World Academy of Science, Engineering and Technology
International Journal of Civil and Environmental Engineering
Vol:9, No:08, 2015

Controlling of Water Temperature during the Electrocoagulation Process Using an Innovative Flow Columns -Electrocoagulation Reactor

Authors : Khalid S. Hashim, Andy Shaw, Rafid Alkhaddar, Montserrat Ortoneda Pedrola

Abstract : A flow column has been innovatively used in the design of a new electrocoagulation reactor (ECR1) that will reduce the temperature of water being treated; where the flow columns work as a radiator for the water being treated. In order to investigate the performance of ECR1 and compare it to that of traditional reactors; 600 mL water samples with an initial temperature of 35 0C were pumped continuously through these reactors for 30 min at current density of 1 mA/cm2. The temperature of water being treated was measured at 5 minutes intervals over a 30 minutes period using a thermometer. Additional experiments were commenced to investigate the effects of initial temperature (15-35 0C), water conductivity (0.15 – 1.2 S) and current density (0.5 -3 mA/cm2) on the performance of ECR1. The results obtained demonstrated that the ECR1, at a current density of 1 mA/cm2 and continuous flow model, reduced water temperature from 35 0C to the vicinity of 28 0C during the first 15 minutes and kept the same level till the end of the treatment time. While, the temperature increased from 28.1 to 29.8 0C and from 29.8 to 31.9 0C in the batch and the traditional continuous flow models respectively. In term of initial temperature, ECR1 maintained the temperature of water being treated within the range of 22 to 28 0C without the need for external cooling system even when the initial temperatures varied over a wide range (15 to 35 0C). The influent water conductivity was found to be a significant variable that affect the temperature. The desirable value of water conductivity is 0.6 S. However, it was found that the water temperature increased rapidly with a higher current density.

Keywords : water temperature, flow column, electrocoagulation
Conference Title : ICCEGE 2015 : International Conference on Civil, Environmental and Geological Engineering
Conference Location : Venice, Italy
Conference Dates : August 13-14, 2015