Answer on Question #63492 - Chemistry | General Chemistry

Suppose our unknown acid was acetic acid, CH_3COOH ($K_a = 1.8 \cdot 10^{-5}$) and that your initial aqueous solution contained 0.100 mol of acetic acid in total volume of 100 mL.

To this acetic acid solution you begin adding a 1.0 mol/L NaOH solution. Let's see what happens after adding different amounts of NaOH.

Suppose you have added a total of 20.0 mL of NaOH solution since the beginning of the titration. How many mol of acetate ions (CH_3COO^-) are present in the reaction mixture at this point?

Solution

In dealing with weak acids, there will be an incomplete dissociation in water.

$$CH_3COOH \leftrightarrows CH_3COO^- + H^+$$
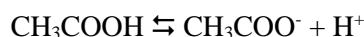
So your initial aq solution has $0.100 \ mol$ of acetic acid and,

$n = 1.0 \frac{mol}{L} \cdot 0.0200 \ L = 0.020 \ mol$ of NaOH.

The added base will neutralize some of the of acid, and produce the conjugate base, CH_3COO^- and H_2O. At this point, we have neutralized 0.020 moles of the acid and produced 0.020 moles of $CH3COO^-$.

Answer

0.020 mol of acetate ions ($CH3COO^-$) are present in the reaction mixture.