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A novel and facile route for CuMn-MgAl mixed oxides catalysts to catalytic degradation of violet crystal in water

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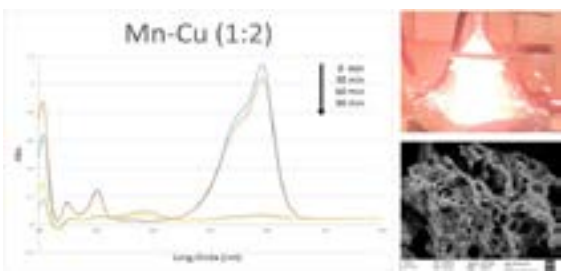
Currently the textile industry, educational centers and laboratories have a pollution problem due to the irresponsible discharge of dye wastewater into the waterways, which is generating a great impact on the quality and aesthetics of water resources. Recently, the use of mixed oxides has gained a great deal of interest in the advanced oxidation process (AOP) for the treatment of waste water of dyes due to its good degradation efficiency, low toxicity and physical and chemical properties. However, still using extreme conditions to remove contaminants, limits the use of these techniques for future industrial use. In this work the degradation of wastewater containing 50 mg/L violet crystal (VC) by air oxidation in a continuous flow trickle-bed reactor over Cu_xMn_yMgAl catalyst obtained by auto combustion method were studied. It was found the decolorization efficiency and the chemical oxygen demand (COD) removal of VC reached above 92% and 100%, respectively, within 60 min at room temperature and atmospheric pressure. The total organic carbon (TOC) decreased 76.1%. The obtained samples were characterized by powder X-ray diffraction, fourier transform infrared, atomic absorption spectrometry, scanning electron microscope, N_2 adsorption and temperature programmed reduction with H_2. The results show that the activity on violet crystal oxidation was significantly influenced by the preparation method of the mixed oxides. The auto combustion method provides better catalysts because the redox properties improve and the specific area increase. The most effective catalyst was Cu_2Mn_1MgAl, with 100% of decolorization in 1 hour of the reaction. A real textile wastewater was also successfully treated with this catalyst. The monitoring by CG-MS allows recognizing the mineralization of the VC to CO_2, H_2O and compounds with shorter chains less toxic than the initial dye.



Recent Publications

1. Camilo Perdomo, Alejandro Pérez, Rafael Molina and Sonia Moreno (2016) Storage capacity and oxygen mobility in mixed oxides from transition metals promoted by cerium. Applied Surface Science. 383:42-48.

2. Tomas Ramirez Reina, Cristina Megias-Sayago, Alejandro Pérez Flórez, Svetlana Ivanova, Miguel Angel Centeno and José Antonio Odriozola (2015) H_2 oxidation as criterion for PrOx catalyst selection: Examples based on Au–CoOx-supported systems. Journal of Catalysis. 326:161-171.

3. H Laguna, A Perez, M A Centeno and J A Odriozola (2015) Synergy between gold and oxygen vacancies in gold supported on Zr-doped ceria catalysts for the CO oxidation. Applied Catalysis B. 176:385-395.

4. Alejandro Perez, Mario Montes, Rafael Molina and Sonia Moreno (2014) Modified clays as catalysts for the catalytic oxidation of ethanol. Applied Clay Science 95:18-24.

Biography

Alejandro Perez is currently working at the Pontificia Universidad Javeriana in Bogota, Colombia as a Teacher and Researcher in the line of environmental technology and materials, where they have developed a wide range of solids for water treatment. He has had the opportunity to learn and deepen in spectroscopic, texture and microscopic techniques for the characterization of materials. Also, in chromatographic techniques for monitoring the reactions evaluated.

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