

Chapter 17 Acid-Base

- The conjugate acid of HPO_4^{2-} is
 - H_2PO_4
 - H_3PO_4
 - PO_4^{3-}
 - PO_4^{2-}
 - H_2PO_4^-
- The conjugate base of H_2AsO_4^- is
 - H_2AsO_4
 - H_3AsO_4
 - HAsO_4^-
 - HAsO_4^{2-}
 - AsO_4^{3-}
- In the reaction, $\text{HClO}_3 + \text{N}_2\text{H}_4 \rightleftharpoons \text{ClO}_3^- + \text{N}_2\text{H}_5^+$, which species are an acid-base pair?
 - $\text{HClO}_3, \text{N}_2\text{H}_4$
 - $\text{N}_2\text{H}_4, \text{ClO}_3^-$
 - $\text{HClO}_3, \text{N}_2\text{H}_5^+$
 - $\text{N}_2\text{H}_4, \text{N}_2\text{H}_5^+$
 - $\text{ClO}_3^-, \text{N}_2\text{H}_5^+$
- In the reaction, $\text{HClO}_3 + \text{N}_2\text{H}_4 \rightleftharpoons \text{ClO}_3^- + \text{N}_2\text{H}_5^+$, which two species are both bases?
 - $\text{HClO}_3, \text{N}_2\text{H}_4$
 - $\text{HClO}_3, \text{ClO}_3^-$
 - $\text{HClO}_3, \text{N}_2\text{H}_5^+$
 - $\text{N}_2\text{H}_4, \text{N}_2\text{H}_5^+$
 - $\text{ClO}_3^-, \text{N}_2\text{H}_4$
- For the system
$$\text{NH}_2\text{OH} + \text{CH}_3\text{NH}_3^+ \rightleftharpoons \text{CH}_3\text{NH}_2 + \text{NH}_3\text{OH}^+$$
the position of the equilibrium lies to the left. Which is the strongest acid in the system?
 - NH_2OH
 - CH_3NH_3^+
 - CH_3NH_2
 - NH_3OH^+
 - NH_2OH and CH_3NH_3^+ are equal in acid strength, and are the strongest acids in the system

6. If the OH^- ion concentration in an aqueous solution at 25.0°C is measured as $3.4 \times 10^{-3}\text{ M}$, what is the pH?
- 2.47
 - 7.22
 - 8.24
 - 11.53
 - 16.47
7. The pH of a solution is measured to be 10.4. What are the values of $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ for this solution?
- $[\text{H}_3\text{O}^+] = 4.0 \times 10^{-11}$, $[\text{OH}^-] = 4.0 \times 10^3$
 - $[\text{H}_3\text{O}^+] = 2.5 \times 10^{-4}$, $[\text{OH}^-] = 4.0 \times 10^{-11}$
 - $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-10}$, $[\text{OH}^-] = 3.6 \times 10^{-4}$
 - $[\text{H}_3\text{O}^+] = 4.0 \times 10^{-11}$, $[\text{OH}^-] = 2.5 \times 10^{-4}$
 - $[\text{H}_3\text{O}^+] = 9.6 \times 10^{-2}$, $[\text{OH}^-] = 2.8 \times 10^{-1}$
8. If the OH^- ion concentration in an aqueous solution at 25.0°C is $6.6 \times 10^{-4}\text{ M}$, what is the molarity of the H^+ ion?
- $1.5 \times 10^{-1}\text{ M}$
 - $1.5 \times 10^{-4}\text{ M}$
 - $6.6 \times 10^{-10}\text{ M}$
 - $1.5 \times 10^{-11}\text{ M}$
 - $6.6 \times 10^{-11}\text{ M}$
9. If the H^+ ion concentration in an aqueous solution at 25.0°C has a value of 0.100 M , what is the pOH of the solution?
- 1.00
 - 7.00
 - 12.00
 - 13.00
 - 11.40
10. If the H^+ ion concentration in an aqueous solution at 25.0°C has a value of 0.100 M , then what is the pH of the solution?
- 1.00
 - 0.100
 - 1.00
 - 6.90
 - 13.00
11. Calculate the pH of a beer in which the hydrogen ion concentration is $3.9 \times 10^{-5}\text{ M}$.
- 4.4
 - 3.9
 - 10.1
 - 5.0
 - 9.6

12. Calculate the pH of a 0.020 M solution of Ca(OH)_2 whose temperature is 25.0°C .
- 1.40
 - 0.040
 - 1.69
 - 12.60
 - 12.30
13. Given 0.01 M solutions of each of the following bases, which solution would have the highest pH?
- Aniline ($\text{C}_6\text{H}_5\text{NH}_2$), $K_b = 3.9 \times 10^{-10}$
 - Dimethylamine ($(\text{CH}_3)_2\text{NH}$), $K_b = 5.1 \times 10^{-4}$
 - Hydrazine (N_2H_4), $K_b = 1.3 \times 10^{-6}$
 - Methylamine (CH_3NH_2), $K_b = 4.4 \times 10^{-4}$
 - Pyridine ($\text{C}_5\text{H}_5\text{N}$), $K_b = 1.7 \times 10^{-9}$
14. The ionization constant, K_a , for malic acid is 5.0×10^{-5} . What is the pK_a of this acid?
- 2.00×10^4
 - 4.30
 - 5.70
 - 1.75×10^{-1}
 - 10.70
15. Formic acid, HCO_2H , has an ionization constant with the value: $K_a = 1.76 \times 10^{-4}$. Calculate the value of pK_b for the conjugate base of formic acid.
- 3.75
 - 5.35
 - 8.65
 - 10.25
 - 12.24
16. A 0.100 M solution of an acid, HA, has a $\text{pH} = 2.00$. What is the value of the ionization constant, K_a for this acid?
- 1.1×10^{-2}
 - 1.1×10^{-3}
 - 1.1×10^{-4}
 - 1.0×10^{-3}
 - 1.0×10^{-4}
17. A 0.400 M solution of an acid, HQ, has a $\text{pH} = 1.301$. What is the value of the ionization constant, K_a , for this acid?
- 5.00×10^{-2}
 - 1.25×10^{-3}
 - 5.56×10^{-3}
 - 6.25×10^{-3}
 - 7.14×10^{-3}

18. A 0.200 M solution of a weak base in water has a $\text{pH} = 10.40$ at 25°C . Calculate the value of K_b for this base.
- a. 1.0×10^{-5}
 - b. 3.2×10^{-7}
 - c. 2.2×10^{-5}
 - d. 4.0×10^{-11}
 - e. 5.0×10^{-5}
19. The ionization constant, K_a , for benzoic acid, $\text{HC}_7\text{H}_5\text{O}_2$, is 6.28×10^{-5} . What is the pH of a 0.15 molar solution of this acid?
- a. 0.82
 - b. 2.52
 - c. 4.20
 - d. 5.03
 - e. 5.79