Buffer Problem

1. Explain why an 'effective' acidic buffer, has a pH close to the value of the pKa of the acid.

2. What does a buffer with a pH significantly larger than the pKa tell one about the ratio of the acid to salt (conjugate base) ratio?

3. What does a buffer with a pH significantly smaller than the pKa tell one about the ratio of the acid to salt (conjugate base) ratio?

Lactic acid ($C_3H_6O_3$) and hydrocyanic acid (HCN) have Ka's of 1.38×10^{-4} and 6.17×10^{-10} respectively

a) Show how HCN dissociates in water and identify all of the acid/base conjugate pairs.

b) Which is the stronger acid? Explain.

c) What is the formula of the conjugate base of lactic acid?

A 20.0 mL 0.100 M solution of lactic acid is titrated with 0.100 M NaOH.

a) A buffer solution exists in the flask after 5.00 mL of NaOH have been added. Write equations to show the action of each component of the buffer when acid or base is added from an external source.

b) Calculate the moles of lactic acid present in the flask before the titration

c) Calculate the pH of the contents of the Erlenmeyer flask at the following points during the titration.

i) After 0.00 mL of NaOH have been added

ii) After 5.00 mL of NaOH have been added

iii) After 10.0 mL of NaOH have been added

iv) After 20.0 mL of NaOH have been added

v) After 25.0 mL of NaOH have been added

Sketch the titration curve, including all the points you have calculated