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ÁREA: Síntese e caracterização de catalisadores e adsorventes

Optimization of SBA-15 silica property parameters to enable scaling.

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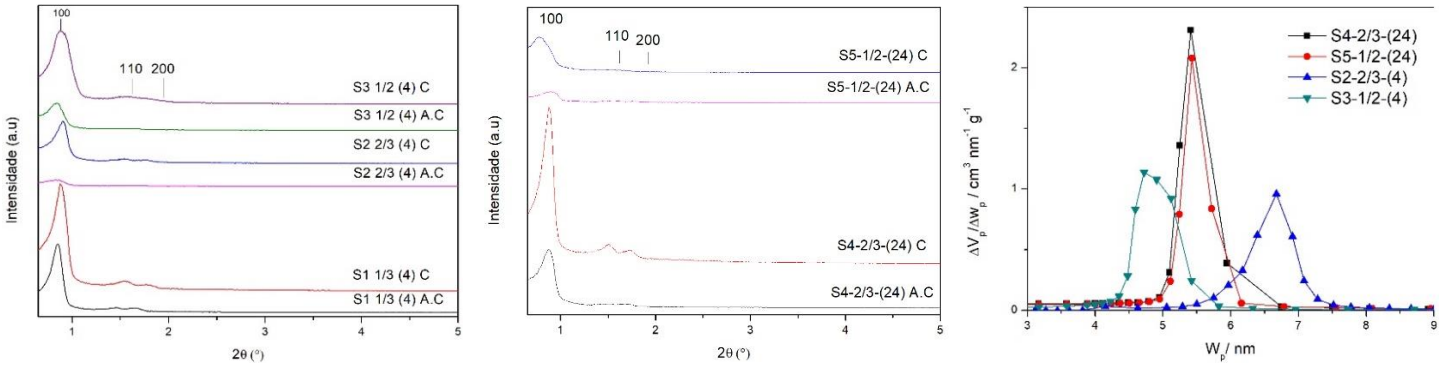
Abstract

In the present work, the focus was on scaling up the synthesis of mesoporous SBA-15 material. To achieve this, the research explored reducing the reaction volume, making the scale-up feasible. The experiment involved decreasing the volume of water and hydrochloric acid to half, one-third, and two-thirds of the original amount. The resulting materials were carefully characterized and compared with SBA-15 synthesized under standard conditions.
The approach used was based on acidic hydrolysis, where the team began by dissolving the directing agent, a P123 copolymer, into a 37% HCl solution. Afterward, they introduced the silicon precursor, tetraethyl orthosilicate (TEOS), keeping the mixture under constant stirring at 35°C. They focused on two key parameters: the aging time and the reduced volume of the liquid phase.
A variety of characterization techniques, including X-ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), nitrogen adsorption-desorption (BET), and Scanning Electron Microscopy (SEM), were employed to analyze the materials. The results, particularly those shown in figure 1, confirmed the successful formation of the SBA-15 structure and highlighted the viability of scaling up the synthesis process.

Figure 1: X-ray diffraction and nitrogen adsorption-desorption (BET)



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