

LIGNOR™ PROCESS FOR ACIDIC ROCK DRAINAGE TREATMENT

J.M. Zhuang and T.Walsh

ABSTRACT

The process using lignosulfonates for acidic rock drainage (ARD) treatment is referred to as the Lignor™ process. Lignosulfonates are waste by-products produced in the sulfite pulping process. The present study has shown lignosulfonates are able to protect lime from developing an external surface coating, and hence to favor its dissociation. Further, the addition of lignosulfonates to ARD solutions increased the clotting and settling rate of the formed sludge. The capability of lignosulfonates to form stable metal-lignin complexes makes them very useful in retaining metal ions and thus improving the long-term stability of the sludge against leaching. The Lignor™ process involves metal sorption with lignosulfonates, ARD neutralization by lime to about pH 7, pH adjustment with caustic soda to 9.4–9.6, air oxidation to lower the pH to a desired level, and addition of a minimum amount of FeCl₃ for further removal of dissolved metals. The Lignor™ process removes all concerned metals (especially Al and Mn) from the ARD of the Britannia Mine (located at Britannia Beach, British Columbia, Canada) to a level lower than the limits of the B.C. Regulations. Compared with the high-density sludge (HDS) process, the Lignor™ process has many advantages, such as considerable savings in lime consumption, greatly reduced sludge volume, and improved sludge stability.

Key words: Lignosulfonates, acidic rock drainage, heavy metals, sludge stability.

Published in:

ENVIRONMENTAL TECHNOLOGY

Vol. 25, 2004, pp. 1031-1041