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PHOTODEGRADATION OF PHENOL WITH HDL OF Mg-Al AND Zn-Al

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Resumen

Hoy en día la escase de agua es uno de los principales problemas que enfrenta la humanidad debido a la sobreexplotación demográfica y mal uso entre otras causas, debido a esto proceso existentes y nuevos han buscado mejorar el tratamiento de aguas residuales para su reciclaje, en este tenor la fotodegradacion catalítica es uno de los proceso mas prometedores, siendo el TiO2, el más utilizado, sin embargo este tiene deficiencias, entre ellas la rápida recombinación del par electron-hueco, debido a esto el uso de nuevos materiales se ha vuelto primordial entre ellos se encuentran los HDL.

Palabras clave: HDL, banda prohibida, fotodegradación, Fenol y área superficial

Abstract

Nowadays water scarcity is one of the main problems facing humanity due to demographic overexploitation and misuse among other causes, due to this existing and new processes have sought to improve the treatment of wastewater for recycling, in this According to catalytic photodegradation, it is one of the most promising processes, with TiO2 being the most used, however it has deficiencies, including the rapid recombination of the electron-hollow pair, due to this the use of new materials has become paramount among They meet the HDL.

Keywords: *HDL, band gap, Photodegradation, Phenol, Surface area*

Por medio del presente confirmo que estoy de acuerdo en someter el trabajo para su posible publicación en Topics in catalysis en caso de ser seleccionado.

1. Introducción

Nowadays, the need to preserve the environment has led to the search for new methods for the efficient elimination of chemical compounds that alter the stability of our natural resources. Within these resources, water is first and foremost a precious and scarce commodity; since water pollution is a fact of great importance because pollutants can accumulate and be transported both by surface and groundwater for which the main source of damage is municipal and industrial wastewater. Wastewater are those that contain some organic or inorganic compound that change their color, smell, taste and other physical and chemical characteristics. This wastewater originates either by using them in various processes in the industry or simply by domestic use. The treatment of liquid waste can be a very complex problem due to the great variety of chemicals and their levels of concentration, but thanks to research conducted on the effects of certain pollutants that cause negative impacts to the environment and, consequently, to the human health new technologies have been generated in order to solve this problem, among which are coagulation, sedimentation, flocculation, filtration and Advanced Oxidation processes (POA's); within which the photocatalysis treatment has an advantage over commonly used techniques since it is a reaction that involves the combination of photochemistry with catalysis and which is carried out at environmental conditions. This process generally uses semiconductors, being the TiO the most used, however in the last few years materials have been used that although not being semiconductor materials present photocatalytic activity, within these we can mention hydrotalcites, hydrocalumites, double-layered hydroxides, etc, have shown good activity in the degradation of toxic recalcitrant molecules.

2. Experimental

This work focuses on the study of the catalytic photodegradation of phenol with HDL, and were synthesized two materials by coprecipited method, the precursors were $Mg(NO_3)_2$, $Al(NO_3)_3$, $Zn(NO_3)_2$, Sigma Aldrich, reactive grade, subsequently they were thermally treated at 300ºC, then they were characterized by the following techniques: Determination of the specific area, X-ray diffraction, UV-vis spectroscopy by determination of band gap value, and FTIR spectroscopi, the reaction of photodegradation of phenol was follow by UV-vis spectroscopy and TOC determination.

3. Results

The determination of surface area of the HDL shows that the HDL Mg-Al has 308 m^2/g and the HDL of Zn-Al has an area of 80 m^2/g, and the materials show a band gap value of 4.4 and 3.17 respectively, it can be seen in the Table 1. As observed the material Zn-Al was the most active because it degrades 95% of the molecule while the HDL Mg-Al only degrades 30%, this is due to the value of Eg presented by the materials, it should be noted that the Zn-Al material presents a similar value to that of TiO_2.

Table 1. Surface area, band gap value of HDL

Sample	Surface area m^2/g	Band gap eV
Mg-Al	300	4.4
Zn-Al	80	3.17

We can see in the Figure 1 the the graph of relative degradation in this we can see that the HDL of Zn-Al was the most active.

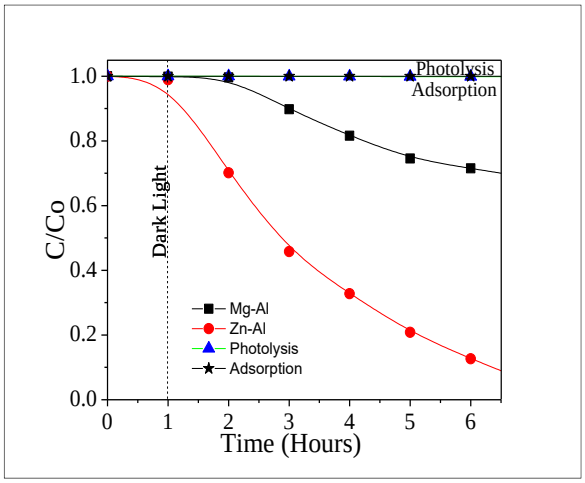

Fig. 1. Graphic of relative degradation

4. Conclusions

The HDL of Zn-Al presents greater crystallinity, and an Eg value similar to the TiO_2 anatase phase.

The specific area was not decisive in this reaction, because even when the Mg-Al presents an area of 300m^2/g it did not have the same efficiency in the degradation of Phenol.

The physicochemical properties of the HDL of Zn-Al provide greater activity in the degradation of Phenol.

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