Indonesian Journal of Innovation Studies
Vol. 5 (2019): January . Article type: (Innovation in Food Engineering)

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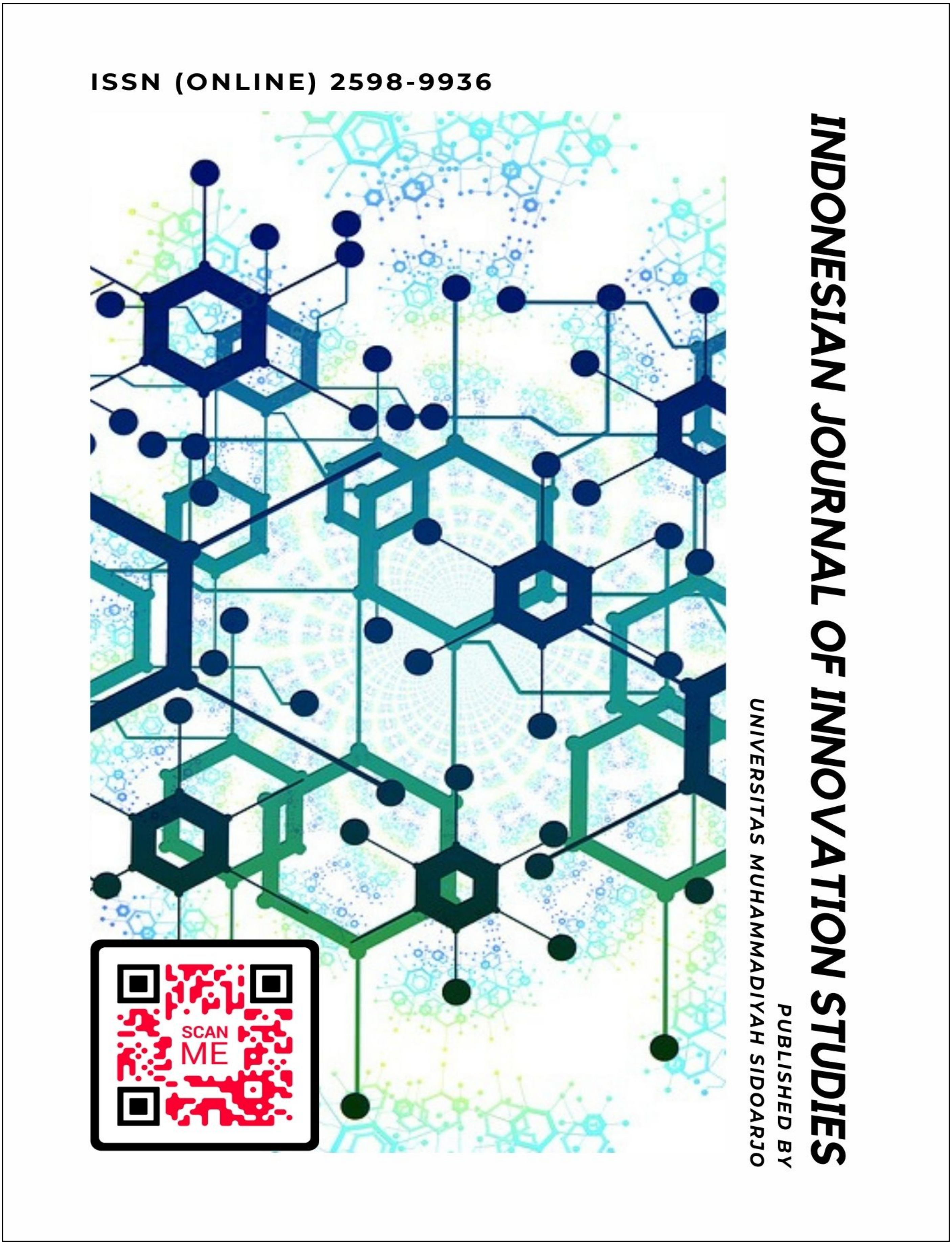
ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo



ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

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Indonesian Journal of Innovation Studies
Vol. 5 (2019): January . Article type: (Innovation in Food Engineering)

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ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

Indonesian Journal of Innovation Studies
Vol. 5 (2019): January . Article type: (Innovation in Food Engineering)

Article information

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Check this article impact (*)

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ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

Indonesian Journal of Innovation Studies
Vol. 5 (2019): January . Article type: (Innovation in Food Engineering)

Technology of Making Pectin from Flaxseed

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Abstract

This paper investigates major points of the technology of making pectin from flaxseed. Case of the study makes both methodological and theoretical points. It concludes, major features of the research for the further investigations

Published date: 2019-01-03 00:00:00

ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

Introduction

Food has always been and will remain the most important issue facing humanity. This is because the human body receives the nutrients it needs.

