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ÁREA: **Síntese e caracterização de catalisadores e adsorventes**

Synthesis and characterization of NiAlMg mixed oxide catalysts aimed at application in the deoxygenation reactions of triglycerides

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The production of advanced fuels via catalytic deoxygenation from renewable sources, such as vegetable oils, is essential for the transition of the energy matrix [1]. The use of catalysts in this process aims for high efficiency in converting vegetable oils into advanced fuels, such as green diesel and sustainable aviation kerosene. Depending on its composition, the catalyst can exhibit properties that enhance deoxygenation, resulting in products with higher energy value and lower environmental impact [2]. This work considers the synthesis and characterization of mixed NiAlMgOx catalysts derived from layered double hydroxides (LDH), varying the Mg/Al ratio. The precursors with the composition $Ni_{0,2}Mg_YAl_{(0,8-Y)}(OH)_2(TA)_{(0,8-Y)/2}\cdot mH_2O$ (with TA = terephthalic acid, Y = 0,1 and 0,2) were synthesized by the slow addition of aqueous solutions of metal nitrates and terephthalic acid in NaOH (1 mol/L) to deionized water (65 °C), under stirring and constant pH. The precipitate was aged under stirring for 4 hours at 65 °C and subsequently at room temperature for 16 hours. After filtration and washing, the material was dried in an oven at 100 °C (overnight) and calcined at 600 °C for 3 hours with a heating rate of 10 °C min^{-1}, forming the mixed oxide catalysts $NiAlMg_{(0,1)}$ and $NiAlMg_{(0,2)}$. The characterization of the materials was performed using X-ray diffraction (XRD), Thermogravimetric analysis (TGA), Energy-dispersive X-ray spectroscopy (EDX), Nitrogen physisorption at -196 °C, Hydrogen temperature-programmed reduction (H_2-TPR), and Ammonia temperature-programmed desorption (NH_3-TPD). The XRD patterns confirmed the formation of the NiAlMg layered double hydroxides (LDHs) and the mixed oxides (with the dominant phase being $NiAl_2O_4$) after calcination. TGA established 550 °C as the minimum calcination temperature required to completely decompose the LDH structure. The composition of the materials (EDX) shows the proportionality between the fractions (Y_i), the differences in aluminum content across the formulations, and a constant nickel content. The catalysts are of the mesoporous type, with $S_{NiAlMg(0,1)} = 258\ m^2/g$, $S_{NiAlMg(0,2)} = 275\ m^2/g$, $Vp\text{-}_{NiAlMg(0,1)} = 0,8\ cm^3/g$, and $Vp\text{-}_{NiAlMg(0,2)} = 1,0\ cm^3/g$. The increase in magnesium content resulted in a slight decrease in nickel reducibility ($V_{TPR\text{-}\ NiAlMg(0,1)} = 34,5$ mL H_2/g and $V_{TPR\text{-}\ NiAlMg(0,2)} = 33,8$ mL H_2/g). NH_3-TPD analysis indicated a slight decrease in the acidity of the catalysts with increasing magnesium content: 9,56 µmol NH_3/m^2 (Y=0,1) and 9,22 µmol NH_3/m^2 (Y=0,2), primarily attributed to the reduction of acidic sites on the alumina. Given the results obtained, the proposed catalysts exhibit promising characteristics for evaluating the effect of acidity in NiAlMg oxides on the catalytic deoxygenation of vegetable oils aimed at the production of advanced fuels

Keywords: Layered double hydroxides (LDH), Mixed oxides, Catalytic deoxygenation.

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