materials. Each channel contains adsorbent particles which are not immobilized in the article and attrition between the said adsorbent particles are readily to occur.

[0006] There is therefore still a need for adsorbing articles (or else adsorbent articles) with high volumetric efficiency, with adsorption and desorption kinetics that are compatible, especially for uses where high adsorption kinetics are required, for example for gas and/or liquid dynamic separation, such as Pressure Swing Adsorption (PSA), Temperature Swing Adsorption (TSA), and the like.

[0007] Still a need exists for immobilized zeolitic particles in adsorbent beds to prevent any move of said particles, thus avoiding attrition and dust formation, while keeping a high separation efficiency (high volumetric capacity and high kinetics).

[0008] Again, there is a need for adsorbent articles (or blocks) with high zeolite content, low attrition behavior of the particles together, limited pressure drop and high diffusion kinetics.

[0009] The Applicant has now discovered that the above needs can be met in whole or at least in part with the adsorbent article of the present invention, which is now explained.

[0009a] In an aspect, there is provided an adsorbent article comprising zeolitic particles of at least one zeolitic adsorbent, wherein the zeolitic particles are in the form of zeolite(s) agglomerated with one or more inorganic binders, said zeolitic particles in the form of zeolite(s) agglomerated with one or more inorganic binders having a zeolite content and further being immobilized with at least one resin, wherein the average particle size of the at least one zeolitic adsorbent in the form of zeolite(s) agglomerated with one or more inorganic binders is between 0.03 mm and 3 mm, limits included, and wherein the zeolite content in the article is equal to or greater than 60 wt% relative to the total weight of the said article.

[0009b] In another aspect, there is provided a method for separating a fluid from one or more other fluid(s) or separating said fluid from impurities contained in said fluid, wherein the method comprises the step of contacting said fluid with at least one article as defined above.

[0009c] In another aspect, there is provided a blend comprising zeolitic particles having a zeolite particle size, and resin particles having a resin particle size, wherein the resin particles are in the form of beads, agglomerates of beads, or aggregates of beads, and whereinthe volumetric average resin particle size is less than 100 μm.

[0010] In a first embodiment, the present invention relates to an adsorbent article comprising zeolitic particles of at least one zeolitic adsorbent, said particles being immobilized with at least one resin, wherein the average particle size of the at least one zeolitic adsorbent ranges from 0.03 mm to 3 mm, preferably from 0.04 mm to 2 mm, more preferably from 0.05 mm to 1 mm, and wherein the zeolite content is equal to or greater than 60 wt%, more preferred when zeolite content is greater than 70 wt%, preferably strictly greater than 80 wt%, more preferably strictly greater than 85 wt%, still more preferably strictly greater than 88 wt%, typically equal to or greater than 90 wt%, relative to the total weight of the said article.

[0011] In the present description, all numerical ranges include the upper and lower limits, unless otherwise stated. In the present invention, "immobilized particles" means particles which exhibits reduced attrition due to immobility within the article and significant mechanical integrity to be self-supporting.

[0012] According to a first preferred aspect of the present invention, the zeolitic particles in the article comprise at least one zeolitic adsorbent in the form of zeolite(s) agglomerated with one or more inorganic binder. Inorganic binder is preferably chosen from, as non-limiting examples, natural clays, synthetic clays, silica, alumina, and the

CLAIMS

1. An adsorbent article comprising zeolitic particles of at least one zeolitic adsorbent,

wherein the zeolitic particles are in the form of zeolite(s) agglomerated with one or more inorganic binders, said zeolitic particles in the form of zeolite(s) agglomerated with one or more inorganic binders having a zeolite content and further being immobilized with at least one resin, wherein the average particle size of the at least one zeolitic adsorbent in the form of zeolite(s) agglomerated with one or more inorganic binders is between 0.03 mm and 3 mm, limits included, and wherein the zeolite content in the article is equal to or greater than 60 wt%, relative to the total weight of the said article.

2. The article according to claim 1, wherein the zeolitic particles in the article comprise at least one zeolitic adsorbent in the form of zeolite(s) agglomerated with one or more inorganic binder selected from the group consisting of natural clays, synthetic clays, silica, alumina and mixtures thereof.

3. The article according to claim 1, wherein the zeolitic particles have forms and shapes, wherein the forms and shapes are selected from the group consisting of beads, pellets, extrudates, crushed beads, crushed pellets, flakes, cracks, rounded shapes, not rounded shapes, hollowed shapes, not hollowed shapes, cenospheres, and mixtures thereof.

