

# Acid Mine Drainage

## Cognitive Demand:

Science Literacy (D)

Technological Design (T)

## Overview:

Students will learn about Acid Mine Drainage, its impact to our waters, and how to reclaim a habitat impacted by it. They will also do an activity to help them understand how limestones can help to improve water pH after it has been impacted by AMDs.

## Materials:

- Baking Soda
- Ph strip test
- Bottles to sample water

## **Teacher Background:**

In many areas of the country, acid mine drainage forms naturally when certain materials meet water, air, and bacteria through a process called weathering. The weathering of rocks slowly releases acids, metals, and sulfates into rivers, lakes, streams, wetlands and groundwater. The process may be sped up and the acid amounts increased when industries do not take the proper precautions to protect the environment, therefore, the environment contains more acid than it can clean by natural processes. When too much of these acids and minerals is released into rivers and streams, they can become polluted and may no longer support animals.

Acid Mine drainage (AMD) is characterized as having a low pH with a high concentration of heavy metals. In regions with more alkaline substrates, the impacted water can be more alkaline. Over time, the heavy metals begin to drop out of the water, forming a sediment that clogs the gills of animals, as well as the spaces between rocks where small macroinvertebrates live, compromising their habitat. The iron gives the water and associated sediment an orange color.

Fixing AMDs happens through a process called reclamation. The general course for reclamation of AMD impacted lands, and waters is as follows: Exposed gob piles are leveled out as much as possible, covered with a clay cap, covered in about 4-6 inches of "good" soil, and reseeded with native vegetation. Depending on the size of the stream, impacted water is buffered with limestone, or steel slag to boost the pH, and if possible, filtered through a series of clay and limestone berms, or wetlands to add retention time, allowing that water to drop out more heavy metals.

## **Acquisition of Learning:**

Have the students collect water samples from a nearby stream, test the Ph of the water, add baking soda to the water and retest its Ph. The Baking soda is representing the limestone, which serves as a pH. buffer during reclamation projects.