ISGC 2022

N°828 / OC
TOPIC(s) : Chemical engineering / Alternative technologies

Synthesis of a novel ZnAl2O4/CuS nanocomposite and its characterization for photocatalytic degradation of acid red 1 under UV illumination

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PURPOSE OF THE ABSTRACT

Water pollution is a major global challenge which needs an effective solution to solve this problem like photocatalysis using ZnAl2O4/CuS catalyst. ZnAl2O4/CuS nanocomposite micro-flakes were prepared using a hydrothermal method. The as-prepared catalyst was investigated using X-ray diffraction, Fourier transform infrared spectra, scanning electron microscopy and UV?vis diffusive reflectance spectroscopy. X-ray diffraction analysis revealed the presence of CuS phase as a major phase (70%) in the prepared catalyst. The results indicated that the combination of ZnAl2O4 with CuS ameliorate potentially its photocatalytic efficiency during the degradation of acid red 1 (95% within 150 min) under ultraviolet illumination compared to ZnAl2O4 or CuS alone. The effect of catalyst mass, dye concentration and pH solution were investigated using ZnAl2O4/CuS. On the other hand, the reuse tests of ZnAl2O4/CuS displayed high-performance stability after five cycles. Additionally, the activity of hydroxyl radicals (OH.) and superoxide ions (O2·-) as the spices responsible for AR1 dye degradation was confirmed by the free radicals scavenging tests.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
Photocatalysis | Nanoparticles | Dyes | UV irradiation

BIBLIOGRAPHY