ABSTRACT

Water and wastewater treatment has become critical for the remaining development of the current society. The gradually strict standards for effluent discharge worldwide have made the development of advanced wastewater treatment technologies necessary.

In the present study, the performance of two different techniques from advanced oxidation process for hydroxyl radical generation are investigated. The photo catalytic UV/ TiO_2 and photo Fenton UV/Fe^{+2}/ H_2O_2 process were used for treatment of wastewater pollutant with antibiotic tetracycline on a laboratory scale.

The effect of operational parameter for photo Fenton process such as initial concentration of tetracycline antibiotic (10-50 ppm), pH value of polluted water (3-10), Irradiation time (30-90) min, temperature (25- 70) °C, the dosage of hydrogen peroxide (25 to 100 ppm), the dosage of ferrous solphate (5-20 ppm) on the degradation rate have been studied. And for photo catalytic process were initial concentration of tetracycline antibiotic (10-50 ppm), pH value of polluted water (3-10), Irradiation time (30-90) min, temperature (25-70) °C, and the catalyst (TiO_2) dosage varied from (25 to 100) ppm were used.

Minitab software by response surface method (RSM)- Box-Bingham has been used to design the experiments and to discover the optimum conditions for determining a high efficiency of eliminating the contaminated from the wastewater pollutant. This is followed by an analysis of the results using Portable Statgraphics Centurion statistical software.

The model has been determined experimentally by conducting laboratory experiments and theoretically by using the Artificial Neural Network technique by (MATLAB R2017b) program. The results have showed that the degradation rate has been 91.4% of the tetracycline antibiotic in UV/Fe^{+2}/ H_2O_2 system with Optimum condition (irradiation Time, pH value, initial Concentration of tetracycline, [H_2O_2], [Fe^{+2}], and the temperature have been (90 min, 3, 15.656 ppm, 86.363 ppm, 20 ppm, 25°C). while for system UV/ TiO2 the removal efficiency has been 88.7%, and Optimum condition (irradiation time, pH value, initial Concentration of tetracycline, [TiO_2], and the temperature (76 min, 10, 18.08ppm, 100ppm, 70°C) respectively.