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Neutralization and Attenuation of Metal Species in Acid Mine Drainage and Mine Leachates Using Magnesite: a Batch Experimental Approach

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Abstract

This paper evaluates the potential application of amorphous magnesite for remediation of Acid Mine Drainage (AMD). Magnesite was mixed with simulated AMD at specific S/L ratios and agitated in an orbital shaker and its capacity to remove metals and neutralize the acidity assessed over time. XRF analysis showed that magnesite contains MgO (88.54 %) as the major element. XRD revealed that magnesite is amorphous and contains periclase as major mineral phase. Results indicate that contact of AMD with magnesite leads to an increase in pH (pH=10), and a reduction in EC, TDS and metal concentration to below DWAF guidelines. PHREEQC geochemical modeling predicted precipitation of Al, Fe, Mn, Mg bearing mineral phases could be responsible for attenuation of most metal species. However a high proportion of alkali and alkaline earth metals remained in the treated water which might require post treatment polishing.