OC-4: Sono-catalytic Degradation of 4-Chlorophenol by Sono-synthesized Nano-magnet ($La_{0.7}Sr_{0.3}MnO_3$)

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Recently, the researcher was focused on the use of ultrasound and catalyst to increase the oxidation of organic compounds under milder conditions compared to the non-catalyzed processes (Mishra and Gogate, 2012, He et al., 2011). Among different catalysts, prtovskite materials (ABO_3) such as Sr-doped $LaMnO_3$ is particularly of interest due to its proper magnetic (Sakthipandi et al., 2011, Zandalazini et al., 2011) electric, catalytic properties, and non-toxicity (Daengsakul et al., 2009). In this study, $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) nanoparticles with a perovskite structure were prepared by a combination of ultrasound and copercipitation method. The average particle size was about 70 nm after annealing at 900^{o}C for 1 hour. The synthesized catalyst was characterized by X-ray diffraction, transmission electron microscopy, Fourier transform infrared spectroscopy. The catalytic performance of the catalyst was evaluated for the degradation of 4-chlorophenol in the presence and in the absence of ultrasound. The degradation has been studied at different temperatures, pH, catalyst dosage, and initial concentration of 4-chlorophenol. The results have shown that the degradation efficiency was higher in the presence of ultrasound than its absence under the mild conditions. More than 88% decrease in the concentration and 85% decrease in the TOC for 4-chlorophenol could be achieved in a short time of sonication with respect to the conventional method. This behaviour could be attributed to the cavitation process and the following high mass transfer on the catalyst with high surface area which facilitate the removal of pollutant from aqueous solution. In addition, the results indicated that the catalyst without recalcination can be successfully used up to five consecutive cycles without any significant loss in activity in the presence and in the absence of ultrasound.

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