To finish Experiment 7 faster, do the procedures in this order

Part 1, steps 1 – 8 (prepare the sample).

While the hot sample from Part 1 cools, do Part 2 (prepare the standard solution).

When Part 2 is done (you *do not* have to let the solution sit for 20 minutes), go back to your sample and finish up Part 1 Step 9.

Now Parts 1 and 2 are done. Skip Part 3 and go directly to Part 4.

In Part 4, step 1, add 2 ml of hydroxylamine instead of 1 ml. After Part 4 step 1, the solution has to sit for 20 minutes. While it is sitting, do Part 3.

When you are finished with Part 3, continue with Part 4, Step 2.

Working with syringes:

Take only two syringes and reuse them. Rinse them with the next solution you will use before making a measurement. Make sure there is no air bubble inside the syringe!

Cuvettes:

Take only two cuvettes, one for the blank and one for the sample. Rinse the sample cuvette twice with the next solution you will use before making a measurement.

<u>**There are calculations buried in the procedure for Part 4!**</u>

Calculating *x*, *y*, and *z* and determining the chemical formula for the green crystals.

Part 4, Step 4: You already know the *moles of oxalate per gram of sample* from Experiment 6, and now you have *moles of iron per gram of sample* from Experiment 7. Dividing the first number by the second gives you the mole ratio of oxalate to iron (how many oxalates there are for every iron). Since there cannot be a fraction of an oxalate around the iron, this result should be rounded to the nearest whole number!

Part 4, Step 5: "Assume it to be the simplest formula" means assume that y, the number of irons in the oxalate-to-iron ratio, is 1. If there is one iron, then $y = 1$ and $x =$ the number of oxalates we just calculated in Step 4. Notice that potassium and oxalate have the same x subscript. This means that <u>moles of K^+ per gram of sample is the same as moles of oxalate per gram of sample</u>.

Part 4, step 6: To calculate *z* (moles of water in the sample), assume you have one gram of sample and then determine how much of that sample weight would be made up of Fe^{3+}, $C_2O_4^{2-}$, and K^+. Whatever mass is left over is water. To determine z, calculate how moles of water per gram of sample, and take the ratio of *moles of water per gram of sample* to *moles of iron per gram of sample*, just like we did with oxalate and iron in Step 4. Here are those calculations step by step:

a. grams of Fe^{3+} per gram sample = $\dfrac{\text{moles of } Fe^{3+}}{\text{gram of sample}} \times$ AW of Fe (55.847 g/mole)

b. grams of $C_2O_4^{2-}$ per gram of sample = $\dfrac{\text{moles of } C_2O_4^{2-}}{\text{gram of sample}} \times$ MW of $C_2O_4^{2-}$ (88.01960 g/mole)

c. grams of K^+ per gram of sample = $\dfrac{\text{moles of } K^+}{\text{gram of sample}} \times$ AW of K (39.0983 g/mole)

mass of H_2O per gram of sample =

$$1.0000\text{ g} - \frac{\text{grams of } Fe^{3+}}{\text{gram of sample}} - \frac{\text{grams of } C_2O_4^{2-}}{\text{gram of sample}} - \frac{\text{grams of } K^+}{\text{gram of sample}}$$

moles of H_2O per gram of sample = $\dfrac{\text{grams of } H_2O \text{ per gram of sample}}{\text{MW of } H_2O\ (18.0152\text{ g/mole})}$

$$z = \frac{\text{moles of } H_2O \text{ per gram of sample}}{\text{moles of } Fe^{3+} \text{ per gram of sample}}$$

Step 7: Calculate the molecular weight of the crystals based on your formula.

Step 8: Balance the equation for the overall synthesis reaction of green crystals from yellow precipitate. (If your formula is not correct, this equation might not be balanceable! If you cannot balance the equation, Google "potassium oxalatoferrate" to get the correct formula and then balance the equation using that formula. <u>If you do this, make sure you write down in your lab notebook where you got the formula from</u>!

Step 9: Calculate theoretical yield based on the amount of iron salt you started with in Experiment 5, the balanced chemical equation from Step 8, and the molecular weight of the green crystals. Remember that the waters of hydration are part of the chemical formula and are part of the molecular weight!

Calculate the percent yield based on the theoretical yield and the actual yield you measured in Experiment 6.