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CATALYTIC OZONATION ON IRON-LOADED RICE HUSK ASH/PEANUT SHELL ASH FOR THE REMOVAL OF ERYTHROMYCIN IN WATER

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Abstract

This study investigates the mechanism and efficiency of catalytic ozonation process on iron-loaded rice husk ash (Fe-RHA) and Peanut shell ash (Fe-PSA) for the Erythromycin removal from aqueous solution. In the current study, the COD removal efficiency of Erythromycin was studied in simple ozonation and catalytic ozonation using Fe-RHA/O₃ and Fe-PSA/O₃ processes. The operational parameters such as pH effect, catalyst dose, and reuse performance of the catalyst were studied. Moreover, the hydroxyl radical scavenger effect and superoxide ion formation were investigated to understand the mechanism of processes. The results revealed the maximum COD removal efficiency of 91 % at pH 4.0 using Fe-RHA catalyst at an optimum dose = 0.8 g, temperature = 25 °C and initial concentration of 50 ppm. While Fe-PSA/O₃ process show high removal efficiency of 83 % at pH = 8.0 (near wastewater pH, 6.0-9.0) at optimum dose = 0.8 g, temperature = 25 °C and initial concentration of 50 ppm. The TBA effect and Superoxide ion formation studies reveal that Fe-PSA operates as an advanced oxidation catalyst as compared with Fe-RHA at pH 8.0. Both the catalysts showed reasonable re-use performance with more than 70 % removal efficiency even after the third cyclic run. Hence, it is concluded that Fe-PSA shows excellent performance as compared with ozonation alone and Fe-RHA/O₃ process at wastewater pH.

Key words: catalytic ozonation, erythromycin, peanut shell ash, rice husk ash, superoxide ion

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