- the crystals of zeolite X exhibit:
  i. a number-average diameter of less than or equal to 1.7 µm, preferably of less than or equal to 1.5 µm and more preferably of less than or equal to 1.2 µm,
  ii. an Si/Al atomic ratio of between 1.00 and 1.50, preferably between 1.05 and 1.50 and more preferably between 1.10 and 1.50, limits included,
- the content by weight of non-zeolitic phase (NZP) is such that 2.0% < NZP < 5.0%, preferably such that 3.0% < NZP < 5.0%, more preferably such that 3.0% < NZP < 4.0%, advantageously such that 3.2% < NZP < 3.7%, by weight of the total weight of the adsorbent,
- the content by weight of barium oxide (BaO) is greater than 23%, preferably greater than 32% and more preferably greater than 33% by weight, with respect to the total weight of the adsorbent,
- the content by weight of potassium oxide K_2O is less than 9%, preferably less than 8% and more preferably between 0% and 2% and advantageously between 0% and 1%, limits included, with respect to the total weight of the adsorbent, and
- the total content by weight of oxides of alkali metal or alkaline earth metal ions, other than BaO and K_2O, is less than 5% and preferably between 0% and 2% and advantageously between 0% and 1%, limits included, with respect to the total weight of the adsorbent.

[0028b] In another aspect of the present disclosure, there is provided a process for the preparation of an adsorbent as defined herein, comprising at least the stages of:

a) agglomeration of crystals of zeolite X with a number-average diameter of less than or equal to 1.7 µm, preferably of less than or equal to 1.5 µm and more preferably of less than or equal to 1.2 µm, with an Si/Al atomic ratio of between 1.00 and 1.50, preferably between 1.05 and 1.50 and more preferably still of between 1.10 and 1.50, limits included, with a binder comprising at least 80% by weight, preferably at least 90% by weight, and more preferably at least 95% by weight of zeolitisable clay and with a source of silica, then shaping of agglomerates and, finally, drying and calcination of said agglomerates,

b) zeolitization of the said zeolitisable binder by bringing the agglomerates obtained in stage a) into contact with a basic alkaline solution, the duration of said zeolitization process being between approximately 2 hours and 6 hours,

c) cationic exchange of the agglomerates of stage b) by bringing into contact with a solution of barium ions or of barium ions and potassium ions,

d) optional cationic exchange by bringing the agglomerates of stage c) into contact with a solution of potassium ions,

e) then washing and drying the agglomerates thus obtained, and

f) production of the zeolitic adsorbent by activation of the agglomerates obtained in stage e).

~~[0028c] In a further aspect of the present disclosure, there is provided an adsorbent as defined herein, capable of being obtained according to a process as defined herein.~~

[0028d0028c] In yet another aspect of the present disclosure, there is provided a use of an adsorbent as defined herein in the processes of:

- separation of fractions of aromatic C8 isomers and in particular xylenes,
- separation of substituted toluene isomers, such as nitrotoluene, diethyltoluene, toluenediamine and others,
- separation of cresols,
- separation of polyhydric alcohols.

[0028e0028d] In a further aspect of the present disclosure, there is provided a process for the recovery of para-xylene from fractions of aromatic hydrocarbon isomers comprising 8 carbon atoms, in the liquid phase, by adsorption of the para-xylene by means of an adsorbent as defined, in the presence of a desorbent.

[0028f0028e] In another aspect of the present disclosure, there is provided a process for the recovery of para-xylene from fractions of aromatic hydrocarbon isomers comprising 8 carbon atoms, in the gas phase, by adsorption of the para-xylene by means of an adsorbent as defined herein herein, in the presence of a desorbent.

[0028g0028f] In a further aspect of the present disclosure, there is provided a process for the separation of polyhydric alcohols employing an adsorbent as defined herein.

[0028h0028g] In another aspect of the present disclosure, there is provided a process for the separation of substituted toluene isomers, such as nitrotoluene, diethyltoluene or toluenediamine, employing an adsorbent as defined herein.

[0028i0028h] In a further aspect of the present disclosure, there is provided a process for the separation of cresols employing an adsorbent as defined herein.

ACCOUNT OF THE INVENTION

[0029] A first subject-matter of the present invention is thus an agglomerated zeolitic adsorbent, having optimized properties, in particular for the separation of *para*-xylene from aromatic C_8 fractions. The agglomerated zeolitic adsorbent exhibits maximum

between 4.0% and 7.7%, preferably between 4.5% and 6.5% and advantageously between 4.8% and 6%, limits included.

