Trends in electro-Fenton technology for the remediation of different polluted matrices: Efficiency and energy improvements

E. Bocos, E. Alfaya, M. Pazos, M.A. Sanroman*

Department of Chemical Engineering University of Vigo, Isaac Newton Building, Campus As Lagoas Mariscosende 36310, Vigo, Spain

* Corresponding Author. Email: sanroman@uvigo.es

ELECTRO-FENTON PROCESS

It is known that advanced oxidation processes (AOP) are powerful and environmentally friendly technologies for the remediation of wastewaters and soils containing organic pollutants, especially aromatic compounds. Electro-Fenton treatment is an AOP that uses the electric current to generate $H_2O_2$ that reacts with iron in the Fenton’s reactions to finally generate highly reactive hydroxyl radicals able to degrade organic compounds non-selectively. The in situ production of $H_2O_2$ from the two electron reduction of $O_2$ on the cathode under acidic conditions is a limiting factor in the production of hydroxyl radicals in the electro-Fenton treatment. Several factors influence the efficiency of $H_2O_2$ production such as the kind of electrodes and their surface area, the applied voltage and air flow rate. In addition, the efficiency of the electro-Fenton process could be increased when iron is immobilized in hydrogels or clays, which reduces the investment on reagents and seems a promising approach for their use in the degradation of organic pollutants present in wastewater [1-3].

CONCLUSIONS

SUMMING UP, the results obtained using electro-Fenton reactions for the decontamination of several polluted matrices, permit to conclude the high stability and efficiency of processes developed in the our studies and open promising perspectives for removal of organic pollutants from different environments. Moreover, the application of MFC could be energy-saving and efficient for these treatments.

REFERENCES


This work has been supported by the Spanish Ministry of Economy and Competitiveness and ERDF Funds (CTM2011-26423). The authors thank the financial support of Elvira Bocos and Marta Pazos under PPI and Ramón y Cajal programs, respectively.