

- _____ 1. Compared to a solution with a pH value of 7, a solution with a thousand times greater hydronium ion concentration has a pH value of
1) 10 2) 7 3) 3 4) 4
- _____ 2. Which change in the H^+ ion concentration of an aqueous solution represents a *decrease* of one unit on the pH scale?
1) a tenfold increase
2) a tenfold decrease
3) a hundredfold increase
4) a hundredfold decrease
- _____ 3. The pH of a solution is 7. When acid is added to the solution, the hydronium ion concentration becomes 100 times greater. What is the pH of the new solution?
1) 1 2) 5 3) 9 4) 14
- _____ 4. When the pH of an aqueous solution is changed from 1 to 2, the concentration of hydronium ions in the solution is
1) decreased by a factor of 2
2) decreased by a factor of 10
3) increased by a factor of 2
4) increased by a factor of 10
- _____ 5. When the hydronium ion concentration of a solution is increased by a factor of 10, the pH value of the solution
1) decreases 1 pH unit
2) decreases 10 pH units
3) increases 1 pH unit
4) increases 10 pH units
- _____ 6. As the pH of a solution is changed from 3 to 6, the concentration of hydronium ions
1) increases by a factor of 3
2) increases by a factor of 1000
3) decreases by a factor of 3
4) decreases by a factor of 1000
- _____ 7. Solution *A* has a pH of 3 and solution *Z* has a pH of 6. How many times greater is the hydronium ion concentration in solution *A* than the hydronium ion concentration in solution *Z*?
1) 100 2) 2 3) 3 4) 1000
- _____ 8. Which statement correctly describes a solution with a pH of 9?
1) It has a higher concentration of H_3O^+ than OH^- and causes litmus to turn blue.
2) It has a higher concentration of OH^- than H_3O^+ and causes litmus to turn blue.
3) It has a higher concentration of H_3O^+ than OH^- and causes methyl orange to turn yellow.
4) It has a higher concentration of OH^- than H_3O^+ and causes methyl orange to turn red.
- _____ 9. Which of these pH numbers indicates the highest level of acidity?
1) 5 2) 8 3) 10 4) 12
- _____ 10. Which of these 1 M solutions will have the highest pH?
1) NaOH 3) HCl
2) CH_3OH 4) NaCl
- _____ 11. Which relationship is present in a solution that has a pH of 7?
1) $[H^+] = [OH^-]$
2) $[H^+] > [OH^-]$
3) $[H^+] < [OH^-]$
4) $[H^+] + [OH^-] = 7$
- _____ 12. Which could be the pH of a solution whose H_3O^+ ion concentration is less than the OH^- ion concentration?
1) 9 2) 2 3) 3 4) 4
- _____ 13. As the H_3O^+ ion concentration of a solution increases and the OH^- concentration decreases, the pH of the solution
1) decreases
2) increases
3) remains the same

14. A sample of pure water contains

- 1) neither OH^- ions nor H_3O^+ ions
- 2) equal concentrations of OH^- and H_3O^+ ions
- 3) a larger concentration of H_3O^+ ions than OH^- ions
- 4) a smaller concentration of H_3O^+ ions than OH^- ions

15. What is the H_3O^+ ion concentration of a solution that has an OH^- ion concentration of $1.0 \times 10^{-3}\text{M}$?

- 1) $1.0 \times 10^{-3}\text{M}$
- 2) $1.0 \times 10^{-7}\text{M}$
- 3) $1.0 \times 10^{-11}\text{M}$
- 4) $1.0 \times 10^{-14}\text{M}$

16. A solution has a hydroxide ion concentration of $1 \times 10^{-5}\text{M}$. What is the hydrogen ion concentration of the solution?

- 1) $1 \times 10^{-1}\text{M}$
- 2) $1 \times 10^{-5}\text{M}$
- 3) $1 \times 10^{-9}\text{M}$
- 4) $1 \times 10^{-14}\text{M}$

17. If a given solution at 298 K contains $[\text{H}^+] = 1.0 \times 10^{-9}$, what is the $[\text{OH}^-]$?

- 1) 1.0×10^{-1}
- 2) 1.0×10^{-5}
- 3) 1.0×10^{-9}
- 4) 1.0×10^{-14}

18. What is the pH of a 0.001 M KOH solution?

- 1) 14
- 2) 11
- 3) 3
- 4) 7

19. What is the OH^- ion concentration, in moles per liter, of a solution with a pH of 7?

- 1) 7
- 2) 14
- 3) 1×10^{-7}
- 4) 1×10^{-14}

20. What is the H^+ ion concentration of an aqueous solution that has a pH of 11?

- 1) $1.0 \times 10^{-11}\text{ mol/L}$
- 2) $1.0 \times 10^{-3}\text{ mol/L}$
- 3) $3.0 \times 10^{-1}\text{ mol/L}$
- 4) $11 \times 10^{-1}\text{ mol/L}$

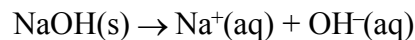
21. An aqueous solution with a pH of 4 would have a hydroxide ion concentration of

- 1) $1 \times 10^{-4}\text{ mol/L}$
- 2) $1 \times 10^{-7}\text{ mol/L}$
- 3) $1 \times 10^{-10}\text{ mol/L}$
- 4) $1 \times 10^{-14}\text{ mol/L}$

22. What is the pH of a solution with a hydroxide ion concentration of 0.001 mole per liter?

- 1) 1
- 2) 7
- 3) 3
- 4) 11

23. Given the equation:



What is the $\text{OH}^{\text{(aq)}}$ concentration in a 0.001 M solution of NaOH?

- 1) 1 M
- 2) 2 M
- 3) 0.001 M
- 4) 0.002 M

24. What is the pH of a 0.10 M solution of NaOH?

- 1) 1
- 2) 2
- 3) 13
- 4) 14

25. As the hydrogen ion concentration of an aqueous solution increases, the hydroxide ion concentration of this solution will

- 1) decrease
- 2) increase
- 3) remain the same

26. What is the pH of a 0.001 M HNO_3 solution?

- 1) 1
- 2) 2
- 3) 3
- 4) 11

27. The $[\text{H}_3\text{O}^+]$ of a solution is 1×10^{-8} . This solution has a pH of

- 1) 6, which is acidic
- 2) 8, which is basic
- 3) 6, which is basic
- 4) 8, which is acidic

28. The pH of a 0.1 M solution is 11. What is the concentration of H_3O^+ ions, in moles per liter?

- 1) 1×10^{-1}
- 2) 1×10^{-3}
- 3) 1×10^{-11}
- 4) 1×10^{-13}