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Research Paper

Adoucissement par précipitation a la chaux et le carbonate de sodium des eaux de l'albien d'Ain Sahara (Touggourt – Algérie)

Softening of the Albian water Ain Sahara (Touggourt - Algeria) using precipitation by lime and sodium carbonate

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Abstract

The aim of this work is to soften the water of Ain Sahara borehole of the Continental Intercalaire aquifer, which is located in the Touggourt region (South-East Algeria) using slaked lime ($Ca(OH)_2$) and sodium carbonate (Na_2CO_3). This reservoir is particular by its considerable volume both its extension over more than 600,000 km^2 and its average thickness of several hundred meters. This underground water aquifer situated at an average temperature of 57 °C is an important reserve of thermal water. The exploitation of this Albian aquifer is done at a rate of 150 L s^{-1}, which equivalent of 12960 m3 / d and represents an operating capacity of 14.2 million m^3/year. These waters are highly mineralized (1.8 to 2.5 g L^{-1}), with a very high level of hardness (102 °f). The bar chart has shown that the concentration of lime needed to reduce the carbonate carbon hardness of this water is equivalent to the concentration of bicarbonate ions ($HCO3^-$) of 120 mg L^{-1}. According to the bar chart, the maximum efficiency is 9%, therefore the lime process should not be the right solution to scale problems in the Ain Sahara region. The parameters study such as pH and conductivity shows an increase in pH after 10 min of lime addition arriving to 10.15 followed by a slow decrease to 9.90 after 50 min. The conductivity study shows as well an increase after 10 min of lime addition followed by a decrease arriving to 2.69 µS cm^{-1}. In both cases, the pH increase is due to the enrichment of the water by the OH^- and Ca^{2+} ions. The treatment by sodium carbonate shows a very good softening efficiency compared to the lime with hardness removal efficiency greater than 54%.

Key words: Softening; Scaling; Lime; Sodium Carbonate.

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