Hypothesis

- What are you doing?

Trying to find the % solution of an unknown concentration after making dilutions of a known concentration to compare it against.

- What do you expect the outcome to be?

We expect to find out the % solution.

- Why do you expect that outcome?

Because we can use the known concentration to make a reference chart and then compare the unknown to it.

- Why did you choose to do this experiment this way?

We chose to do it this way because it will give us a spread of the data.

Preparing the spectrometer and calibration:

1. Plug the spectrometer cord into one of the USB ports on your computer. Sometimes, the spectrometers will not be recognized by some computers, so you may want to swap cords with another partnership if you experience problems.

2. Start Logger Pro and make sure the system recognizes that the spectrometer is connected. . (If it is connected, you should see a rainbow background on the graph.)

Make a solution of 2 mL distilled water and 1mL Benedicts solution

3. Fill one cuvette with the solution and place it in the spectrometer so that the flat sides of the cuvette face the light (you will see what this means in lab). To ensure consistency make sure the cuvette is facing the same direction each time it is placed in the spectrometer.

4. Click on **Experiment**, then **Calibrate**, then **Spectrometer**. A dialogue box will appear and display the message: waiting ____ seconds for lamp to warm up.

> *After the lamp has warmed once, you will not need to warm it again during lab and can skip the warm up when prompted later in lab.

5. When the warm up is complete, click **Finish Calibration**, then click **OK**.

6. Now click on **Configure Spectrometer** (the rainbow under a curve) on the toolbar. Make sure that the program is set to collect "absorbance vs. wavelength" and click **Okay**.

7. Now, go back into **Configure Spectrometer** icon on the toolbar. Select "absorbance vs. concentration". *Under Column Name type "Percent Solution", under the Short Name type "Per.", and under Units type "%".* Then, click **Okay** and leave the cuvette in the spectrometer.

1. Get 6 test tubes and do the following in each tube:
2. 10 mL of the 2% and 1 mL of Benedict
3. 8mL of the 2% and 2mL Distilled water with 1 mL of Benedict
4. 6mL of the 2% and 4mL Distilled water with 1 mL of Benedict
5. 4mL of the 2% and 6mL Distilled water with 1 mL of Benedict
6. 2mL of the 2% and 8mL Distilled water with 1 mL of Benedict
7. 1mL of the 2% and 8mL Distilled water with 1 mL of Benedict
8. heat the tubes for 3 minutes and let sit for 5 minutes
9. Calculate the % solution of each test tube from this formula: $C_2 = (C_1V_1) / V_2$

Compiling a reference chart:

1. Now take a sample from each solution and load it into a cuvette. Place the cuvette into the spectrometer with the clear sides facing the light and Click **Collect** to measure the absorbance of the sample for your lowest percent solution. Click **Keep** ( )and when prompted to enter the concentration, enter your calculated percent solution. (this comes from the math you did, starting with 1.4) **DO NOT click Stop until you are done with all of your assays (an assay is a sample)**.

2. Next, using the spectrometer, run the assay for each of the standards you mixed and be sure to "keep" the data from each run so that you eventually have all seven standards mapped

on the graph. You will continue to click **Keep** after each assay and enter the percent solution, but DO NOT click Stop until you are done with all seven assays.

a. Therefore, after clicking keep and logging that data, you can remove the cuvette. Rinse cuvette and place 3 mL of your next solution into the cuvette. Once placed, you'll click **KEEP** again when ready to log and enter the calculated percent solution.

3. **Once you have collected all six, click Stop.** Then click the **Linear Fit** icon on the toolbar to add a trend line. Note the slope of the line (Hint- remember "m" denotes slope) as it appears in the text box.

1. Get the unknown solution and add 1 mL of Benedict solution.
2. repeat what you did in part one.
3. Measure the unknown solution with the spectrometer
4. Using it's y-value, calculate it's x-value (the % solution) from the trendline made from the dilutions