

## 17.1

## HYDROGEN IONS AND ACIDITY

## Section Overview

## Objectives

1. Calculate concentrations based on the  $K_a$  of weak acids and hydrolysis of weak bases and equilibrium concentrations
2. Calculate  $K_a$  and  $K_b$  concentrations from  $K_a$  and  $K_b$  values and vice versa and  $K_a$  and  $K_b$  values from  $pK_a$  and  $pK_b$  values
3. Calculate  $pH$  and  $pOH$  (all solutions)

## Vocabulary

- |                   |                              |              |
|-------------------|------------------------------|--------------|
| 1. autoionization | 2. conjugate acid of a base  | 3. weak acid |
| 4. autoionization | 5. conjugate base of an acid | 6. weak base |
|                   | 7. $K_a$                     | 8. $pH$      |

## Key Equations

- |   |  |
|---|--|
| 1. $K_a = \frac{[H^+][A^-]}{[HA]}$ (Eq. 17.1) | 2. $K_b = \frac{[B][H_2O]}{[BH^+]}$ (Eq. 17.2) |
| 3. $pH = -\log[H^+]$ (Eq. 17.3)               | 4. $pOH = -\log[OH^-]$ (Eq. 17.4)              |

## Part A: Completion

Use the appropriate number of significant figures in the answers to the following questions that are based on the  $K_a$  and  $K_b$  values given in the table below. Round answers to the correct number of significant figures.

1. What is the  $K_a$  of a weak acid if the concentration of the undissociated acid is 0.10 M, the concentration of the conjugate base is 0.010 M, and the concentration of the acid is 0.090 M?
2. What is the  $K_b$  of a weak base if the concentration of the undissociated base is 0.10 M, the concentration of the conjugate acid is 0.010 M, and the concentration of the base is 0.090 M?
3. What is the  $K_a$  of a weak acid if the concentration of the undissociated acid is 0.10 M, the concentration of the conjugate base is 0.010 M, and the concentration of the acid is 0.090 M?
4. What is the  $K_b$  of a weak base if the concentration of the undissociated base is 0.10 M, the concentration of the conjugate acid is 0.010 M, and the concentration of the base is 0.090 M?

5.  $K_a$
6.  $K_b$
7.  $K_a$
8.  $K_b$
9.  $K_a$
10.  $K_b$
11.  $K_a$
12.  $K_b$
13.  $K_a$
14.  $K_b$

# 19 2 Hydrogen Ions And Acidity Section Review

**Gary A. Thibodeau, Kevin T. Patton**



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