How many milliliters of a 6.02 M acetic acid solution must be added to 500.0 mL of a 0.0500 M solution of sodium acetate to prepare a buffer at a pH of 4.50.

\[ K_a(\text{acetic acid}) = 1.75 \cdot 10^{-5} \]
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\[ K_a(\text{acetic acid}) = 1.75 \times 10^{-5} \]

\[ \text{pKa} = -\log(1.75 \times 10^{-5}) = 4.757 \]  \hspace{1cm} (2)

\[ \text{mmoles of acetate ion} = (500.0 \text{ mL})(0.0500 \text{ M}) = 25.00 \text{ mmol} \]

\[ \text{pH} = 4.50 = 4.757 + \log(25.00/x), \text{ where } x \text{ is the mmol of acetic acid required} \]

\[ x = 45.175 \text{ mmol} \]

\[ (45.175 \text{ mmol}) \times (1 \text{ mL}/6.02 \text{ mmol}) = 7.5 \text{ mL} \]