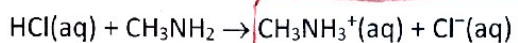


Ma Unit 8 Quiz Free Response Practice (5 points)

V_b

A solution of 0.080 M HCl, hydrochloric acid, is prepared to determine the concentration of 40.0 mL of a solution of methylamine, CH₃NH₂, a weak base ($K_b = 4.38 \times 10^{-4}$). The 40.0 mL of CH₃NH₂ is placed in an Erlenmeyer flask. A pH probe is used to obtain pH readings throughout the titration experiment. To reach the equivalence point, 25.0 mL of hydrochloric acid is added to the Erlenmeyer flask. Assume all data is collected at 25°C.

The neutralization reaction is shown below:



only things left @ equiv. pt

V_a

a. What concentration of CH₃NH₂ was initially present in solution? Justify your answer with a calculation. [1 pt]

$$M_a V_a = M_b V_b$$

$$(0.080 \text{ M})(25.0 \text{ mL}) = M_b (40.0 \text{ mL})$$

$$M_b = \frac{0.080 \times 25.0}{40.0} = \boxed{0.050 \text{ M}}$$

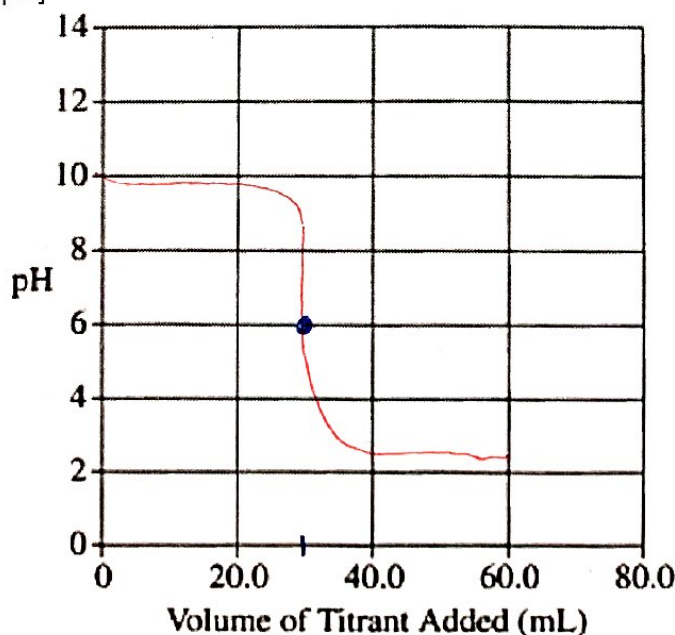
b. When the moles of added HCl are equal to the initial moles of CH₃NH₂ present in solution, will the pH of the solution be less than 7, equal to 7, or greater than 7? Justify your answer. [2 pt]

→ @ eq. point!

1 pt [Less than 7] b/c when mol (HCl) = mol (CH₃NH₂) ⇒ equivalence point, ⇒ both are completely neutralized

*1 pt [OR] CH₃NH₃⁺ hydrolyzes water, producing H₃O⁺
CH₃NH₃⁺(aq) + H₂O(l) ⇌ H₃O⁺(aq) + CH₃NH₂(aq)*

c. On the axis below, sketch the general shape of the titration curve when 40.0 mL of CH₃NH₂ is titrated with 60.0 mL of HCl over time. [2 pts]



*1 pt for 2 correct
2 pts for all 3 correct*

- initial pH > 7
- eq. pt @ 25 mL and pH < 7
- general shape of graph accurate