

Recovering Critical Elements from Acid Mine Drainage

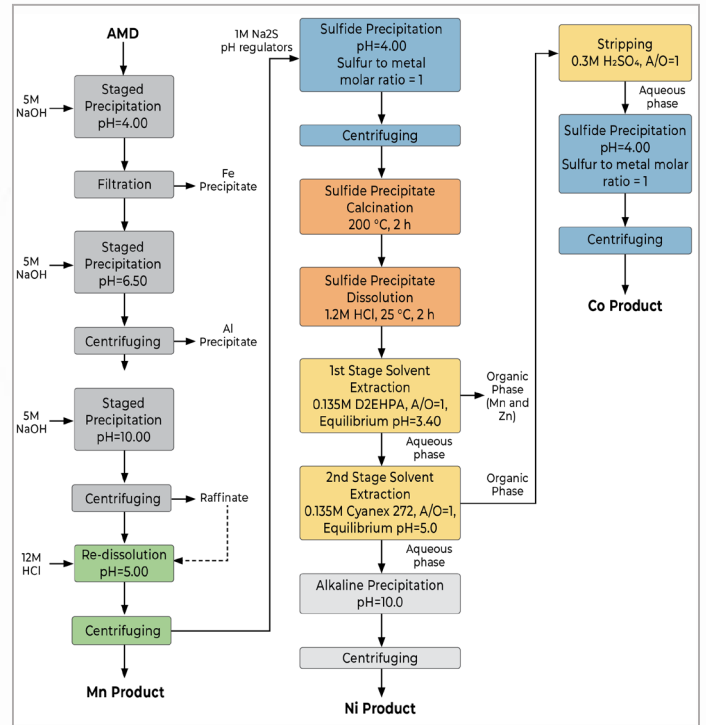
VTIP 22-057: “Innovative circuit for recovering critical elements from leachate of coal-based materials”

THE CHALLENGE

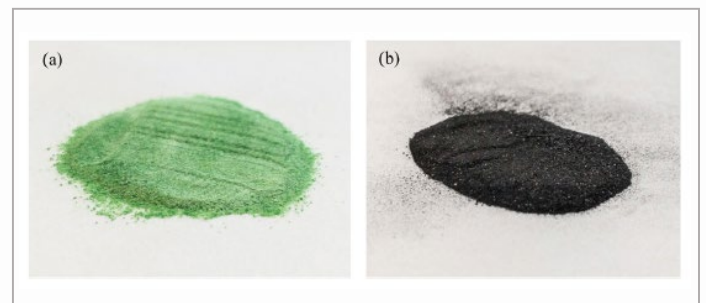
The demand for certain elements, such as Manganese (Mn), Cobalt (Co), and Nickel (Ni), has surged in recent years due to the rapid growth of battery production for electric vehicles and utility-scale energy storage. The United States government has deemed Co, Ni, and Mn critical elements, primarily because of the country’s high dependence on importing the elements as well as the elements’ importance to the development of clean energy and high-tech industries. Therefore, establishing supply chains for these critical mineral commodities within the country, via recovery from secondary resources such as acid mine drainage, has become increasingly attractive.

OUR SOLUTION

The laboratory of Wencai Zhang at Virginia Tech has developed an innovative circuit for producing individually separated, high purity Mn, Co, Ni, and Zn, from leach solutions of coal-based materials. The circuit includes a proper configuration of different unit operations, such as staged precipitation, sulfide precipitation, and solvent extraction. Based on preliminary experimental tests, Co and Ni products of > 95% purity and Mn products of > 50% purity can be generated from leach solutions of coal-based materials using this circuit.



Flowsheet for generating high-purity products of Mn, Co, and Ni from acid mine damage.



High-grade nickel (a) and cobalt (b) products generated via the described circuit.



CONTACT:

David Irvin
 davidir86@vt.edu
 540-231-7376