REVIEW ON MEDICINAL AND CHEMICAL PROPERTIES OF NATURAL POLYMERS

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Abstract – This article is focused on two main natural polymers namely sodium alginate and pectin. Both natural polymers are widely used in pharmaceutical industry, to enhance therapeutic activity of final dosage forms. Both polymers are used as pharmaceutical aid.

Keywords: - Polymers, Sodium alginate and Pectin

1. INTRODUCTION

Before start the chemical properties of natural polymers, it is necessary to know about polymers. The word poly means "many" (Greek) and mer meaning "parts", so the meaning of polymers is many parts having network of molecules with many repeating units and they a strung together to make long chain that can be either three, two or one dimensional. Polymers are three types.

1.1 Natural Polymers
1.2 Synthetic Polymers
1.3 Semi-synthetic Polymers

1.1: Natural polymers- Natural polymers found in nature and can be extracted. They are often water-based. Types of natural polymers

i). Plant origin **-** Cellulose, Hemicellulose, Glucomannan, Agar, Starch, Pectin, Inulin, Rosin, Guar gum, Locust bean Gum, Gum Acacia, Karaya gum, Gum Tragacanth, Aloe Vera gel.

ii). Animal origin **-** Chitin, Alginates, Carageenans, Psyllium, Xanthum gum.

Natural polymers made very large market in pharmaceutical industry because plenty of properties like non-toxicity, economic, stable easily available and can easily modified by chemical reactions. Natural polymers are biocompatible, so they improve drug release, absorption and solubility of formulations. They are mainly polysaccharides, so they impart nutritional value in formulations.

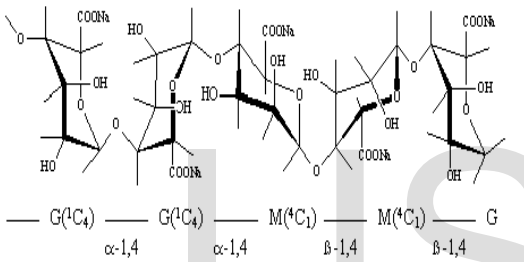
1.2: Synthetic Polymers- A synthetic polymer is refereed as plastics made by human from artificial components rather than natural ones. Examples of synthetic polymers are polythene, polystyrene, poly acrylates olyamides, polyesters, polyurethanes, polysulfides, polycarbonates, nylon, Teflon and polyvinyl chloride.

1.3: Semi - Synthetic Polymers-The chemical treatment of natural polymers to modify physical properties termed as semi synthetic –polymers. Examples are starch, silicons and vulcanized rubber.

2. CHEMICAL PROPERTIES OF SODIUM ALGINATE

Sodium alginate consists mainly sodium salt of alginic acid which is mixture of polyuronic acids composed of residue of D-manuronic acid and L-guluronic acids and is obtained from algae belonging to the order phaeophyceae. It dissolves slowly in water, forming a viscous solution and insoluble in ethanol and ether.

2.1: Structural Formula



2.2: Chemical Formula

(C6 H7 NaO6) n

2.3: Description

White to yellowish brown filamentous, grainy, granular or powdered forms.

2.4: Solubility

Dissolves slowly in water, forming a viscous solution; insoluble in ethanol and ether.

2.5: Stability and Storage Conditions

Stable in dry conditions, should be stored in a well-closed container, in a cool (8-150C) and dry place.

3. MEDICINAL PROPERTIES OF SODIUM ALGINATE

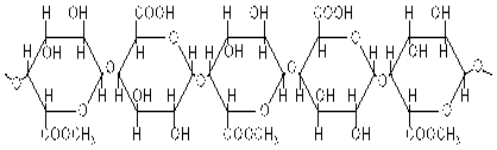
It is used as anti reflux, dental impression material, denture fixatives, wound dressing, encapsulation and film forming properties. Alginic acid powder swells when wetted with water. This has led to its use as a tablet disintegrates for some specialized applications. Alginic acid has also been used in some dietary foods, such as biscuits; it swells in the stomach and, if sufficient is taken, it gives a "full" feeling so the person is dissuaded from further eating. The same property of swelling has been used in products such as Gavisconä tablets, which are taken to relieve heartburn and acid indigestion. The swollen alginic acid helps to keep the gastric contents in place and reduce the likelihood of reflux irritating the lining of the esophagus. Alginate is used in the controlled release of medicinal drugs and other chemicals. In some applications, the active ingredient is placed in a calcium alginate bead and slowly released as the bead is exposed in the appropriate environment. More recently, oral controlled-release systems involving alginate microspheres, sometimes coated with chitosan to improve the mechanical strength, have been tested as a way of delivering various drugs.

4. CHEMICAL PROPERTIES OF PECTIN

Pectin is a purified carbohydrate product obtained from the dilute acid extract of the inner portion of the rind of citrus fruits or apple pomace. It comes chiefly of partially methoxylated polyglactouronic acids. It has been used successfully for many years in the food and beverage industry as a thickening agent, a gelling agent and a colloidal

stabilizer. Pectin also has several unique properties that have enabled it to be used as a matrix for the entrapment and/or delivery of a variety of drugs, proteins and cells.

4.1: Structure



4.2: Description

White, yellowish, light grayish or light brownish powder

4.3: Functional Category

Thickening agent, gelling agent, colloidal stabilizer, film former and carrier for drug delivery to the gastrointestinal tract, such as matrix tablets, gel beads, film-coated dose form.

4.4: Solubility

Pectin's are soluble in pure water, practically insoluble in chloroform and ether. Dry powdered pectin, when added to water, has a tendency to hydrate very rapidly, forming clumps. Clump formation can be prevented by dry mixing pectin powder with water-soluble carrier material.

4.5: Stability and Storage Conditions

Stable in dry conditions, should be stored in a well-closed container, in a cool, dry place.

4.6: Loss on Drying

Not more than 10% determined on 0.5g by drying in an oven at 1050 for 2 h.

5. MEDICINAL PROPERTIES OF PECTIN

Pectin has applications in the pharmaceutical industry. Pectin favorably influences cholesterol levels in blood. Pectin acts as a natural prophylactic substance against poisoning with toxic cations. It has been poisoning with toxic cations. It has been shown to be effective in removing lead and mercury from the gastrointestinal tract and respiratory organs. Pectin has a promising pharmaceutical uses and is presently considered as a carrier material in colon-specific drug delivery systems (for systemic action or a topical treatment of diseases such as ulcerative colitis, Crohn's disease, and colon carcinomas). Pectin is an interesting candidate for pharmaceutical use, e.g. as a carrier of a variety of drugs for controlled release applications. Pectin reduces rate of digestion by immobilizing food components in the intestine. This results in less absorption of food.

6. CONCLUSION

Today polymers have very large market, whether it is synthetic or natural polymers, in pharmaceutical industry natural polymers are extensively used but most commonly it is used as additives. Research has to be done to discover medicinal properties of natural polymers (sodium alginate and pectin in this case) apart from as pharmaceutical aid.

7. REFERENCES

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