Worksheet 12: THEORETICAL YIELD & PERCENT YIELD

1. 2.57 g of sodium chloride reacts with excess lead (II) nitrate to produce a yellow precipitate. What is the percent yield for the reaction if 5.97 g of the precipitate was collected when the experiment carried out? Answer: 97.5%

$NaCl + Pb(NO_3)_2 \rightarrow NaNO_3 + PbCl_{2(s)}$

2. 2.67 g of potassium hydroxide reacts with excess aqueous copper (II) nitrate in the lab. If the percent reaction was 86.5%, what was the was of the precipitate collected in the lab (ie: actual yield)?

Answer: 2.01 g

$KOH + Cu(NO_3)_2 \rightarrow KNO_3 + Cu(OH)_{2(s)}$

3a. Iron is the most widely used metal in North America. It may be produced by the reaction of iron (III) oxide, from iron ore, with carbon monoxide to produce iron metal and carbon dioxide. What theoretical yield of iron metal produced from the reaction of 900 g of iron (III) oxide.

Answer: 630 g

$Fe_2O_3 + CO \rightarrow Fe + CO_2$

3b. If at the end of the process at the refinery, the workers collected 600 g iron, what is the percent reaction for the process?

Answer: 95.2 %

LIMITING REAGENTS

4. In a lab scale experiment, 5.00 g of sodium metal is reacted with 8.00 g of chlorine gas to produce salt. Theoretically what mass of salt can be produced from this reaction.

Answer: 12.7 g

$Na + Cl_2 \rightarrow NaCl$

5a. In a lab scale experiment 0.250 g of nitrogen is reacted with 0.250 g of hydrogen to produce ammonia. What is the theoretical mass of ammonia produced?

Answer: 0.304 g

$N_2 + H_2 \rightarrow NH_3$

5b. What was the actual mass produced if the % yield is 51.5 %? Answer: 0.157 g

6a) A mass of 3.00 g of lead (II) nitrate was reacted with 2.50 potassium iodide. Determine the theoretical mass of precipitate that forms. (Determine the limiting reagent).

Answer: 3.5 g

$Pb(NO_3)_2 + KI \rightarrow PbI_{2(s)} + KNO_3$

6b) The reaction flask was allowed to stand overnight and the precipitate separated from the solution by filtration, washed several times and allowed to dry overnight.

mass of filter paper = 0.85 g
mass of filter paper + ppt = 4.18 g

What is the actual mass of lead (II) iodide produced? Answer: 3.33 g

6c) Determine the % yield of the precipitate. Answer: 95.9 %