of water-absorbent polymer particles with at least one surface-postcrosslinker and thermal surface-postcrosslinking of the coated water-absorbent polymer particles, wherein the content of residual monomers in the water-absorbent polymer particles prior to the coating with the surface-postcrosslinker is in the range from 0.03 to 15% by weight, and the temperature during the thermal surface-postcrosslinking is in the range from 100 to 180°C.

The present disclosure further provides a process for producing water-absorbent polymer, comprising the steps forming water-absorbent polymer particles by polymerizing a monomer solution, coating of water-absorbent polymer particles with at least one surface-postcrosslinker and thermal surface-postcrosslinking of the coated water-absorbent polymer particles, wherein the content of residual monomers in the water-absorbent polymer particles prior to the coating with the surface-postcrosslinker is in the range from 0.1 to 10% by weight, the surface-postcrosslinker is an alkylene carbonate, and the temperature during the thermal surface-postcrosslinking is in the range from 100 to 180°C.

In an aspect, there is provided a process for producing surface-postcrosslinked water-absorbent polymer particles, comprising the steps forming water-absorbent polymer particles by polymerizing a monomer solution, comprising

(a) at least one ethylenically unsaturated monomer which bears acid groups and may be at least partly neutralized,
(b) optionally one or more crosslinker,
(c) at least one initiator,
(d) optionally one or more ethylenically unsaturated monomers copolymerizable with the monomers mentioned under a),
(e) optionally one or more water-soluble polymers, and
(f) water,

coating of water-absorbent polymer particles with at least one surface-postcrosslinker and thermal surface-postcrosslinking of the coated water-absorbent polymer particles, wherein the content of residual monomers in the water-absorbent polymer particles prior to the coating with the surface-postcrosslinker is in the range from 0.1~~03~~ to 10~~5~~% by weight, and the temperature during the thermal surface-postcrosslinking is in the range from 100 to ~~180~~160°C.

In another aspect, there is provided a surface-postcrosslinked water-absorbent polymer particles obtainable as defined above.

The present disclosure is based on the finding that the level of residual monomers in the water-absorbent polymer particles prior to the thermal surface-postcrosslinking, the temperature of the thermal surface-postcrosslinking, and the surface-postcrosslinker itself have an important impact on the properties of the formed surface-postcrosslinked water-absorbent polymer particles.

The result of the specific conditions according to the process of the present disclosure are water-absorbent polymer particles having a high centrifuge retention capacity (CRC) and a high absorption under a load of 49.2 g/cm² (AUHL). That is a surprising result. It is known that the centrifuge retention capacity (CRC) significantly decreases during thermal surface-

Claims

1. A process for producing surface-postcrosslinked water-absorbent polymer particles, comprising the steps forming water-absorbent polymer particles by polymerizing a monomer solution, comprising

   a) at least one ethylenically unsaturated monomer which bears acid groups and may be at least partly neutralized,
   b) optionally one or more crosslinker,
   c) at least one initiator,
   d) optionally one or more ethylenically unsaturated monomers copolymerizable with the monomers mentioned under a),
   e) optionally one or more water-soluble polymers, and
   f) water,

   coating of water-absorbent polymer particles with at least one surface-postcrosslinker and thermal surface-postcrosslinking of the coated water-absorbent polymer particles, wherein the content of residual monomers in the water-absorbent polymer particles prior to the coating with the surface-postcrosslinker is in the range from 0.1~~03~~ to 10~~5~~% by weight, and the temperature during the thermal surface-postcrosslinking is in the range from 100 to ~~180~~160°C.

2. A process according to claim 1, wherein the monomer solution comprises at least one crosslinker b).

3. A process according to any of claims 1 or 2, wherein the surface-postcrosslinker is selected from alkylene carbonates, 1,3-oxazolidin-2-ones, bis- and poly-1,3-oxazolidin-2-ones, bis- and poly-1,3-oxazolidines, 2-oxotetrahydro-1,3-oxazines, N-acyl-1,3-oxazolidin-2-ones, cyclic ureas, bicyclic amide acetals, oxetanes, and morpholine-2,3-diones.

~~4. A process according to any of claims 1 to 3, wherein the content of residual monomers in the water-absorbent polymer particles prior to the coating with the surface-postcrosslinker is in the range from 0.1 to 10% by weight.~~

~~5.~~4. A process according to any of claims 1 to ~~4~~3, wherein the ethylenically unsaturated monomer which bears acid groups is an ethylenically unsaturated carboxylic acid.

~~6.~~5. A process according to any of claims 1 to ~~5~~4, wherein the ethylenically unsaturated monomer which bears acid groups is acrylic acid.

7.6. A process according to any of claims 1 to 65, wherein the moisture content of the water-absorbent polymer particles prior to the thermal surface-postcrosslinking is in the range from 3 to 10% by weight.

8.7. A process according to any of claims 1 to 76, wherein the content of residual monomers in the water-absorbent polymer particles prior to the coating with the surface-postcrosslinker is in the range from 0.25 to 2.5% by weight.

