



Decolorization

Synthesis, characterization and application of Co/Co₃O₄ nanocomposites as an effective photocatalyst for discoloration of organic dye contaminants in wastewater and antibacterial properties

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JOURNAL OF MOLECULAR LIQUIDS

Volume

337

Article Number

116405

DOI

10.1016/j.molliq.2021.116405

Published

SEP 1 2021

Early Access

MAY 2021

Indexed

2021-08-28

Document Type

Article

Abstract

Keywords Contamination of surface water with dye chemical compounds and/or biological substances, even in small amounts, can affect the health of humans and other organisms. The photocatalytic oxidation process has been considered as a commercial technique to remove environmental pollutants. In the current study, we reported the synthesis of Co/Co₃O₄ nanocomposites investigated for their photocatalytic and antimicrobial activities. The affecting parameters (various surfactants and calcination) on the synthesis process were investigated. The synthesis of Co/Co₃O₄ nanocomposites was confirmed via methodical characterization such as SEM, FT-IR, XRD, VSM, EDX, CV and DRS investigations. Well diffusion assay and bacterial cell viability assay were executed against clinical pathogens to prepare the antibacterial activity of synthesized Co/Co₃O₄ nanocomposites. Also, the photocatalytic activity of nano-catalysts was concluded against the organic colors (acid blue 92 and acid red 151). Cobalt oxide nanoparticles (NPs) synthesized in the presence of SDBS as an anionic template showed the



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highest decolorization of 93% over acid red 151 after 120 min of illumination. The results showed a minimum bacterial inhibitory concentration for bacteria *P. aeruginosa*, and *B. subtilis* is about 31.25 $\mu\text{g/mL}$ and 125 $\mu\text{g/mL}$, respectively. The Co/Co₃O₄ nanocomposites exhibited vigorous antibacterial activity against gram-negative microorganisms mentioned like *Pseudomonas aeruginosa*. (C) 2021 Elsevier B.V. All rights reserved.

Author Keywords

[Antibacterial activity](#)[Photocatalytic activity](#)[Dye degradation](#)[Magnetic nanocomposites](#)

Keywords Plus

[HYDROTHERMAL SYNTHESIS](#)[NANOPARTICLES](#)[NANOCRYSTALS](#)[SALCOHOL](#)