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Dynamic Laser Speckle Technique as an alternative tool to determine hygroscopic capacity and specific surface area of microporous zeolites

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Abstract

Adsorption phenomena have several technological applications such as desiccants, catalysts, separation of gases, etc. Their uses depend on the textural properties of the solid adsorbent and the type of the adsorbed liquid or gas. Therefore, it is important to determine these properties. The most common measurement methods are physicochemical based on adsorption of N₂ to determine the surface area and the distribution of pores size. However these techniques present certain limitations for microporous materials. In this paper we propose the use of the Dynamic Laser Speckle (DLS) technique to measure the hygroscopic capacity of a microporous natural zeolite and their modified forms. This new approach based on the adsorption of water by solids allows determine their specific surface area (S). To test the DLS results, we compared the obtained S values to those calculated by different conventional isotherms using the N₂ adsorption-desorption method.

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