1. Molarity
2. Acid-base reactions
3. Oxidation states

1. A solution is prepared by dissolving 10.8 g ammonium sulfate in enough water to make 100.0 mL of stock solution. A 10.00 mL sample of this stock solution is added to 50.00 mL of water. Calculate the concentration of ammonium ions and sulfate ions in the final solution.

2. Calculate the sodium ion concentration when 70.0 mL of 3.0 M sodium carbonate is added to 30.0 mL of 1.0 M sodium bicarbonate.

3. What mass of solid AgBr is produced when 100.0 mL of 0.150 M AgNO₃ is added to 20.0 mL of 1.00 M NaBr?

4. Write the balanced formula, complete ionic, and net ionic equations for each of the following acid-base reactions.
   a. HClO₄ (aq) + Mg(OH)₂ (s) --->
   b. HCN (aq) + NaOH (aq) --->
   c. HCl (aq) + NaOH (aq) --->
5. What volume of each of the following acids will react completely with 50.00 mL of 0.200 M NaOH?
   a. 0.100 M HCl
   b. 0.150 M HNO₃
   c. 0.200 M HC₂H₃O₂

6. Assign oxidation states for all atoms in each of the following compounds.
   a. KMnO₄
   b. NiO₂
   c. Na₄Fe(OH)₆
   d. (NH₄)₂HPO₄
   e. P₄O₆

7. Hydrogen cyanide is produced industrially from the reaction of gaseous ammonia, oxygen, and methane:
   \[ 2\text{NH}_3 (g) + 3\text{O}_2 (g) + 2\text{CH}_4 (g) \rightarrow 2\text{HCN} (g) + 6\text{H}_2\text{O} (g) \]
   If \(5.00 \times 10^3\) kg of each of NH₃, O₂, and CH₄ are reacted, what mass of HCN and of H₂O will be produced assuming 100% yield?