Question #63556, Chemistry / Organic Chemistry

Suppose our unknown acid was acetic acid, CH_3COOH (Ka = 1.8 x 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 23.0 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? Do not include units in your answer.

Solution:
Reaction occurs
$CH_3COOH + NaOH = CH_3COONa + H_2O$
According to chemical equation:

$$n(CH_3COO^-) = n(CH_3COONa) = n(NaOH)_{added}$$
$$n(NaOH)_{added} = c(NaOH) \times V(NaOH) = 1.0 \times 0.023\ L = 0.023\ mol$$
$$n(CH_3COO^-) = \mathbf{0.023\ mol}$$

Answer*:*
0.023