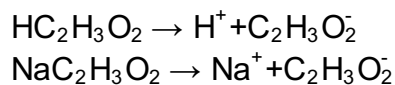


What is the hydrogen ion concentration of a buffer solution that is 0.05 M in acetic acid and 0.1 M in sodium acetate. (The K_a for acetic acid is 1.8×10^{-5})

Acetic acid ionizes and sodium acetate completely dissociates.



The solution is a buffer solution since it is composed of a weak acid and a salt of the weak acid. The hydrogen ion concentration of such a buffer is calculated using the following.

$$K_a = \frac{(\text{H}^{\text{positive}}) \cdot (\text{A}^{\text{negative}})}{\text{HA}}$$

(A-) is the concentration of the salt of the acid and (HA) is the concentration of the Acid. We also know that the K_a is 1.8×10^{-5} .

$$\text{A}^{\text{negative}} := 0.1$$

$$\text{HA} := 0.05$$

$$K_a := 1.8 \cdot 10^{-5}$$

$$\text{linsolve}\left(K_a = \frac{(\text{H}^{\text{positive}}) \cdot (\text{A}^{\text{negative}})}{\text{HA}}, \text{H}^{\text{positive}}\right) = 9\text{e-}06$$

We now know the hydrogen ion concentration which is 9×10^{-6} M.