**VI) Separating Mixtures of Ions by Precipitation**

Describe a method to separate Ba\(^{2+}\) and Pb\(^{2+}\) ions which are in solution together:

**Chemical separation:** We want to add an anion that will only form a ppt. with one of Ba\(^{2+}\) or Pb\(^{2+}\) in order to remove from solution.

1. **Ba\(^{2+}\), Pb\(^{2+}\)**
   - ions left in soln:
     - \(\text{Ba}^{2+}, \text{Pb}^{2+}\)
     - \(\text{Na}^+, \text{Ba}^{2+}\)
     - \(\text{BaSO}_4(s)\)
     - \(\text{Na}^+, \text{K}^+, \text{soluble, spectator ions}\)

**Assignment 5: Ion Separation Exercises**

1. Describe a method to separate Cl\(^-\) and OH\(^-\) that are in solution together.
2. A solution is known to contain Mg\(^{2+}\), Ca\(^{2+}\), and Pb\(^{2+}\). Describe a method to separate the cations.
3. You have a solution known to contain any or all of Cu\(^+\), Ca\(^{2+}\), Fe\(^{3+}\), and Sr\(^{2+}\). You have the following 'test' solutions available: 1M Na\(_2\)CO\(_3\), 1M NaOH, 1M NaCl, 1M Na\(_2\)S. What order would you add each to test for each cation?