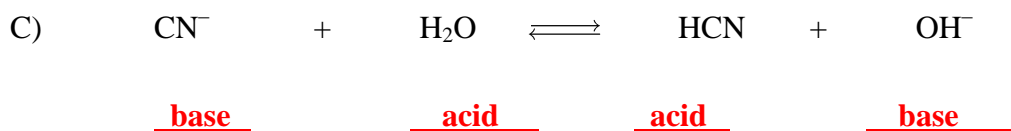
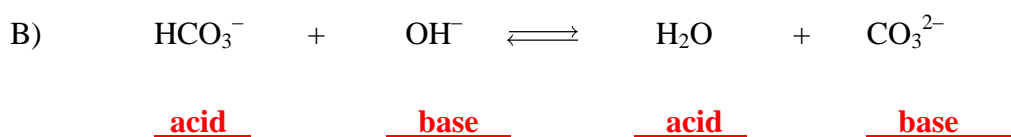
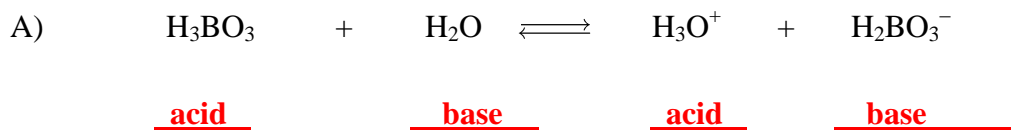


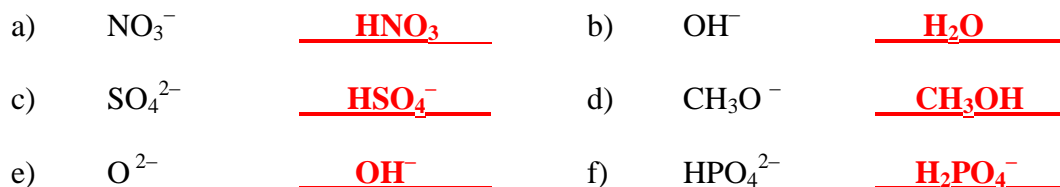
REVIEW QUESTIONS

## Chapter 10

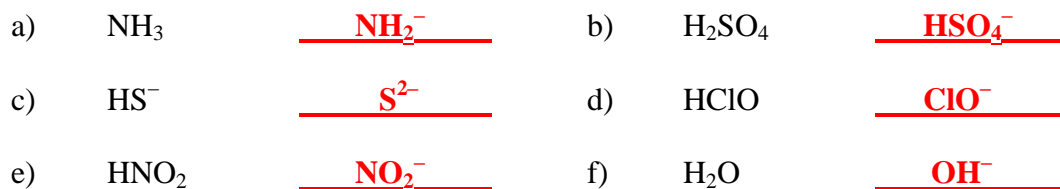
1. For each reaction shown below, determine the Brønsted-Lowry acid and base and their conjugates:



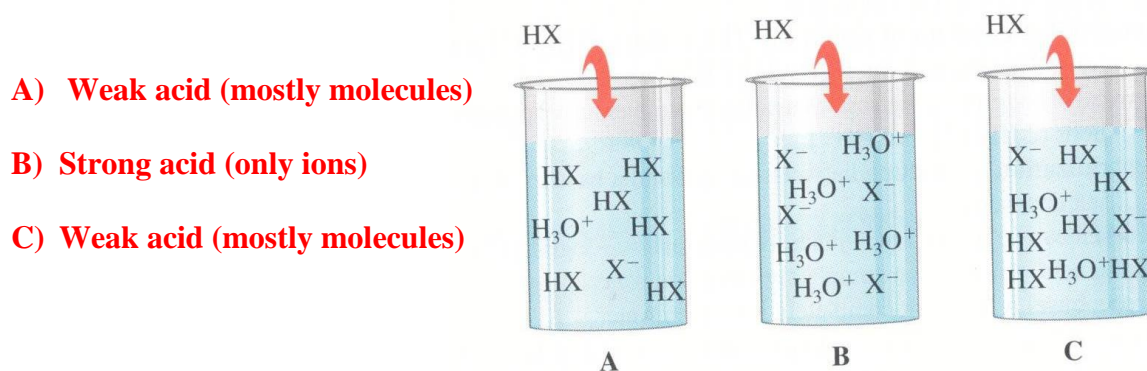
2. Identify the Brønsted-Lowry acid for each base shown below:



3. Identify the Brønsted-Lowry base for each acid shown below:



4. Each diagram below represents an acid solution with the formula HX. For each solution, determine if it is a strong acid or a weak acid.



