

Advanced oxidation process to improve the mineralization of olive oil mill effluents

Özkan Görmez, Erdal Yabalak, Fatma Kıрма, Belgin Gözmen Sönmez*

Mersin University, Department of Chemistry, Arts and Science Faculty, Mersin, Turkey
 Email: bgozmen@yahoo.com and bgozmen@mersin.edu.tr

Abstract

Turkey is one of the major olive oil producing countries in the Mediterranean region and this product is important in the economy. However, Olive mill wastewater (OMW) which is formed as waste of olive mill, causes considerable damage to the environment. OMW cannot be purified as enough as desired by conventional and biological treatments due to high organic matter content. For this reason, more effective methods are needed. In advanced oxidation techniques (AOTs) radicals are believed to be the major reactants responsible for organic matter oxidation. Hydroxyl radicals ($\bullet\text{OH}$) react rapidly with many organic and inorganic chemicals in water without being selective. Recently, the sulfate radicals formed after the catalytic activation of persulfate also react with organic pollutants without being selective. In this work, electro/Fe/persulfate(PS) oxidation method which belongs to advanced oxidation techniques was used. Optimum conditions (oxidant and FeII dosage, current, pH) of parameters that are affecting OMW treatment were determined by taking the advantage of response surface methodology (RSM) which is known as a statistical and mathematical modelling technique. This method has been commonly used to characterize and optimize the experimental factors. The effectiveness of the degradation method is measured as removal percentage of chemical oxygen demand (COD).

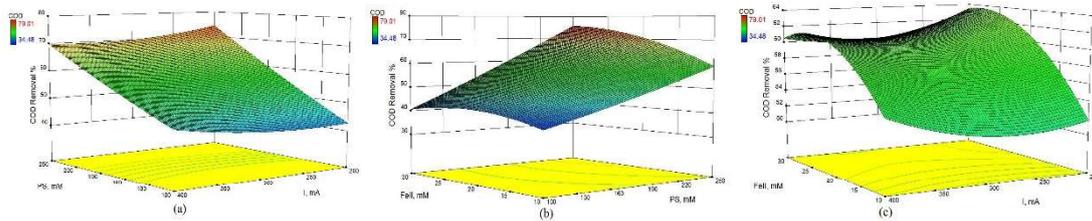


Figure 1. Effect of (a) oxidant (PS) concentration and amount of current (I), (b) FeII concentration and oxidant (PS) concentration, (c) FeII concentration and amount of current (I), on COD removal rates of OMW.

Figure 1 shows the effect of each experimental parameters on the degradation of OMW. It can be clearly seen from Figure 1 (a), (b) and (c) that maximum and minimum COD removal were obtained as 79.01% and 34.48% respectively.

Keywords: Olive oil mill, Optimization method, RSM, Mineralization, Persulfate.

ACKNOWLEDGEMENT

The authors thank the Research Fund of Mersin University in Turkey with Project Number: 2017-1-AP3-2243.

(*) Corresponding author