514b Novel Synthetic Method for Narrow Distributed Colloidal Silicalite

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Preparation of zeolites is important for a variety of applications such as microelectronics, separation agents, ion exchange, catalysis, adsorbents, nano-composites and zeolite membranes. Silicalite-1 is a crystalline, microporous polymorph of silicon dioxide with the MFI framework, and its preparation has received considerable attention for a number of applications. In view of the emerging importance of nano/colloidal particles of silicalite 1 as a hydrophobic material for selective membranes or in nano-composites and our general interest in the development of ethanol selective membranes for biofuel production, we decided to address the main issues in dealing with their synthesis, wherein obtaining a uniform particle size distribution and efficient dispersion is a challenge. There are various methods reported for the synthesis of nano-phase/colloidal silicalite. However, their conventional preparations involving inorganic base/long reaction times/low purity leaves much to be desired and improvements are sought. An efficient preparation involving organic base has reduced the reaction time from several days to a few hours (12-24h) and avoids the use of inorganic base in the reaction medium. Inorganic base is difficult to get rid of or requires long workup procedure (causes sintering or aggregation during calcination). Herein, we report an efficient method for the preparation of narrowly distributed, easily dispersible silicalite 1 using tetraethylorthosilicate (TEOS) as the silica source, tetrapropylammonium hydroxide (TPAOH) as the organic template and triethylamine (TEA) as an organic base. The work will also describe optimization of reaction conditions and characterization of the silicalite using SEM, XRD and TG analyses.