Purpose:
This laboratory will introduce you to laboratory glassware and instruments, and teach you to use them with proper techniques. You will be instructed how to use an analytical balance, volumetric flasks and pipettes, burettes and a spectrophotometer. Then you’ll practice using them by performing a titration and colorimetric spectroscopy.

Procedure:
1) Using an analytical balance and a piece of weighing paper that you have folded to leave indentations for easier handling weigh out 0.5 g of colored powder. Add the powder directly (and carefully) so it slides from the paper down the fold line into a 50 mL volumetric flask and dilute to the mark with distilled water (Make sure to record your observations).

2) Using a 10 mL volumetric pipette, pipette 10 mL of your orange solution into a 125 mL Erlenmeyer flask. Repeat two times, labeling each flask (3 solutions total). Wash your pipette with water, then with distilled water and finally with the solution you plan to use next (Solution A). Add 10 mL of Solution A to each Erlenmeyer flask from your clean pipette.

   The solutions should be cleaned up and washed off if any is spilled!

3) Fill your burette with Solution B. It does not need to be filled exactly to the 0.00 mark, just record the bottom of the meniscus to hundredths of mL. Titrate each flask until the precipitate JUST disappears with a single drop. Make sure to keep the solution stirred by swirling by hand. Carefully read and record the final volume above the initial volume in your notebook, subtract, and find net total volume of titrant (Solution B) used for each flask (Use correct significant figures).

4) Using 100 mL and 10 mL graduated cylinders, dilute each of your three titrated solutions 1:1000 with distilled water. This will mean performing two consecutive dilutions (called serial dilutions). Each diluted solution is then poured into a labeled 100 mL beaker. Calibrate and zero the spectrophotometer as instructed. Record the absorbance at 495 nm to determine the concentration in each beaker.
5) Wash your glassware and clean up your laboratory desk. Report to the instructor with your safety eyewear before doing your calculations.

**Calculations:**

1) Calculate the average \( \bar{x} = \frac{x_1 + x_2 + x_3}{3} \) amount of Solution B used in titrating.

2) Calculate the standard deviation \( \sigma = \sqrt{\frac{1}{2} \sum_{n=1}^{3} (x_n - \bar{x})^2} \) of the above mean.

3) Calculate the relative standard deviation \( \% RSD = 100 \times \frac{\sigma}{\bar{x}} \) or precision.

4) Calculate the average, Standard deviation and \%RSD using your absorbance measurements. Compare your \%RSD from your titration results to the \%RSD of your absorbance results. Did your precision change? Why?