9.8. A process according to any of claims 1 to 87, wherein the surface-postcrosslinker is ethylene carbonate, 3-methyl-1,3-oxazolidin-2-one, 3-methyl-3-oxethanmethanol, 1,3-oxazolidin-2-one, 3-(2-hydroxyethyl)-1,3-oxazolidin-2-one, 1,3-dioxan-2-one or a mixture thereof.

10.9. A process according to any of claims 1 to 98, wherein and the temperature during the thermal surface-postcrosslinking is in the range from 140 to 160°C.

11.10. Surface-postcrosslinked water-absorbent polymer particles obtainable according to any of claims 1 to 910.

12.11. Polymer particles according to claim 1110, wherein the polymer particles have an absorption under high load from 15 to 50 g/g and the sum of centrifuge retention capacity and absorption under high load is from 60 to 120 g/g.

13.12. Surface-postcrosslinked water-absorbent polymer particles having a centrifuge retention capacity from 35 to 75 g/g, an absorption under high load from 20 to 50 g/g, a level of extractable constituents of less than 10% by weight, and a porosity from 20 to 40%.

14.13. Polymer particles according to any of claims 11 10 to 1213 wherein the polymer particles have a centrifuge retention capacity from 40 to 55 g/g.

15.14. Polymer particles according to any of claims 1011 to 1413, wherein the polymer particles have an absorption under high load from 25 to 35 g/g.

16.15. Polymer particles according to any of claims 1011 to 1514, wherein polymer particles have a porosity from 25 to 30%.

17.16. Surface-postcrosslinked water-absorbent polymer particles having a total liquid uptake of

$$Y > -500 \times \ln(X) + 1880$$

wherein Y [g] is the total liquid uptake and X [g/g] is the centrifuge retention capacity, wherein the centrifuge retention capacity is at least 25 g/g and the liquid uptake is at least 30 g.

~~18.~~17. Polymer particles according to claim ~~17~~16, wherein the polymer particles have a total liquid uptake of

$$Y > -485 \times \ln(X) + 1865$$

wherein Y [g] is the total liquid uptake and X [g/g] is the centrifuge retention capacity.

~~19.~~18. Polymer particles according to ~~any of~~ claim~~s~~ ~~17~~ 16 or ~~18~~17, wherein the polymer particles have a centrifuge retention capacity of at least 40 g/g.

~~20.~~19. Polymer particles according to any of claims ~~17~~ 16 to ~~19~~ 18 wherein the polymer particles have a total liquid uptake of at least 45 g.

~~21.~~20. Surface-postcrosslinked water-absorbent polymer particles having a change of characteristic swelling time of less than 0.6 and a centrifuge retention capacity of at least 35 g/g, wherein the change of characteristic swelling time is

$$Z < (\tau_{0.5} - \tau_{0.1}) / \tau_{0.5}$$

wherein Z is the change of characteristic swelling time, $\tau_{0.1}$ is the characteristic swelling time under a pressure of 0.1 psi (6.9 g/cm²) and $\tau_{0.5}$ is the characteristic swelling time under a pressure of 0.5 psi (35.0 g/cm²).

~~22.~~21. Polymer particles according to claim ~~21~~20, wherein the polymer particles have a change of characteristic swelling time of less than 0.4.

~~23.~~22. Polymer particles according to any of claims ~~21~~ 20 or 21~~2~~, wherein the polymer particles have a centrifuge retention capacity of at least 40 g/g.

~~24.~~23. Polymer particles according to any of claims ~~11~~ 10 to 22~~23~~, wherein the polymer particles have a mean sphericity from 0.80 to 0.95.

~~25.~~24. Polymer particles according to any of claims ~~11~~ 10 to 22~~23~~, wherein the polymer particles have a bulk density from 0.6 to 1 g/cm³.

~~26.~~25. Polymer particles according to any of claims ~~11~~10 to ~~22~~23, wherein the polymer particles have an average particle diameter from 200 to 550 µm.

~~27.~~26. A fluid-absorbent article, comprising

(A) an upper liquid-pervious layer,
(B) a lower liquid-impervious layer and
(C) a fluid-absorbent core between the layer (A) and the layer (B), comprising from 5 to 90% by weight fibrous material and from 10 to 95% by weight water-absorbent polymer particles according to any of claims ~~11~~10 to ~~25~~26,
(D) an optional acquisition-distribution layer between (A) and (C), comprising from 80 to 100% by weight fibrous material and from 0 to 20% by weight water-absorbent polymer particles according to any of claims ~~10~~11 to ~~25~~26,
(E) an optional tissue layer disposed immediately above and/or below (C); and
(F) other optional components.

~~28.~~27. A fluid-absorbent article, comprising water-absorbent polymer particles according to any of claims ~~11~~10 to ~~27~~26 and less than 15% by weight fibrous material and/or adhesives in the absorbent core.