pH of a buffer

A buffer is created when large amounts (\_\_\_\_\_\_\_\_) of a weak acid and large amounts ( \_\_\_\_\_\_\_\_\_\_\_\_) of the salt of the conjugate base of the acid are mixed.

OR

A buffer is created when large amounts of a weak base and large amounts of the salt of the \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ of the base are mixed.

In this case, the pH of the solution will resist changes in the pH with the addition of any strong acid or base. This is based on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ principle also called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ effect.

The pH can be calculated using SRF and ICE charts or the Henderson Hasselback equation.

pH = pKa + log [A-]/[[HA] for a weak acid + salt of conjugate base

pH = 14- (pKb + log [HA]/[A-] for a weak base + salt of conjugate acid

Notice that the pH will equal the pKA when equal concentration of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The relative amounts of the acid and its salt is important not the absolute amounts.

Thus the pH will equal the pKa when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are mixed or if \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are mixed.

Sample problem: Calculate the pH of a 100.0 mL buffer made so that the lactic acid concentration is 0.75 M and the sodium lactate concentration is 0.25M (Ka of lactic acid is 1.4 x 10-4)

Using ICE chart:

Using Henderson Hasselback equation:

Sample problem: Calculate the pH of a 100.0 mL buffer made so that the lactic acid concentration is 0.75 M and the sodium lactate concentration is 0.25M (Ka of lactic acid is 1.4 x 10-4) where 10.0mL of 1.0M HCl is added.

SRF

ICE

Henderson Hasselback: