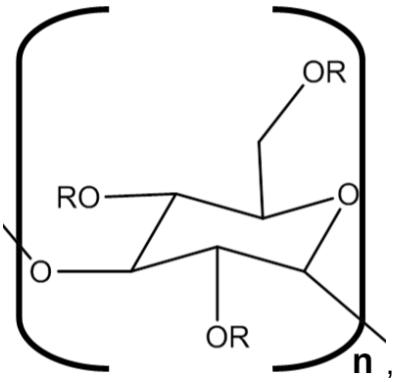
comprising a solvent. From this solution continuous, strong, cotton-like fibers, highly suitable for use in textiles, were spun and used.

Kiho et al. (*Carb. Res.* 189:273-270, 1989) disclosed the alkaline extraction and isolation of poly alpha-1,3-glucan from the fungus, *Agrocybe cylindracea*, which was further derivatized to sodium carboxymethylglucan (CMG). This ether derivative exhibited anti-tumor properties against sarcoma. Similarly, Zhang et al. (Intl. Publ. No. CN1283633) described the extraction of poly alpha-1,3-glucan from the medicinal fungus, *Ganoderma lucidum*, and its derivatization to CMG.

Development of new poly alpha-1,3-glucan ether derivatives and methods of preparing such derivatives is desirable given their potential utility in various applications.

SUMMARY OF INVENTION

In one embodiment, the invention concerns a composition comprising a poly alpha-1,3-glucan ether compound represented by the structure:



wherein

(i) n is at least ~~6~~800,

(ii) each R is independently an H or an organic group, and

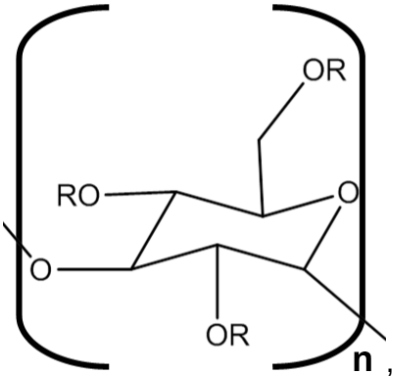
(iii) the compound has a degree of substitution of about 0.05 to about 3.0, and the compound contains two or more types of said organic group.

In a second embodiment, the organic group is a hydroxy alkyl group, alkyl group, or carboxy alkyl group. The compound in this embodiment may contain one type of the organic group, or two or more types of the organic group. The organic group may be a hydroxypropyl, dihydroxypropyl, hydroxyethyl, methyl,

ethyl, or carboxymethyl group, for example. In a third embodiment, the compound contains one type of the organic group, whereas the compound contains two or more types of the organic group in a fourth embodiment.

In a fifth embodiment, the degree of substitution of the poly alpha-1,3-glucan ether compound is about 0.2 to about 2.0.

In a sixth embodiment, the invention concerns a method for producing a poly alpha-1,3-glucan ether compound. This method comprises contacting poly alpha-1,3-glucan in a reaction under alkaline conditions with at least one etherification agent comprising an organic group. The etherification agent is etherified to the poly alpha-1,3-glucan in this contacting step, thereby producing a poly alpha-1,3-glucan ether compound represented by the structure:



,

wherein

(i) n is at least ~~6~~800,

(ii) each R is independently an H or the organic group, and

(iii) the compound has a degree of substitution of about 0.05 to about 3.0, and the compound contains two or more types of said organic group. A poly alpha-1,3-glucan ether produced by this method can optionally be isolated.

In a seventh embodiment, the alkaline conditions of the reaction comprise an alkali hydroxide solution.

In an eighth embodiment, the reaction comprises an organic solvent. The organic solvent is isopropanol in a ninth embodiment.

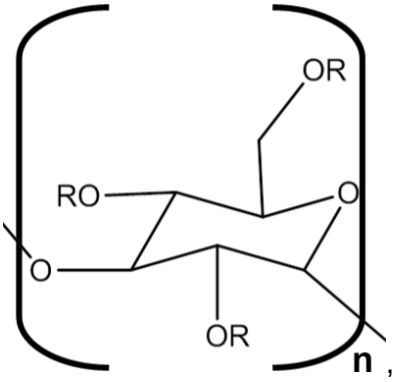
In a tenth embodiment, the contacting step of the method further comprises heating the reaction, and/or neutralizing the pH of the reaction.

