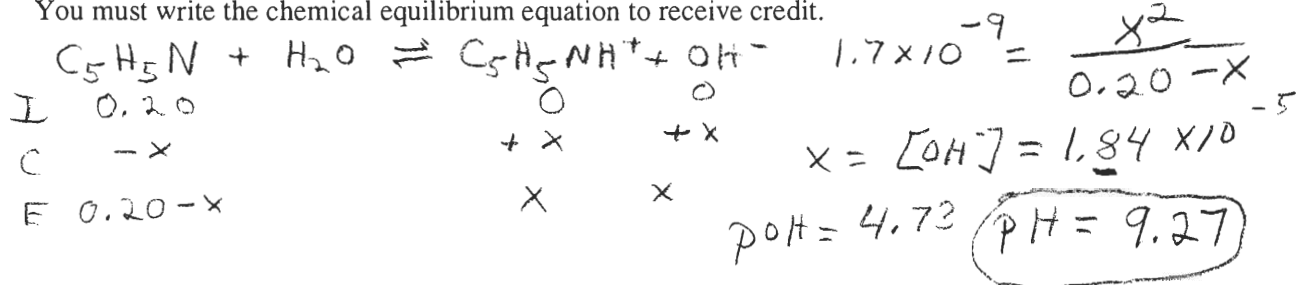


Show all work to receive credit.

1. (5 Pts) Calculate the pH of a 0.20 M solution of the weak base pyridine ( $C_5H_5N$ ;  $K_b = 1.7 \times 10^{-9}$ )  
You must write the chemical equilibrium equation to receive credit.



2. (3 Pts) Calculate the  $H_3O^+$  ion concentration, the  $OH^-$  ion concentration, and the pOH for 200 mL of a solution with a pH of 3.85.

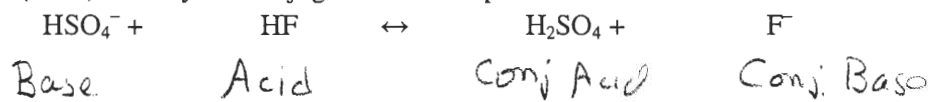
$pH = 3.85$

$[H_3O^+] = 10^{-3.85} = 1.4 \times 10^{-4}$

$[OH^-] = 10^{-10.15} = 7.08 \times 10^{-11}$

$pOH = 10.15$

3. (2 Pts) Identify the conjugate acid-base pairs in the reaction

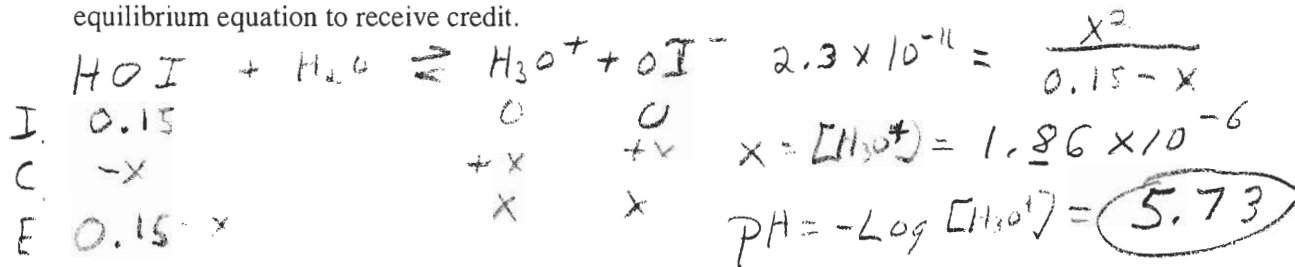


4. (4 Pts) What is the pOH of a  $7.5 \times 10^{-3}$  M  $Ca(OH)_2$  solution?

$[OH^-] = 2 \times 7.5 \times 10^{-3} = 0.015$

$pOH = -\log [OH^-] = 1.82$

5. (5 Pts) Calculate the pH of a 0.15 M solution of  $HOI$  ( $K_a = 2.3 \times 10^{-11}$ ) You must write the chemical equilibrium equation to receive credit.



6. (2 Pts) Write the formula for the conjugate acid of  $HPO_4^{2-}$       $H_2PO_4^-$

7. (4 Pts) Calculate the pH of a solution containing 0.20 g of NaOH in 2,000 mL of solution. (molar masses: Na 23.0, O 16.00, H 1.008)

$\frac{0.20 \text{ g}}{40.00 \text{ g/mol}} = 0.005 \text{ mol}$

$\frac{0.005 \text{ mol}}{2.000 \text{ L}} = 0.0025 \text{ M}$

$pOH = -\log 0.0025 = 2.60$

$pH = 11.40$