

George Mason University
CHEM 321: Quantitative Analysis
Lab Final Exam (75 mins)

NAME _____

Honor Code Pledge:

(Show your work to get full credits. Atomic weights: H-1, C-12, N-14, O-16, Mg-24.3, Zn 65.4, Ag-108)

1. (10 points)

The Zn in a 0.7556 g sample of foot powder was titrated with 21.27 mL of 0.01645 M EDTA. What is the concentration (in mg/g of sample) of Zn in this sample?

2. (5 points)

The standard deviation of a single weighing is found to be 1.0 mg. How many weighings are required for the standard deviation of the mean to be 0.1 mg?

3. (5 points)

The two forms of a colored indicator shows the following absorbance value at a fixed, 540 nm, wavelength and at pH =5.0. What is the pK_a of the indicator? (Absorbance of HIn = 0.64, and absorbance of In^- = 0.16).

4. (10 points)

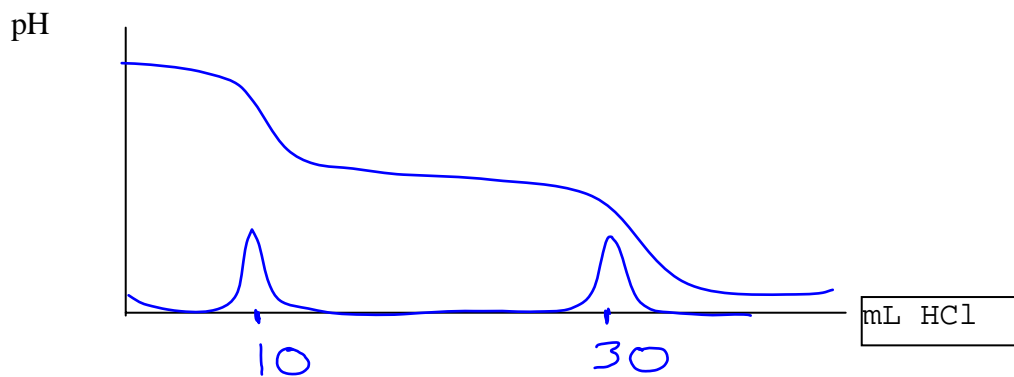
How many grams of potassium acid phthalate (Formula weight 204.233) should be weighed into a flask to standardize 0.05 M NaOH if you wish to use about 30.0 mL of base for titration?

5. (5 points)

A certain spectrometer is capable of detecting an absorbance of 0.001. If a trace analysis of a compound with a molar absorptivity of 10^5 is desired in a 1.0 cm path-length cell, what is the lowest concentration that can be detected with this instrument?

6. (15 points)

A 0.2000 g mixture of Na_2CO_3 , NaHCO_3 and NaCl is titrated with 0.100 M HCl . Calculate the percent composition of the mixture from the following pH titration curve. (NaCl is inert)



7. (50 points)**Answer the following questions (show balanced reactions when appropriate)**

- (a) During the iron gravimetric experiment the dissolved iron was precipitated with ammonia not sodium hydroxide. Explain.
- (b) Explain why the $\text{Fe}(\text{OH})_3$ precipitate was washed with NH_4NO_3 solution.
- (c) What happens when a ferric salt (FeCl_3) is treated with hydroxylamine hydrochloride in a basic medium (pH 7-9) and then mixed with 1,10-phenanthroline?
- (d) Explain why the indicator dichlorofluorescein changes its color at the end of the Ag^+ and Cl^- titration.
- (e) Explain why it is necessary to control the pH during the EDTA titration of metal ions.

(f) During the standardization of EDTA with standard Mg solution the color of Erichrome Black T (EBT) indicator changes from red to blue. Explain.

(g) Explain why an aqueous permanganate solution is intrinsically unstable.

(h) Balance the following reaction:

