CH 461 & CH 461H - Lab Quiz 3 Name_____

This Lab Quiz is **due at 12:00 PM on Thursday 10/24/19**. It is open book (i.e., the universe), no discussion or help about this quiz from any person. Please place numerical answers in the space provided **in the units given** after the space and indicate basis of the answer when calculations are required (provide formulas and substitutions) - just the final numerical answer is not acceptable. Please e-mail or ask me if you have questions. Report all answers to 3 sig figs.

1. A UV-Vis spectrophotometric method using a CCD detector was used to determine the concentration of Fe^{3+} in a sample of lean beef hamburger. **Solution preparation:** Seven subsamples are prepared. Each subsample is 0.5000 g of freeze dried hamburger that is microwave digested in 6 mL of concentrated HNO_3 in a teflon cup, then each quantitatively transferred to a separate 10.00 mL volumetric flask (diluted with DI) to make solutions X. **Instrument setup:** The analysis wavelength is 490 nm. Integration time 10 ms, 10 averages, boxcar 0. The blank was measured 15 times yielding a standard deviation of 135 counts. Four iron standards were run and the calibration curve slope was found to be 1310 counts /(µg/mL Fe^{3+}) .

   a. What is the detection limit in concentration units using the definition for DL given in class ?

   DL = _____µg/mL Fe^{3+}

   b. Each X subsample solution is quantitatively diluted 1/2 to make subsample solutions Y that are measured in the spectrometer. The average signal counts for six of the Y solutions is 710 cts. What is the average mass/mL of Fe^{3+} in these six Y solutions?

   _____µg/mL Fe $^{3+}$ in Y

   c. What is the average mass/mL of Fe^{3+} in the six X solutions?

   _____µg/mL Fe $^{3+}$ in X

   d, What is the average mass of Fe^{3+} in the 0.5000 g subsample of freeze dried hamburger?

   _____mg Fe $^{3+}$ in 0.5000 g beef

   e. Based on this analysis, what is the total amount of Fe^{3+} in one 4 oz serving of this beef?

   _____mg Fe $^{3+}$/g beef

   f. Based on this analysis, what is the total amount of Fe^{3+} in one 4 oz serving of this beef?

   _____mg Fe $^{3+}$/4 oz serving

g. If the seventh subsample gave 395 counts, would you stake your reputation as a scientist and report that in fact Fe^{3+} is present in this unknown (according to the definition for DL recommended in CH 461)? **Yes or No and give a brief explanation why you think this**.

2, Which of the following solutions for **Mn^{4+}** would you expect the to be more affected by stray light when determining concentrations by absorbance spectrophotometry, and why do you think this? **Give an equation for transmittance to support your answer.**

Solution A: 0.156 M Mn^{4+} Solution B: 0.467 M Mn^{4+}