5th International Conference on Research Developments in Applied Science, Engineering & Management (AEM- 2019)

Mahratta Chamber of Commerce, Industries and Agriculture ,Pune (India) AEM- 2019

23rd February 2019, www.conferenceworld.in ISBN: 978-93-87793-72-9

EXTRACTION OF PECTIN FROM AN ORANGE PEEL

[1]Zaid Sayed, [2]Adnan Sadar, [3]Nipun Jain, [4]Atharva Vidye, [5]Vaishnavi Patil, [6]Sankalp Shobit Singh, [7]Aprajita, [8]Sanjana Kolamkar, [9]Shahid Sayyad, [10]Rujuta Kumbhare

[1-10]Department of Engineering, Sciences and Humanities (DESH)

Vishwakarma Institute of Technology, Pune(India)

ABSTRACT

In this work we haveexamined the characteristics of pectin extracted from orange peel. Pectin, which is a family of complex polysaccharides that contains 1, 4-linked x and β galactosyluronic acid residues was extracted using alcohol precipitation method from peels of oranges. The results showed that the color of pectin from orange peel was pale yellow. Pectin is soluble in hot and cold alkaline water. The moisture content and ash was found higher in pectin. The overall results showed that the pectin from this source was suitable for industrial use.

Keywords: *orange peel, pectin, pale yellow, alcohol precipitation*

I. INTRODUCTION

Pectin (derived from Greek meaning ––congealed and curdled) is a structural hetero-polysaccharide contained in the primary cell walls of terrestrial plants

(2). Orange trees are widely cultivated in tropical and subtropical climates for the sweet fruit, which is peeled or cut (to avoid the bitter rind) and eaten whole, or processed to extract orange juice, and also for the fragrant peel

(3). Pectin are a class of complex polysaccharides found in the cell walls of higher plants, where they function as a hydrating agent and cementing material for the cellulosic network

(4). 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

(5).Pectin is a naturally occurring biopolymer that is finding increasing applications in the pharmaceutical and biotechnology industry. 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

ISBN: 978-93-87793-72-9

(6). Oranges are citrus fruits which consist of two parts namely the peels (rind skin) and pulp. These two parts are easily separated from each other with the pulp serving as the edible parts of the fruit while the peels as a good source of pectin. Pectin is a naturally occurring biopolymer that is finding increasing applications in the pharmaceutical and biotechnology industry.

Pectin is a complex mixture of polysaccharides that makes up about one third of the cell wall dry substance of higher plants. Much smaller proportions of these substances are found in the cell walls of grasses. The highest concentrations of pectin are found in the middle lamella of cell wall, with a gradual decrease as one passes through the primary wall toward the plasma membrane. Pectin is a purified carbohydrate product obtained from the inner portion of the rind/peels of citrus fruits. It consists chiefly of partially methoxylatedpolygalacturonic acid. Pectin is capable of forming gels with sugar and acid under suitable conditions. It is formed almost universally in plant cell of all species suitable for use in the production of sugar jellies and industrial production of apple pomace, citrus peels and sugar beat chips(1). Although pectin occurs commonly in most of the plant tissues as a cementing substance in the middle lamella and as a thickening on the cell wall, the number of sources that may be used for the commercial manufacture of pectins is very limited(4).Citrus pectins are light cream or light tan in colour; apple pectins are often darker. The pectin is separated as a stringy gelatinous mass, which is pressed and washed to remove the mother liquor, dried and ground(4). Pectin is an essentially linear polysaccharide.

II. MATERIALS AND METHODS

2.1 Material: HCL, Acetone, Ethanol, orange peel, Distilled water.

2.2 Sample preparation:

Oranges were physically examined to ascertain their wholesomeness. They were split/cut into four parts and the peel removed (a soft white substance inside the skin of citrus fruits), then the peels were further cut into smaller pieces for easy drying and washed with large quantity of water to remove the Glycosides the bitter taste of the peels and then weighed with a digital weighing balance and air dried.

Pectin is extraction from prepared sample. The 100 gram dried peels were separately transferred into a beaker (1000 mL) containing 500 mL of water 2.5 mL hydrochloric acid was added to give a pH of 2.2. Each of the fruits was then boiled for 45 min separately. Thereafter, the peels were removed from the extracts by filtering through a filter paper filter study. The cake was washed with 250 mL boiled water and the combined filter allowed to cool to 25°C to minimize heat degradation of the pectin. The extracted pectin was precipitated by adding 200 mL 95% ethanol to 100 mL of the extracted pectin with thorough stirring, left for 30 min to allow the pectin float on the surface. The gelatinous pectin flocculants was then skimmed off. The extracted pectin was purified by washing in 200 mL ethanol and then pressed on a nylon cloth to remove the residual HCl and universal salt. The resulting pectin was weighed and shredded into small pieces and was air dried. Finally, the dried pectin was further reduced into smaller

ISBN: 978-93-87793-72-9

pieces using a pestle and mortar and weighed using a digital weighing balance. Percentage yield of pectin from initial wet peels was then determined on both wet and dry weight basis.

