A need therefore exists for the provision of moldings and processes for their preparation which are adapted to other catalytically active materials having different physical properties than those generally observed in zeolites, in particular for allowing the production of moldings containing novel and yet unknown zeolitic materials for use in catalytic applications necessitating the use of moldings, for which the use of moldings would prove advantageous for providing an improved environment for the zeolitic species, in particular relative to their catalytic activity and abrasion resistance. This applies in particular since the use of shaped bodies in a variety of catalyzed reactions allow for the gradual variation and thus for the optimization of the chemical and physical properties of the moldings containing zeolitic materials for making it possible to fine-tune the resulting product in function of the specific requirements needed for a given application.

DETAILED DESCRIPTION

It is therefore the object of the present disclosure to provide a process for the production of a molding which may employ a wider variety of zeolitic materials. In particular, it is the object of the present disclosure to provide a methodology for the preparation of moldings for zeolitic materials which due to their particular physical and chemical properties either could not be processed to shaped bodies using the methodologies known in the art, or which only displayed poor results in catalysis after having been processed to a shaped body compared to their catalytic properties when employed as such in zeolitic form. Consequently, besides providing a process for the production of a molding which allows access to a larger number of zeolitic materials, the present disclosure also aims to improve the catalytic performance of zeolitic materials which due to their physical and chemical particular properties are not suited for use in molded bodies as presently known in the art.

Therefore, the present disclosure relates to a process for the production of a molding, comprising

(I) providing a zeolitic material;
(II) mixing the zeolitic material provided in step (I) with one or more binders;
(III) kneading of the mixture obtained in step (II);
(IV) molding of the kneaded mixture obtained in step (III) to obtain one or more moldings;
(V) drying of the one or more moldings obtained in step (IV); and
(VI) calcining of the dried molding obtained in step (V);

wherein the zeolitic material provided in step (I) displays a water adsorption ranging from 1 to 15 wt.-% when exposed to a relative humidity of 85%, wherein preferably the water adsorption ranges from 2 to 14 wt.-%, more preferably from 2,5 to 11 wt.-%, more preferably from 3 to 10 wt.-%, more preferably from 4 to 9 wt.-%, more preferably from 5 to 8.7 wt.-%, more preferably from 7 to 8.4 wt.-%, and more preferably from 7.5 to 8.2 wt.-%.

In an aspect, there is provided a molding, comprising steps of:

(I) providing a zeolitic material, wherein said step comprises

(1) providing a mixture comprising one or more sources of YO_2 and a compound containing one or more alkenyltrialkylammonium cation $R^1R^2R^3R^4N^+$ as a structure directing agent (wherein, Y is a tetravalent element; R^1, R^2, and R^3 each independently represent an alkyl; and R^4 represents an alkenyl); and

(2) crystallizing the mixture obtained in step (1) to obtain a zeolitic material;

(II) mixing the zeolitic material provided in step (I) with one or more binders;

(III) kneading of the mixture obtained in step (II);

(IV) molding of the kneaded mixture obtained in step (III) to obtain one or more moldings;

(V) drying of the one or more moldings obtained in step (IV); and

(VI) calcining of the dried molding obtained in step (V);

wherein the zeolitic material provided in step (I) exhibits a water adsorption capacity in the range of 1 to 9 wt.-% when exposed to a relative humidity of 85%, the water adsorption capacity is measured under isothermal conditions at 25°C, and the zeolitic material provided in step (I) comprises titanium silicalite-1 (TS-1).

In another aspect, there is provided a molding, which is obtainable by means of the production method as defined above.

In another aspect, there is provided a molding, wherein the molding contains a zeolitic material which exhibits a water adsorption capacity in the range of 1 to 9 wt.-% when exposed to a relative humidity of 85%, the water adsorption capacity is measured under isothermal conditions at 25°C, and the zeolitic material comprises TS-1, and the molding has a tortuosity relative to cyclooctane in the range of 1.2~1.6±0.1, wherein tortuosity represents the tortuosity characteristics of the molding at a temperature of 298.15 K.

It is herewith noted that within the meaning of the present invention, and in particular with respect to the particular and preferred embodiments defined in the present application, the term

Claims:

1. A production method for a molding, comprising steps of:
(I) providing a zeolitic material, wherein said step comprises
(1) providing a mixture comprising one or more sources of YO_2 and a compound containing one or more alkenyltrialkylammonium cation $R^1R^2R^3R^4N^+$ as a structure directing agent (wherein, Y is a tetravalent element; R^1, R^2, and R^3 each independently represent an alkyl; and R^4 represents an alkenyl); and
(2)crystallizing the mixture obtained in step (1) to obtain a zeolitic material;
(II)mixing the zeolitic material provided in step (I) with one or more binders;
(III) kneading of the mixture obtained in step (II);
(IV) molding of the kneaded mixture obtained in step (III) to obtain one or more moldings;
(V) drying of the one or more moldings obtained in step (IV); and
(VI) calcining of the dried molding obtained in step (V);
wherein the zeolitic material provided in step (I) exhibits a water adsorption capacity in the range of 1 to 9 wt.-% when exposed to a relative humidity of 85%, the water adsorption capacity is measured under isothermal conditions at 25°C, and the zeolitic material provided in step (I) comprises titanium silicalite-1 (TS-1).

