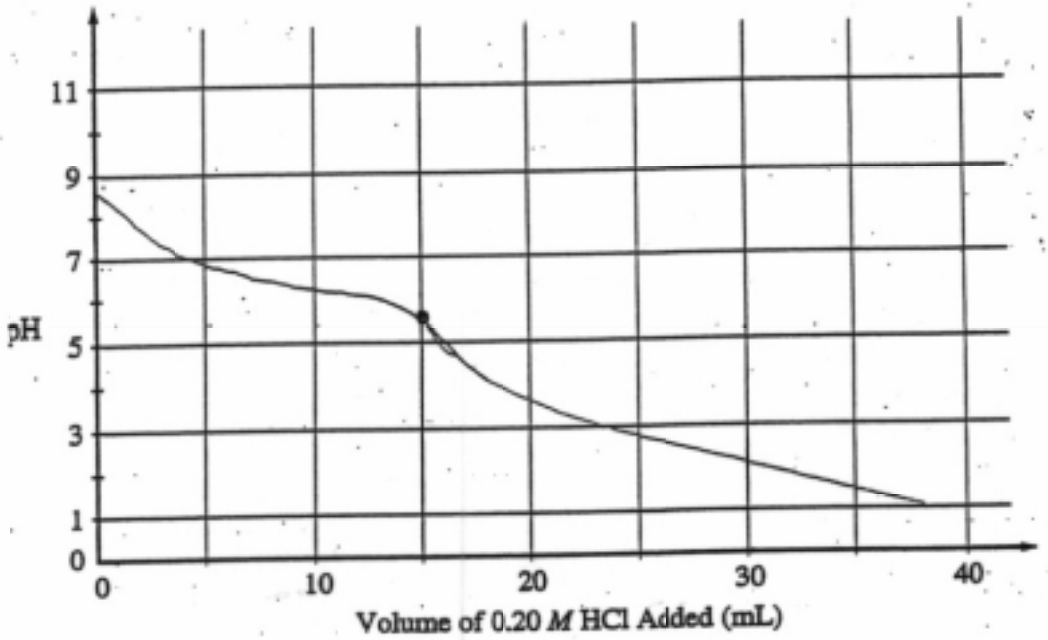
8C1

8. A volume of 30.0 mL of 0.10 *M* $NH_3(aq)$ is titrated with 0.20 *M* $HCl(aq)$. The value of the base-dissociation constant, K_b, for NH_3 in water is 1.8×10^{-5} at 25°C.

(a) Write the net-ionic equation for the reaction of $NH_3(aq)$ with $HCl(aq)$.

(b) Using the axes provided below, sketch the titration curve that results when a total of 40.0 mL of 0.20 *M* $HCl(aq)$ is added dropwise to the 30.0 mL volume of 0.10 *M* $NH_3(aq)$.



(c) From the table below, select the most appropriate indicator for the titration. Justify your choice.

Indicator	pK_a
Methyl Red	5.5
Bromothymol Blue	7.1
Phenolphthalein	8.7

(d) If equal volumes of 0.10 *M* $NH_3(aq)$ and 0.10 *M* $NH_4Cl(aq)$ are mixed, is the resulting solution acidic, neutral, or basic? Explain.

a) $NH_3(aq) + HCl(aq) \rightleftharpoons NH_4^+(aq) + Cl^-(aq)$

b) .1 mol NH_3 = $\frac{.1 \text{ mol}}{L}$. HCl = $\frac{.2 \text{ mol}}{L}$