5. Complete the missing information in the table below:

$[\text{H}_3\text{O}^+]$	$[\text{OH}^-]$	Acidic/Basic
$1.0 \times 10^{-12}$	$1.0 \times 10^{-2}$	Basic
$3.8 \times 10^{-4}$	$2.6 \times 10^{-11}$	Acidic
$2.4 \times 10^{-11}$	$4.2 \times 10^{-4}$	Basic
$1.0 \times 10^{-5}$	$1.0 \times 10^{-9}$	Acidic
$6.5 \times 10^{-8}$	$1.5 \times 10^{-7}$	Basic

**Sample calculations:**

$$[\text{OH}^-] = \frac{K_w}{[\text{H}_3\text{O}^+]} = \frac{1.0 \times 10^{-14}}{3.8 \times 10^{-4}} = 2.6 \times 10^{-11}$$

$$[\text{H}_3\text{O}^+] = \frac{K_w}{[\text{OH}^-]} = \frac{1.0 \times 10^{-14}}{4.2 \times 10^{-4}} = 2.4 \times 10^{-11}$$

6. Identify each of the substances below as **strong electrolyte**, **weak electrolyte** or **non-electrolyte**:

a) KCl strong electrolytes      b) HNO<sub>3</sub> strong electrolyte

c) CH<sub>3</sub>OH non-electrolytes      d) HF weak electrolyte

e) H<sub>3</sub>PO<sub>4</sub> weak electrolytes

7. What are the  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$  for a solution with the following pH values?

a) 4.10

$$[\text{H}_3\text{O}^+] = \text{antilog}(-4.10) = 7.9 \times 10^{-5} \text{ M}$$

$$[\text{OH}^-] = \frac{K_w}{[\text{H}_3\text{O}^+]} = \frac{1.0 \times 10^{-14}}{7.9 \times 10^{-5}} = 1.3 \times 10^{-10} \text{ M}$$

b) 9.80

$$[\text{H}_3\text{O}^+] = \text{antilog}(-9.80) = 1.6 \times 10^{-10} \text{ M}$$

$$[\text{OH}^-] = \frac{K_w}{[\text{H}_3\text{O}^+]} = \frac{1.0 \times 10^{-14}}{1.6 \times 10^{-10}} = 6.3 \times 10^{-5} \text{ M}$$

8. What is the pH of a solution that contains 1.54 g of  $\text{HNO}_3$  in 0.500 L of solution?

$$[\text{H}_3\text{O}^+] = [\text{HNO}_3] = 1.54 \text{ g} \times \frac{1 \text{ mol}}{63.01 \text{ g}} \times \frac{1}{0.500 \text{ L}} = 0.0489 \text{ M}$$

$$\text{pH} = -\log(0.0489) = 1.311 \quad (3 \text{ sig figs})$$

9. What is the pH of a solution prepared by dissolving 1.00 g of  $\text{Ca}(\text{OH})_2$  in enough water to make 875 mL of solution?

$$[\text{Ca}(\text{OH})_2] = 1.00 \text{ g} \times \frac{1 \text{ mol}}{74.03 \text{ g}} \times \frac{1}{0.875 \text{ L}} = 0.0154 \text{ M}$$

$$[\text{OH}^-] = 2 [\text{Ca}(\text{OH})_2] = 2 (0.0154) = 0.0308 \text{ M}$$

$$[\text{H}_3\text{O}^+] = \frac{K_w}{[\text{OH}^-]} = \frac{1.0 \times 10^{-14}}{0.0308} = 3.25 \times 10^{-13} \text{ M}$$

$$\text{pH} = -\log(3.25 \times 10^{-13}) = 12.488 \quad (3 \text{ sig figs})$$