

Strong vs. Weak Bases

- Calculations for bases work similarly to acids
- Strong bases ionize completely, so you know $[\text{OH}^-]$
- Weak bases do not ionize completely, so you need to use K_b and an ICE table.
- **Be careful! For bases, you know $[\text{OH}^-]$. $-\log[\text{OH}^-]=\text{pOH}$, but most questions ask for pH**

Example: Strong Base. Find the pH of 5.0×10^{-2} M NaOH.

Example: *Group 2 Hydroxide* Strong Base. Find the pH of 3.0 M $\text{Ca}(\text{OH})_2$

Example: Weak Base. Find the pH of 15 M NH_3 ($K_b = 1.8 \times 10^{-5}$)

Strong and Weak Bases Worksheet. Show all work!

1. Calculate the pH of a 0.40 M solution of sodium hydroxide.
2. Calculate the pH of a 0.40 M solution of barium hydroxide.
3. Calculate the pH of the following solutions:
 - a. 0.10 M NaOH
 - b. 1.0×10^{-10} M NaOH
4. Calculate the concentration of an aqueous $\text{Sr}(\text{OH})_2$ solution that has a $\text{pH} = 10.50$.
5. Write the reaction and the corresponding K_b equilibrium expression for each of the following substances acting as bases in water:
 - a. NH_3
 - b. $\text{C}_5\text{H}_5\text{N}$
6. Use the table of weak acids and weak bases to help answer the following questions:
 - a. Which is the stronger base, NO_3^- or NH_3 ?
 - b. Which is the stronger base, H_2O or NH_3 ?
 - c. Which is the stronger base, OH^- or NH_3 ?
 - d. Which is the stronger base, CH_3NH_2 or NH_3 ?

7. Calculate the pH of a 0.40 M solution of $(\text{C}_2\text{H}_5)_2\text{NH}$ ($K_b = 1.3 \times 10^{-3}$).
8. Calculate $[\text{OH}^-]$, $[\text{H}^+]$, and the pH of 0.20 M solutions of each of the following amines:
- Triethylamine [$(\text{C}_2\text{H}_5)_3\text{N}$, $K_b = 4.0 \times 10^{-4}$]
 - Hydroxylamine [HONH_2 , $K_b = 1.1 \times 10^{-8}$]
9. Codeine ($\text{C}_{18}\text{H}_{21}\text{NO}_3$) is a derivative of morphine. It was once commonly used in cough syrups but is now available only by prescription because of its addictive properties. If the pH of a 1.7×10^{-3} M solution of codeine is 9.59, calculate K_b .