In an eleventh embodiment of the method, the organic group is a hydroxy alkyl group, alkyl group, or carboxy alkyl group. The compound in this

CLAIMS

What is claimed is:

1. A composition comprising a poly alpha-1,3-glucan ether compound represented by the structure:



wherein

(i) n is at least ~~6~~800,

(ii) each R is independently an H or an organic group, and

(iii) the compound has a degree of substitution of about 0.05 to about 3.0, and the compound contains two or more types of said organic group.

2. The composition of ~~claim~~ Claim 1, wherein said organic group is a hydroxy alkyl group, alkyl group, or carboxy alkyl group~~, and wherein the compound contains one type of said organic group, or two or more types of said organic group~~.

3. The composition of ~~claim~~ Claim 2, wherein said organic group is a hydroxypropyl, dihydroxypropyl, hydroxyethyl, methyl, ethyl, or carboxymethyl group.

~~4. The composition of claim 2, wherein the compound contains one type of said organic group.~~

~~5. The composition of claim 2, wherein the compound contains two or more types of said organic group.~~

~~6~~4. The composition of ~~claim 1~~any one of Claims 1 to 3, wherein the degree of substitution is about 0.2 to about 2.0.

5. The composition of any one of Claims 1 to 4, wherein n is at least 900.

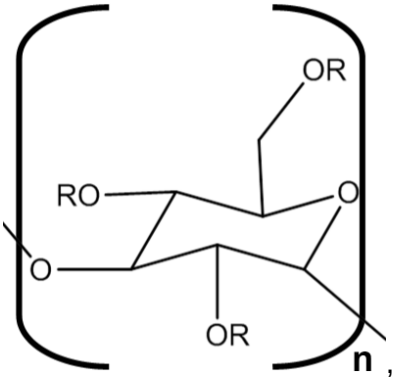
6. The composition of any one of Claims 1 to 5, wherein n is at least 1000.

7. The composition of any one of Claims 1 to 6, wherein the percentage of glycosidic linkages of the poly alpha-1,3-glucan ether compound that are alpha-1,3 is at least 99%.

8. The composition of any one of Claims 1 to 7, wherein the percentage of glycosidic linkages of the poly alpha-1,3-glucan ether compound that are alpha-1,3 is 100%.

~~7~~9. A method of producing a poly alpha-1,3-glucan ether compound, the method comprising:

(a) contacting poly alpha-1,3-glucan in a reaction under alkaline conditions with at least one etherification agent comprising an organic group, wherein the etherification agent is etherified to the poly alpha-1,3-glucan thereby producing a poly alpha-1,3-glucan ether compound represented by the structure:



,

wherein

(i) n is at least ~~6~~800,

(ii) each R is independently an H or the organic group, and

(iii) the compound has a degree of substitution of about 0.05 to about 3.0~~;~~, and the compound contains two or more types of said organic group; and

(b) optionally, isolating the poly alpha-1,3-glucan ether compound produced in step (a).

~~8~~10. The method of ~~claim~~ Claim ~~7~~9, wherein said alkaline conditions comprise an alkali hydroxide solution.

~~9~~11. The method of ~~claim~~ Claim ~~7~~9, wherein the reaction comprises an organic solvent.

~~10. The method of claim 9, wherein the organic solvent is isopropanol.~~

~~11~~~~8~~12. The method of ~~claim 7~~any one of Claims 9 to 11, wherein step (a) further comprises:

(i) heating the reaction; and/or

(ii) neutralizing the pH of the reaction.

~~12~~~~9~~13. The method of ~~claim 7~~any one of Claims 9 to 12, wherein said organic group is a hydroxy alkyl group, alkyl group, or carboxy alkyl group~~,~~

~~and wherein the compound contains one type of said organic group, or two or more types of said organic group~~.

~~13~~14. The method of ~~claim 7~~any one of Claims 9 to 13, wherein the poly alpha-1,3-glucan is in a form of a slurry.

~~14~~15. The method of ~~claim 13~~Claim 14, wherein the slurry comprises poly alpha-1,3-glucan, sucrose, glucose, fructose and a glucosyltransferase enzyme.

~~15~~16. The method of ~~claim 7~~any one of Claims 9 to 15, wherein the poly alpha-1,3-glucan is in a form of a wet cake.

17. The method of any one of Claims 9 to 16, wherein n is at least 1000.

18. The method of any one of Claims 9 to 17, wherein the percentage of glycosidic linkages of the poly alpha-1,3-glucan ether compound that are alpha-1,3 is 100%.