Limiting Reagent Problems – Set II
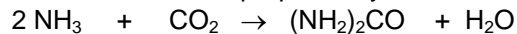
1. Urea, $(NH_2)_2CO$ is used as a fertilizer. It is prepared by the reaction between ammonia and carbon dioxide:

$$2 NH_3 \ + \ CO_2 \ \rightarrow \ (NH_2)_2CO \ + \ H_2O$$

(a) If 13.6 g of ammonia and 30.8 g of carbon dioxide are allowed to react, which reactant is the limiting reagent ? Justify your answer. (NH_3 since it would make less urea)

(b) How many grams of urea can be made in the above reaction ? **(24.0 g)**

(c) How many moles of the **excess** reagent remain after the above reaction is over? **(0.3mol)**

2. Given: $3 H_2 \ + \ N_2 \ \rightarrow \ 2 NH_3$

(a) If 3 g of hydrogen and 28 g of nitrogen are allowed to react, which reactant is the limiting reagent? Justify your answer. (LR is H_2 since it would make less products)

(b) How many grams of ammonia could be made ? (**17g**)

(c) How many grams of the excess reagent remain after the above reaction is over ? (14g)

3. When chromium (III) phosphate is reacted with hydrogen gas pure chromium metal and phosphoric acid are made.

    (a) Write a balanced equation for this reaction.

    (b) If 29.4 g of chromium (III) phosphate and 2.0 g of hydrogen are allowed to reacted, How many grams of chromium metal can be made? How many grams of excess reagent remains at the end of the reaction? (**10.4 g ; 1.4g**)

4.   (a) Write a balanced equation for the burning of butane, C_4H_{10}, in air. The products of combustion are carbon dioxide and water.

    (b) How many grams of carbon dioxide and water are produced when 11.6 g of butane and 48 g of oxygen are allowed to react. (**35.2 g CO$_2$; 18 g H$_2$O**)

    (c) How many grams of the excess reagent are left at the end of the reaction? (**6.4g O$_2$**)