To achieve this, it is necessary to acquire, study and introduce ecologically pure and naturally occurring pectin in the food industry. We used this technology as a research tool to remove flax.

The stem is vertically growing, thin, cylindrical, with the upper branch. The leaf is lancet-like or linear, with a pointed tip and a straight edge, and has been consecutively occupied in the stem. The flowers are at the ends of the stem and branches. The bowl leaves, the crown and the pollen (paternity) are five, the mother's node is five-fold up. The crown is blue, and the root is purple, like the dusty thread. Fruit - 10-seed, round, dry. It blooms in June-August.

The cultivated flax is of several types and is of considerable length and of great importance. Long-winged flaxseed is mainly planted for fiber, and for the most part it is sown for oil. The length of the fibrous linen is 60–120 cm, the stem does not produce much horns, and the bark does not open when ripe. The height of the stinging flax is 30 to 50 cm and opens when the blossoms are ripe.

Fiber flax is found in Ukraine, Belorussia, Central and Western regions of Russia, Europe, Ukraine, Belarus, Moldova, southern regions of Russia, Western Siberia and North Caucasus and Central Asia. strain.

Flax is a dual plant (planted for oil and fiber) and is extracted from the root of the fruit yellow.

The fruits are well packed in the threshing floor. After drying, the seed is removed, the seed is sown, and the stem is separated for fiber. In large plantations mechanized harvesting, grinding and sowing.

The finished product is a flat, egg-shaped seed. One end of the seed is thin, the other side wide and round; The surface is smooth, glossy, and yellowish-brown. If the appearance of the seed is not shiny, it is not ripe - it is of poor quality. The product is odorless, mucous and greasy, and when exposed to water, the mucous membrane is submerged and submerged.

Theoretical background

Flax seed contains 30-48% dry oil, 5-12% mucus, 18-33% protein, 12-26% carbohydrates, enzymes and carotene. Linamarin glucoside is found in all plant organs (especially on the lawn).

When the seeds are hydrolyzed, they form galactose, xylose, arabinose, sugar, and galacturonic acid.

Flax seed is used as an all-encompassing and relieving drug. Seed is shaken in warm water (1:30) to prepare the mucous solution. As the mucus is in the epidermis layer of the seed, it dissolves rapidly in water.

About 15-20% of the seeds are used for mouthwash. Coconut powder (occasionally crushed whole seeds) is heated to the area of the body.

Flaxseed is used in medicine, in the food industry and in techniques.

Flatten the stem and remove the fiber. This fiber is widely used in the textile industry. As all high plants contain biologically active substances, flax contains similar substances. Among these substances, pectin is an important substance.

Scientists from Ukraine, Russia, Kyrgyzstan, Tajikistan and Uzbekistan have been doing research on developing pectin-derived technology from plants and studying the physico-chemical properties of this polysaccharide for the next 15-20 years. Pectin is not only used for the production of vibrational products in the food industry, but is widely used for its ability to release heavy metals and radioactive nucleotides from the human body.

Pectin, a polysaccharide group, is present in more or less amounts in almost all plants. It is located on the cytolytic membrane of the plant cell along with polysaccharide, fiber, lignin, cellulose, hemicellulose.

Pectin is derived from the Greek word "pectos", which means "a substance which gives rise to certain conditions or to a degree of hardness."

The plant cell membrane is composed of pectates, mainly salts of pectin and pectinic acid with alkaline-earth metals. During hydrolysis of Protopectin, salt and soluble pectin are formed by alkaline-ground metals of hydrolytic acid. As a result, the membrane of the plant breaks down and substances in the cytoplasm are released into the

ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

environment, forming the pectocellulose shell of the cell and serving as a cementing agent, thereby ensuring the integrity of the cell. Hydrogenation of pectin by drowning is reminiscent of proteins.

