

## 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      |
| 4. hydronium      | 5. hydroxide ion ( $\text{OH}^-$ ) | 6. autoionization |
|                   | 7. weak base                       | 8. pH             |

## Key Equations

- |  |  |
|--|--|
| 1. $\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$ (14.1) | 2. $\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$ (14.2) |
| 3. $\text{pH} = -\log[\text{H}^+]$ (14.3)                                  | 4. $\text{pOH} = -\log[\text{OH}^-]$ (14.4)  |

## Part A: Completion

Use the appropriate number to identify the relationship of the conjugate acid-base pair indicated in the second step. Write the number in the space provided.

1.  $\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$  (14.1) (14.1) (14.2) (14.3) (14.4)
2.  $\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
3.  $\text{HCl} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{Cl}^-$  (14.1) (14.2) (14.3) (14.4)
4.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
5.  $\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
6.  $\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
7.  $\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
8.  $\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)

9.  $\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
10.  $\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
11.  $\text{HCl} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{Cl}^-$  (14.1) (14.2) (14.3) (14.4)
12.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
13.  $\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
14.  $\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)
15.  $\text{HCl} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{Cl}^-$  (14.1) (14.2) (14.3) (14.4)
16.  $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$  (14.1) (14.2) (14.3) (14.4)

# 19 2 Hydrogen Ions And Acidity Answer Key

**Puja Mehta**



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## **Table of Contents 19 2 Hydrogen Ions And Acidity Answer Key**

1. Understanding the eBook 19 2 Hydrogen Ions And Acidity Answer Key
  - The Rise of Digital Reading 19 2 Hydrogen Ions And Acidity Answer Key
  - Advantages of eBooks Over Traditional Books
2. Identifying 19 2 Hydrogen Ions And Acidity Answer Key
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an 19 2 Hydrogen Ions And Acidity Answer Key
  - User-Friendly Interface
4. Exploring eBook Recommendations from 19 2 Hydrogen Ions And Acidity Answer Key
  - Personalized Recommendations
  - 19 2 Hydrogen Ions And Acidity Answer Key User Reviews and Ratings
  - 19 2 Hydrogen Ions And Acidity Answer Key and Bestseller Lists
5. Accessing 19 2 Hydrogen Ions And Acidity Answer Key Free and Paid eBooks
  - 19 2 Hydrogen Ions And Acidity Answer Key Public Domain eBooks
  - 19 2 Hydrogen Ions And Acidity Answer Key eBook Subscription Services
  - 19 2 Hydrogen Ions And Acidity Answer Key Budget-Friendly Options
6. Navigating 19 2 Hydrogen Ions And Acidity Answer Key eBook Formats
  - ePub, PDF, MOBI, and More
  - 19 2 Hydrogen Ions And Acidity Answer Key Compatibility with Devices
  - 19 2 Hydrogen Ions And Acidity Answer Key Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of 19 2 Hydrogen Ions And Acidity Answer Key
  - Highlighting and Note-Taking 19 2 Hydrogen Ions And Acidity Answer Key
  - Interactive Elements 19 2 Hydrogen Ions And Acidity Answer Key
8. Staying Engaged with 19 2 Hydrogen Ions And Acidity Answer Key

- Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers 19 2 Hydrogen Ions And Acidity Answer Key
9. Balancing eBooks and Physical Books 19 2 Hydrogen Ions And Acidity Answer Key
- Benefits of a Digital Library
  - Creating a Diverse Reading Collection 19 2 Hydrogen Ions And Acidity Answer Key
10. Overcoming Reading Challenges
- Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine 19 2 Hydrogen Ions And Acidity Answer Key
- Setting Reading Goals 19 2 Hydrogen Ions And Acidity Answer Key
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of 19 2 Hydrogen Ions And Acidity Answer Key
- Fact-Checking eBook Content of 19 2 Hydrogen Ions And Acidity Answer Key
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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