

Acid Base Practice Test

Choose the letter of the best answer.

1. What type of solution is one with a pH of 11?
 - A. acidic
 - B. basic
 - C. saturated
2. According to the Bronsted-Lowry definition, a base is
 - A. a substance that can donate an electron pair to the formation of a covalent bond
 - B. a substance that increases the anion formed by the autoionization of the solvent
 - C. a substance that increases the hydroxide ion concentration in water
 - D. a substance that can accept a proton from an acid
 - E. None of the above
3. The correct name for an aqueous solution of H_3PO_4 is
 - A. phosphate acid
 - B. phosphoric acid
 - C. phosphorous acid
 - D. hydrophosphorus acid
 - E. hydrophosphoric acid
4. The correct name for an aqueous solution of HCN is
 - A. hydrogen cyanic acid
 - B. hydrogen cyanide
 - C. hydrocyanic acid
 - D. hydrogen cyanide acid
 - E. hydrogen cyanous acid
5. The correct name for an aqueous solution of H_2SO_4 is
 - A. hydrosulfuric acid
 - B. hydrosulfurous acid
 - C. sulfurous acid
 - D. sulfuric acid
 - E. None of the above

Read each statement. If it is true, write "true" on the line. If it is false, write "false."

6. Water has a very low degree of ionization
7. Dyes with pH sensitive colors are used as indicators.
8. Consider the reaction $\text{HNO}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_3\text{O}^+(\text{aq}) + \text{NO}_2^-(\text{aq})$. Which species is the conjugate base?
 - A. $\text{HNO}_2(\text{aq})$
 - B. $\text{H}_2\text{O}(\text{l})$
 - C. $\text{H}_3\text{O}^+(\text{aq})$
 - D. $\text{NO}_2^-(\text{aq})$
 - E. two of these

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9. Which of the following is a conjugate acid-base pair?
- A. $\text{NH}_4^+/\text{NH}_3$
 - B. $\text{H}_3\text{O}^+/\text{OH}^-$
 - C. HCl/OCl^-
 - D. $\text{H}_2\text{SO}_4/\text{SO}_4^{2-}$
 - E. None of the above
10. The conjugate base of a weak acid is
- A. a weak base
 - B. a strong acid
 - C. a strong base
 - D. a weak acid
 - E. None of the above
11. A solution has $[\text{H}^+] = 4.2 \times 10^{-3} \text{ M}$. The $[\text{OH}^-]$ in this solution is
- A. $4.2 \times 10^{-3} \text{ M}$
 - B. $2.4 \times 10^{-12} \text{ M}$
 - C. $1.0 \times 10^{-14} \text{ M}$
 - D. $4.2 \times 10^{-11} \text{ M}$
 - E. None of the above
12. A solution has a pH of 4.35. The $[\text{H}^+]$ in this solution is
- A. 4.35 M
 - B. $3.50 \times 10^{-4} \text{ M}$
 - C. $4.35 \times 10^{-5} \text{ M}$
 - D. $4.50 \times 10^{-5} \text{ M}$
 - E. None of the above
13. What is the pH of a solution that has $[\text{OH}^-] = 4.0 \times 10^{-9} \text{ M}$?
- A. 9.40
 - B. 8.40
 - C. 4.60
 - D. 5.60
 - E. None of the above
14. Calculate the pH of a 0.53 M HCl solution.
- A. -0.53
 - B. -0.28
 - C. 13.70
 - D. 0.28
 - E. 0.53
15. A solution has $[\text{H}^+] = 4.0 \times 10^{-8} \text{ M}$. The pOH of this solution is
- A. 6.60
 - B. 3.20
 - C. 7.40
 - D. 10.80
 - E. None of the above

