

## **Instructional Objectives for Topic 3 (Mineral Weathering and Formation)**

After we conclude Topic 3 in the notes you should be able to do the following:

1. List and describe the physical and chemical mechanisms of weathering.
2. Explain in your own words Bowens reaction series and how it is used to interpret the stability of primary silicate minerals at the earth's surface.
3. Explain how geochemical properties such as Si:O linkage and isomorphous substitution affect the weathering of primary silicate minerals.
4. Explain how ligand exchange rates affect the weathering of primary silicate minerals and determine relative dissolution rates of other minerals given the ligand exchange rates of the dissolved metal that composes the mineral.
5. Describe the detailed mechanisms of ferromagnesium, feldspar, and mica mineral weathering.
6. Distinguish between congruent and incongruent dissolution and give examples of each.
7. Distinguish between alteration and neofomation and give examples of each.
8. Describe the solubility of silica/Al as a function of pH and interpret solubility diagrams for dissolved and solid phases of silica/Al.
9. Describe the polymerization of Al and identify the importance of the polymerized species in the environment and industry.
10. Identify potential aluminosilciate minerals that will form in different environments.