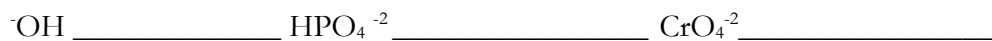


1. Define a Bronsted acid and Bronsted base. Give an example and determine the acid-base conjugate pairs
2. Characterize the following chemicals as a Brønsted-Lowry acid, base, or both

	Acid/Base/Both (i.e amphoteric)
H ₂ CO ₃	
HSO ₃ ⁻	
NO ₂ ⁻	
KOH	
H ₃ O ⁺	
N ₂ H ₄	

3. List the conjugate acids for each of the following:



- List the conjugate bases for each of the following:



4. If you mixed an equal amount of acid and base, in which direction would it favor at equilibrium? Using the conjugate acid-base strength to support your answer. (Do not use K_a or K_b)
5. Choose from the conjugate acid–base pairs $\text{HSO}_4^-/\text{SO}_4^{2-}$, HF/F^- and $\text{NH}_4^+/\text{NH}_3$ to complete the following equation with the pair that gives an equilibrium constant $K_c > 1$. Explain.
- _____ + NO_2^- \rightarrow _____ + HNO_2
6. Write the mathematical equation for calculating the following:

pH =

pOH =

7. Complete the table below to describe aqueous solutions.

Classification	Relative ion concentration	pH at 25 °C
		pH < 7
Neutral	$[H_3O^+] = [OH^-]$	
		pH > 7

8. Use the following acidity constants to help answer the questions below:

$$K_a(\text{HC}_2\text{H}_3\text{O}_2) = 1.8 \times 10^{-5}; \quad K_a(\text{HCN}) = 4.9 \times 10^{-10}; \quad K_a(\text{HCOOH}) = 1.7 \times 10^{-4}$$

(a) Which of the three acids is the strongest? _____

(b) Which of the following bases is the weakest: $\text{C}_2\text{H}_3\text{O}_2^-$, CN^- , or HCOO^- ? _____

(c) What is the $\text{p}K_a$ of HCN? _____

(d) What is the K_b for HCOO^- ? _____

9. Write the chemical equation for the ionization of $\text{C}_6\text{H}_5\text{NH}_3^+$ and its corresponding K_a equation and value.

10. Write the chemical equation for the base ionization of $\text{C}_6\text{H}_5\text{NH}_2$ and its corresponding K_b equation and value.

11. Use the chemical equations and K expressions from 9 and 10 above to show that $K_a * K_b$ for a conjugate acid-base pair is equal to K_w .

12. Write the Lewis structures of the reactants and product of each of the following equations, and identify the Lewis acid and the Lewis base in each:

