

Key (white)Show all work to receive credit.

1. (8 Pts) Determine the pH, pOH,
- $[H_3O^+]$
- and
- $[OH^-]$
- of each of the following solutions.

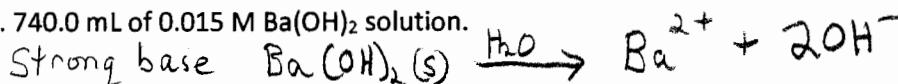
a. 95.0 mL of 0.035 M HCl solution.



$$[H_3O^+] = 0.035 \quad pOH = 12.54$$

$$pH = -\log 0.035 = 1.46 \quad [OH^-] = 10^{-12.54} = 2.86 \times 10^{-13}$$

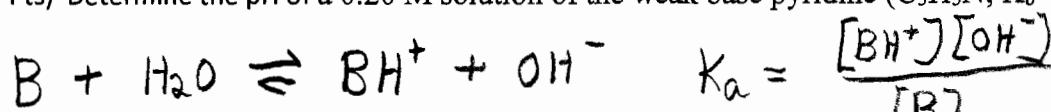
- b. 740.0 mL of 0.015 M
- $Ba(OH)_2$
- solution.



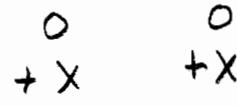
$$[OH^-] = 0.030 \quad pH = 12.48$$

$$pOH = -\log [0.030] = 1.52 \quad [H_3O^+] = 10^{-12.48} = 3.33 \times 10^{-13}$$

2. (7 Pts) Determine the pH of a 0.20 M solution of the weak base pyridine (
- C_5H_5N
- ;
- $K_b = 1.7 \times 10^{-9}$
-).



I 0.20



$$1.7 \times 10^{-9} = \frac{x^2}{0.20 - x}$$

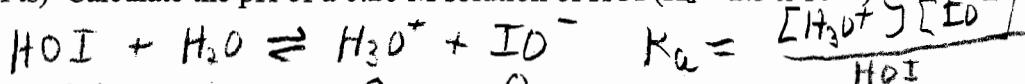
(5% rule)

C $-x$ 

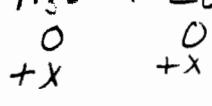
$$x = [OH^-] = 1.84 \times 10^{-5}$$

$$pOH = 4.73 \quad pH = 9.27$$

3. (6 Pts) Calculate the pH of a 0.20 M solution of HOI (
- $K_a = 2.3 \times 10^{-11}$
-).



I 0.20



$$2.3 \times 10^{-11} = \frac{x^2}{0.20 - x}$$

(5% rule)

C $-x$ 

$$x = 2.14 \times 10^{-6} = [H_3O^+]$$

 $pH = 5.67$

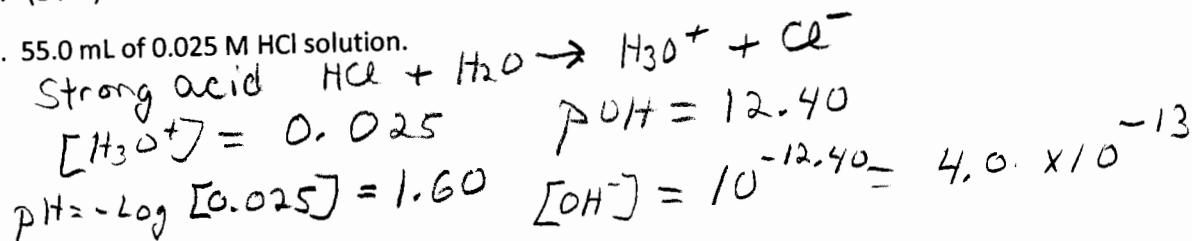
4. (4 Pts) In the reaction:
- $HCl + NH_3 \rightleftharpoons NH_4^+ + Cl^-$
- ,

a. HCl is an acid and Cl^- is its conjugate base.b. NH_3 is a base and NH_4^+ is its conjugate acid.

