Determine the pH for each of the following acid/base systems:

1. 6.00 g of NH₄NO₃ (MW = 80.00) is dissolved in water and brought to a final volume of 300.0 mL. $K_a$ for NH₄⁺ is $5.6 \times 10^{-10}$. $pK_a = 9.25$

\[
\frac{[\text{NH}_4^+]}{[\text{H}_3\text{O}^+]} = \frac{[\text{NH}_4^+]}{\frac{[\text{H}_3\text{O}^+]}{[\text{H}_2\text{O}]}} = \frac{\frac{9.25}{25}}{5.6 \times 10^{-10}} = 1.2 \times 10^{-5}
\]

$\text{pH} = 4.92$

2. 30.00 mL of a 0.25 M solution of NH₄NO₃ (MW = 80.00) is diluted to a final volume of 200 mL. $K_a$ for NH₄⁺ is $5.6 \times 10^{-10}$

\[
\frac{[\text{NH}_4^+]}{[\text{H}_3\text{O}^+]} = \frac{30 \times 0.25}{200} = 0.125
\]

3. 30.00 mL of a 0.25 M solution of NH₄NO₃ (MW = 80.00) has added to it 50.00 mL of a 0.12 M KOH (MW = 56.00) solution. $K_a$ for NH₄⁺ is $5.6 \times 10^{-10}$

\[
\text{Major Reaction: } \text{NH}_4^+ + \text{OH}^- \rightarrow \text{NH}_3 + \text{H}_2\text{O}
\]

\[
\text{pH} = 9.15
\]

4. What is the pH at the equivalence point when 30.00 mL of a 0.25 M solution of NH₄NO₃ (MW = 80.00) is titrated with a standardized 0.2000 M solution of KOH (MW = 56.00)? $K_a$ for NH₄⁺ is $5.6 \times 10^{-10}$

\[
\frac{[\text{NH}_4^+]}{[\text{H}_3\text{O}^+]} = \frac{30 \times 0.25}{7.5} = 1.0
\]

\[
\text{pH} = 9.65
\]

Please Write and Sign the Pledge.