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Recent Innovations in Chemical Science and Environment Technology



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March 3rd - 4th, 2017

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Sri Aurobindo College

University of Delhi, Malviya Nagar

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on

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OP19 In-situ Synthesis of Functionalized Microporous Molecular Sieves and its Catalytic Applications

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Functionalization of inorganic framework materials such as zeolite, silicoaluminophosphate, by organic functionalities via covalently connected within channel resulted new class of materials [1]. The organic functionality present in the confined molecular sieve helps in tuning the surface charge, hydrophobicity, molecular sensing and reactivity [1]. Faujasite type zeolite molecular sieve are known as potential FCC catalysis in petrochemical industries [2]. Silicoaluminophosphate molecular sieve with faujasite framework topology (SAPO-37) have better framework flexibility than framework silicate materials. It will be interesting to introduce organic functionality on such faujasite type SAPO-37 molecular sieves [2]. Among the various functionality, the amine functionalized molecular sieve materials have immense applications as base catalysts, grafting of metal complexes, CO₂ capture etc. [1, 3]. Although organic functionality introduced into the molecular sieve materials either by post synthesis or one spot co-condensation method [1], the later method facilitate to introduce relatively higher concentration with uniform distribution. In the present studies attempts have made on in-situ synthesis of faujasite type silicoaluminophosphate molecular sieves using various silane such

as (N-[3-(trimethoxysilyl) propyl] ethylenediamine, 3-aminopropyltriethoxysilane, 3-anilinopropyltri-methoxysilane, which are represented as S-37-DN, S-37-N, S-37-AN respectively. The synthesized materials were systematically characterized using analytical and spectroscopic methods. The powder XRD revealed the presence of faujasite structure, FT-IR and NMR studies confirmed the presence of surface amine functionality covalently connected on the channel of faujasite molecular sieve. The textural properties using N₂ sorption studies confirm the presence of hierarchical pore with good surface area in the range of 200-300 m²g⁻¹. The ring opening of epoxide with amine by aminolysis results in γ -amino alcohol which is an important intermediate usually prepared using inorganic base catalyst. The amine functionalized faujasite materials were studied for propylene oxide ring opening using aniline at ambient conditions, which showed about 66 % conversion.

In summary, novel amine functionalized faujasite type materials synthesized and shown potential catalyst for ring opening of epoxide.

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