

forming a homogeneous mixture comprising a water-soluble carboxyalkyl polysaccharide, water, and a crosslinking agent, wherein the water-soluble carboxyalkyl polysaccharide dissolves into the water;

recovering said carboxyalkyl polysaccharide and said crosslinking agent from said mixture; and

heat-treating said recovered carboxyalkyl polysaccharide and said crosslinking agent at a temperature above about 50° C. for a time effective to crosslink said carboxyalkyl polysaccharide to render said carboxyalkyl polysaccharide water swellable and water insoluble, wherein the water-swellable, water-insoluble carboxyalkyl polysaccharide exhibits an initial Absorbency Under Load value of at least 17 and retains at least about 50 percent of the initial Absorbency Under Load value after aging for about 60 days at about 24° C. and at least about 30 percent relative humidity.

2. The method according to claim 1 wherein the carboxyalkyl polysaccharide is prepared from a polysaccharide selected from the group consisting of cellulose, starch, guar, carrageenan, agar, gellan gum, chitin, chitosan, and mixtures thereof.

3. The method according to claim 1 wherein the carboxyalkyl polysaccharide is a carboxyalkyl cellulose.

4. The method according to claim 1 wherein the carboxyalkyl polysaccharide is a carboxymethyl polysaccharide.

5. The method according to claim 4 wherein the carboxymethyl polysaccharide is carboxymethyl cellulose.

6. The method according to claim 1 wherein the water-swellable, water-insoluble carboxyalkyl polysaccharide exhibits an initial Absorbency Under Load value of at least about 20.

7. The method according to claim 1 wherein said recovered carboxyalkyl polysaccharide and crosslinking agent are heat-treated at a temperature of from about 100° C. to about 200° C. for a time of from about 1 minute to about 600 minutes.

8. The method according to claim 1 wherein said mixture, comprising said water-soluble carboxyalkyl polysaccharide, water, and a crosslinking agent, has a pH between about 4 to about 9.

9. The method according to claim 1 wherein the heat-treated carboxyalkyl polysaccharide has an initial Absorbency Under Load value at least about 10 percent greater than an otherwise identical carboxyalkyl polysaccharide prepared without a crosslinking agent.

10. The method according to claim 9 wherein the heat-treated carboxyalkyl polysaccharide has an initial Absorbency Under Load value at least about 20 percent greater than an otherwise identical carboxyalkyl polysaccharide prepared without a crosslinking agent.

11. The method according to claim 1 wherein the water-swellable, water-insoluble carboxyalkyl polysaccharide retains at least about 70 percent of the initial Absorbency Under Load value after aging for about 60 days at about 24° C. and at least about 30 percent relative humidity.

12. The method according to claim 1 wherein the water-swellable, water-insoluble carboxyalkyl polysaccharide retains at least about 50 percent of the initial Absorbency Under Load value after aging for about 60 days at about 24° C. and at about 100 percent relative humidity.

13. The method according to claim 1 wherein said carboxyalkyl polysaccharide and said crosslinking agent are recovered by evaporative drying.

14. The method according to claim 1 wherein said carboxyalkyl polysaccharide and said crosslinking agent are recovered by precipitation.

15. The method according to claim 1 wherein the crosslinking agent is selected from the group consisting of an organic compound comprising at least two functional groups capable of reacting with a carboxyl, amino, or hydroxyl group of a carboxyalkyl polysaccharide or a metal ion with more than two positive charges.

16. The method according to claim 15 wherein said crosslinking agent is selected from the group consisting of diamines, polyamines, diols, polyols and mixtures thereof.

17. The method according to claim 6 wherein the crosslinking agent is selected from the group consisting of chitosan glutamate, type A gelatin, diethylenetriamine, ethylene glycol, butylene glycol, polyvinyl alcohol, hyaluronic acid, polyethylene imine, and mixtures thereof.

18. The method according to claim 15 wherein said crosslinking agent is selected from the group consisting of chloroacetic acid and sodium chloroacetate and mixtures thereof.

19. The method according to claim 15 wherein said crosslinking agent comprises a metal ion selected from the group consisting of Al³⁺, Fe³⁺, Ce³⁺, Ti⁴⁺, Zr⁴⁺, and Ce⁴⁺.

20. The method according to claim 19 wherein said crosslinking agent is selected from the group consisting of AlCl₃, FeCl₃, Ce₂(SO₄)₃, Zr(NH₄)₄(CO₃)₄, Ce(NH₄)₄(SO₄)₄·2H₂O, and mixtures thereof.

21. The method according to claim 1 wherein the water-swellable, water-insoluble carboxymethyl cellulose retains at least about 50 percent of the initial Absorbency Under Load value after aging for about 60 days at about 24° C. and at about 100 percent relative humidity.

22. A method for producing a water-swellable, water-insoluble carboxymethyl cellulose, the method comprising the following steps:

forming a homogeneous mixture comprising a water-soluble carboxymethyl cellulose, water, and a crosslinking agent selected from the group consisting of organic compounds comprising at least two functional groups capable of reacting with a carboxyl or hydroxyl group of a carboxyalkyl polysaccharide and a metal ion having more than 2 positive charges, wherein the water-soluble carboxyalkyl polysaccharide dissolves into the water;

recovering said carboxymethyl cellulose and said crosslinking agent from said mixture; and

heat-treating said recovered carboxymethyl cellulose and crosslinking agent at a temperature above about 100° C. for a time effective to crosslink said carboxymethyl cellulose to render said carboxymethyl cellulose water swellable and water insoluble wherein said heat-treated carboxymethyl cellulose has an initial Absorbency Under Load value of at least 17 and retains at least about 50 percent of the initial Absorbency Under Load value after aging for about 60 days at about 24° C. and at least about 30 percent relative humidity.

23. The method according to claim 22 wherein said crosslinking agent is selected from the group consisting of chitosan glutamate, type A gelatin, diethylenetriamine, ethylene glycol, butylene glycol, polyvinyl alcohol, hyaluronic acid, polyethylene imine, chloroacetic acid, sodium chloroacetate, AlCl₃, FeCl₃, Ce₂(SO₄)₃, Zr(NH₄)₄(CO₃)₄, Ce(NH₄)₄(SO₄)₄·2H₂O, and mixtures thereof.

24. The method according to claim 22 wherein said carboxymethyl cellulose and said crosslinking agent are heat-treated at a temperature of from about 100° C. to about 200° C. for a time of from about 1 minute to about 600 minutes.

25. The method according to claim 22 wherein said carboxymethyl cellulose and said crosslinking agent are recovered by evaporative drying.