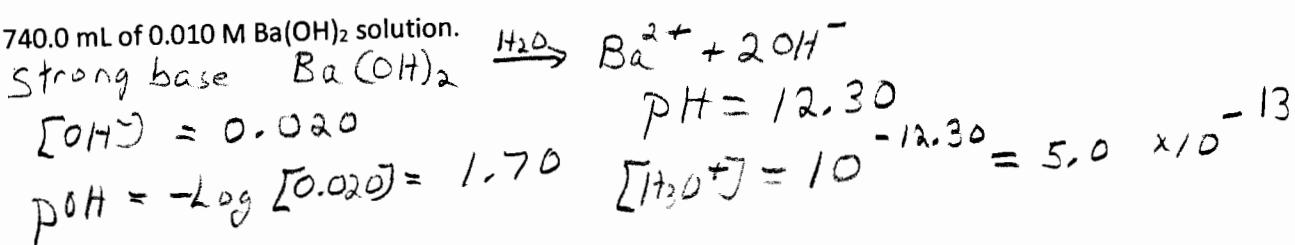
Key GreenShow all work to receive credit.

1. (8 Pts) Determine the pH, pOH, $[H_3O^+]$ and $[OH^-]$ of each of the following solutions.

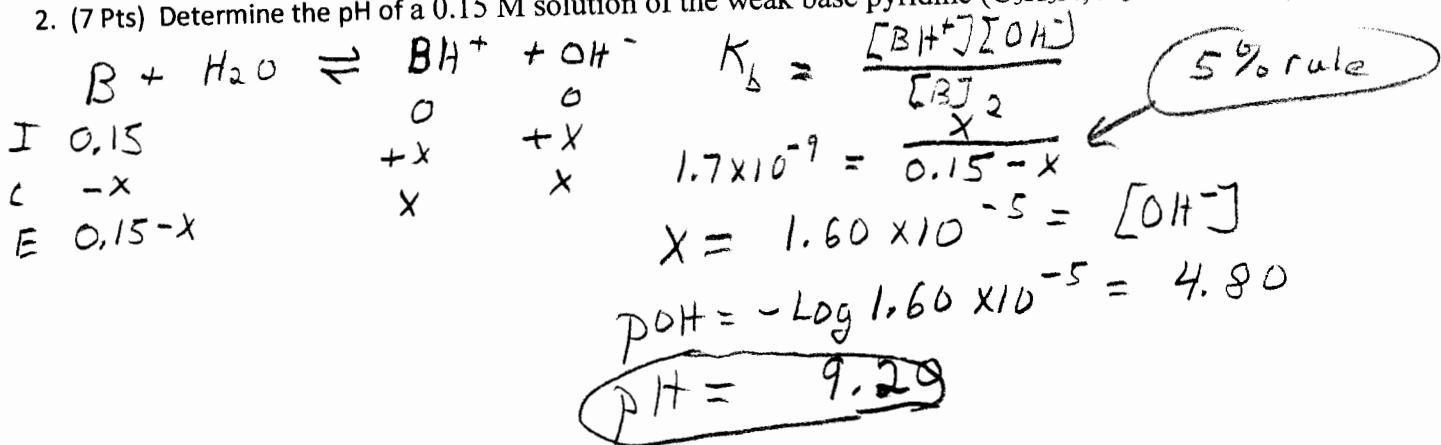
- a. 55.0 mL of 0.025 M HCl solution.



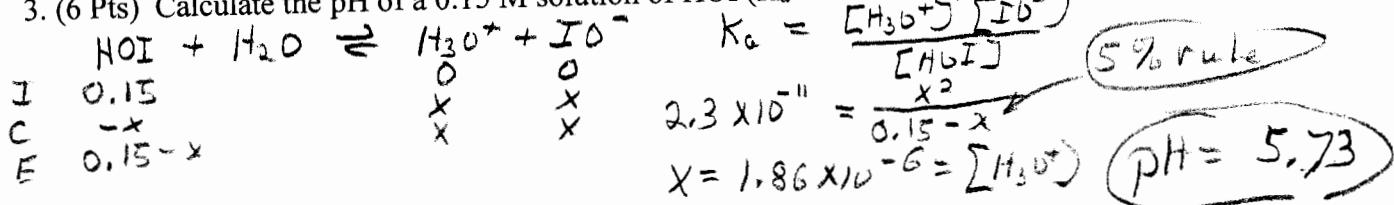
- b. 740.0 mL of 0.010 M $Ba(OH)_2$ solution.



2. (7 Pts) Determine the pH of a 0.15 M solution of the weak base pyridine (C_5H_5N ; $K_b = 1.7 \times 10^{-9}$).



3. (6 Pts) Calculate the pH of a 0.15 M solution of HOI ($K_a = 2.3 \times 10^{-11}$)



4. (4 Pts) In the reaction: $HNO_3 + NH_3 \rightleftharpoons NH_4^+ + NO_3^-$,

a. HNO_3 is an acid and NO_3^- is its conjugate base.

b. NH_3 is a base and NH_4^+ is its conjugate acid.