

Chemistry

Stoichiometry Activity stoixelprac04.doc

Directions:

1. Open the Excel Stoichiometry worksheet. Make sure that the stoichiometry tab is selected at the bottom of the page.
2. In the first part of this exercise you will be working with the synthesis reaction between calcium and oxygen to produce calcium oxide. You will first hold a fixed amount of calcium and vary the amount of oxygen to see how much calcium oxide will be produced. Then you will hold the oxygen mass constant and vary the calcium mass. You will use this data to construct a graph to see the mass of calcium and oxygen that will give the maximum amount of calcium oxide with no reactant mass left over.
3. Create a new worksheet by selecting *worksheet* from the *insert* menu at the top of the page. Notice that a new tab is created at the bottom of the page. This is where you will temporarily place your data to construct your graph.
4. Click on the new tab that was created and in cells A1 through A11 place the numbers 0 through 50 in increments of five. These numbers represent the varying mass of reactant as you progress through the experiment.
5. Click back to the stoichiometry worksheet and enter a value of 50.0g for the mass of the calcium. Now, beginning with 0.0g and working your way up through 50.0 (in increments of five) enter in these values for the mass of the oxygen and note the amount of calcium oxide that is produced for each mass. Record the mass of calcium oxide produced in cells B1 through B11 on the worksheet you created.
6. Next, enter 50.0g for the mass of the oxygen and repeat the process by varying the amounts of calcium this time beginning at 0.0g as in step 5. Record the masses of calcium oxide produced in cells C1-C11 on your worksheet.
7. You should now have three columns of data on your worksheet. Beginning at cell A1, click and hold the left mouse button while you drag the mouse diagonally until you have highlighted cells A1 through C11. Now select the chart wizard icon from the toolbar at the top of the worksheet (it has a little picture of a chart on it). Begin by choosing XY (scatter) as your type of graph. Select the chart sub-type that is described as "Scatter with data points connected by lines". Click the button that says *Next*. Click the series tab and highlight *Series1* from the series window. Click in the *Name* window and type "Oxygen Mass". Highlight *Series2* and type "Calcium Mass" for its name. Click the *Next* button again. On the *titles* tab, enter "Reactant Mass Versus Product Mass" as the chart title. For *Value (X) axis* type "Reactant Mass". For *Value (Y) axis*, type "Product mass". Click the *Gridlines* tab and select only the minor gridlines for x and the major gridlines for y. Now click on the *Finish* button. Your graph should now be visible within your worksheet. Now you will analyze the chart.

Summary: Open a new Microsoft Office Word document and type a heading for your report. Be sure to include your names. Copy and paste your Excel data table and chart into your Word document. If you are not sure how to do this consult your instructor.

Below this data, type the answers to the following questions:

Questions:

1. From the chart, what is the maximum amount of calcium oxide that can be produced?
2. Using your graph, determine the amount of Calcium and Oxygen gas required to produce the mass of calcium oxide from question 1. How did you determine this?
3. Explain the difference in the shapes of the Calcium graph line and the Oxygen graph line.
4. Explain the difference in the slopes of the two graph lines.
5. Go back to the stoichiometry tab in the Excel worksheet and enter in your answers from question 2. Is the mass of calcium oxide you predicted in question 1 produced?
6. Is there any reactant mass left over? If so, is it a lot or a little? What might account for this?
7. Is the ratio of moles of reactants to moles of product consistent with the balanced chemical equation? Explain.
8. Is the ratio of grams of reactants to grams of product consistent with the coefficients of the balanced chemical equations? Explain.
9. Verify that the moles of reactants are consistent with the entered mass by calculating the moles of calcium and oxygen below. Do they agree?
10. Answer the following question:
In a reaction where calcium metal reacts with oxygen gas to produce solid calcium oxide, if 50.0g each of calcium and oxygen gas are allowed to react (show your answers by calculations).
 - a) what is the limiting reagent?
 - b) how much calcium oxide product can be produced?
 - c) how much excess reagent is leftover?
11. How does the problem in question 10 tie-in with what you learned in this activity? Are the results of your answer to question 10 consistent with the results you achieved in this activity? Explain.

Print your finished report and return to your instructor. Please do not save changes to the Excel spreadsheet using the original document name.