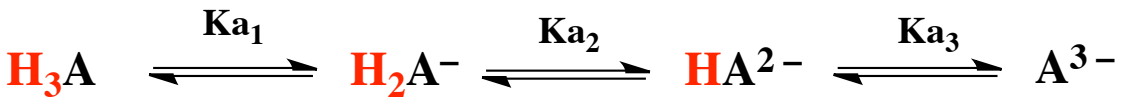
CONCEPT: POLYPROTIC BUFFERS

A triprotic buffer can be approached in a way similar to diprotic buffers. The key difference is that a triprotic acid has 3 pKa values.

For Polyprotic Buffers



Acid Form | **Intermediate 1** | **Intermediate 2** | **Base Form**

$$pH = pKa_1 + \log\left(\frac{H_2A^-}{H_3A}\right)$$

$$pH = pKa_2 + \log\left(\frac{HA^{2-}}{H_2A^-}\right)$$

$$pH = pKa_3 + \log\left(\frac{A^{3-}}{HA^{2-}}\right)$$

$0.10\ M\ H_3C_6H_5O_7$ $Ka_1 = 7.4\times10^{-4}$
$0.15\ M\ NaH_2C_6H_5O_7$

$0.25\ moles\ Na_2HC_6H_5O_7$ $Ka_2 = 1.7\times10^{-5}$
$0.17\ moles\ NaH_2C_6H_5O_7$

$50.0\ mL\ of\ 0.32\ M\ Na_3C_6H_5O_7$ $Ka_3 = 4.0\times10^{-7}$
$60.0\ mL\ of\ 0.25\ M\ NaHC_6H_5O_7$