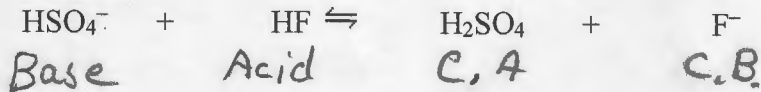


Show all work to receive credit.

1. (2 Pts) Identify the conjugate acid-base pairs in the reaction:

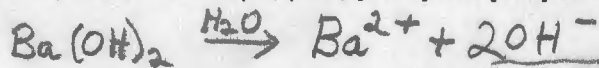


2. (3 Pts) Which of these acids is stronger,  $\text{H}_3\text{As}_3$  or  $\text{H}_3\text{AsO}_4$ ?  $\text{H}_3\text{AsO}_4$

Which of these is the stronger acid, HCl or HBr? HBr

Which is the stronger base NaOH or  $\text{Al}(\text{OH})_3$ ? NaOH

3. (4 Pts) Calculate the pH, pOH,  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$  of a 0.025 M  $\text{Ba}(\text{OH})_2$  solution.



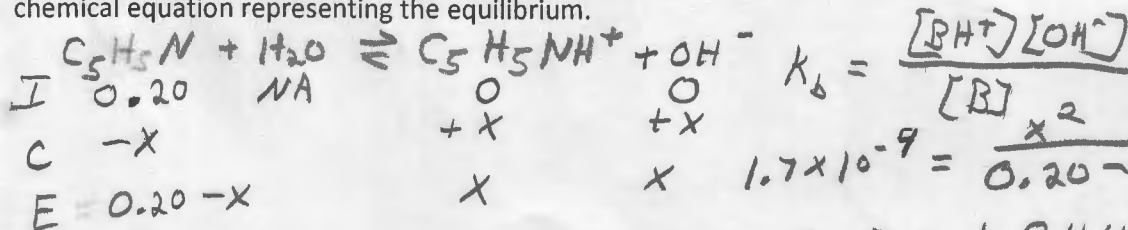
$$[\text{OH}^-] = 2 \times 0.025 = 0.050 \text{ M OK}$$

$$\text{pOH} = 1.30$$

$$\text{pH} = 12.70$$

$$[\text{H}_3\text{O}^+] = 10^{-12.70} = 2 \times 10^{-13}$$

4. (6 Pts) Calculate the pH of a 0.20 M solution of the weak base pyridine ( $\text{C}_5\text{H}_5\text{N}$   $K_b = 1.7 \times 10^{-9}$ ). Be sure to write a chemical equation representing the equilibrium.



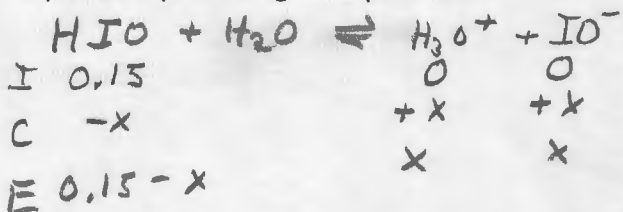
$$1.7 \times 10^{-9} = \frac{x^2}{0.20 - x} \quad \leftarrow \text{"5\% rule?"}$$

$$x = [\text{OH}^-] = 1.844 \times 10^{-5}$$

$$\text{pOH} = 4.73$$

$$\text{pH} = 9.27$$

5. (6 Pts) Calculate the pH of a 0.15 M solution of HIO, hypoiodous acid ( $K_a = 2.3 \times 10^{-11}$ ) Be sure to write a chemical equation representing the equilibrium.



$$K_a = \frac{x^2}{0.15 - x}$$

$$x = 1.857 \times 10^{-6} = [\text{H}_3\text{O}^+]$$

$$\text{pH} = 5.73$$

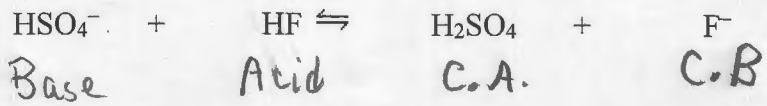
If worked as strong acid:  $\text{pH} = -\log 0.15 = 0.82$

6. (4 Pts) Calculate the pH of 150 mL of 0.015 M hydrobromic acid, HBr.

Strong acid:  $\text{pH} = -\log 0.015 = 1.82$

Show all work to receive credit.

