Catalysis Letters
https://doi.org/10.1007/s10562-018-2366-8

Aluminium Oxide Supported on SBA-15 Molecular Sieves as Potential Lewis Acid Catalysts for Epoxide Ring Opening Using Aniline

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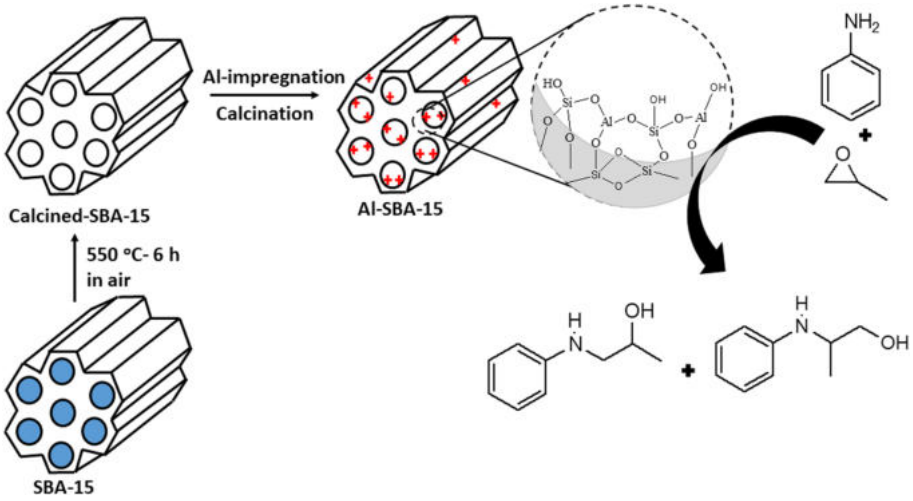
Received: 8 February 2018 / Accepted: 15 March 2018

Abstract

A series of aluminium oxide (Al_2O_3)-supported SBA-15 molecular sieves were prepared using a one-step wet-impregnation method. Powder X-ray diffraction, nitrogen adsorption/desorption, infrared spectroscopy and ammonia TPD were used to investigate the structures and chemical natures of the surface-bound species. The FT-IR studies of metal-impregnated SBA-15 materials revealed strong covalent interaction of Al_2O_3 on SBA-15 materials with strong Lewis acidic properties, evident from ammonia-TPD studies. The metal oxide-supported SBA-15 catalysts are active for epoxide ring opening with aniline at room temperature, and showed remarkably high stability and selectivity towards mono-alkylated products (about 86%) viz., 1-(phenylamino)propan-2-ol and 2-(phenylamino)propan-1-ol. The catalytic activities remained intact after several recycles. The observed activities and selectivities were compared with other metal oxide-loaded SBA-15 catalysts obtained by similar preparation methods.

Graphical Abstract

Aluminium oxide supported SBA-15 molecular sieves were prepared using a one-step wet-impregnation method. The materials showed strong Lewis acidic sites and promising catalytic activity for epoxide ring opening with aniline at room temperature.



Keywords Epoxide ring opening · Kinetics · β-Amino alcohol · Al_2O_3-SBA-15 · Molecular sieves

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Extended author information available on the last page of the article

Published online: 22 March 2018