

Application of magnesium hydroxide and barium hydroxide for the removal of metals and sulphate from mine water

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Abstract

The proposed magnesium-barium-oxide process consists of metal removal with $\text{Mg}(\text{OH})_2$, magnesium and sulphate removal with $\text{Ba}(\text{OH})_2$ and calcium removal with CO_2 . The raw materials, $\text{Mg}(\text{OH})_2$ and $\text{Ba}(\text{OH})_2$ are recovered from the BaSO_4 and $\text{Mg}(\text{OH})_2$ sludges that are produced. Laboratory studies showed that metals are removed to low levels. This includes iron(II), the dominant metal ion in mine water, which is first oxidised to iron(III), whereafter it precipitates as $\text{Fe}(\text{OH})_3$ resulting in residual levels of Fe(II) in the mine water of less than 20 mg/l. Sulphate is also removed to less than 25 mg/l. The final sulphate concentration is a function of the amount of $\text{Ba}(\text{OH})_2$ dosed, as the amount of sulphate removed is stoichiometrically equivalent to the $\text{Ba}(\text{OH})_2$ dosage. During CO_2 -dosing, CaCO_3 is precipitated to the saturation level of CaCO_3 .

Keywords: Magnesium hydroxide; barium hydroxide; sulphate removal; water treatment