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ARSENIC REMOVAL FROM CONTAMINATED GEOTHERMAL WATER BY ALUMINIUM AND IRON ELECTROCOAGULATION – INVESTIGATION OF PROCESS PARAMETERS

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Abstract

In the present study, the electrocoagulation (EC) process was used to remove arsenic (As) from both synthetic and real groundwater. The optimized operating conditions of the removal studies with synthetic water were initial pH as 4.5, initial As concentration as 15 mg/L, initial solution conductivity as 170 µS/cm, applied current as 1 A, applied voltage as 5 V, electrode distance as 10 mm, current density as 2.5 A/m^2, operating time as 240 minutes for aluminium (Al) and iron (Fe) electrode types. The real groundwater operating conditions were initial pH as 7.760, initial As concentration as 1.26 mg/L, initial solution conductivity as 807 µS/cm, applied current as 1 A, applied voltage as 5 V, electrode distance as 10 mm, current density as 5.2 A/m^2, operating time as 240 minutes. As removal was found to be 99.9% for both electrode types. The minimum energy consumption for a reaction time of 240 minutes was calculated as 0.46 kWh/m^3 and 0.51 kWh/m^3 for Al and Fe electrodes at current densities of 5.2 A/m^2 and 5.8 A/m^2, respectively. With the current electricity costs for Karaali Geothermal groundwater, a cost of 0.11 $ per liter was calculated for Al electrode and 0.12 $ per liter for Fe electrode.

Key words: aluminium, arsenic, electrocoagulation, groundwater, iron

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