Chapter 16 concept map (The Chemistry of Acids and Bases)

1. Use Brønsted-Lowry theory to classify a substance as an acid (H^+-donor) or a base (H^+-acceptor). Recognize the ability of a substance to act as an amphiprotic species.
2. Write formulas for conjugated acids and bases of given species. Recognize conjugate acids and bases in a reaction.
3. Use the pH scale to classify a substance as acidic, neutral or basic. Know the relationship between $[H_3O^+]$, $[OH^-]$ and K_w (and pH, pOH and pK_w). Be able to calculate pH and pOH of a substance given its $[H_3O^+]$ or $[OH^-]$ concentration.
4. Know the six strong acids (HCl, HBr, HI, HNO_3, H_2SO_4, $HClO_4$). Recognize that OH^- is a strong base, so the soluble hydroxide salts (e.g., NaOH) act as strong bases.
5. Write equations for acid and base ionization in water. Write equilibrium constant expressions for K_a and K_b. Use the values of K_a and K_b (or pK_a and pK_b) to classify an acid or a base as strong or weak.
6. For a conjugate acid-base pair, know the relationship between K_a, K_b and K_w (and pK_a, pK_b and pK_w) and apply it to the concept of relative strength within a conjugate acid-base pair.
7. Write equations for ionization of polyprotic acids. Understand how the K_a/pK_a values of a polyprotic acid compare to each other.
8. Predict the acid/base properties of salts by writing hydrolysis reactions for their constituent ions.
9. Predict whether a solution of an amphiprotic species is acidic or basic by comparing the K_a and K_b values of the species.
10. Predict the direction of an acid-base reaction.
11. Perform ICE table calculations with acids and bases (including polyprotic species).
12. Explain the acid behavior of various acids (hydrohalic acids, oxoacids, carboxylic acids) as a result of their molecular structure.
13. Use Lewis theory to classify a substance as an acid (electron pair acceptor) or a base (electron pair donor).