Directions: First 40 minutes with partner, non-programmable calculator; no notes – next 10 minutes with notes – remaining 25 minutes at the board.

1) For the reaction $SrCO_3 + 2HCl \rightarrow SrCl_2 + CO_2\uparrow + H_2O$, how many grams of $SrCl_2$ are produced when 5 mL of 4 M $SrCO_3$ are reacted with HCl?

2) For the reaction $2HCl + CaCO_3 \rightarrow CaCl_2 + CO_2\uparrow + H_2O$, how many grams $CaCl_2$ are produced when 45 mL 0.34 M $CaCO_3$ react with the HCl?

3) For the reaction $NaHCO_3 + HC_2H_3O_2 \rightarrow NaC_2H_3O_2 + CO_2\uparrow + H_2O$, how many mL of 0.5 M $HC_2H_3O_2$ are required to react with 10 g $NaHCO_3$?

4) How many mL of 0.33 M HNO_3 are required to react with 15 g AgCl as follows: $HNO_3 + AgCl \rightarrow AgNO_3 + HCl$?

5) For the following reaction: $N_2 + 3I_2 \rightarrow 2NI_3$, if you start with 25 g I_2 and you obtain 15 g NI_3, what is the per cent yield of NI_3?

6) For the following reaction: $2Na + 2H_2O \rightarrow 2NaOH + H_2\uparrow$, if you start with 10 g Na and you obtain 8 g NaOH, what is the per cent yield of NaOH?

7) For the following reaction: $CO_2 + NH_3 \rightarrow CH_4N_2O$ (urea) $+ H_2O$, if you start with 6 g CO_2 and obtain 5 g urea, what is the per cent yield of urea?

8) If 2 mol HCl reacts with $AgNO_3$ as follows: $HCl + AgNO_3 \rightarrow AgCl + HNO3$, how many mol AgCl are produced?

9) If 36.5 g HCl reacts with AgNO$_3$ as above, how many grams of AgCl will be produced?

10) If you also have 10 g AgNO$_3$ for the above two questions, which reagent is the limiting reagent?

11) Given the following reaction: N$_2$ + 3I$_2$ → 2NI$_3$, if you have 28 g N$_2$, how many grams of NI$_3$ will you be able to make?

12) If you also have 50 g I₂ for the above reaction in #24, what is the limiting reagent?

13) 454 g of paper are placed in a calorimeter at 25°C. The calorimeter has a mass of 3 kg and is made of iron. 500 kJ are added to the system. If the specific heat capacity of paper is 5 J/K/g, what is the final temperature of the system?

14) An aluminum pipe of 150 g is at 5°C. If the ends of this pipe are plugged after 400 g of Pb at 400°C are poured into it, what is the final temperature of the system?

15) A diamond container at 10°C has 150 g water at 75°C poured into it. The diamond container has a mass of 30 g. What is the final temperature of this system?