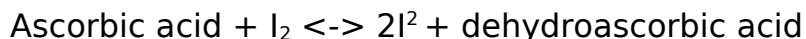**Post lab questions for Vit.C Lab**

1. Write the reaction that occurs between Vit.C and iodine. Then, write the half reactions indicating where oxidation and reduction occur.

   Reduction   Oxidation

   Ascorbic acid + I_2 <-> $2I^2$ + dehydroascorbic acid

2. Write the reaction that occurs between potassium permanganate and sodium oxalate solution. Also, include the half reactions indicating where oxidation and reduction occur.

   $5C_2O_4^{2-}(aq) + 2MnO_4^-(aq) + 16H^+(aq) \rightarrow 10CO_2(g) + 8H_2O(l) + 2Mn^{2+}(aq)$
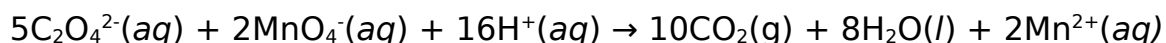
3. If you had used a 10mL-graduated cylinder (instead of a 5-mL pipette) to aliquot the 5mL of stock (vit.C) solution in part A, how would the accuracy of your measurements be affected?

   The average deviation would be much greater, as a graduated cylinder is not nearly as accurate as a 5-ml pipette.

4. Explain why vitamin C should be soluble in water. Then, explain why the commercial tablet didn't seem to dissolve completely in solution (part B).

   Since water and ascorbic acid are both polar, the acid should be soluble in water.

   The tablet has a small amount of plastic covering it, to protect it from oxidation when being stored.

5. How many grams of (pure) vitamin C is contained in your unknown stock solution (part A)?

    0.276g

6. Consider the following titration: If 21.35 mL of 0.005M Iodine solution is needed to titrate a solution of commercial Vitamin C tablet (500mg) prepared in a 100mL-volumetric flask, then what is the mass(%) of vitC in the commercial tablet.

   M_KI = 0.005M KI, L_KI = 0.02135L, G_T = 0.500g, L_VC = 0.1L

   mol_KI = 2mol_I_2 = 2mol_VC = M_KI * L_KI = 0.0001068mol

   G_VC = mol_VC * 176.12 = 0.009400g

   G_VC / G_T * 100 = **1.880%**

7. <u>Case study</u>: While preparing a tablet solution in 100mL volumetric flask (part B), you accidentally forgot to dilute the solution to the mark. Next, you titrated the aliquot with the Iodine solution. <u>Question</u>: how would the volume of I_2 be different from what you've expected? How would the concentration of vit C be different from what you've expected?

The solution would be more concentrated than expected, so the volume of I_2 would be greater per unit of aliquot.

8. Discuss all possible *sources of errors* in your experiment.

Creating the solution from a vitamin C tablet was one of our largest sources of error. Instead of using a graduated cylinder to measure an accurate amount of water to dissolve the vitamin C, we used a beaker. The vitamin C itself also has mass, so that could have contributed to our error slightly.

Another source of error was doing titration on the vitamin c solution without diluting it. This made it very difficult to accurately measure the end point.

A less significant source of error was the fact that vitamin C oxidizes naturally when exposed to the atmosphere. Since our solution was created and used promptly the margin of error would have been much less significant that the others above.

If the vitamin C tablet did not dissolve completely, that would also contribute to the error, making the concentration appear smaller, or possibly larger if the solution at the bottom was used and a "chunk" or two of vitamin C made it into the pipette and dissolved during titration.