Ground water coagulation using soluble stainless steel electrodes

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Abstract: This study dealt with colloids separation from ground water in the Eastern Province of Saudi Arabia. The water was found to have a conductivity of 4400 μs/cm and chloride and sulfate concentrations of 834 and 550 mg/l, respectively. The turbidity of the water was increased to 76 nephlometric turbidity unit (NTU) by the addition of bentonite. The efficiency of using soluble stainless steel electrodes for the in-situ formation of ferric hydroxide has been investigated. The electrical current input was found to be inversely proportional to the residual turbidity in the test water. At a contact time of 5 min and a natural chloride content, the highest turbidity removal efficiency of 95% was achieved at a current of 1 A. When the current was reduced to 0.5 A and the contact time was increased to 10 min, the residual turbidity was reduced from 4.0 to 1.6 NTU. Furthermore, similar turbidity removals were achieved at a much shorter contact time (2 min) when 1 g/l sodium chloride was added to the test water. Due to the importance of pH variation with regard to coagulation, the phenomenon of voltage-induced hydrogen evolution was investigated as well. While the solutions final pH increased with the increase in current and contact time, it decreased with the increase in sodium chloride concentration.