Chemistry 1210
pH and Indicators; Determination of the Ka's for Weak Acids; Potentionmetric Titrations of Strong and Weak Acids

Date:_____   Name:_____
                                          Partner:_____

OBJECT: To determine the pKa's and useful pH ranges of several indicators and
                     to measure the pH of solutions with pH meters and indicators.

                     To determine the Ka for weak acids from pH measurements of dilute
                     solutions of aetic acid, propionic acid and phosphoric acid.

                     To study the tirations of a strong acid, a weak acid and a polyprotic
                     acid with a strong base.

PROCEDURE: As in the Chemistry 1210 lab manual, page 61-65

Part II OBSERVATIONS:

Part II Data and Calculations:

Solution Name	Molarity of Weak Acid	Measured pH	Calculated $[H^+]$	Calculated Ka	Literature Ka
Reference for Literature Ka including Name of book, edition, and page:					

Calculations (for all three acids):

*Discussion- How do the experimental Ka's compare to literature values(bigger or
        smaller). List two sources of error and explain how they would cause these
        differences.*

Part III
Attach three graphs, each containing the following information:
-Label all equivalence points, end points and points where ph = pKa (if applicable)

-Label principal species at (i) start of the titration, (ii) at point where ph = pKa (if applicable), (iii) at equivalence point(s), (iv) beyond the end of the titration

-Label the name and colour of the indicator at each region on the titration curve

-Label any buffer regions if applicable

Part III Comments:

How do the three titration curves differ in shape?

How and why do the three titration curves differ in pH at equivalence?

What is significant about the buffer regions (where applicable)?

What is significant about the region at the start of the titration curves for weak acids?

How can the pKa of a weak acid be determined from its titration curve?

Questions:

1.   Explain the difference between the terms equivalence point and endpoint. *Do not simply define each term, explain what makes them different as well.*

2.   Consider the following two solutions: Solution A has a volume of 1 litre which contains 0.35 moles of acetic acid and 0.25 moles of sodium acetate. The Ka value for acetic acid $1.78 * 10^{-5}$. Solution B also has a volume of 1 litre and it contains $2.8 * 10^{-4}$ mol HCl and $2.84 * 10^{-4}$ mol of NaCl.

a)   Calculate the pH of each of the two solutions.

b)   What is the pH of each solution after thoroughly mixing in 10.00 mL of 0.1000 *M* NaOH in to each solution?

Part I
OBSERVATIONS: Circle the pH (range) at which each indicator appears to change from its acidic form to its basic form

Name of Indicator	pH of buffers										Unknown solution(s)			Est-imated pKa	Lit pKa
	1	2	3	4	5	6	7	8	9	10					

Reference including Name, edition and page for lit pKa's
Estimated pH of unknown solution(s) based on observed colours
Measured pH of unknown solution(s) if available