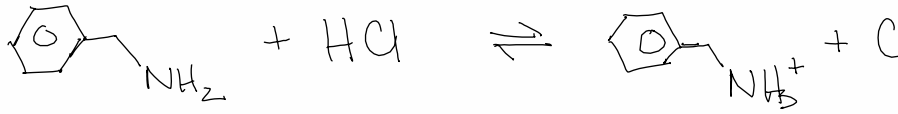

weak base / strong acid pH < 7 $pK_b = 4.65$

@ eqpt mols acid = mols base

$M_1V_1 = M_2V_2$

$0.0319 \frac{mol}{L} \cdot 50mL = 0.050 \frac{mol}{L} \cdot x \quad x \Rightarrow 31.8\ mL$

0-15.9 15.9 15.9 mL – 31.8 mL 31.8 >31.8

pH >> 9.35 pH >> 9.35 – 9.35 9.35 9.35 – pH < 7 pH < 7 pH << 7

10.93 9.98

$B + H_2O \rightleftharpoons BH^+ + OH^-$

$K_b = \frac{[BH^+][OH^-]}{[B]} = \frac{x^2}{F - x} = 2.23 \times 10^{-5}$

assume $x \ll F$ $x = \sqrt{K_b F} = 8.45 \times 10^{-4} = [OH^-]$

$x = 2\%\ F$ assumption fails

$0 = x^2 + K_b x - F K_b \quad x = 8.45 \times 10^{-4} = [OH^-]$

$pOH = 3.07 \rightarrow pH = 10.926$

$B + H^+ \rightleftharpoons BH^+ \quad pH = pK_{BH^+} + \log \frac{B}{BH^+}$

mols acid added $= 0.05 \frac{mol}{L} \times 0.0061L = 3 \times 10^{-4}$ moles $= BH^+$ moles

mols of B remaining $= 1.59 \times 10^{-3}$ moles $- 3 \times 10^{-4}$ moles $= 1.29 \times 10^{-3}$ B

$pH = 9.35 + \log \frac{1.29 \times 10^{-3}}{3 \times 10^{-4}} = 9.35 + 0.633 = 9.98 = pH$