant remains?

(3) For the reaction: $2H_2\ (g) + O_2\ (g) \rightarrow 2H_2O\ (g)$
If the reaction starts with 4.00 g H_2 and 4.00 g O_2, what is the limiting reactant? How many grams of water are formed?

Name_____ Date_____

	Combination	Reaction	Reactants used up	Reactants in excess	Amount of Reactant(s) in Excess	Amount of Product
1	1W, 1R	$W + R \rightarrow WR$	R	W	1 W	5 WR
2	1W, 1B					
3	1W, 1Y					
4	1R, 1B					
5	1B, 1Y					
6	2W, 1R	$2W + R \rightarrow W_2R$				
7	2W, 1B					
8	2W, 1Y					
9	2R, 1B					
10	2B, 2Y					
11	2W, 2R					
12	3W, 1R					
13	3R, 1B					
14	1Y, 3W					
15	1W, 1R, 1B, 1Y					
16	3W, 2R					
17	3W, 2B					
18	3W, 2Y					
19	3W, 3R					
20	2W, 2R, 2B					
21	2W, 2R, 1B, 1Y					
22	3W, 2R, 1B, 1Y					
23	4W, 2R, 1B, 1Y					
24	2W, 2R, 2B, 2Y					
25	3W, 3R, 1B, 1Y					