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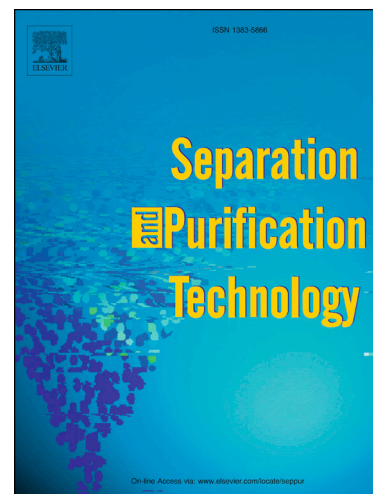
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# Insight into heterogeneous Fenton-sonophotocatalytic degradation of nitrobenzene using metal oxychlorides

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## Abstract

Heterogeneous Fenton degradation of nitrobenzene (NB, 20 ppm) was investigated at room temperature and pH=7 using 0.1 g L<sup>-1</sup> of FeOCl (I), CuOCl (II), ZnOCl (III) and BiOCl (IV) metal oxychlorides catalysts in presence of ultrasonic (US, 20 kHz), ultraviolet (UV, 6W,  $\lambda = 254$  nm) and UV/US double irradiation with H<sub>2</sub>O<sub>2</sub> (5 mM) as an oxidant. The results showed that the order of the investigated systems with regard to their degradation performance was US/UV > UV > US, with I > II > IV > III but with mineralization extents of 46%, 41%, 35% and 33 %, respectively under dual irradiation for 60 minutes. The synergistic effect correlates with the values of band gap of used oxychlorides and plays a vital role in enhancing the degradation performance of the dual system through generated reactive radicals ( $\bullet\text{OH}$  &  $\text{O}_2^{\bullet-}$ ) besides photo-born holes ( $\text{h}^+$ ) and electrons ( $\text{e}^-$ ). Experiments conducted in presence of different scavengers indicated that ( $\bullet\text{OH}$ ) and ( $\text{h}^+$ ) play a major and more important role than that of ( $\text{O}_2^{\bullet-}$ ) in the degradation process. Scavenging the generated electrons indicated that they act as degradation inhibitors. Band gap values dictated the variable activities shown by different metal oxychlorides.

**Keywords:** Nitrobenzene, Degradation, Synergy, Ultraviolet, Ultrasonic, Oxychlorides

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