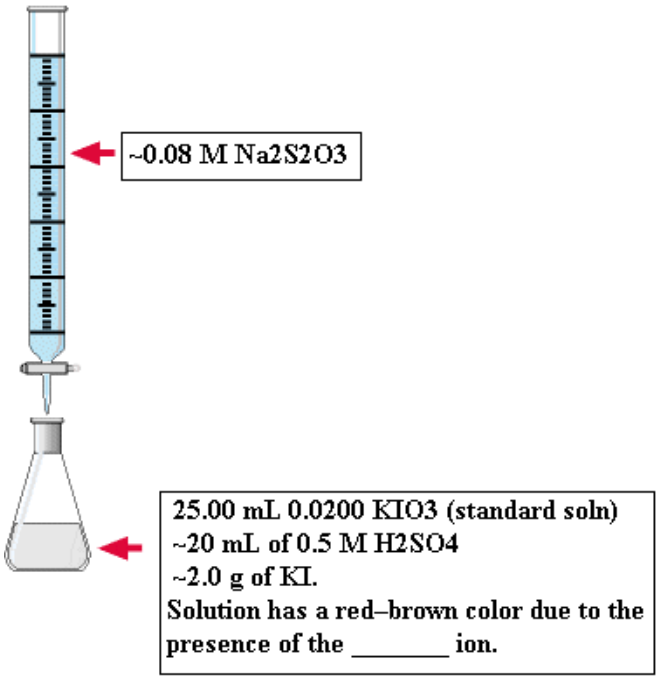
Lab 4. Analysis of Vitamin C Prelab Lecture Notes

Part I — Preparation and Standardization of Sodium Thiosulfate

1. Prepare 500 mL of **~0.08 M solution of sodium thiosulfate**, $Na_2S_2O_3 \cdot 5H_2O$. *How*??

2. **Standardization of the sodium thiosulfate, $Na_2S_2O_3$**



a.) Write the equation of the chemical reaction that occurs in the flask *before* titrating with $Na_2S_2O_3$ and indicate which *reactant is limiting* and which *reactants are in excess*.

Equation # ____:

b.) Write the equation of the chemical reaction that occurs in *when titrating* with $Na_2S_2O_3$. Indicate the limiting reactant.

Equation # ____:

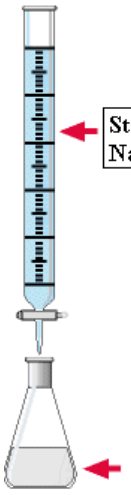
c.) What happens to the color of the solution during the titration? Why?

- The *red–brown color* should fade and the solution will turn a *pale yellow color* as the _____ is consumed in reaction # _____.
- Add starch indicator. The solution should turn a deep blue, or possibly a green–brown.
- Continue titrating until the blue color has disappeared. Record the volume of thiosulfate used.

d.) Calculate the concentration (in mol/L) of the sodium thiosulfate solution if **36.81 mL $Na_2S_2O_3$** were required to reach the endpoint. *Do the calculation as a "chain" calculation*.

e.) How many trials should you do?

Part II — Analysis of an Unknown Sample containing Vitamin C



Standard Solution of Na2S2O3

Vitamin C oxidizes readily! Start and finish titration of the unknown on the same day!

25.00 mL Unknown containing Vit. C
25.00 mL 0.0200 KIO3 (standard soln)
~20 mL of 0.5 M H2SO4
~1.0 g of KI.
Solution has a red–brown color due to the presence of the _____ ion.

a.) Write the equation of the chemical reaction that occurs in the flask *before* a reaction occurs that involves Vitamin C and the before titration. Indicate which *reactant is limiting* and which *reactants are in excess*.

Equation # ____:

b.) Write the equation of the chemical reaction that occurs between Vitamin C and a product of the equation above. *Indicate the limiting reactant*.

Equation # ____:

c.) Write the equation of the chemical reaction that occurs in *when titrating* with $Na_2S_2O_3$

Equation # ____:

d.) Calculate the concentration (in **mol/L** and **mg per 100 mL**) of vitamin C in the unknown if **14.45 mL 0.0815 $Na_2S_2O_3$** were required to reach the endpoint. *Hints:*

i.) Find the moles of I_3^- formed in reaction #3.

ii.) Use the data from the titration to find the moles I_3^- that were leftover unreacted in the reaction between the vitamin C and the I_3^- in reaction #1.

iii.) Use (i.) and (ii.), above, to find the moles of Vit C (176.129 g/mol) present in the 25.00 mL of the unknown and then calculate the concentration of Vit C in the unknown in mol/L and mg/L