

Photocatalytic Degradation of Naproxen in Water under Solar Irradiation over NiFe₂O₄ Nanoparticle System

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Abstract : To optimize water purification and wastewater treatment by heterogeneous photocatalysis, we used NiFe₂O₄ as a catalyst and solar irradiation as a source of energy. In this concept, an organic substance present in many industrial effluents was chosen: naproxen ((S)-6-methoxy- α -methyl-2-naphthaleneacetic acid or 2-(6-methoxynaphthalenyl) propanoic), a non-steroidal anti-inflammatory drug. The main objective of this study is to degrade naproxen by an iron and nickel catalyst, the degradation of this organic pollutant by nickel ferrite has been studied in a heterogeneous aqueous medium, with the study of the various factors influencing photocatalysis such as the concentration of matter and the acidity of the medium. The photocatalytic activity was followed by HPLC-UV and UV-Vis spectroscopy. A first-order kinetic model appropriately fitted the experimental data. The degradation of naproxen was also studied in the presence of H₂O₂ as well as in an aqueous solution. The new hetero-system NiFe₂O₄/oxalic acid is also discussed. The fastest naproxen degradation was obtained with NiFe₂O₄/H₂O₂. In a first-place, we detailed the characteristics of the material NiFe₂O₄, which was synthesized by the sol-gel methods, using various analytical techniques: visible UV spectrophotometry, X-ray diffraction, FTIR, cyclic voltammetry, luminescent discharge optical emission spectroscopy.

Keywords : naproxen, nickelate, photocatalysis, oxalic acid

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