CLAIMS:

1. A mordenite zeolite comprising a structure directing agent (SDA) selected from the group consisting of TEA, MTEA and mixtures thereof within its pores, having a mesopore surface area of greater than 30 m^2/g and comprising agglomerates composed of primary crystallites, wherein the primary crystallites have an average primary crystal size as measured by TEM of less than 80 nm.

2. The mordenite zeolite of claim 1, wherein the primary crystallites have an average primary crystal size of less than 80 nm in each of the a, b and c crystal vectors as measured by X-ray diffraction.

3. The mordenite zeolite of claim 1, wherein at least 90% by number of the primary crystallites have a primary crystal size of less than 80 nm as measured by TEM.

4. The mordenite zeolite of claim 1, wherein said primary crystallites have an aspect ratio of less than 2, wherein the aspect ratio is defined as the longest dimension of the crystallite divided by the width of the crystallite, where the width of the crystallite is defined as the dimension of the crystallite in the middle of that longest dimension in a dimension orthogonal to that longest dimension, as measured by TEM.

5. The mordenite zeolite of claim 1 having a mesopore surface area of greater than 40 m^2/g.

6. The mordenite zeolite of claim 1, wherein the ratio of mesopore surface area to the total surface area is greater than 0.05.

7. A calcined mordenite zeolite prepared by subjecting the mordenite zeolite of claim 1 to a calcining step, the calcined mordenite zeolite having a mesopore surface area of greater than 30 m^2/g and comprising agglomerates composed of primary crystallites, wherein the primary crystallites have an average primary crystal size as measured by TEM of less than 80 nm.

8. The calcined mordenite zeolite of claim 7, wherein the $Si:Al_2$ molar ratio is greater than or equal to 50.

9. A process for the preparation of a mordenite zeolite of claim 1 comprising:

a) providing a synthesis mixture comprising a silicon source, an aluminum source, an alkali metal (M) hydroxide, a source of a structure directing agent (SDA) selected from the group consisting of TEA, MTEA and mixtures thereof, optionally seed crystals and water, said synthesis mixture having a composition including the following molar ratios:

$Si:Al_2$	15-40
$OH^-:Si$	≤ 0.32
$M^+:Si$	≤ 0.32
SDA:Si	≤ 0.10
$H_2O:Si$	<20

b) subjecting said synthesis mixture to crystallization conditions which include heating the synthesis mixture at a temperature in the range of from 100ºC to 160ºC to form crystals of a mordenite zeolite comprising the structure directing agent (SDA) within its pores.

10. The process of claim 9 wherein the silicon source is a precipitated silica.

11. The process of claim 9, wherein the aluminum source is a sodium aluminate solution or an aluminum sulfate solution.

12. The process of claim 9, wherein the SDA source is selected from the group consisting of tetraethylammonium bromide (TEABr), tetraethylammonium hydroxide (TEAOH), methyltriethylammonium chloride (MTEACI), methyltriethylammonium hydroxide (MTEAOH), and mixtures thereof.

13. A process for the preparation of a calcined mordenite zeolite which comprises the steps of i) subjecting the mordenite zeolite of claim 1 to an ion exchange treatment to remove alkali metal cation M^+, and then ii) calcining the mordenite zeolite at a temperature of equal to or greater than 500ºC for a period of at least 1 hour.

14. The process of claim 13 which further includes a dealumination step comprising contacting the mordenite zeolite with steam at a temperature of at least 200ºC for a duration of at least one hour, and then washing with an aqueous acid solution.