According to the results presented by the American Chemical Team, pectin includes:

Pectin is a water-soluble substance that contains partially or completely methoxylated polyalacturonic acid. Pectins differ depending on the size of methoxyl group and the nature of vibrations. For example, n-pectin (N-pestin) is a highly etherified pectin. It has an etherification rate of more than 50%, with methanol in every 100 carboxyl groups. Highly methoxylated pectins produce vibrations only when the sugar and acid concentrations are high in the environment.

L-pectin (L-pestin) is a low etherification pectin with an etherification rate of less than 50%.

Low etherification pectin can form vibrations even in non-sugar environments, but in small quantities it is necessary to have a high ionic metal ion. Pectin substances - polysaccharide is a group of natural compounds. They are extracted from plant cells and stored in large quantities of polyalacturonic acid. The carboxyl groups of this acid form partly with the methanol -OSN3 group. Pectin is a physical mixture of pectin with additives (for example, pentose and hexose).

Pectin acids (pectin acids) are high-molecular polygalacturonic acids in which carboxyl group is free and partly ether. Pectinic salts can be normal and sour (pectinates). Pectinic acids are completely demethoxylated and pectin-free chain.

Protopectin (Protopectin) is a natural pectin that is insoluble in water and is made up of mainly pectin species. This species is formed by the reaction of many valence metals with carboxyl groups. The species is formed by the ethers formed between the phosphoric acid residue and the carboxyl groups.

There is also the Hong Kong nomenclature, recognized by many scholars. According to this nomenclature, in addition to polyalacturonic acids, the complex also contains additional monogamins, for example Arabian and Galactan. According to the American classification, pectin can be partially hydrolyzed from protopectin. According to the classification of hooklein, pectin is not dependent on its extraction.

Methodology

According to modern theory, pectin has a linear structure. The substance of the pectin is a chain made up of D-galacturonic acid. The chain has a pyronose configuration with a 1,4-L glycoside bond.

There is another idea about the structure of the pectin molecule. According to this theory, the pectin rings are opposite each other and lie on different planes.

Depending on the location of carboxyl groups and glycoside bonds, polyalacturonic acid is called L-D-galacturonglycol.

Certain plants (sunflower, beans, etc.) have acetylated groups of S2 and S3 in the galacturon chain in the pectin chain.

The heteropolysaccharide characterization of pectin indicates the presence of neutral sugars in it. In other words, in the main chain of polyalacturonic acid is the L-ramnose link with α-1,2 bond.

According to Ress's theory, L-ramnose compounds in citrus, apple, and sunflower pectins are more or less interconnected to the galacturon chain.

Polygalacturons, formed by the sequence of L-ramnoza, are stable and have a length of 25 units. Neutral sugars in the form of side chains or side chains are bonded with the main chain. Long side chains are made up of arabinose and galactose residues, while shorter chains consist of xylose bonds.

The amount of covalent bound nouronides varies widely. Pectin extracted from the sunflower turban under mild conditions is a pure polygalacturon.

The purity of pectin is highly dependent on the supplementation with it. For example, arabs are more susceptible to hydrolysis than pectin acids. Therefore, the quality and quantity of the additives depend on the method of extraction.

According to Pilnle's theory the apple pectin molecule consists of linear parts and branched fragments. Homogalacturonan content is 70-80%. In branching fragments, the 1,2-linked ramnose sections are interconnected with 1,4-bonded D-galacturonpuranozyl compartments to form ramnogalacturonan. The length of such substitution structures, according to Albershein, is 300 L-ramnose and 300 D-galacturonic acids. Long or chains are made up of

ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

arabinose and galactose gardens, in short - mainly xylose residues. Other neutral sugars - mannose, fructose, glucose can be linked to the Ramnogalacturonan chain. The total amount of neutral sugars may vary depending on the type of raw material, extraction and subsequent processing conditions.

Protopectin is a water-insoluble polysaccharide of plant cells. It can be obtained from water-soluble pectin. In the main plant fibers, the protoplasmic membranes of the cells contain multiple valent pectinates of prospecting. In fruit and vegetable juice there is dissolved pectin. Water-insoluble pectin is associated with hemicellulose in plants.

