Summary

[0025a] In one aspect of the present disclosure, there is provided a zeolitic adsorbent comprising at least one FAU zeolite and comprising barium and/or potassium, characterized in that the external surface area of said zeolitic adsorbent, measured by nitrogen adsorption, is greater than 20 $m^2.g^{-1}$.

[0025b] In another aspect of the present disclosure, there is provided a process for preparing an adsorbent as described herein, comprising at least the steps of:

a) agglomeration of crystalline elements of at least one FAU type zeolite, having an external surface area greater than 40 $m^2.g^{-1}$, with number-average diameter between 0.1 µm and 20 µm inclusive, with a binder comprising at least 80% of clay or of a mixture of clays, optionally zeolitizable, and with up to 5% of additives as well as with the amount of water that allows forming of the agglomerated material; drying of the agglomerates at a temperature between 50°C and 150°C; calcination of the dried agglomerates while flushing with oxidizing and/or inert gas, at a temperature above 150°C, for some hours;

b) optionally zeolitization of some or all of the binder by bringing the agglomerates obtained in step a) into contact with an alkaline basic solution;

c) cationic exchange(s) of the agglomerates from step a) and/or from step b) by bringing into contact with a solution of barium ions and/or of potassium ions;

d) additional optional cationic exchange of the agglomerates from step c) by bringing into contact with a solution of potassium ions;

e) washing and drying the agglomerates obtained in steps c) or d), at a temperature between 50°C and 150°C; and

f) obtaining the zeolitic adsorbent according to the invention by activation of the agglomerates obtained in step e) while flushing with oxidizing and/or inert gas, at a temperature between 100°C and 400°C, for a time determined as a function of the desired water content and loss on ignition.

[0025c] In a further aspect of the present disclosure, there is provided an adsorbent obtainable by the method as described herein.

[0025d] In yet another aspect of the present disclosure, there is provided a use of an adsorbent as described herein, in processes for:

- separation of cuts of C8-aromatic isomers and notably of xylenes,
- separation of isomers of substituted toluene,
- separation of cresols,
- separation of polyhydric alcohols.

[0025e] In a further aspect of the present disclosure, there is provided a method for separating *para*-xylene from cuts of aromatic isomers with 8 carbon atoms, using, as agent for adsorption of *para*-xylene, a zeolitic adsorbent comprising barium and/or potassium having a large external surface area characterized by nitrogen adsorption greater than 20 $m^2.g^{-1}$, employed in liquid-phase processes, but also in gas-phase processes.

[0025f] In another aspect of the present disclosure, there is provided a method for separating polyhydric alcohols, using an adsorbent as described herein.

[0025g] In yet another aspect of the present disclosure, there is provided a method for separating isomers of substituted toluene, using an adsorbent as described herein.

[0025h] In a further aspect of the present disclosure, there is provided a method for separating cresols using an adsorbent as described herein.

CLAIMS

1. Zeolitic adsorbent comprising at least one FAU zeolite and comprising barium and/or potassium, characterized in that the external surface area of said zeolitic adsorbent, measured by nitrogen adsorption, is greater than 20 $m^2.g^{-1}$.

2. Zeolitic adsorbent according to Claim 1, wherein the content of barium oxide (BaO) is above 10% by weight relative to the total weight of the adsorbent.

3. Zeolitic adsorbent according to Claim 1 or Claim 2, wherein the content of potassium oxide K_2O is below 25% by weight relative to the total weight of the adsorbent.

4. Adsorbent according to any one of Claims 1 to 3, wherein said FAU zeolite has an Si/Al atomic ratio between 1.00 and 1.50 inclusive.

5. Adsorbent according to any one of the preceding claims, wherein no zeolitic structure other than the faujasite structure is detected by X-ray diffraction.

6. Adsorbent according to any one of the preceding claims, wherein the fraction by weight of FAU zeolite is greater than or equal to 80% relative to the total weight of adsorbent.

