

Acid/Base Review

1. List three properties of an acid. **Reacts with limestone, reacts with metal, sour**
2. List three properties of a base. **Bitter, slippery, does not react with metals or limestone**
3. What is the pH range for an acid? **< 7 - 0**
4. What is the pH range for a base? **> 7 - 14**
5. What are the products of the self-ionization of water? **H⁺ and OH⁻**
6. To what degree does water ionize? **slightly**
7. What is the value for K_w at 25°C? **1 x 10⁻¹⁴**
8. What is the hydrogen ion concentration of water at 25°C? **1 x 10⁻⁷**
9. If the hydrogen ion concentration is 10⁻⁸, what is the nature of the solution? **Base, pH = 8**
10. If the hydroxide ion concentration is 10⁻⁸, what is the nature of the solution? **Acid, pH = 6**
11. If the hydrogen ion concentration is 10⁻⁵, what is the pH of the solution? **pH = 5**
12. If the hydroxide ion concentration is 10⁻¹², what is the pH of the solution? **pH = 2**
13. If the hydrogen ion concentration is 8.5 x 10⁻³, what is the pH of the solution? **pH = 2.07**
14. If the hydroxide ion concentration is 2.8 x 10⁻¹², what is the pH of the solution? **pH = 2.45**
15. If the pH is 12.75, what is the concentration of hydrogen ions? **[H⁺] = 1.78 x 10⁻¹³**
16. If the pH is 11.63, what is the concentration of hydroxide ions? **[OH⁻] = 4.27 x 10⁻³**
17. What is the [H⁺] concentration of a 0.20 M HCl solution? **0.20 M [H⁺]**
18. What is the [H⁺] concentration of a 0.20 M H₂SO₄ solution? (assume complete dissociation) **0.40M**
19. What is the [OH⁻] concentration of a 3.01 x 10⁻² M Ca(OH)₂ solution? **6.02 x 10⁻² M [OH⁻]**
20. What are the products of a neutralization reaction? **Water and a salt**
21. What is the point in a titration when the amount of OH⁻ exactly equals the amount of H⁺? **Equivalence Point**
22. What type of reaction is involved in a titration? **Neutralization**
23. How can you tell when the amount of OH⁻ exactly equals the amount of H⁺ in a titration? **An indicator**
24. What is the concentration of 100.0 mL HCl if 25.0 mL of 0.25 M NaOH neutralizes it? **6.25 x 10⁻²**
25. How many mL of 0.50 M NaOH are required to neutralize 25 mL of 0.10 M HCl? **5.0 mL**
26. Name the following acids. HCl, HClO, HClO₂, HClO₃, HClO₄, H₂S, H₂SO₃, H₂SO₄
Hydrochloric Acid, Hypochlorous Acid, Chlorous Acid, Chloric Acid, Perchloric Acid
Hydrosulfuric Acid, Sulfurous Acid, Sulfuric Acid
27. Name the following bases, NaOH, Ca(OH)₂, Al(OH)₃, NH₃ Sodium Hydroxide, Calcium Hydroxide,
Aluminum Hydroxide, Ammonia
28. What is the difference between a strong acid and a weak acid? **A strong acid ionizes completely and produces a large amount of H⁺ in solution, a weak acid ionizes only slightly and produces fewer H⁺ in solution.**
29. What is the difference between strength of an acid and concentration of an acid? **Strength has to do with the % ionization of the acid and concentration is Molarity. A strong acid and a concentrated acid are not the same thing.**
30. What is a conjugate acid? **The acid once it has lost its H⁺, example HCl → Cl⁻**
31. What is a conjugate base? **The base once it has gained its H⁺, example NH₃ → NH₄⁺**
32. In the following reaction, identify the acid, base, conjugate acid and conjugate base.

$$\begin{array}{ccccccc} \text{HNO}_2 & + & \text{NaOH} & \rightarrow & \text{H}_2\text{O} & + & \text{NaNO}_2 \\ \text{Acid} & + & \text{Base} & & \text{Conj Acid} & & \text{Conj Base} \end{array}$$
33. What is the conjugate base of Acetic Acid, HC₂H₃O₂? **C₂H₃O₂⁻**
34. What are the components of a buffer? **weak acid & its conjugate base or weak base & its conjugate acid**
35. What is the purpose of a buffer? **To keep the pH with in a narrow range**