

## **Synthesis of Iron Oxide Pigment from the Treatment of the Truetown Acid Mine Drainage Seep Utilizing Aeration**

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### Abstract:

Mining for coal has caused numerous water sources in the Appalachian region to become polluted with acid mine drainage (AMD), painting the affected waterways orange. The goal of this research is to formulate a technique for the remediation of the Truetown AMD seep in Athens County, and produce an iron oxide precipitate that can be marketed as a paint pigment.

Utilizing an active aeration system, the iron within the AMD can be oxidized and recovered as an iron oxide precipitate and with little processing can be sold as an iron oxide pigment (IOP). With the sale of IOPs trending upwards, the metals recovered from the treatment of the seep could prove to be a profitable investment as well as a method to remediate the damage done by AMD in Sunday Creek. Once demonstrated at Truetown, this technique should be suitable for use at other AMD sites.

Batch style pigment synthesis tests have shown that aeration treatment can be used to produce pigment with varying ferric oxide contents, crystal structures, and reaction rates; these characteristics are primarily dependent on the pH of the AMD during oxidation. Lower pH experiments in the range of 3.5-5.0 produced a denser, lighter colored pigment with a higher ferric oxide content, and more uniform goethite crystal structure than pigment produced at pHs greater than 6. This research should prove to be valuable to those interested in the sustainable treatment of AMD with a primary design focus on metals recovery for use as marketable IOPs.