STUDY ON SELECTIVITY OF HYDROGENOLYSIS/REDUCTIVE HYDROGENATION PROCESSES OF SUGARCANE BAGASSE UNDER SUPERCRITICAL STATE CATALYZED BY STRUCTURED METAL OXIDES

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The development of strategies for selective catalytic depolymerization and deoxygenation of lignocellulosic biomass is a challenge due to its complex structure, especially due to the recalcitrant behavior of lignin in relation to the hydrolysis of its phenolic ethers. The proposed research focuses on the synthesis and characterization of solid structured metal oxides catalysts derived from hydrotalcites with a formula of $Mg_6Al_2(CO_3)(OH)_{16}.4(H_2O)$ and doped with different transition elements (Cu, Zn, Fe, Nb, Ni, Zn, Mo, Ti, Zr), and lanthanides (La and Lu) for the deconstruction of lignocellulosic material by means of conventional catalytic hydrogenation and hydrogenolysis using as hydrogen source (methanol or ethanol) through their respective reforms in their supercritical state (250 to 300ºC and pressures above 62 atm). Using sugarcane bagasse as a substrate, we expect obtain lignin phenolic monomer units as well as their derivatives with different levels of saturation, including alcohols derived from cellulose and hemicellulose for use as fuel or for chemical intermediates.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

Among the metals to be incorporated into the hydrotalcite structure, copper is what stands out most in catalyzing the reform of methanol and ethanol for hydrogen production. The incorporation of secondary metals as modifiers (Zn, Fe, Nb, Ni, Zn, Mo, Ti, Zr) is being investigated. An example of the synergistic effect obtained with hydrotalcites changes is that these modified material only with Ni in partial replacement of Mg does not reform the alcohols at the experimental conditions, but its incorporation in combination with Cu increases by 10% the volume of hydrogen produced. In parallel, we are studying the hydrogenation process of various phenolic compounds similar to the possible lignin fragments to understanding the effects on the hydrogenolysis process of this class of organic compounds.

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