CLAIMS

1. A method of making a small crystal zeolite, comprising

(a) preparing a reaction mixture comprising:

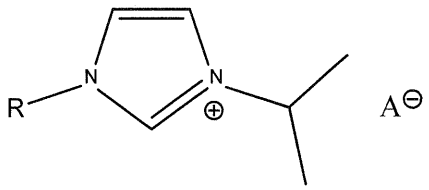
(i) at least one active source of an oxide of silicon;

(ii) at least one active source of an oxide of aluminum;

(iii) at least one active source of an alkali metal;

(iv) hydroxide ions; and

(v) an organic templating agent having the structure:




wherein R is a $C_1$ to $C_5$ alkyl group and $A^-$ is an anion which is not detrimental to the crystallization of the zeolite; and

(b) maintaining the reaction mixture under conditions sufficient to form crystals of the zeolite wherein the zeolite is prepared in the absence of an amine component,

wherein the zeolite has a crystallite size of 10 to 40 nanometers.

2. The method of claim 1, wherein the reaction mixture has a composition in terms of molar ratios falling within the ranges below:

| | |
|---|---|
| $SiO_2/Al_2O_3$ molar ratio | 20 < 72 |
| $H_2O/SiO_2$ molar ratio | 5 - 100 |
| $OH^-/SiO_2$ molar ratio | 0.07 - 1.0 |
| $M/SiO_2$ molar ratio | 0.02 - 0.5 |
| $Q/SiO_2$ molar ratio | 0.02 – 0.5 |

wherein M is an alkali metal cation; and Q is the organic templating agent.

3. The method of claim 2, wherein the $H_2O/SiO_2$ molar ratio is 15 to 20.

4. The method of claim 1, wherein the at least one active source of an oxide of silicon and the at least one active source of an oxide of aluminum are derived from a common source.

5. The method of claim 1, wherein the organic templating agent is N-methyl-N'-isopropyl imidazolium hydroxide.

6. The method of claim 1, wherein the organic templating agent is N,N'-diisopropyl imidazolium hydroxide.

7. The method of claim 1, wherein the conditions sufficient to form crystals of the zeolite comprises heating the reaction mixture at a first temperature of from 175°C to 190°C for a period of from 12 to 48 hours; and reducing the first temperature of the reaction mixture to a second temperature of from 140°C to 170°C for a suitable period of time to form crystals of the zeolite.

8. The method of claim 1, wherein the zeolite has, in its as-synthesized form, a silica to alumina molar ratio of 20 to less than 40.

~~9. The method of claim 1, wherein the zeolite has a crystallite size of 10 to 40 nanometers.~~

~~10~~9. The method of claim 1, wherein the zeolite has a crystallite size of 12 to 20 nanometers.

~~11~~10. The method according to claim 1, wherein the zeolite has, in its calcined form, an X-ray diffraction pattern substantially as shown in the following Table:

| 2-Theta (±0.20) (Degrees) | d-spacing (Angstroms) | Relative Absolute Intensity (%) |
|---|---|---|
| 8.1 | 10.88 | M |
| 8.9 | 9.88 | W |
| 11.4 | 7.78 | M |
| 16.1 | 5.51 | W |
| 19.8 | 4.49 | VS |
| 21.0 | 4.22 | VS |
| 23.0 | 3.86 | VS |
| 24.2 | 3.67 | VS |
| 25.4 | 3.50 | S |
| 26.1 | 3.41 | S |
| 31.6 | 2.83 | W |
| 35.6 | 2.52 | M |
| 36.7 | 2.45 | W |
| 44.8 | 2.02 | W. |

~~12~~11. The method of claim 1 further comprising monitoring at least one viscometric parameter of the reaction mixture; and determining an endpoint.

~~13~~12. The method of claim ~~12~~11, the at least one viscometric parameter of the reaction mixture is selected from the group consisting of viscosity shear rate index, measured viscosity, or combination thereof.

~~14~~13. The method of claim ~~12~~11, wherein the endpoint is determined based on a change in measured viscosity of the reaction mixture, a change in pH of the reaction mixture, or combination thereof.