Measuring Acid Strength

Data Table

Unknown Label	
Trial	**pH**
Trial #1	
Trial #2	
Average	

Post-Lab Questions

1. Average the pH readings for each trial (#1 and #2) to calculate the average pK_a value for your unknown weak acid.

2. Comment on the precision (reproducibility) of the pH determinations. Describe sources of experimental error and their likely effect on the measured pH (pK_a) values.

3. The following table lists the identities of the possible unknowns in this experiment. Complete the table by calculating the pK_a value for each acid. *Note:* $pK_a = -\log K_a$.

Acid	Formula	K_a	pK_a
Potassium dihydrogen phosphate	KH_2PO_4	K_{a2} of $H_3PO_4 = 6.2 \times 10^{-8}$	
Potassium hydrogen sulfate	$KHSO_4$	K_{a2} of $H_2SO_4 = 1.2 \times 10^{-2}$	
Potassium hydrogen phthalate	$KHC_8H_4O_4$	K_{a2} of $H_2C_8H_4O_4 = 3.9 \times 10^{-6}$	
Potassium hydrogen tartrate	$KHC_4H_4O_6$	K_{a2} of $H_2C_4H_4O_6 = 4.6 \times 10^{-5}$	

4. Remember that in this activity $pH = pK_a$. Compare the pK_a value for your unknown with the information in the table. Determine the probable identity of the unknown.

5. Write separate equations for the unknown dissolving in water and for the ionization reaction of the weak acid anion that this salt contains.

6. Why was it not necessary to know the exact mass of each acid salt?

7. Why was it not necessary to know the exact concentration of the sodium hydroxide solution?

8. Why was it necessary to measure the exact volume of distilled water used to dissolve the acid, as well as the exact volume of solution transferred from the beaker to the Erlenmeyer flask?