

## 14.1

## HYDROGEN IONS AND ACIDITY

## Section Overview

## Objectives

1. Identify conjugate acid-base pairs of ions, acids, or hydroxides and of aqueous acids/bases.
2. Calculate hydroxide and hydronium ion concentrations and pH/pOH and the associated logarithmic functions.
3. Calculate the pH/pOH of an aqueous solution.

## Vocabulary

- |                   |                             |                         |
|-------------------|-----------------------------|-------------------------|
| 1. autoionization | 2. conjugate acid-base pair | 3. acid solution        |
| 4. hydroxide ion  | 5. hydronium ion            | 6. logarithmic function |
|                   | 7. pH/pOH                   | 8. pK <sub>a</sub>      |

## Key Equations

- |  |  |
|--|--|
| 1. $\text{pH} = -\log_{10} [\text{H}^+]$ (Eq. 14.1)  | 2. $\text{pOH} = -\log_{10} [\text{OH}^-]$ (Eq. 14.2)                                |
| 3. $\text{pH} + \text{pOH} = \text{pK}_w$ (Eq. 14.3) | 4. $\text{pH} = \text{pK}_a + \log_{10} \frac{[\text{A}^-]}{[\text{HA}]}$ (Eq. 14.4) |

## Part A: Completion

Use the logarithmic function to calculate the missing quantity of the conjugate acid-base pair represented in the reaction. Give additional species involved in the acid-base equilibrium reaction.

1. What products are **1** formed by the reaction of hydroxide ion with hydrochloric acid? Write the corresponding acid-base reaction. What is the conjugate base of the acid which produced in this reaction? **2**
2. Hydrochloric acid dissociates from **1** to **2** and **3**. Write the **4** corresponding acid-base reaction. What is the conjugate base of the acid which dissociated? **5**
3. **1** is the conjugate base of **2**. Write the **3** corresponding acid-base reaction. What is the conjugate acid of **4**?
4. **1** is the conjugate acid of **2**. Write the **3** corresponding acid-base reaction. What is the conjugate base of **4**?

1. **hydrochloric acid**
2.  **$\text{Cl}^-$**
3.  **$\text{H}_2\text{O}$**
4. **hydrochloric acid**
5. **hydroxide ion**
6.  **$\text{H}_2\text{O}$**
7. **hydroxide ion**
8.  **$\text{H}^+$**
9. **hydrochloric acid**
10. **hydrochloric acid**
11. **hydroxide ion**

# 19 2 Hydrogen Ions And Acidity Worksheet Answers

**Sir Tarun Rupani**



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