Improved Methods to Prepare Zeolite MEL Materials

Summary
Zeolites represent a class of materials made from aluminosilicates and are typically used for a variety of applications/processes that require adsorption and/or catalytic activity. There are many different zeolites based upon structural differences and therefore specific applications for each one. Zeolite ZSM-11 (i.e. the MEL framework type) is commonly used for methanol-hydrocarbon conversion processes as well as other catalytic and ion transporting reactions.

Synthesis of the zeolite ZSM-11 and its pure silica isostructure silicalite-2 requires the use of an organic structure-directing agent (OSDA) during manufacturing of the zeolite. In this invention, MEL-type zeolite is prepared using (1) a single or blend of alkylenediamines (e.g. 1,8-diaminooctane, 1,6-diaminohexane, etc.) as the OSDA(s) or (2) a combination of alkylenediamine OSDA(s) and seeds of MEL crystals. These methods lead to pure MEL crystals with sub-micron size. It is demonstrated that syntheses incorporating MEL seeds allows for the use of minimal OSDA to obtain the desired MEL product.

Competitive Advantages
- Reduced raw materials used during manufacture of zeolite ZSM-11
- Reduced time of manufacturing of zeolite ZSM-11
- Better yield of submicron sized zeolite ZSM-11 particles which in turn can provide better catalytic activity

Problem Addressed
- Control over particle size of manufacturing zeolite ZSM-11 material
- Existing methods of manufacturing ZSM-11 use relatively expensive raw materials

Applications
- Methanol-hydrocarbon conversion processes
- Specific processes that include an ion exchange membrane

Publications

Patents
- Provisional patent filed

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Research Interests:
- Microporous Materials Synthesis
- Testing for Catalytic Applications and others