

**ADVANCED GEOCHEMISTRY OF NATURAL WATERS**  
**LABORATORY EXERCISE #3**

Determination of  $pK_a$ 's, identity and concentration of a weak, polyprotic acid

Procedure

1) Calibrate the pH meter using its internal calibration option. Use the pH = 7 and pH = 2 buffers to start. Mid-way through the titration it may be desirable to recalibrate the meter using pH = 7 and pH = 10 buffers.

2) After calibrating, titrate the unknown acid solution up to as high a pH as possible.

3) Plot a titration curve of pH vs. mL base added. From this curve, estimate the  $pK_a$ 's of the acid and determine its identity (it is a common inorganic polyprotic acid). Note that you may not be able to titrate all of the protons on the acid or determine all the  $pK_a$ 's. However, you should be able to determine at least two  $pK_a$ 's and titrate two protons, and this is sufficient to make an identification.

4) Report the  $pK_a$ 's determined and the total concentration of acid as the mean  $\pm$  standard deviation of at least three replicate measurements.