Protopectin is a highly molecular substance with amorphous and optical isotopes, which together with cellulose and hemicellulose form the cell wall. Using polarization and electron microscopes, X-ray diffraction has been shown that pectin substances form microscopic fibril crystals that are spread over the cell wall.

Protopectin forms the basis of the pectocellulose bark and serves as a reinforcing agent to form the cell as a single plane. The primary cell wall pectin has a higher etherification level than the pectin of the middle plates. They contain large quantities of calcium. The total amount of pectin, the percentage of protopectin versus soluble pectin, depends on the type of plant, or the conditions of growth and development.

Literature review

Pectin is present in various parts of all plants (leaves, stems, roots, fruits and seeds). T.K. According to Goponenko and A.F. Fang-Yung, pectin substances are localized differently in plant parts and perform different functions.

The aforementioned scientists, according to the structure of pectin substances, have subdivided them into galacturonans, ramnogalacturonans, arabinans, galactans, and arabino- galactans. The structure of pectin depends not only on the type of plant, but also on its maturity.

X. According to Iost, soluble pectin is found in juice, vacuole, and in intercellular texture of ripe fruits. Soluble pectin acts as a nutrient reserve during metabolism. This affects the process of extraction of pectin and the physicochemical properties of the product.

The biosynthesis of pectin in the cell is well studied. However, theories on the formation of pectin compounds are not sufficiently proven by experiments. Glucose and galactose are the primary products of biosynthesis. At certain stages, they are oxidized, converted to glucuron and galacturonic acid, which results in a chain of polyalacturonic acid, which is transglyucosylated as phosphorous ether. The formation of pectin molecules ethered by the carboxyl groups of the methoxyl groups is probably due to the activation of methoxyl at different stages of the biosynthesis process. The end of the biosynthesis of pectin macromolecules is determined by the addition of neutral sugars and polysaccharides to the polygalacturon chain.

In many plants, the percentage of dissolved pectin increases as the process of maturation approaches. L.V. Donchenko believes that the process is reversed in sugar beet. Consequently, the changes in pectin metabolism in the life of various plants vary widely.

The main difference between pectins of different plants is the amount of monosaccharides in them. The apple pectin contains more galactose, and the rootstock is arabinose. Different pectins have different amounts of galacturonic acid. Each fraction of pectin contains small amounts of galacturonic acid with the addition of ramnoza and other monosaccharides.

Despite the above differences, the quality characteristics of pectins in different plants are the same. In particular, fruit and apple leaf pectins are characterized by high levels of ether. Pectin in sugar beet has been found to contain low ether and free kaboxyl groups.

Pectin is first absorbed in the water and then dissolved. Therefore, it is believed that there is a link between dissolution and dissolution of pectin.

In wet weather, pectin secretes water. Insoluble pectins (they are called clogged pectins or protopectin) are partially in water.

It is the best solvent water for pectin compounds. They are insoluble in 84% phosphoric acid solution, liquid ammonia, glycerol and formalin. In the remaining organic and inorganic solvents, they are practically insoluble.

The solubility of pectin substances depends on the degree of their polymerization and ether. Water solubility increases with increasing ether and decreasing molecular weight. Pectins, completely free from methoxyl groups, do not dissolve in water, although they do not possess a large molecular mass. Two different pectin chains, with different molecular weight, are relatively short and are easily soluble in water, with many methoxyl groups. Pectin, with an elasticity of 66%, is well soluble in water, less than 39.6%. At room temperature you can make 2-3% solution of pectin, but it is not possible to make a higher solution.

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Many valence cations form pectates with free carboxyl groups in pectin. These salts are insoluble in water.

Pectin solutions are optically active and rotate around the axis of the polarized light plane. Specific rotation of highly polarized pectinic acid is [a] D = 280-290o.

Pectin solutions have a double-ray effect. Under the action of enzymes and alkalis, the reduction of the pectin chain decreases its ability to absorb double-sided light. When pectin cleanses and neutralizes carboxyl groups, the ability to absorb double radiation is enhanced.

Main part

The viscosity of pectin solutions is one of its main properties. As the concentration of pectin increases, the viscosity of the solution increases. Pectin solutions with high viscosity are highly appreciated in the production of certain foods - marmalade, confectionery, jelly, zephyr, apple bean, some fruit juices.

