

## 14.1

## HYDROGEN IONS AND ACIDITY

## Section Overview

## Objectives

1. Identify conjugate acid-base pairs of ions, acids, or hydroxides and of aqueous concentrations.
2. Calculate hydroxide and hydronium ion concentrations and pH values and vice versa for weak acids and bases.
3. Calculate the pH of weak acid solutions.

## Vocabulary

- |                   |                             |                   |
|-------------------|-----------------------------|-------------------|
| 1. autoionization | 2. conjugate acid-base pair | 3. weak acid/base |
| 4. hydronium ion  | 5. hydroxide ion            | 6. hydronium ion  |
|                   | 7. weak base                | 8. pH             |

## Key Equations

- |   |   |
|---|---|
| 1. $\text{pH} = -\log[\text{H}_3\text{O}^+]$ (Eq. 14.1) | 2. $\text{pOH} = -\log[\text{OH}^-]$ (Eq. 14.2) |
| 3. $\text{pH} + \text{pOH} = \text{pK}_w$ (Eq. 14.3)    | 4. $\text{pH} + \text{pOH} = 14.00$ (Eq. 14.4)  |

## Part A: Completion

Use the appropriate number to identify the relationship of the conjugate acid-base pair represented in the reaction. Also indicate which member of the pair is the stronger acid.

1.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (strong hydroxide base/weak hydronium acid) (Eq. 14.1)
2.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate base of the acid is the stronger base) (Eq. 14.1)
3.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate acid of the base is the stronger acid) (Eq. 14.1)
4.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate acid of the base is the stronger acid) (Eq. 14.1)
5.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate acid of the base is the stronger acid) (Eq. 14.1)
6.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate acid of the base is the stronger acid) (Eq. 14.1)
7.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate acid of the base is the stronger acid) (Eq. 14.1)
8.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate acid of the base is the stronger acid) (Eq. 14.1)
9.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate acid of the base is the stronger acid) (Eq. 14.1)
10.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (the conjugate acid of the base is the stronger acid) (Eq. 14.1)

1.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$
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10.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$

# 19 2 Hydrogen Ions And Acidity Section Review Answers

**Arturo Cuomo**



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