7. Adsorbent according to any one of the preceding claims, whose loss on ignition measured at 900°C according to standard NF EN 196-2 is less than or equal to 7.7%.

8. Adsorbent according to any one of the preceding claims, wherein the total volume of the macropores and mesopores, measured by mercury intrusion porosimetry, is between 0.15 $cm^3.g^{-1}$ and 0.5 $cm^3.g^{-1}$.

9. Adsorbent according to any one of the preceding claims, wherein the volume fraction of the macropores is between 0.2 and 1 of the total volume of the macropores and mesopores inclusive.

10. Adsorbent according to any one of the preceding claims, whose number-average diameter of the crystalline elements (or "crystals") is between 0.1 µm and 20 µm inclusive.

11. Process for preparing an adsorbent according to any one of Claims 1 to 10, comprising at least the steps of:

a) agglomeration of crystalline elements of at least one FAU type zeolite, having an external surface area greater than 40 $m^2.g^{-1}$ with number-average diameter between 0.1 µm and 20 µm inclusive, with a binder comprising at least 80% of clay or of a mixture of clays, optionally zeolitizable, and with up to 5% of additives as well as with the amount of water that allows forming of the agglomerated material; drying of the agglomerates at a temperature between 50°C and 150°C; calcination of the dried agglomerates while flushing with oxidizing and/or inert gas, at a temperature above 150°C, for some hours;

b) optionally zeolitization of some or all of the binder by bringing the agglomerates obtained in step a) into contact with an alkaline basic solution;

c) cationic exchange(s) of the agglomerates from step a) and/or from step b) by bringing into contact with a solution of barium ions and/or of potassium ions;

d) additional optional cationic exchange of the agglomerates from step c) by bringing into contact with a solution of potassium ions;

e) washing and drying the agglomerates obtained in steps c) or d), at a temperature between 50°C and 150°C; and

f) obtaining the zeolitic adsorbent according to the invention by activation of the agglomerates obtained in step e) while flushing with oxidizing and/or inert gas, at a temperature between 100°C and 400°C, for a time determined as a function of the desired water content and loss on ignition.

12. Method according to Claim 11, wherein said at least one FAU type zeolite has an Si/Al atomic ratio between 1.00 and 1.50, inclusive.

13. Adsorbent obtainable by the method according to Claim 11 or Claim 12.

14. Use of an adsorbent according to any one of Claims 1 to 10, or 13, in processes for:

- separation of cuts of C8-aromatic isomers and notably of xylenes,
- separation of isomers of substituted toluene,
- separation of cresols,
- separation of polyhydric alcohols.

15. Use according to Claim 14, for separating *para*-xylene from cuts of aromatic isomers with 8 carbon atoms.

16. Method for separating *para*-xylene from cuts of aromatic isomers with 8 carbon atoms, using, as agent for adsorption of *para*-xylene, a zeolitic adsorbent comprising barium and/or potassium having a large external surface area characterized by nitrogen adsorption greater than 20 $m^2.g^{-1}$, employed in liquid-phase processes, but also in gas-phase processes.

17. Method according to Claim 16, using a zeolitic adsorbent according to any one of Claims 1 to 10, or 13 as the agent for adsorption of *para*-xylene.

18. Method according to Claim 16 or Claim 17, for separating *para*-xylene from cuts of isomers of aromatic hydrocarbons containing 8 carbon atoms, in the liquid phase, by adsorption of *para*-xylene by means of an adsorbent according to any one of Claims 1 to 10, or 13 in the presence of a desorbent.

19. Method according to any one of Claims 16 to 18, of the simulated moving-bed type.

20. Method for separating polyhydric alcohols, using an adsorbent according to any one of Claims 1 to 10, or 13.

21. Method for separating isomers of substituted toluene, using an adsorbent according to any one of Claims 1 to 10, or 13.

22. Method for separating cresols using an adsorbent according to any one of Claims 1 to 10, or 13.