The viscosity of pectin in aqueous solution may depend on a variety of reasons: concentration, length of the molecule chain, degree of release, electrolyte availability and temperature. As the molecular weight increases, the viscosity of the pectin solution increases when the other parameters are constant. The viscosity increases with the increase in macromolecule charge (free carboxyl groups) in the same molecular mass. Scientific studies of N. Disev and others have shown that pectins, which are dissolved in varying degrees, have the maximum viscosity at pH = 6: 7, and at pH = 4, the minimum. At pH = 3.5: 8.0, the solution behaves like a band of elementary fibrils. When a small amount of salt is added to the pectin solution, the viscosity drops significantly and the viscosity remains constant no matter what pectin is.

The formation of a structure in the viscosity process is continuous and ensures the continuity of the system. The viscosity of pectins depends to some extent on the molecular mass of pectin. The molecular weight of pectin is based on the nature of its origin. For pectals of apple, pear and plum, this figure is 25000-35000, bean sprouts 16000-25000, orange peel 40000-50000, lemon 23000-71000, cotton yarn The iniki is 30000-55000.

However, the molecular weight of pectin depends not only on the nature of the plant, but also on the technology of pectin extraction. It is possible to obtain from this raw material a pectin with different molecular weight under different technological effects - temperature, extragent type, ambient pH, extraction duration and the like.

Pectin substances can be coagulated from any polysaccharides under the influence of one or another substance, particularly electrolytes. D.K Pathes., B Study of coagulation of polysaccharides under the influence of electrolytes. Coagulation of pectin substances depends on many factors. Coagulation of pectin is directly proportional to the amount, molecular weight, free-carboxyl and hydroxyl groups, coagulation solution and coagulation agent concentrations.

In sugar beet making businesses, pectin in diffusion juice is coagulated with the effect of calcium hydroxide.

N. Ben-Shalom found that the coagulation of pectin is influenced by flavanoids. If the level of ether exceeds 50%, pectinic acids are precipitated by calcium.

Pectin is insoluble in organic matter, so it can be submerged under the influence of organic solvents - methanol, ethanol, isoproponol, acetone. Pectin production is widely used for the removal of pectin from its solutions under the influence of ethanol and acetone. It is also important to remember that acetone produces a denser and more pectoral sediment. When coagulating pectin with ethanol, a product is produced that meets the standard requirements.

The deposition of pectin by multicolored metals has been used for many years in production. Quaternary ammonium compounds can also be used to extract pectin from solutions.

Acid and alkalis have different effects on pectin. Natural protopectin is soluble even in low temperatures under the influence of acids. Some scientists believe that acid eliminates many valence metal ions in the pectin, while others argue that it hydrolyses the cellulose-pectin complex.

Under the influence of strong mineral acids on highly ejected pectins, the saponification of methoxyl and acetyl groups in pectinic acid occurs. As the temperature rises, this process can accelerate and even cause pectin breakdown. For example, beetle pectin was completely degraded for 12 h at 78-80 ° C and pH = 0.8-1.0MH.

It has been shown that hydrolysis of ester groups occurs not only in acids but even in the action of alkalis. Under their influence, pectin is destroyed at room temperature. It is also important to recognize that alkaline dispersion is faster than acidification. Excessive concentration of alkaline causes complete breakdown of protopectin.

ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

Analyses

In practice, pectin dissolved in plants does not play the role of raw materials. As a rule, a person consumes dissolved pectin directly with plant fruit. Different juices, dried and dried fruits, vegetables, and the like are stocks of molten pectin that are consumed directly by humans. However, for the purposes of direct application of pectin in the plant, this substance is hydrolyzed and then extracted in protopectin in plants. Therefore, the development of pectin industry is one of the major problems not only in the food industry, but also in medicine, geology, printing, electricity, and other industries, with the aim of expanding the production of various compounds and plant-based compounds.

The most important feature of pectin is the cleansing of the body from heavy metals. N. Kolmakova suggested using pectin as a food fiber. According to the author, dietary fiber (fiber, lignin, pectin) prevents the body from developing a number of cancers. In addition, according to N. Kolmakova data, pectin can be consumed by diabetes mellitus, and pectin reduces cholesterol levels in the body.

