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Potential applications of quarry dolomite for post treatment of desalinated water

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ABSTRACT

Recent WHO publications recommend a minimum concentration of 10 mg Mg/L in desalinated water. Dolomite dissolution was investigated as means of adding magnesium ions to desalinated water at the post treatment stage, in addition to Ca^{2+} ions and carbonate alkalinity. The results show that dolomite dissolution *per se* is not feasible for post treatment purposes, because dolomite stops dissolving at a relatively low pH, rendering the alkalinity and Calcium Carbonate Precipitation Potential values very low and negative, respectively. To overcome this problem three combined dolomite-calcite dissolution alternatives were investigated. The results show that the most promising method is to dissolve dolomite and then use the $CO_{2(aq)}$-rich effluent to further dissolve calcite. Applying such in-series dissolution, it is possible to produce water with the following quality criteria: alkalinity = 75 mg/L as $CaCO_3$, $[Mg^{2+}]$ = 12.4 mg/L, $[Ca^{2+}]$ = 120 mg/L as $CaCO_3$, pH 8.17. However, the resultant total hardness value is high (170 mg/L as $CaCO_3$). The operational costs of this alternative were approximated at 0.042 \$ m^{-3} product water.

Keywords: Dolomite dissolution; Post treatment; Desalination; Calcite dissolution; Magnesium

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