washing and so on from the uncrystallized silicon-phosphorus-aluminum dry gel.

For solving the problems in the above described SAPO synthesis processes, the present inventors attempt to synthesize SAPO by a solvothermal synthesis process, that is, to synthesize SAPO molecular sieves by employing a non-water medium as the main solvent, and it is surprisingly found that, various kinds of SAPO molecular sieves can be successfully synthesized in the case where an organic amine is used as both the main solvent and the template agent of the synthesis system, in the presence of only a small amount of water.

Disclosure of the Invention

An object of the present invention is to provide a process for synthesizing SAPO molecular sieves in solvothermal systems.

In order to achieve the above described object, the present invention employs organic amines as the organic solvent and the template agents of the solvothermal synthesis systems, to synthesize SAPO molecular sieves in the presence of small amount of water.

Specifically, the present invention provides a solvothermal synthesis process of SAPO molecular sieves, characterised in that~~comprising~~ the main~~following synthesis~~ steps are as follows:

a) an organic amine, an aluminum source, a phosphorus source, a silicon source, and water are mixed in a molar ratio of 6-30 : 1 : 0.5-5 : 0.01-1.0 : 0.1-15, to obtain an initial mixture for preparing the SAPO molecular sieves, wherein the organic amine is one organic amine which functions as both a main solvent and a template agent, and the molar ratio of water to the organic amine is less than 2.0;

b) the initial mixture obtained in the step a) is maintained at 30-60 °C, and aged with mixing for not more than 24 hours, to obtain an initial gel;

c) the initial gel obtained in the step b) is crystallized at 150-250 °C for 0.5-15 days.

wherein~~In the synthesis process of the present invention,~~ the initial mixture for~~in the~~ prepar*ing*~~ation~~ the~~of~~ SAPO molecular sieves ~~may~~ further comprises an organic alcohol therein, and the molar ratio of the organic amine, the aluminum source, the phosphorus source, the silicon source, the organic alcohol and water in the initial mixture is 6-30 : 1: 0.5-5 : 0.01-1.0 : 0.01-0.50 : 0.1-15.

In the synthesis process of the present invention, the molar ratio of the organic amine/water is larger than 0.51, preferably larger than 1.0, more preferably lager than 1.5, most preferably lager than 3.0, and less than 300; the aging time is 0-24 h, preferably 0.5-15 h; and the crystallization time is 0.5-15 days, preferably 1-7 days.

The process of the present invention further comprises a step of separating, washing, and drying the crystallized product of step c), to obtain as-synthesized SAPO-molecular sieves.

The aluminum source used in the present invention is any one of pseudo boehmite, aluminium isopropoxide, alumina, aluminum hydroxide, aluminum chloride, and aluminum sulfate or a mixture thereof; the phosphorus source used is any one of orthophosphoric acid, metaphosphoric acid, a phosphate, and a phosphite or a mixture thereof; the silicon source used is any one of silica sol, ethyl orthosilicate, white carbon black, and silica or a mixture thereof; the organic amine used is any one of an organic primary, secondary, and tertiary amine or a mixture thereof, comprising any one of morpholine, piperidine, isopropylamine, triethylamine, diethylamine, di-n-propylamine, diisopropylamine, hexamethyleneimine, N',N',N,N-tetramethyl-1,6- hexanediamine, and N,N-diisopropylethylamine or a mixture thereof, and preferably any one of diethylamine, triethylamine, morpholine, hexamethyleneimine, and N,N-diisopropylethylamine or a mixture thereof.

The organic alcohol used in the initial mixture is any one of methanol, ethanol, n-propanol, and i-propanol or a mixture thereof. In the synthesis of SAPO molecular sieves, especially in the synthesis of SAPO-34, SAPO-18, SAPO-35, or SAPO-56 molecular sieve, the addition of the organic alcohol is mainly for the purpose of suppressing the formation of impure crystal phase, thereby ensuring the re-productivity of the synthesis process and high purity.

In the present invention, the prepared SAPO molecular sieve is any one of