Comparative study of Diazinon removal efficiency from aquatic environments using electro–Fenton and electro– persulfate processes

Abstract

Background and Aim: Diazinon is one of the most important pesticides widely used in agriculture. Because these compounds are resistant to biodegradation, their entry into water resources has become a serious environmental problem. Therefore, the aim of this study was to investigate the applicability of electrofenone and electro-sulfate in the removal of diazinon from aqueous media.

Materials and Methods: In this study, the removal efficiency of diazinon in electrofenton and electropersulfate processes was investigated separately in a 1 liter Plexiglas reactor. The studied variables were pH, current density and reaction time and persulfate in electropersulfate process and pH, hydrogen peroxide concentration, current density and reaction time were examined in electrofenton process.

Results: The results showed that the quadratic model was suitable for the obtained data (P_{value} = 0.0001) and in optimal conditions of electrophanton process performance (pH = 3, hydrogen peroxide concentration 0.279 mmol / l, flow density 04 5.5 mA / cm 2, reaction time 47.09 min) equal to 100% and electropress sulfate process performance (pH = 3, persulfate concentration 80 mmol / l, current density 7.82 mA / cm 2 and time The 60-minute reaction was determined to be 98.59%. Regression analysis with high correlation coefficient was obtained in the electrofenton process (R2 = 0.9980) and the F_{value} value of the model was 765.56 and in the electropersulfate process (R2 = 0.9869) and the F_{value} value of the model was 113.22 meaning the adequacy of the model. . The validation of the model was confirmed using residual graphical analysis and diagnostic charts.

Conclusion: The results indicate that advanced oxidation methods such as electrofenton and electropersulfate can be an alternative process for chemical and biological treatment processes and Box-Benken design is a useful tool to optimize the process conditions.

Keywords: Diazinon, Electrofenton, Electropersulfate, Iron electrode