Preparation and characterization of porous magnesium oxides using chitosan as precursor

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Magnesium oxide is one of the most extensively used metal oxides in various catalytic processes due to the unique basic character of its surface. This oxide is usually prepared by thermal treatment of magnesium hydroxide or carbonate [1]. The objective of this study was to prepare porous magnesium oxide using a metal-chitosan complexation method, developed by our group [2]. The method consists of obtaining a hybrid compound of magnesium hydroxide and the biopolymer chitosan. Through the polymer elimination by thermal treatment a porous MgO is obtained. The surface properties of the samples obtained were compared to those of a commercial magnesium oxide. The prepared samples were characterized by infrared spectroscopy, thermogravimetric analysis, N_2 adsorption/desorption isotherms, X-ray diffraction, scanning electron microscopy and temperature programmed desorption of CO_2 measurements.

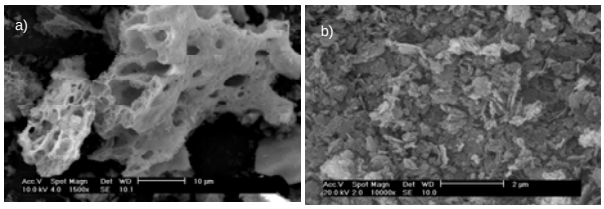

Figure 1. SEM images for the samples: (a) prepared MgO and (b) commercial MgO.

The synthesis method proposed herein, via magnesium-chitosan complexation, showed promising results in the preparation of MgO. Samples were obtained with important properties for catalytic applications, such as high specific surface area and pore volume values ($87.8 m^2 g^{-1}$ and $0.339 cm^3 g^{-1}$, respectively), compared to the commercial magnesium oxide ($14.2 m^2 g^{-1}$ and $0.024 cm^3 g^{-1}$, respectively). Besides, the TPD-CO_2 results revealed the presence of medium-strength basic sites on the surface of prepared samples, which could be interesting to perform reactions that need moderate basicity since base strength is not a single factor for determining the catalytic activity. The SEM images, shown in Figure 1, reveal that the prepared MgO samples has a porous aspect, consistent with the higher values for specific surface area and pore volume presented, in contrast with the MgO commercial sample morphology that presents a compact appearance. We believe that these samples have an excellent potential for catalytic applications due to its textural properties.

Keywords: Magnesium oxide, chitosan, porous materials,

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