

1. A substance that is capable of acting as both acid and as base is _____.
 - a. autosomal
 - b. conjugated
 - c. amphoteric
 - d. autocratic
 - e. contrapunctal
2. The hydride ion, (H^-), is a stronger base than the hydroxide ion, (OH^-). The products of the reaction $\text{H}^-(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightleftharpoons$ products are _____.
 - a. $\text{H}_3\text{O}^-(\text{aq})$
 - b. $\text{OH}^-(\text{aq}) + \text{H}_2(\text{g})$
 - c. $\text{OH}^-(\text{aq}) + 2\text{H}^+(\text{aq})$
 - d. No Reaction
 - e. $\text{H}_2\text{O}_2(\text{aq})$
3. The magnitude of K_w indicates that
 - a. water autoionizes very slowly
 - b. water autoionizes very quickly
 - c. water autoionizes only to a very small extent
 - d. the autoionization of water is exothermic
 - e. the autoionization of water is endothermic
4. What is the pOH of a 0.015 M solution of barium hydroxide?
 - a. 12.18
 - b. 12.48
 - c. 1.52
 - d. 1.82
 - e. 10.35
5. In basic solution, _____.
 - a. $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
 - b. $[\text{H}_3\text{O}^+] > [\text{OH}^-]$
 - c. $[\text{H}_3\text{O}^+] < [\text{OH}^-]$
 - d. $[\text{H}_3\text{O}^+] = 0 \text{ M}$
 - e. $[\text{OH}^-] > 7.00$
6. What is the pH of an aqueous solution at 25°C in which $[\text{OH}^-]$ is 0.0025 M?
 - a. +2.60
 - b. -2.60
 - c. +11.40
 - d. -11.40
 - e. -2.25

7. What is the concentration (in M) of hydronium ions in a solution at 25°C with pH = 4.282?
- a. 4.282
 - b. 9.718
 - c. 1.92×10^{-10}
 - d. 5.224×10^{-5}
 - e. 1.66×10^4
8. What is the concentration (in M) of hydroxide ions in a solution at 25°C with pH = 4.282?
- a. 4.282
 - b. 9.718
 - c. 1.91×10^{-10}
 - d. 5.22×10^{-5}
 - e. 1.66×10^4
9. The $[H^+]$ in a solution at 25°C with a pH of 4.39 is _____ M.
- a. 3.9×10^{-4}
 - b. 0.64
 - c. 0.012
 - d. 4.1×10^{-5}
 - e. 2.5×10^4
10. The pH of a 0.011 M NaOH solution at 25°C is _____.
- a. 1.96
 - b. 4.51
 - c. 12.04
 - d. 12.90
 - e. -1.96
11. The $[H^+]$ and pH of a 0.021 M HNO₃ solution at 25°C are _____ M and _____, respectively
- a. 4.8×10^{-13} , 12.32
 - b. 4.8×10^{-13} , -12.32
 - c. 0.021, +1.68
 - d. 0.021, -1.68
 - e. 4.8×10^{-6} , +5.32
12. The pH of a 0.030 M HCl solution at 25°C is _____.
- a. 3.00
 - b. 1.52
 - c. 3.51
 - d. 0.52
 - e. -1.52

13. What molar concentration of aqueous barium hydroxide would have pH = 12.25?
- a. 1.75
 - b. 0.018
 - c. 5.6×10^{-13}
 - d. 2.8×10^{-13}
 - e. 0.0090
14. The pH of a 0.55 M aqueous solution of HBrO at 25°C is 4.48. What is the value of K_a for HBrO?
- a. 2.0×10^{-9}
 - b. 1.1×10^{-9}
 - c. 6.0×10^{-5}
 - d. 3.3×10^{-5}
 - e. 3.0×10^4
15. The pH of a 0.15 M aqueous solution of HOAc at 25°C is _____. The K_a for HOAc is 1.8×10^{-5} .
- a. 5.57
 - b. 7.35
 - c. 2.78
 - d. 9.18
 - e. -5.57
16. A 0.0035 M aqueous solution of a particular compound has pH = 2.46. The compound is
- a. a weak base
 - b. a weak acid
 - c. a strong acid
 - d. a strong base
 - e. a salt
17. Which species from the following list would be the strongest Brønsted-Lowry base?
- a. Cl^-
 - b. Br^-
 - c. NO_3^-
 - d. F^-
 - e. ClO^-

18. K_b for C_5H_5N is 1.4×10^{-9} . K_a for $C_5H_5NH^+$ is _____. $T = 25^\circ C$
- 1.0×10^{-7}
 - 1.4×10^{-23}
 - 7.1×10^{-4}
 - 1.4×10^{-5}
 - 7.1×10^{-6}
19. Determine the pH of a 0.15 M solution of KF. For hydrofluoric acid, $K_a = 7.0 \times 10^{-4}$.
- 12.01
 - 5.83
 - 8.16
 - 2.33
 - 6.59
20. Calculate the pH of 0.726 M anilinium hydrochloride, ($C_6H_5NH_3Cl$) solution in water given that K_b for aniline is 3.83×10^{-4} .
- 1.778
 - 12.222
 - 5.361
 - 8.639
 - 12.361
21. What is the pH of a 0.068 M aqueous solution of sodium cyanide? (K_a for HCN = 4.9×10^{-10})
- 0.74
 - 2.93
 - 11.07
 - 13.26
 - 7.00
22. K_a for HX is 7.5×10^{-12} . What is the pH of a 0.15 M solution of NaX?
- 7.87
 - 1.85
 - 5.97
 - 8.03
 - 12.15
23. Of the following, which is the strongest acid?
- HClO
 - HClO₃
 - HClO₂
 - HClO₄
 - HIO

24. The more electronegative X is, the _____ polar will be the H-X bond and the _____ easily the H-X bond is broken, making HX more _____ acidic.
- a. more, less, weakly
 - b. more, more, weakly
 - c. more, more, strongly
 - d. more, less, strongly
 - e. less, less, strongly
25. When the proton in the COOH group in an amino acid is transferred to the NH₂ group of that same amino acid molecule, a(n) _____ is formed.
- a. cation
 - b. amphoter
 - c. zwitterion
 - d. dianion
 - e. dication

- 1. c
- 2. b
- 3. c
- 4. c
- 5. c
- 6. c
- 7. d
- 8. c
- 9. d
- 10. c
- 11. c
- 12. b
- 13. e
- 14. a
- 15. c
- 16. c
- 17. d
- 18. e
- 19. c
- 20. c
- 21. c
- 22. e
- 23. d
- 24. c
- 25. c