Claims

1. An Al-SBA-15 molecular sieve, which has a schematic chemical composition as represented by the formula "first oxide*second oxide", wherein said first oxide is silica, said second oxide is alumina, the content by mass percent of alumina in said schematic chemical composition is 25% or more, and 85% or less, the pore distribution of the molecular sieve also comprises: the pore volume of the pores having a pore diameter of <4 nm is 15% or less of the total pore volume, the ratio of the B acid to the L acid is 0.4 or less, and 0.1 or more,
wherein the process for preparing the Al-SBA-15 molecular sieve comprises:

(1) mixing an amorphous silica alumina in powder and water to form a slurry,

(2) formulating an acidic solution containing a P123 triblock copolymer, and

(3) mixing the slurry and said acidic solution containing a P123 triblock copolymer under a crystallization condition to obtain the molecular sieve.

2. The molecular sieve according to claim 1, wherein the content by mass percent of alumina in said schematic chemical composition is 30% or more, and 55% or less.

3. The molecular sieve according to claim 1, wherein in the molecular sieve, the ratio of the B acid to the L acid is 0.4 or less, and the ratio of the B acid to the L acid is 0.2 or more.

4. The molecular sieve according to claim 1, wherein the pore distribution of the molecular sieve comprises: the pore volume of the pores having a pore diameter of 4-15 nm is 40%-70% of the total pore volume.

5. The molecular sieve according to claim 1, wherein the specific surface area of the molecular sieve is 550-850 m^2/g, and/or, the total pore volume of the molecular sieve is 0.7-1.3 mL/g, and/or, the average pore diameter of the molecular sieve is 9-15 nm.

6. The molecular sieve according to claim 1, wherein the specific surface area of the molecular sieve is 650-750 m^2/g, and/or, the total pore volume of the molecular sieve is 0.9-1.2 mL/g, and/or, the average pore diameter of the molecular sieve is 10-12 nm, and/or, the pore distribution of the molecular sieve comprises: the pore volume of the pores having a pore diameter of 4-15 nm is 50%-60% of the total pore volume.

7. A process for preparing the Al-SBA-15 molecular sieve according to claim 1, comprising:

(1) mixing an amorphous silica alumina in powder and water to form a slurry,

(2) formulating an acidic solution containing a P123 triblock copolymer, and

(3) mixing the slurry and said acidic solution containing a P123 triblock copolymer under a crystallization condition to obtain the molecular sieve.

8. The process according to claim 7, wherein said amorphous silica alumina is an amorphous silica alumina dry gel.

9. The process according to claim 7, wherein said crystallization condition at least comprises: the crystallization temperature is 80-120°C; the crystallization time is 10-35 hours; and the pH in the crystallization process is controlled at 2.0-5.0.

10. The process according to claim 7, wherein the alumina mass content of said amorphous silica alumina on a dry basis is 25% or more and 85% or less, and/or, the specific surface area of said amorphous silica alumina is 400-650 m^2/g, and/or, the pore volume of said amorphous silica alumina is 0.52-1.8 mL/g, and/or, the average pore diameter of said amorphous silica alumina is 6 nm to 12 nm, and/or, the average particle size of said amorphous silica alumina is 15μm to 150μm, and/or, the pore distribution of said amorphous silica alumina comprises: the pore volume having a pore diameter of 4-15 nm is 85%-95% of the total pore volume, the pore volume having a pore diameter of >15 nm is 5% or less of the total pore volume, and/or, the water content of said amorphous silica alumina is 20-45 wt%, and/or, the mass ratio of said amorphous silica alumina on a dry basis, to said P123 triblock copolymer is 0.5:1 to 5:1.

11. The process according to claim 10, wherein the alumina mass content of said amorphous silica alumina, on a dry basis, is 30% or more, and 55% or less, and/or, the specific surface area of said amorphous silica alumina is 450-600 m^2/g, and/or, the pore volume of said amorphous silica alumina is 0.85-1.5 mL/g, and/or, the average pore diameter of said amorphous silica alumina is 7 nm to 10 nm, and/or, the average particle size of said amorphous silica alumina is 25μm to 75μm, or 40μm to 60μm, and/or, the water content of said amorphous silica alumina is 25-32 wt%, and/or, the mass ratio of said amorphous silica alumina, dry basis, to said P123 triblock copolymer is 1:1 to 5:1.

12. The process according to claim 7, wherein in step (1), the mass ratio of said amorphous silica alumina, on a dry basis, to water is 10:90 to 30:70, and/or, in step (2), the pH of said acidic solution is 1-5, the mass content of said P123 triblock copolymer in said acidic solution is 0.5% to 5.0%, and/or, in step (3), the mass ratio of the slurry, on a dry basis of said amorphous silica alumina, to said acidic solution, based on said P123 triblock copolymer, is 0.5:1 to 5:1.

13. The process according to claim 12, wherein in step (1), the mass ratio of said amorphous silica alumina, on a dry basis, to water is 15:85 to 25:75, and/or, in step (2), the pH of said acidic solution is 1.2-2.3, and/or the mass content of said P123 triblock copolymer in said acidic solution is 0.8% to 2.8%, and/or, in step (3), the mass ratio of the slurry, on a dry basis of said amorphous silica alumina, to said acidic solution, based on said P123 triblock copolymer, is 1:1 to 5:1.

14. A molecular sieve composition, comprising the Al-SBA-15 molecular sieve of claim 1, and an optional binder.

15. A process for treating an organic substance, which comprises a step of contacting said organic substance and the Al-SBA-15 molecular sieve of claim 1, or the molecular sieve composition of claim 14.

16. The treatment process of claim 15, wherein said treatment is selected from adsorptive separation, hydrotreatment, and hydrocracking, and/or said organic substance is a hydrocarbon oil.