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# Study of the Adsorption of Rose Bengal on a Hybrid Material based on Oxide and Photocatalytic Test

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## ABSTRACT

The present work presents the study of the photocatalytic activity of  $\text{CuAl}_2\text{O}_4$  and  $\text{CuAl}_2\text{O}_4/\text{K}$  for the elimination of an acid dye chosen as a model; in this case the Rose Bengale (RB). All the nanoparticles prepared during this study were characterized by X-ray diffraction, infrared spectroscopy. The study of adsorption kinetics has shown that it is very fast from the start of the process (5 min) for kaolin and  $\text{CuAl}_2\text{O}_4$ , equilibrium is quickly reached for kaolin) with a retention rate of 40% for an adsorbed quantity of 8.02 mg/g. On the other hand, for the  $\text{CuAl}_2\text{O}_4$  catalyst, the evolution continues to reach equilibrium at 120 min, with a retention rate of 80.44% and an adsorbed quantity equal to 16.087 mg/g. for  $\text{CuAl}_2\text{O}_4/\text{K}$  equilibrium is quickly reached with a retention rate of 3.05% for an adsorbed quantity of only 0.62 mg/g.

**Keywords:** Spinel supported, adsorption, Photocatalysis, Rose Bengal.

## 1 Introduction

Environmental protection has become a major economic and political and even social issue, especially when it comes to water and air. Many industries such as chemicals, petrochemicals, food processing, textiles, paper mills, tanneries, etc., produce very dangerous effluents such as dyes [1,2]. These environmental pollutants pose serious toxic risks to microorganisms and represent a threat to aquatic life and human beings [3]. Its degradation is essential and indispensable for ecological protection. Recently, photocatalytic degradation of dyes through AOP under UV irradiation on semiconductors has received much attention mainly to its capacity to degrade numbers recalcitrant dyes [4].

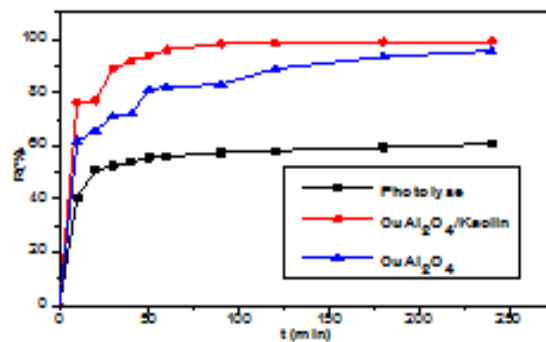
## 2 Experimental

Nanosized spinel  $\text{CuAl}_2\text{O}_4$  was successfully supported on kaolin, natural support; using impregnation method; and the pure spinel was also prepared by the sol-gel method, and also study of the effectiveness of catalysts  $\text{CuAl}_2\text{O}_4$  and  $\text{CuAl}_2\text{O}_4/\text{kaolin}$  for the elimination of rose Bengal.

## 3 Results and Discussion

The degradation is very rapid during the first minutes for all the photocatalysts, for  $\text{CuAl}_2\text{O}_4/\text{Kaolin}$  reaches maximum yield of 98.53 % after 60 min, while for  $\text{CuAl}_2\text{O}_4$  the elimination rate reaches 89 % after 180 min. for photolysis it is stabilized after 60min of irradiation at 50 %.





**Figure1:** photodegradation of RB

#### 4 Conclusion

For photocatalytic tests, CuAl<sub>2</sub>O<sub>4</sub>/K showed remarkable efficiency for the degradation of a solution of Rose Bengal, under solar irradiation. Indeed, the elimination of RB was almost total (98.53%) after 60 min of exposure to solar radiation, while for mass spinel CuAl<sub>2</sub>O<sub>4</sub>, the elimination rate reached 89% after 180 min.

#### References

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