

Assessment

Quiz

Section: What are Acids and Bases?

In the space provided, write the letter of the term or phrase that best answers the question.

- _____ 1. A strong acid
- ionizes completely in solution.
 - produces hydronium ions in solution.
 - reacts with metals that are more active than hydrogen.
 - All of the above
- _____ 2. When a solution of hydrochloric acid reacts with zinc, which of the following substances is a reactant?
- Cl^-
 - H^+
 - H_3O^+
 - H_2O
- _____ 3. Which of the following characteristics describes a base?
- reacts with oils in the skins and converts them to acids
 - forms alkaline solutions
 - is a nonelectrolyte
 - None of the above
- _____ 4. Which of the following substances is a weak base?
- NH_3
 - KOH
 - K_2O
 - NaOH
- _____ 5. All Brønsted-Lowry acids
- are aqueous solutions.
 - can act as Arrhenius acids.
 - donate protons.
 - All of the above
- _____ 6. Which if the following substances is a Brønsted-Lowry and an Arrhenius base?
- $\text{NH}_3(s)$
 - $\text{NH}_3(aq)$
 - $\text{HCl}(g)$
 - $\text{HCl}(aq)$

Quiz *continued*

- _____ **7.** The conjugate base of the hydronium, H_3O^+ , ion is
- OH^- .
 - H^+ .
 - H_2O .
 - H_3O^{2+} .
- _____ **8.** The conjugate acid of the chloride ion, Cl^- , is
- Cl_2 .
 - H^+ .
 - HCl .
 - ClO .
- _____ **9.** A conjugate acid is an acid that forms when
- the acid gains a proton.
 - a base loses a proton.
 - a base gains a proton.
 - Both (a) and (b)
- _____ **10.** An amphoteric species will accept a proton in the presence of a
- strong acid.
 - strong base.
 - Both (a) and (b)
 - None of the above

Answer Key

Quiz—Section: What Are Acids and Bases?

- | | |
|------|-------|
| 1. d | 6. b |
| 2. c | 7. c |
| 3. b | 8. c |
| 4. a | 9. c |
| 5. c | 10. a |

Quiz—Section: Acidity, Basicity, and pH

- | | |
|------|-------|
| 1. a | 6. d |
| 2. c | 7. d |
| 3. d | 8. c |
| 4. b | 9. a |
| 5. b | 10. d |

Quiz—Section: Neutralization and Titration

- | | |
|------|-------|
| 1. d | 6. b |
| 2. c | 7. b |
| 3. d | 8. c |
| 4. b | 9. d |
| 5. c | 10. c |

Quiz—Section: Equilibria of Weak Acids and Bases

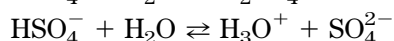
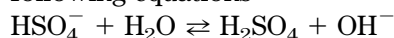
- | | |
|------|-------|
| 1. b | 6. d |
| 2. b | 7. c |
| 3. a | 8. d |
| 4. b | 9. a |
| 5. a | 10. a |

Chapter Test

- | | |
|-------|-------|
| 1. b | 11. b |
| 2. c | 12. c |
| 3. d | 13. a |
| 4. c | 14. b |
| 5. b | 15. c |
| 6. c | 16. d |
| 7. c | 17. c |
| 8. b | 18. b |
| 9. d | 19. d |
| 10. b | 20. c |

21. An Arrhenius base produces OH^- ions in aqueous solution, and an Arrhenius acid produces H^+ ions in solution. A Brønsted-Lowry base is a proton acceptor, and a Brønsted-Lowry acid is a proton donor.

22. The bisulfate ion can act as either an acid or a base by donating a proton or accepting a proton, as shown in the following equations



23. The experiment can still produce useful results if base is now added to the flask in an amount that exactly neutralizes the excess acid added by mistake. The important point is that exactly equivalent amounts of acid and base are present in the reaction flask, not the way in which those amounts were added.

24.

$$20.0 \text{ mL HNO}_3 \times \frac{1 \text{ L}}{1000 \text{ mL}} \times$$

$$\frac{0.020 \text{ mol HNO}_3}{1 \text{ L}} = 4.0 \times 10^{-4} \text{ mol NaOH}$$

$$\frac{4.0 \times 10^{-4} \text{ mol NaOH}}{25 \text{ mL NaOH}} \times \frac{1000 \text{ mL}}{1 \text{ L}}$$

$$= 0.016 \text{ M NaOH}$$

25. $2.30 = -\log [\text{H}_3\text{O}^+]$

$$[\text{H}_3\text{O}^+] = 5.00 \times 10^{-3} \text{ M}$$

$$[\text{CH}_3\text{COO}^-] = 5.00 \times 10^{-3} \text{ M}$$

$$[\text{CH}_3\text{COOH}] = 1.7 \text{ M}$$

$$K_a = \frac{(5.00 \times 10^{-3})(5.00 \times 10^{-3})}{1.7}$$

$$= \frac{2.5 \times 10^{-5}}{1.7}$$

$$= 1.5 \times 10^{-5}$$