Understanding Concepts

71. Is it possible to have a concentrated weak acid? Explain.

72. Write equations showing that the hydrogen phosphate ion (HPO_4^{2-}) is amphoteric.

73. The pH of a 0.50*M* HNO_2 solution is 1.83. What is the K_a of this acid?

74. Write the formula and name of the conjugate base of each Brønsted-Lowry acid.

a. HCO_3^- **b.** HI

c. NH_4^+ **d.** H_2SO_3

75. Write the formula and name of the conjugate acid of each Brønsted-Lowry base.

a. ClO_2^- **b.** $H_2PO_4^-$

c. H_2O **d.** NH_3

76. Calculate the $[OH^-]$ or pH of each solution.

a. pH = 4.60 **b.** $[OH^-] = 1.8 \times 10^{-2}M$

c. pH = 9.30 **d.** $[OH^-] = 7.3 \times 10^{-9}M$

77. Write the three equations for the stepwise ionization of phosphoric acid.

78. Use the Brønsted-Lowry and Lewis definitions of acids and bases to identify each reactant as an acid or a base.

a. $KOH + HBr \longrightarrow KBr + H_2O$

b. $HCl + H_2O \longrightarrow Cl^- + H_3O^+$

79. Write the formula for the conjugate base of each acid.

a. H_2SO_4 **b.** HCN

c. H_2O **d.** NH_4^+

80. Use the phosphate buffer ($H_2PO_4^-/HPO_4^{2-}$) to illustrate how a buffer system works. Show, by means of equations, how the pH of a solution can be kept almost constant when small amounts of acid or base are added.

81. Write an equation for the reaction of each antacid with hydrochloric acid.

a. magnesium hydroxide

b. calcium carbonate

c. aluminum hydroxide

82. How would the equilibrium between hypochlorous acid and the hypochlorite ion be affected by the addition of each?

$HOCl(aq) + OH^-(aq) \rightleftharpoons OCl^-(aq) + H_2O(l)$

a. HCl **b.** NaOH

83. The following data were collected from a titration of 50.00 mL of ethanoic acid (CH_3COOH) of unknown concentration with 0.100*M* NaOH. Plot these data (pH on the *y*-axis) to obtain a titration curve.

Volume of NaOH (mL)	pH	Volume of NaOH (mL)	pH
0		50.00	8.73
10.00	4.15	50.01	8.89
25.00	4.76	51.00	11.00
40.00	5.36	60.00	11.96
49.00	6.45	75.00	12.30
49.99	8.55	100.00	12.52

a. What is the pH at the end point of this titration?

b. Use Figure 19.12 to identify one or more indicators that could be used to determine the end point in this titration.

84. Write an equation to show that an aqueous solution of sodium ethanoate will be basic.

85. Arrange these solutions in order of decreasing acidity.

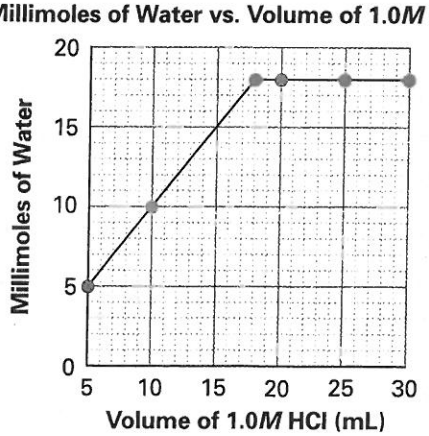
a. 0.1*M* NaOH

b. 0.1*M* HCl

c. 0.1*M* ammonium chloride

d. 0.1*M* sodium ethanoate

86. The graph shows the number of millimoles (mmol) of water formed by the drop-by-drop addition of 1.0*M* HCl to a 25.0-mL sample of NaOH of unknown concentration.



a. Write an equation for the reaction.

b. Estimate the concentration of the NaOH.