

## Photocatalytic Degradation of Naproxen in Water under Solar Irradiation over $\text{NiFe}_2\text{O}_4$ Nanoparticle System

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**Abstract :** To optimize water purification and wastewater treatment by heterogeneous photocatalysis, we used  $\text{NiFe}_2\text{O}_4$  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- $\alpha$ -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  $\text{H}_2\text{O}_2$  as well as in an aqueous solution. The new hetero-system  $\text{NiFe}_2\text{O}_4$ /oxalic acid is also discussed. The fastest naproxen degradation was obtained with  $\text{NiFe}_2\text{O}_4/\text{H}_2\text{O}_2$ . In a first-place, we detailed the characteristics of the material  $\text{NiFe}_2\text{O}_4$ , 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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