

**Group Work – Thursday, February 24, 2022****Question 1. Example:** Identify the conjugate base of each of the following acids?

- (a)  $(\text{CH}_3)_3\text{NH}^+$  Conjugate base = \_\_\_\_\_  
(b)  $\text{H}_2\text{SO}_4$  Conjugate base = \_\_\_\_\_  
(c)  $\text{HNO}_2$  Conjugate base = \_\_\_\_\_

**Question 2. For each of the following:**

- (a) Write the acid-dissociation reaction or base-dissociation reaction, (b) the acid-dissociation constant or base dissociation constant expression for each, and (c) identify the conjugate acid-base pairs in each.
- Nitrous acid ( $\text{pK}_a = 3.14$ ) in water
  - Hypochlorous acid ( $\text{pK}_a = 7.54$ ) in water
  - Ethylamine,  $\text{CH}_3\text{CH}_2\text{NH}_2$  ( $\text{pK}_b = 3.37$ ), in water
  - Pyridine,  $\text{C}_5\text{H}_5\text{N}$  ( $\text{pK}_b = 8.82$ ), in water

**Question 3.** Using the given information above:

- Which acid is **stronger**, nitrous acid or hypochlorous acid?
- Which base is **stronger**, ethylamine or pyridine?

**Question 4.** Write a balanced chemical equation for the overall acid-base reaction between pyridine and nitrous acid. Using the two equations you developed in **Question 2** along with the autoionization of water as the third equation (
$$2 \text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{H}_3\text{O}^+(\text{aq}) + \text{OH}^-(\text{aq}) \quad K_w = 1.0 \times 10^{-14}$$
) summing to the overall balanced acid-base reaction, find the  $K_{\text{overall}}$  for the acid-base reaction between pyridine and nitrous acid. (*Hint: this is a connection to Chapter 15 concepts.*)