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16. A solution has $[H^+] = 4.0 \times 10^{-8} M$. The pH of this solution is
- 7.40
 - 10.80
 - 6.60
 - 3.20
 - None of the above
17. Calculate the $[H^+]$ in a solution that shows a pH of 2.30.
- $5.0 \times 10^{-3} M$
 - 2.3 M
 - $2.0 \times 10^{-12} M$
 - 11.7 M
 - None of the above
18. The pH of a solution at $25^\circ C$ in which $[OH^-] = 3.4 \times 10^{-5} M$ is
- 6.34
 - 10.47
 - 4.47
 - 9.53
 - None of the above
19. A solution is prepared by dissolving 36.5 g $HCl(g)$ in enough water to make 1.0 L of solution. The pH of this solution is
- 1.00
 - 1.00
 - 0
 - 14.00
 - None of the above
20. Which of the following is *true* for a buffered solution?
- The solution resists any change in its $[H^+]$.
 - The solution will not change its pH very much even if a strong base is added.
 - The solution will not change its pH very much even if a concentrated acid is added.
 - Any H^+ ions added will react with a conjugate base of a weak acid already in solution.
 - All of the above
21. A buffered solution contains $HC_2H_3O_2$. It also contains
- $KOH(aq)$
 - $NaCl(aq)$
 - $H_2C_2H_3O_2(aq)$
 - $NaC_2H_3O_2(aq)$
 - $NaOH(aq)$
22. The reaction $HCl(aq) + KOH(aq) \rightarrow H_2O(l) + KCl(aq)$ is a(n) _____ reaction.
- double replacement
 - precipitation
 - single-replacement
 - A and E
 - acid base

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Answer the following question(s).

23. The point of a titration when the OH^- ions exactly equal the H^+ ions is called the _____.

24. What is the purpose of titration?

Answer Sheet

1. B. basic
2. D. a substance that can accept a proton from an acid
3. B. phosphoric acid
4. C. hydrocyanic acid
5. D. sulfuric acid
6. True
7. True
8. D. $\text{NO}_2^-(aq)$
9. A. $\text{NH}_4^+/\text{NH}_3$
10. C. a strong base
11. B. $2.4 \times 10^{-12} M$
12. D. $4.50 \times 10^{-5} M$
13. D. 5.60
14. D. 0.28
15. A. 6.60
16. A. 7.40
17. A. $5.0 \times 10^{-3} M$
18. D. 9.53
19. C. 0
20. E. All of the above
21. D. $\text{NaC}_2\text{H}_3\text{O}_2(aq)$
22. D. A and E
23. equivalence point
24. To determine the concentration of an acid or base

Standards Summary

CA 3.g*	Students know how to identify reactions that involve oxidation and reduction and how to balance oxidation-reduction reactions.
CA 5.a	Students know the observable properties of acids, bases, and salt solutions.
CA 5.b	Students know acids are hydrogen-ion-donating and bases are hydrogen-ion-accepting substances.
CA 5.d	Students know how to use the pH scale to characterize acid and base solutions.
CA 5.e*	Students know the Arrhenius, Brønsted-Lowry, and Lewis acid-base definitions.
CA 5.f*	Students know how to calculate pH from the hydrogen-ion concentration.
CA 5.g*	Students know buffers stabilize pH in acid-base reactions.
CA 6.d	Students know how to calculate the concentration of a solute in terms of grams per liter, molarity, parts per million, and percent composition.
NSES B.2.3	Bonds between atoms are created when electrons are paired up by being transferred or shared. A substance composed of a single kind of atom is called an element. The atoms may be bonded together into molecules or crystalline solids. A compound is formed when two or more kinds of atoms bind together chemically.
NSES B.3.3	A large number of important reactions involve the transfer of either electrons (oxidation/reduction reactions) or hydrogen ions (acid/base reactions) between reacting ions, molecules, or atoms. In other reactions, chemical bonds are broken by heat or light to form very reactive radicals with electrons ready to form new bonds. Radical reactions control many processes such as the presence of ozone and greenhouse gases in the atmosphere, burning and processing of fossil fuels, the formation of polymers, and explosions.