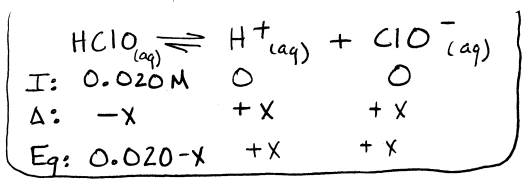


1. The  $K_a$  of  $\text{HClO}$  is  $3.0 \times 10^{-8}$ . What is the pH at  $25^\circ\text{C}$  of an aqueous solution that is  $0.020\text{ M}$  in  $\text{HClO}$ ?

(a) 2.45  
 (b) 1.70  
 (c) 4.61  
 (d) 9.22

$$K_a = \frac{[\text{H}^+][\text{ClO}^-]}{[\text{HClO}]}$$

$$= \frac{x^2}{0.020 - x} \Rightarrow 3.0 \times 10^{-8} = \frac{x^2}{0.020}$$



$$x = 2.45 \times 10^{-5}$$

$$\text{pH} = -\log[\text{H}^+] = -\log(2.45 \times 10^{-5}) = 4.61$$

2. Which of the following possesses the greatest concentration of hydroxide ion?

- (a) a  $1 \times 10^{-3}\text{ M}$  solution of  $\text{NH}_4\text{Cl}$  Acidic  
 (b) a solution with  $\text{pOH} = 12.0$   $[\text{OH}^-] = 1.0 \times 10^{-12}$   
 (c) a  $1.0 \times 10^{-4}\text{ M}$  solution of  $\text{HNO}_3$  Acidic  
 (d) pure water  $[\text{OH}^-] = 1.0 \times 10^{-7}$

3. An aqueous solution of \_\_\_\_\_ will produce a basic solution.

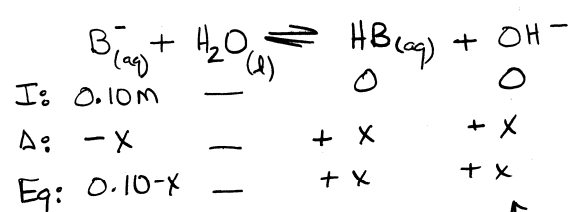
- (a)  $\text{NH}_4\text{ClO}_4 \Rightarrow$  acidic  
 (b)  $\text{KBr} \Rightarrow$  neutral  
 (c)  $\text{NaCl} \Rightarrow$  neutral  
 (d)  $\text{NaC}_2\text{H}_3\text{O}_2 \Rightarrow$  basic

4. Which of the following bases is not a strong base?

- (a)  $\text{Ca}(\text{OH})_2$   
 (b)  $\text{O}^{2-}$   
 (c)  $\text{HSO}_4^- \leftarrow$  weak base / conjugate base of a strong acid.  
 (d)  $\text{Ba}(\text{OH})_2$

5. The pH of a  $0.10\text{ M}$  solution of a weak base is  $9.82$ . What is the  $K_b$  for this base?

- (a)  $2.1 \times 10^{-4}$   
 (b)  $4.3 \times 10^{-8}$   
 (c)  $8.8 \times 10^{-8}$   
 (d)  $6.6 \times 10^{-4}$



$$K_b = \frac{x^2}{0.10 - x}$$

$$= \frac{(6.61 \times 10^{-5})^2}{0.10}$$

$$K_b = 4.3 \times 10^{-8}$$

$$\text{pH} = 9.82$$

$$\text{pOH} = 14 - 9.82 = 4.18$$

$$-\log[\text{OH}^-] = \text{pOH} \Rightarrow [\text{OH}^-] = 6.61 \times 10^{-5}$$



10. Which one of the following is the weakest acid?

- (a)  $\text{HC}_6\text{H}_5\text{O}$  ( $K_a = 1.3 \times 10^{-10}$ )
- (b)  $\text{HCN}$  ( $K_a = 4.9 \times 10^{-10}$ )
- (c)  $\text{HClO}$  ( $K_a = 3.0 \times 10^{-8}$ )
- (d)  $\text{HC}_2\text{H}_3\text{O}_2$  ( $K_a = 1.8 \times 10^{-5}$ )