1. (2 Pts) Identify the conjugate acid-base pairs in the reaction:

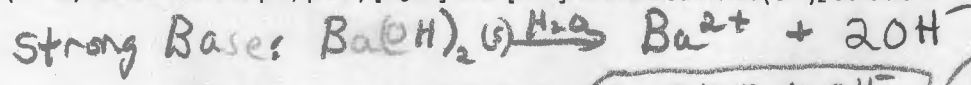


2. (3 Pts) Which of these acids is weaker,  $\text{H}_3\text{As}_3$  or  $\text{H}_3\text{AsO}_4$ ?  $\text{H}_3\text{AsO}_3$

Which of these is the weaker acid, HCl or HBr? HCl

Which is the weaker base NaOH or  $\text{Al}(\text{OH})_3$ ?  $\text{Al}(\text{OH})_3$

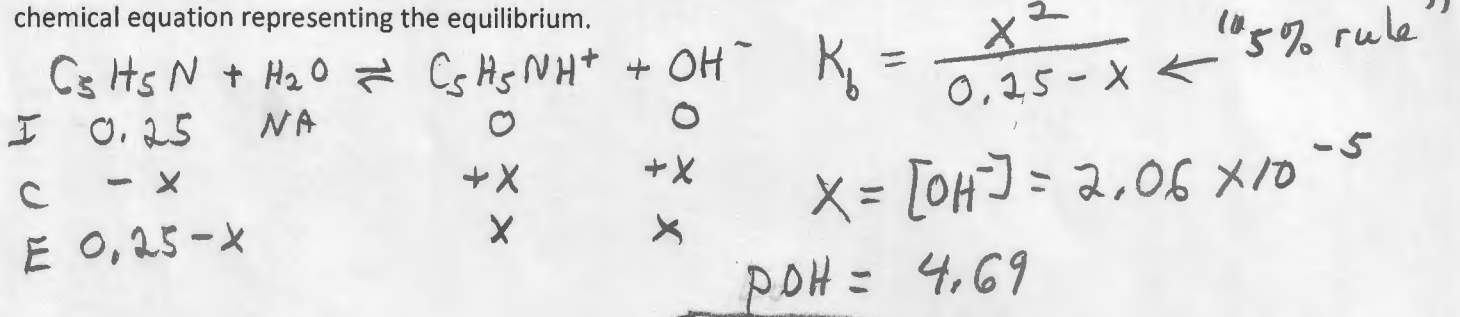
3. (4 Pts) Calculate the pH, pOH,  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$  of a 0.035 M  $\text{Ba}(\text{OH})_2$  solution.



$[\text{OH}^-] = 2 \times 0.035 = 0.070 \text{ M OH}^-$        $\text{pOH} = 1.15$

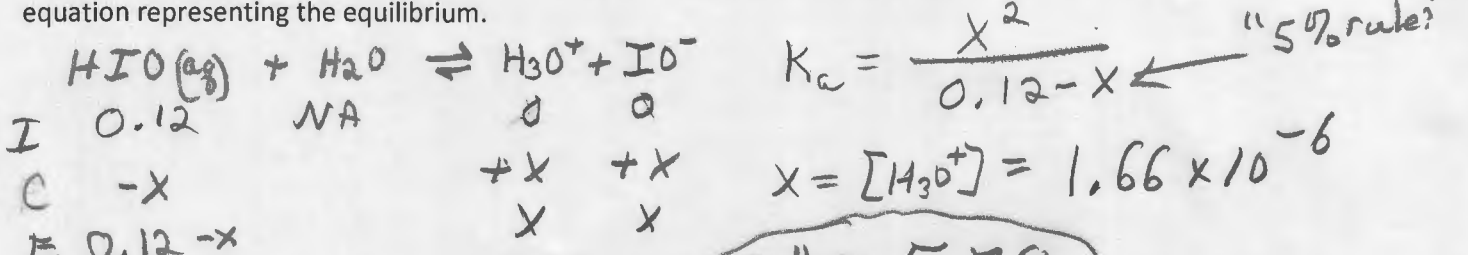
$\text{pH} = 12.85$        $[\text{H}_3\text{O}^+] = 10^{-12.85} = 1.43 \times 10^{-13}$

4. (6 Pts) Calculate the pH of a 0.25 M solution of the weak base pyridine ( $\text{C}_5\text{H}_5\text{N}$   $K_b = 1.7 \times 10^{-9}$ ). Be sure to write a chemical equation representing the equilibrium.



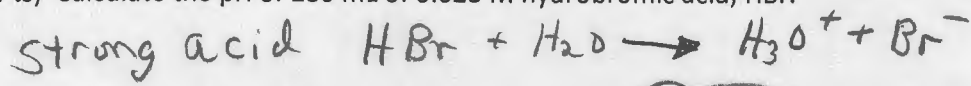
$\text{pH} = 9.31$

5. (6 Pts) Calculate the pH of a 0.12 M solution of, HIO, hypoiodous acid ( $K_a = 2.3 \times 10^{-11}$ ) Be sure to write a chemical equation representing the equilibrium.



$\text{pH} = 5.78$

6. (4 Pts) Calculate the pH of 180 mL of 0.025 M hydrobromic acid, HBr.



$\text{pH} = -\text{Log } 0.025 = 1.60$