2. The production method as in claim 1, wherein the one or more binders are selected from the group consisting of inorganic binders.

3. The production method as in claim 1 or 2, wherein the mixture obtained in step (II) exhibits a weight ratio of the one or more binders to the zeolitic material (binder : zeolitic material) in the range of 0.1 to 0.6.

4. The production method as in claim 1 or 2, wherein step (II) further comprises a step of mixing the zeolitic material and the one or more binders with a solvent system, wherein the solvent system comprises one or more solvents.

5. The production method as in claim 4, wherein the mixture obtained in step (II) exhibits a weight ratio of the solvent system to the zeolitic material (solvent system : zeolitic material) in the range of 0.7 to 1.7.

6. The production method as in claim 1 or 2, wherein step (II) further comprises a step of mixing the zeolitic material and the one or more binders with one or more pore forming agents.

7. The production method as in claim 6, wherein the mixture obtained in step (II) exhibits a weight ratio of the one or more pore forming agents to the zeolitic material (pore forming agent : zeolitic material) in the range of 0.1 to 0.7.

8. The production method as in claim 6, wherein the mixture obtained in step (II) exhibits a weight ratio of the solvent system to the one or more binders and pore forming agents to the zeolitic material (solvent system : binder and pore forming agent : zeolitic material) in the range of (0.7 - 1.7) : (0.4 - 1) : 1.

9. The production method as in claim 1 or 2, wherein the step of calcining the dried molding obtained in step (V) is performed at a temperature in the range of 350 to 850°C.

10. The production method as in claim 1 or 2, wherein the method further comprises a step (VII) of subjecting the calcined molding obtained in step (VI) to a hydrothermal treatment.

11. The production method as in claim 10, wherein the hydrothermal treatment is performed with a water containing solvent system and/or with an aqueous solution.

12. The production method as in claim 10, wherein the hydrothermal treatment is performed for a duration of 1 to 48 hours.

13. The production method as in claim 1 or 2, wherein the zeolitic material provided in step (I) comprises one or more zeolites.

14. A molding, which is obtainable by means of a the production method as in claim 1 or 2.

15. A molding, wherein the molding contains a zeolitic material which exhibits a water adsorption capacity in the range of 1 to 9 wt.-% when exposed to a relative humidity of 85%, the water adsorption capacity is measured under isothermal conditions at 25°C, and the zeolitic material comprises TS-1, and the molding has a tortuosity relative to cyclooctane in the range of 1.2~1.6±0.1, wherein tortuosity represents the tortuosity characteristics of the molding at a temperature of 298.15 K.

16. The molding as in claim 15, wherein the zeolitic material has an MFI-type framework structure comprising YO_2 or an MFI-type framework structure comprising YO_2 and X_2O_3,
wherein Y is Si, and X is a trivalent element, and

said material having an X-ray diffraction pattern comprising at least the following reflections:

Intensity (%)	Diffraction angle 2θ/° [Cu K(alpha 1)]
55 – 100	7.66 – 8.20
40 – 75	8.58 – 9.05
92 – 100	22.81 – 23.34
49 – 58	23.64 – 24.18
16 – 24	29.64 – 30.21
14 – 25	44.80 – 45.25
16 - 24	45.26 – 45.67

wherein 100% relates to the intensity of the maximum peak in the X-ray powder diffraction pattern.

17. The molding as in claim 16, wherein the ^{29}Si MAS NMR of the zeolitic material comprises:

a first peak (P''1) in the range of -110.4 ppm to -114.0 ppm; and
a second peak (P''2) in the range of -100.2 ppm to -104.2 ppm.

18. The molding as in claim 17, wherein the deconvoluted ^{29}Si MAS NMR spectrum comprises one additional peak comprised in the range of -113.2 ppm to -115.2 ppm.

19. The molding as in any one of claims 16 to 18, wherein at least a portion of the Y atoms in the MFI-type framework structure is isomorphously substituted by Ti.

20. The molding as in any one of claims 16 to 18, wherein the molar ratio of YO_2 to Ti is in the range of 5 to 100.

21. The molding as in any one of claims 16 to 18, wherein the MFI-type framework structure of the zeolitic material does not contain X_2O_3.

22. The molding as in any one of claims 15 to 18, wherein the zeolitic material comprises one or more cation and/or cationic elements as ionic non-framework elements.

23. The molding as in any one of claims 15 to 18, wherein the molding further comprises one or more binders.

24. The molding as in any one of claims 15 to 18, wherein the BET surface area of the zeolitic material contained in the molding measured according to DIN 66131 is in the range of 50 to 700 m²/g.

25. The molding as in any one of claims 15 to 18, wherein the specific surface area of the molding measured according to DIN 66131 is in the range of 50 to 700 m²/g.

26. The molding as in any one of claims 15 to 18, wherein the pore volume of the molding measured according to DIN 66133 is in the range of 0.1 to 2.5 ml/g.

27. The molding as in any one of claims 15 to 18, wherein the molding has a mechanical strength of 1 to 15 N.

28. The molding as in any one of claims 15 to 18, wherein the molding has a tortuosity relative to water in the range of 0.3 to 5.0 ± 0.2.

29. The molding according to any one of claims 15 to 18, wherein the molding is used as a catalyst, catalyst support, adsorbent, or for ion exchange.