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Title: Degradation of an anti-inflammatory drug using magnesium ferrite in the Fenton oxidation process

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Abstract:The growth of the global economy is exponentially increasing. The rapid growth of urbanization and industrialization releases a huge volume of wastewater that imposes adverse effects on human health[1]. The presence of organic compounds such as painkillers in water is a threat to public health; because many of them are poisonous; endocrine disruptor and mutagenic for humans and animals[2]. Fenton advanced oxidation process is one of the most cost-effective methods for wastewater treatment[3]. In this research, the Fenton oxidation process using a ferrite-based catalyst, i.e. magnesium ferrite ($MgFe_2O_4$), has been used to remove diclofenac sodium (DS) from an aqueous solution. DS is a nonsteroidal anti-inflammatory drug (NSAID) used to block substances that cause inflammation and pain.

The effect of four reaction parameters including the amount of the catalyst, the amount of hydrogen peroxide oxidant and pH on the drug removal was studied. In the optimal conditions, the removal efficiency of the DS with a concentration of 50 mg/l reached more than 90% at 33 min; with 15 mg of the catalyst, 1.5 mL of H_2O_2 at pH 7. The results show that the magnetically separable catalyst can be used efficiently in the Fenton process for the treatment of pharmaceutical wastewaters.

Keywords: Wastewater treatment, catalyst, Fenton, magnesium ferrite

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