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Towards the sustainable powering of the electrocoagulation of wastewater through the use of solar-vanadium redox flow battery: A first approach

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17 **ABSTRACT**

18 Electrocoagulation (EC) of wastewater polluted with 100 mg dm⁻³ of oxyfluorfen (OFF)
19 has been studied in cells with iron anodes and aluminum cathodes. Solar power
20 combined with energy storage in a vanadium redox flow battery (VRFB) has been used
21 to electrically power a continuous EC process. Three scenarios have been evaluated.
22 Firstly, a constant current was applied to the EC reactor. Secondly, a solar energy
23 profile was applied to the EC reactor and the RFB. Finally, the EC process was operated
24 in the same way as the second scenario except that the RFB was powered with double
25 the current charge than in the second scenario. The results show that electrocoagulation
26 is not suitable for the complete removal of oxyfluorfen from wastewater, although it
27 attained a significant pollutant accumulation into the flocs of 25%, showing potential as
28 a pretreatment for this kind of waste. Likewise, results obtained pointed out that
29 electrocoagulation can be powered directly with solar energy and this energy can also
30 be regulated by VRFB, although, in the latter case, to attain the same treatment
31 efficiency, around 1/3 more energy is required during energy storage. In addition, the
32 higher the energy provided by the VRFB is, the lower the Fe/Al ratio produced during
33 the electrocoagulation is.

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