Pectin as a soluble food fiber has a positive effect on human health. Pectin, in addition to being a health-improving agent, has a number of technological features: high vitality. Based on the above, F. Kopilova recommends the use of apple pectin in marshmallow production. According to the author, apple pectus enhances the aroma and taste of the finished product; apple cuttings reduce from 58% to 15-30%.

Pectin is widely used in various sectors of the economy: food, pharmaceuticals, textile, printing, electricity, medicine, geology and more.

1. For the food industry:

a) its solution in water (sugar, gels, gels, masses) for immediate nutrition;

b) manufacture of confectionery products (marmalade, marshmallow, candy interior);

c) for canning industry products (confectionery, silk);

d) for the production of soft drinks (soft drinks);

e) for the production of dairy products (extract of casein protein from ice cream, cheese, milk whey);

e) for the production of oil and fat industry products (mayonnaise);

j) For the production of bread and bakery products (for the purpose of improving the quality of bread and increasing the durability of bread by adding milk whey):

2. For technical purposes:

a) production of galacturonic acid;

b) drilling operations in geology;

c) as a concentrate of the textile industry;

d) stamping press products;

3. In the field of health:

a) as a special feed to purify the body from heavy metals and radioactive nucleotides;

b) for the treatment of digestive organs in young children, for the treatment of adults with polyarthritis and for the treatment of ulcers;

c) for cholesterol control, intracellular respiration and normal metabolism;

d) for the preparation of antiseptic and blood-restoring drugs;

In the confectionery production the main feature of pectin is the formation of vibrations. Pectin is used for the production of post-marmalade products (marshmallow, rolled marmalade) and confectionery (rolled and fruit rolls), which are in great demand among the population.

To produce 1 ton of marmalade, weigh 18 kg of citrus pectin, 21 kg of cotton pectin and 26 kg of sugar beet.

ISSN 2598-9936 (online), https://ijins.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

Discussions

Pectin-containing foods have great effects in the treatment of atherosclerosis. They regulate cholesterol in the body. For this reason, patients with a limit switch (atherosclerosis, ischemia, obesity, etc.) are assigned a vegetable and fruit diet.

Thus, pectin foods, due to their beneficial biological properties, are a dietary and medicinal value.

The primary task is to extract polysaccharides from carbohydrates containing flax.

40 g of raw material (flax) (extracted and sifted through a sieve No.5,5) was extracted in 1: 3 boiling chloroform solution for complete purification of residual oils.

After extraction with chloroform, the raw material was filtered and dried. The crude residue was extracted twice in module 1: 3 in boiling alcohol (ethanol) at 82 ° C. Crude filtered out by filtering. The extracts were combined, evaporated, and graphically analyzed on FN-12 paper using a chromatograph, butanol.1-pyretin-water (6: 4: 3).

Thus, flaxseed was found to contain free monosaccharides such as galactose, glucose, fructose, sucrose, and fructtoamigo saccharides.

The crude residue was extracted with alcohol and subsequently processed with hot water in a water bath (70-80 ° C). Extraction was performed on triplets with hydrodynamics 1:20, 1:15, 1:10. The extracts were combined, slightly evaporated, and diluted with 1: 3 alcohol. The resulting sediment was centrifuged for 10 minutes (6000 rpm) and then dried with alcohol. The product was 2g. Water-soluble polysaccharides are light gray, amorphous powder, are well soluble in water, the solution is fluid.

Pectin was extracted at 75-80 ° C when polysaccharide was extracted with a solution of 0.5% saline acid and ammonium oxalate (1: 1). The process was performed twice at 1:10, 1: 5 hydromodulas. The extracts were combined, evaporated, dialysed and re-evaporated and then precipitated with alcohol. The sediment was removed by filtration, the filtrate was washed with alcohol and dried. The product was 5.15 gr.

Conclusion

Pectin is a white amorphous powder substance that is well soluble in water and forms a viscous solution.

In the Republic, flax is grown mainly for oil production. Its waste is used for fodder production. Since zinc contains mainly pectin in the substrate, I have done research on the technology of processing these flavors without forage. When I study the chemical composition of zinc in the laboratory, it was found that 13% of the content of pectin is pectin.

Acknowlodgement

We hereby say thankyou to *Tashkent Institute of Chemical Technology* for supporting our research.

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