4. The article according to claim 1, wherein at least one zeolitic particle in said article has a dimension equal to or greater than 0.1 mm.

5. The article as claimed in claim 1, wherein said zeolite particles comprise at least one zeolite or a mixture of zeolites, that is(are) advantageously chosen from among the A zeolites (framework type LTA), chabazite (framework type CHA), clinoptilolite (framework type HEU), EMT (framework type EMT), ZSM-5 (framework type MFI), Silicalite-1 (framework type MFI) and faujasite (framework type FAU), and more preferably from among FAU type zeolites.

6. The article according to claim 5, wherein the FAU type zeolites are selected from the group consisting of zeolites X, zeolites MSX, zeolites LSX and zeolites Y, and mixtures thereof in all proportions.

7. The article according to claim 1, wherein the inorganic binder is selected from the group consisting of kaolins, kaolinites, nacrites, dickites, halloysites, attapulgites, sepiolites, delaminated clays, delaminated clays in the form of gels, montmorillonites, bentonites, illites, metakaolins, and mixtures thereof in any proportions.

8. The article according to claim 1, wherein the at least one resin is selected from the group consisting of polymers, thermoplastic homo-polymers, thermoplastic copolymers, polycondensates and mixtures thereof.

9. The article according to claim 1, wherein the at least one resin is selected from the group consisting of polymers, polyolefins, polypropylene, ethylene copolymers, copolymers of ethylene-vinyl acetate, polyacrylics, acrylonitrile homo--polymers, acrylonitrile co-polymers, polyacrylates, polymethacrylates, acrylate copolymers, methacrylate copolymers, polystyrenes, styrene copolymers, homo-polyesters, co-polyesters, halogenated polymers, halogenated copolymers, fluorinated homopolymers, fluorinated copolymers, homo-polyamides, copolyamides, aromatic polyamides, polyvinylchlorides, polyurethanes, polyether sulfones, polyether ketones, polycarbonates,

epoxy resins, phenolic resins, thermosetting resins, elastomeric resins, and mixtures thereof.

10. The article according to claim 1, wherein the weight of zeolite content

relative to the total weight of the said article, is equal to or greater than 88 wt%.

11. The article according to claim 1, wherein the article has a shape selected from the group consisting of cubes, parallelepipeds, spheres, sheets, pleated sheets, films, pleated films, cylinders, convex regular polyhedrons, prisms, cones, ellipses, pyramids, wave shaped pattern, helical , and mixtures thereof.

12. The article according to claim 1, wherein the article comprises one or more features used to increase surface area, wherein the features are selected from the group consisting of protrusions, protruding cones, protruding cylinders, protruding concentric circles, protruding fins, protruding fins with supports, bores, tapered bores, non-tapered bores, partial bores, through bores, circular cross sectional shapes, polygonal cross sectional shapes, star cross sectional shapes, and combinations thereof.

13. The article according to claim 1, wherein the article comprises one or more channels, wherein the channels are circular, polyhedral or sinusoidal.

14. The article according to claim 1, wherein the article has a mechanical resistance, expressed as compressive strength, between 290 psi (2 MPa) and 14500 psi (100 MPa), limits included.

15. A method for separating a fluid from one or more other fluid(s) or separating said fluid from impurities contained in said fluid, wherein the method comprises the step of contacting said fluid with at least one article according to claim 1.

16. The method according to claim 15, wherein the method comprises at least one of drying, conditioning, purifying or separating, and the fluid is selected from the group consisting of gases, liquids, vapors and mixtures thereof.

17. A blend comprising zeolitic particles having a zeolitic particle size, and resin particles having a resin particle size, wherein the resin particles are in the form of beads, agglomerates of beads, or aggregates of beads, and wherein the volumetric average resin particle size is less than 100 μm.

18. The blend according to claim 17, wherein the blend has a particle size ratio defined as the ratio of [(resin particle size) : (zeolitic particle size)] that is between 1:20000 and 3:1, limits included.

19. The article according to claim 1, wherein the inorganic binder comprises at least one member selected from the group consisting of natural clays, synthetic clays, silica and alumina.

20. The article according to claim 1, wherein said at least one resin comprises at least one member selected from the group consisting of copolymers of ethylene-vinyl acetate, homo- and co-polyesters, halogenated polymers and copolymers homo- and co-polyamides, and polyurethanes.