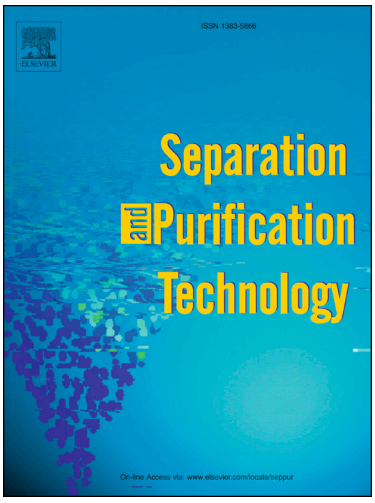

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Insight into heterogeneous Fenton-sonophotocatalytic degradation of nitrobenzene using metal oxychlorides

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Abstract

Heterogeneous Fenton degradation of nitrobenzene (NB, 20 ppm) was investigated at room temperature and pH=7 using 0.1gL^{-1} of FeOCl (I), CuOCl (II), ZnOCl (III) and BiOCl (IV) metal oxychlorides catalysts in presence of ultrasonic (US, 20 kHz), ultraviolet (UV, 6W, λ = 254 nm) and UV/US double irradiation with H_2O_2 (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 (•OH & $O_2^{\bullet -}$) besides photo-born holes (h^+) and electrons (e^-). Experiments conducted in presence of different scavengers indicated that (•OH) and (h^+**)** play a major and more important role than that of ($O_2^{\bullet -}$**)** 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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