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**METHOD OF PRODUCING AN ATYPICALLY SALT-RESPONSIVE ALKALI-DEACETYLATED POLYSACCHARIDE**

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 (Granted under Title 35, U.S. Code (1952), sec. 266)

A nonexclusive, irrevocable, royalty-free license in the invention herein described, throughout the world for all purposes of the United States Government, with the power to grant sublicenses for such purposes, is hereby granted to the Government of the United States of America.

This invention relates to the novel substantially deacetylated derivative of the native microbial polysaccharide gum polymer produced by an aerobic fermentation of the bacterium, *Xanthomonas campestris* NRRL B-1459. This invention further relates to film-forming solutions of the said derivative and to a method of increasing the viscosity of solutions by adding an inorganic salt.

The above polymer possesses unusual and superior physical properties of specific value for a diversity of industrial uses such as film-formation, as thickeners or bodying agents for edible compositions, cosmetic formulations, pharmaceutical vehicles, and drilling muds, and also as emulsifying, stabilizing, and sizing agents. We have also found that solutions of the above deacetylated polysaccharide complex with a precipitate gluten and albumins and globulins from solution, thus providing an effective commercial means of reducing the B.O.D. of proteinaceous waste disposals from pulp mills, slaughter houses, milk plants, flour mills, and related industrial activities. Conversely, it is also apparent that proteinaceous materials could be employed to salvage unprecipitated residuals from a commercial production of our deacetylated polysaccharide and also thereby facilitate a continuous process rather than a batch process.

Native polysaccharide B-1459 as formed in the fermentation described below is the acetyl-ester form of a polymer comprising mannose, glucose, and glucuronic acid (as the potassium salt) in the approximate ratio of 2:1:1. The acetyl group comprises 4.7 percent of the native polymer and is present as the ester of a sugar al-

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of both inorganic salt and a nonsolvent (viz., 2 percent potassium chloride and 56 percent methanol) whereas the deacetylated form precipitates from a 42-44 percent solution of methanol without salt. Thus, large scale production advantages for the recovery of the deacetylated form are apparent.

A known disadvantageous characteristic of solutions of polyelectrolytes such as gum tragacanth, alginates, and carboxymethyl cellulose is the marked decrease in viscosity in the presence of inorganic salts. Solutions of our deacetylated polysaccharide B-1459 are striking exceptions to the above behavior since the addition of inorganic salt to a 0.25 percent or stronger solution of the deacetylated polysaccharide greatly increases the viscosity. Although we discovered that aqueous solutions of the native polysaccharide B-1459 show only a modest increase in viscosity in the presence of inorganic salt, solutions of our novel derivative show remarkably increased viscosities upon the addition of inorganic salts such as potassium chloride, borax, and calcium acetate.

Our alkali deacetylation of polysaccharide B-1459 resulted from our finding that the native polymer atypically contains 4.7 percent of acetyl groups and from our thought that the unusual viscosity response of the native polysaccharide to salt might be due to the presence of the acetyl groups. To verify this point we substantially deacetylated the native polysaccharide (analysis of residual acetyl, 0.3 percent) and found that the viscosity of an aqueous solution in the presence of a salt is even greater than of corresponding solutions of the native polysaccharide. In other words, the viscosity of a solution (0.25 percent or greater) of our deacetylated polymer is increased by salt to a much greater degree than is the viscosity of a corresponding solution of the native polymer. Table I shows the viscosities of 1.0 percent aqueous solutions of the native and the deacetylated polysaccharides in the absence of representative salts and in the presence thereof. It will be noted that whereas the viscosity of a 1.0 percent solution of the native polysaccharide B-1459 does not increase further upon increasing the potassium chloride or borax concentrations from the level of 0.25 percent to 5 percent, the viscosity of the deacetylated polysaccharide further increases with calcium acetate when the salt concentration is raised from 0.25 percent to 0.75 percent.

TABLE I

[Viscosities (cps.)]

	Native B-1459 (1.0% soln.)				Deacetylated B-1459 (10% soln.)		
	Salt added, percent (wt./wt. polysaccharide soln.)						
	0	0.25	0.75	5.0	0	0.25	0.75
KCl:							
Viscosity at 25° C.....	2,500	4,600	-----	4,600	2,560	5,850	6,400
Increase in viscosity, percent.....	-----	84	-----	84	-----	128	150
Borax (Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub> ·10H <sub>2</sub> O):							
Viscosity at 25° C.....	2,500	4,600	-----	4,600	2,560	5,050	5,650
Increase in viscosity, percent.....	-----	84	-----	84	-----	97	120
Ca(OAc) <sub>2</sub> ·H <sub>2</sub> O:							
Viscosity at 25° C.....	2,500	4,950	6,900	-----	3,000	6,450	9,200
Increase in viscosity, percent.....	-----	98	176	-----	-----	115	206

coholic hydroxyl group, that is, as the O-acetyl. It can be removed almost quantitatively by treating the recovered native polysaccharide with dilute alkali or, preferably, by adding the alkali as part of the precipitation procedure, inasmuch as the alkali also promotes purification. The precipitation of the native form requires the presence

We have also discovered that glycerol-plasticized films of our deacetylated polysaccharide B-1459 have remarkably superior double-fold resistance as compared with similar films of both the native polysaccharide B-1459 and of corn amylose and sodium carboxymethyl cellulose, films of the latter being well known in the art and