

1. A student uses 0.200 M HI to titrate 40.00 mL of 0.300 M  $\text{C}_6\text{H}_5\text{NH}_2$ . The  $K_b$  of  $\text{C}_6\text{H}_5\text{NH}_2$  is  $7.4 \times 10^{-10}$ .
  - I. How many mL of HI must be added to reach the equivalence point?
  - II. Calculate the pH before the addition of any HI
  - III. Calculate the pH after the addition of 15.0 mL of HI
  - IV. Calculate the pH after the addition of 30.0 mL of HI
  - V. Calculate the pH after the addition of 40.0 mL of HI
  - VI. Calculate the pH after the addition of 60.0 mL of HI
  - VII. Calculate the pH after the addition of 65.0 mL of HI
  - VIII. Sketch a graph of pH vs. volume of titrant added. Label the pHs from parts II-VII.
  - IX. Multiple choice: Which of the following indicators would be best for this titration?
    - A. Methyl yellow ( $\text{pK}_{\text{in}} = 3.25$ )
    - B. Methyl red ( $\text{pK}_{\text{in}} = 5.0$ )
    - C. Bromothymol blue ( $\text{pK}_{\text{in}} = 7.3$ )
    - D. Thymol blue ( $\text{pK}_{\text{in}} = 9.2$ )
    - E. Alizarin yellow R ( $\text{pK}_{\text{in}} = 11.0$ )