

# Determination of the Equivalent Mass and $pK_a$ of an Unknown Acid

## Preliminary Lab Assignment

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

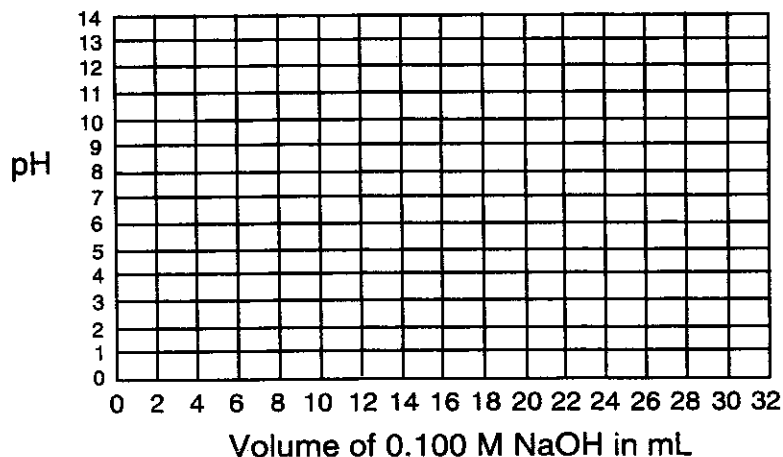
- What is the equivalent mass of each of the following acids?
  - $HC_2H_3O_2$
  - $KHCO_3$
  - $H_2SO_3$
- Calculate the molarity of a solution of sodium hydroxide, NaOH, if 23.64 mL is needed to neutralize 0.5632 g of potassium hydrogen phthalate.
- It is found that 24.68 mL of 0.1165 M NaOH is needed to titrate 0.2931 g of an unknown acid to the phenolphthalein end point. Calculate the equivalent mass of the acid.
- The following values were experimentally determined for the titration of 0.145 g of a weak acid with 0.100 M NaOH:

Volume NaOH, mL	pH
0.00	2.88
5.00	4.15
10.00	4.58
12.50	4.76
15.00	4.93
20.00	5.36
24.00	6.14
24.90	7.15
25.00	8.73
26.00	11.29
30.00	11.96

## EXPERIMENT SIXTEEN

- a. Graph the data on the chart below.

Change of pH During Titration of Weak Acid with NaOH



- b. What is the pH at the equivalence point?
- c. Does the acid appear to be monoprotic or diprotic? Explain.
- d. Give the  $K_a$  and  $pK_a$  value (or values) of the acid. Explain.
- e. Calculate the equivalent mass of the acid.
- f. The following acid–base indicators are available to follow the titration. Which of them would be most appropriate? Explain.

Indicator	Color Change		pH Transition Interval
	Acid Form	Base Form	
Bromphenol blue	yellow	blue	3.0 – 5.0
Bromthymol blue	yellow	blue	6.0 – 7.6
Thymol blue	yellow	blue	8.0 – 9.6