

Recycling Phosphate using Gadolinium Metal Complexes

Jarrett Mansergh

Phosphate is an essential anion for the function and growth of living organisms. For this reason, phosphate rock is often used in fertilizers throughout in the world. However, the runoff from this fertilizer is causing excess amounts of phosphate to accumulate in waterways. This results in an algal bloom that blocks the sun from entering the water and decreases the oxygen level available for aquatic life. Moreover, the overabundance of algae creates toxins harmful to humans and vertebrates. In addition, the world supply of phosphate rock is diminishing rapidly, thus phosphate rock is increasing in price. These problems create the need to find and capture the excess phosphate in water sources in such a way that it can be recycled as fertilizer. With the goal of solving this problem, we are testing several lanthanide metal complexes for a simple recycling process. Through competition and pH studies, Gd-TREN-MAM has been found to be selective for phosphate and capable of releasing the anion at low pH, supporting our concept for a recycling process. Further work will continue to optimize the recycling system.