Preparation of kaolin-based low-cost porous ceramic supports using different amounts of carbonates

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ABSTRACT

Flat ceramic membrane supports were prepared using kaolin as the major constituent with varying amounts of carbonates and sintered at 900°C. The prepared supports were subjected to SEM, XRD, and porosity tests. The supports prepared without using carbonates had the largest mean pore size with the lowest porosity. The porosity of membranes increased by increasing the amount of calcium carbonate. The supports prepared using calcium carbonate had wider pore size distribution on the surface than those prepared using sodium carbonate. Small amount (10%) of sodium carbonate acts as a pore modifier resulting in smaller mean pore size, while large amount (>20%) of sodium carbonate blocks the pores by forming a sodium silicate layer and results in nonporous support. Therefore, calcium carbonate should be preferred over sodium carbonate for preparing highly porous ceramic membranes.

Keywords: Ceramic membrane; Sintering; Kaolin; Microfiltration; Porosity; Pore size distribution