Claims

1. A ZSM-23 zeolite, which is characterized in that the pore volume of mesopores having a pore size of 3-8 nm, preferably 3-6 nm of the zeolite is 45-90%, preferably 50-85%, further preferably 55-81% of the total pore volume of the zeolite.

2. The ZSM-23 zeolite according to claim 1, which is characterized in that the zeolite has a relative crystallinity of 95-120%, and the zeolite has a relative crystallinity retention of 95-100% after a hydrothermal treatment with steam for 2 hours at 600°C.

3. The ZSM-23 zeolite according to any of the previous claims, which is characterized in that the zeolite has a specific surface area of 300-430 m^2/g, and a pore volume of 0.31-0.5 cm^3/g, the specific surface area of micropores is 50-170 m^2/g, and the specific surface area of mesopores is 150-310 m^2/g, for example, the zeolite has a specific surface area of 320-405 m^2/g, and a pore volume of 0.34-0.45 cm^3/g, the specific surface area of micropores is 80-140 m^2/g, and the specific surface area of mesopores is 261-295 m^2/g.

4. A process for preparing the ZSM-23 zeolite according to any of claims 1-3, wherein the process comprises the following steps:

(1) preparing or selecting a silicon source for preparing the ZSM-23 zeolite, wherein the silicon source is an amorphous silica having a specific surface area of 600-1300 m2/g; a pore volume of 0.6-1.3 cm3/g; and a pore diameter of 1-13 nm;

(2) performing an alkali treatment on the silicon source for preparing the ZSM-23 zeolite mentioned in step (1), wherein the alkali treatment involves adding the amorphous silica prepared in step (1) to an alkaline solution, heating and stirring; the time for heating and stirring is 0.5-12 hours; and the temperature for heating is 25-60°C; and the molar ratio of the inorganic alkali as OH- to the amorphous silica as SiO2 is 0.05-0.24;

(3) preparing the ZSM-23 zeolite by using the alkali-treated amorphous silica as the silicon source, the silicon source is mixed with an aluminum source, an alkali source (MOH), a template

agent (R) and water to form a gel, which is crystallized, filtered, washed, dried and calcined to produce the ZSM-23 zeolite, wherein in the gel, the molar ratio of the silicon source (as SiO_2):the aluminum source(as Al_2O_3):the alkali source (as hydroxide):the template agent:H_2O is 1:(0.003-0.03):(0.03-0.3):(0.05-2):(10-90), and the gel is crystallized at 150-200°C for 24-96 hours, filtered, washed, dried, and calcined to produce the ZSM-23 zeolite.

5. The process according to claim 4, which is characterized in that in step (1), said amorphous silica has a specific surface area of 700-1200 m^2/g; a pore volume of 0.7-1.2 cm^3/g; and a pore diameter of 2-10 nm.

6. The process according to any of claims 4-5, which is characterized in that in step (1), the preparation process of the amorphous silica is as follows: adding a silicon source to deionized water to be uniformly dispersed, and then adding a surfactant and stirring; adjusting the pH of the resulting solution to 1-5, preferably 1.5-4, and then heating it in a water bath for a period of time; filtering, washing, drying, and calcining to produce the amorphous silica.

7. The process according to claim 6, which is characterized in that in step (1), the silicon source is an inorganic silicon source, preferably one or more of water glass, silica sol, or white carbon black.

8. The process according to any of claims 6-7, which is characterized in that in step (1), the surfactant is one or more of hexadecyltrimethylammonium chloride, hexadecyltrimethylammonium bromide, octodecyltrimethylammonium chloride, octodecyltrimethylammonium bromide.

9. The process according to any of claims 6-8, which is characterized in that in step (1), the molar ratio of said silicon source as SiO_2 to the surfactant is 1:(0.02-0.3), preferably 1:(0.05-0.2).

10. The process according to any of claims 6-9, which is characterized in that in step (1), the molar ratio of said silicon source as SiO_2 to the deionized water is 1:(30-300), preferably 1:(50-220).

11. The process according to any of claims 6-10, which is characterized in that in step (1), the temperature for heating is 30-80°C, preferably, 40-70°C, the time for heating is 0.5-8 hours, preferably, 3-6 hours.

12. The process according to any of claims 6-11, which is characterized in that in step (1), the temperature for drying is 80-120°C, the time for drying is 4-12 hours, the temperature for calcining is 500-600°C, the time for calcining is 2-6 hours.

13. The process according to claim 4, which is characterized in that in step (2), the alkali treatment is performed by using an inorganic alkali, and the inorganic alkali is one or more of sodium hydroxide, potassium hydroxide, or ammonia water.

14. The process according to claim 4, which is characterized in that in step (2), in the alkali treatment, the time for heating and stirring is 2-8 hours; and the temperature for heating is 30-50°C.

15. The process according to claim 4, which is characterized in that in step (2), the molar ratio of the inorganic alkali as OH^- to the amorphous silica as SiO_2 is 0.06-0.22.

16. The process according to claim 4, which is characterized in that in the gel, the molar ratio of the silicon source (as SiO_2):the aluminum source(as Al_2O_3):the alkali source (as hydroxide):the template agent:H_2O is 1:(0.005-0.02):(0.03-0.16):(0.08-1.6):(20-70).

17. The process according to claim 4, which is characterized in that the gel is crystallized at 170-180°C for 36-72 hours, filtered, washed, dried, and calcined to produce the ZSM-23 zeolite.

18. The process according to any of claims 16-17, which is characterized in that in step (3), the temperature for drying is 80-120°C, the time for drying is 4-12 hours, the temperature for calcining is 500-600°C, the time for calcining is 2-6 hours.