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Zif-67 Drivate Nanocomposite as Efficient Peroxymonosulfate Activator for Degradation of Sulfamethoxazole

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The importance of clean water to human health necessitates the development of cutting-edge techniques for the elimination of all organic contaminants[2, 3]. One of the most promising strategies for getting rid of resistant organic pollutants is the employment of persulfate-based advanced oxidation processes (AOPs), which are commonly employed in the degradation of organic pollutants[3, 4]. In order to promote catalytic activity and activate peroxymonosulfate (PMS) to degradation sulfamethoxazole (SMZ), N-doped porous carbon (Co_3O_4@N-C) materials were prepared by one-pot pyrolysis of a ZIF-67 powder under N_2 atmosphere, followed by oxidation under air atmosphere (200 °C). Co_3O_4@N-C were synthesized using 2-methylimidazole as a nitrogen source and a competitive ligand, which not only affects nucleation and development of the crystal but also stimulates the creation of active Co-N sites. Co_3O_4@N-C nano-architecture is a non-toxic, efficient, and stable PMS activator with a large specific surface area (250 m^2 g^{-1}). The presence of Co_3O_4@N-C was studied in relation to a number of operational factors, such as SMZ concentration, catalyst dose, temperature, and pH. Complete degradation of SMZ (50 M, 100 mL) was accomplished in 15 minutes using the Co_3O_4@N-C composite, which shown improved effectiveness in activating PMS over a broad range of pH (2-10) and varied temperatures. The catalyst was observed to retain its catalytic activity for at least 5 cycles.

Keywords: Degradation, Sulfamethoxazole, ZIF-67, Co_3O_4, Peroxymonosulfate.

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