

Solar-powered electrocoagulation system for water and wastewater treatment

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ABSTRACT

The objective of this study is to investigate the feasibility of solar powered electrocoagulation (SPEC) for wastewater treatment using aluminium electrodes. Optimisation of various operating parameters such as pH, voltage/current, electrodes gap, pollutant concentration etc. were first performed using direct electrical current. SPEC reactor was designed by connecting with photovoltaic panel (PV) either directly or through a set of batteries and charge control system. SPEC process system was sensitive to variation of solar radiation when connected directly with PV panels. SPEC reactor operated for five different times in a day (4 April 2010) yielded highest organics removal of 85% for UV abs and turbidity removal of 87% at midday (10:00 AM–2:00 PM) under optimum operating conditions. Use of batteries and charge controller with PV panels provided more consistent and efficient performance for the SPEC reactor. The variation in organics and turbidity removal was within the range of 10% for experiments conducted on three different times in a day (9 April 2010) with highest removals at 10:30 AM in the morning. This study indicates that, SPEC is a potential alternative for small scale decentralised water and wastewater purification system.

Keywords: Electrocoagulation, Photovoltaic, Solar energy, Water treatment

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