5. Adsorbent according to any one of the preceding claims, in the form of agglomerates, the number-average diameter of which is between 0.4 mm and 2 mm, in particular between 0.4 mm and 0.8 mm and preferably between 0.4 mm and 0.65 mm, limits included.

6. Process for the preparation of an adsorbent according to any one of the preceding claims, comprising at least the stages of:

a) agglomeration of crystals of zeolite X with a number-average diameter of less than or equal to 1.7 µm, preferably of less than or equal to 1.5 µm and more preferably of less than or equal to 1.2 µm, with an Si/Al atomic ratio of between 1.00 and 1.50, preferably between 1.05 and 1.50 and more preferably still of between 1.10 and 1.50, limits included, with a binder comprising at least 80% by weight, preferably at least 90% by weight, and more preferably at least 95% by weight of zeolitisable clay and with a source of silica, then shaping of agglomerates and, finally, drying and calcination of said agglomerates,

b) zeolitization of the said zeolitisable binder by bringing the agglomerates obtained in stage a) into contact with a basic alkaline solution, the duration of said zeolitization process being between approximately 2 hours and 6 hours,

c) cationic exchange of the agglomerates of stage b) by bringing into contact with a solution of barium ions or of barium ions and potassium ions,

d) optional cationic exchange by bringing the agglomerates of stage c) into contact with a solution of potassium ions,

e) then washing and drying the agglomerates thus obtained, and

f) production of the zeolitic adsorbent by activation of the agglomerates obtained in stage e).

7. Preparation process according to Claim 6, in which stage b) of zeolitization is carried out with an alkaline solution, the concentration of which is between 0.5M and 5M.

8. Process according to Claim 6 or Claim 7, in which stage b) of zeolitization is carried out for a period of time of between a few tens of minutes and a few hours, preferably between approximately 1 hour and 8 hours, more preferably between approximately 2 hours and 6 hours.

~~9. Adsorbent according to any one of Claims 1 to 5, capable of being obtained according to the process of any one of Claims 6 to 8.~~

~~10~~9. Use of an adsorbent according to any one of Claims 1 to 5 ~~or according to Claim 9~~ in the processes of:

- separation of fractions of aromatic C_8 isomers and in particular xylenes,
- separation of substituted toluene isomers, such as nitrotoluene, diethyltoluene, toluenediamine and others,
- separation of cresols,
- separation of polyhydric alcohols.

~~11~~10. Use according to Claim ~~10~~9, for the separation of *para*-xylene from fractions of aromatic isomers having 8 carbon atoms.

~~12~~11. Process for the recovery of *para*-xylene from fractions of aromatic hydrocarbon isomers comprising 8 carbon atoms, in the liquid phase, by adsorption of the *para*-xylene by means of an adsorbent according to any one of Claims 1 to 5 ~~or 9~~, in the presence of a desorbent.

~~13~~12. Process for the recovery of *para*-xylene according to Claim ~~12~~ 11 of simulated moving bed type.

~~14~~13. Process for the recovery of *para*-xylene according to Claim ~~12~~ 11 of simulated countercurrent type.

~~15~~14. Process for the recovery of *para*-xylene according to Claim ~~12~~ 11 of simulated cocurrent type.

~~16~~15. Process for the recovery of *para*-xylene from fractions of aromatic hydrocarbon isomers comprising 8 carbon atoms, in the gas phase, by adsorption of the *para*-xylene by means of an adsorbent according to any one of Claims 1 to 5 ~~or 9~~, in the presence of a desorbent.

~~17~~16. Process for the recovery of *para*-xylene according to any one of Claims ~~12~~ 11 to ~~16~~15, in which the desorbent is chosen from toluene and *para*-diethylbenzene.

~~18~~17. Process for the separation of polyhydric alcohols employing an adsorbent according to any one of Claims 1 to 5 ~~or 9~~.

~~19~~18. Process for the separation of substituted toluene isomers, such as nitrotoluene, diethyltoluene or toluenediamine, employing an adsorbent according to any one of Claims 1 to 5 ~~or 9~~.

~~20~~19. Process for the separation of cresols employing an adsorbent according to any one of Claims 1 to 5 ~~or 9~~.