III. ANALYSIS

QUALITATIVE TEST

Pectin colour : Dried pectin samples were observed visually and the colours of samples were noted down.

Solubility in hot and cold water (dry pectin): Initially, 0.03g of the pectin samples were taken in different conical flasks with 10 ml of 95% ethanol added followed by 50 ml distilled water. The mixture obtained was shaken vigorously and a suspension was formed which was then heated at 85-95°C for 15 min using magnetic stirrer. Solubility in hot and cold alkali (NaOH)Initially, 10 ml of 0.1N NaOH taken in a conical flask, 0.1g of dry pectin was added and was heated at 85-90 °C for 10- 15 minutes using magnetic stirrer.

QUANTITATIVE TEST

Equivalent weight determination:

Pectin sample (0.5 g) was weighed into a 250 mL conical flask and moistened with 5 mL ethanol, 1.0 g sodium chloride was added to the mixture followed by 100 mL distilled water and few drops of phenol red indicator. Care was taken at this point to ensure that all the pectin had dissolved and that no clumping occurred at the sides of the flask before the solution was then slowly titrated (to avoid possible de-esterification) with 0.1 M NaoH to a pink colour at the endpoint. Equivalent weight was calculated using the equation below:

Equivalent

Weight = (Weight of Pectin Sample / Volume of Alkali (cm3) × Molarity of Alkali) × 100%

IV. RESULT AND DISCUSSION

In this study, investigated the effect of temperature and acid condition on the extraction of pectin from fruit peel of citrus medicate color of it is important the pectin was dried by sun has light yellow. Pectin is widely used as a texturizer, stabilizer, and emulsifier in a variety of foods and other industries. Its use as a fat and sugar replacer in low-calorie foods is expected to increase in the future with increasing demand for these foods. In spite of its availability in a large number of plant species, commercial sources of pectin are very limited. Gelation is the most important property of pectin that makes it an important component of food and Pharmaceutical products. In our study we have worked on effect of pH, temperature and time on isolation of pectin. We could find out the Optimum parameters (pH, temperature and time) for different isolated pectin sample. The yield of pectin obtained is highest in turbid extract, but this might be due to some suspended impurities present in the extract.

ISBN: 978-93-87793-72-9

V. FIGURES AND TABLES

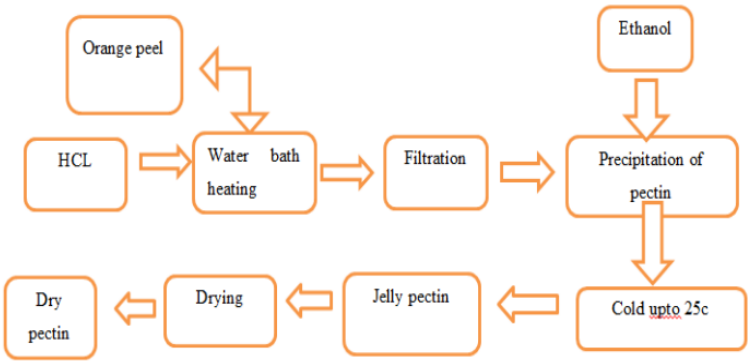

Fig. 1: Extraction process of pectin

Fig 2. Adding required chemicals to 100gm of orange peels

 ISBN: 978-93-87793-72-9

Fig.3 Boiling of peels

Fig.4 Separating the cake

Fig. 5 Separating the pectin with nylon cloth

 ISBN: 978-93-87793-72-9

VI. CONCLUSION

In this experiment, we have extracted pectin from orange peel. Pectin has many uses and has high industrial value. The main use for pectin is as a gelling agent, thickening agent and stabilizer in food. Pectin is contained in the primary cell walls of terrestrial plants and hence helps in the cell growth, cell differentiation and increases the rigidity of plant tissue. We have tested the application of pectin as a gelling agent and also observed the improvement in the rigidity of plant cell wall.

REFERENCES

1. V.O. Aina, Mustapha M. Barau, O.A. Mamman, Amina Zakari, HauwaHaruna, M.S. Hauwa Umar and Yagana Baba Abba, ―Extraction and Characterization of Pectin from Peels of Lemon (Citrus lemon), Grape Fruit (Citrus paradisi) and Sweet Orange (Citrus sinensis), British Journal of Pharmacology and Toxicology 3(6): 259-262, 2012
2. Pranatishrivastava, RishabhMalyaviya, ―Source of Pectin Extraction and Its Application in Pharmaceutical Industry – An Overview, Indian Journal of Natural Products and Resources Vol. 2 (1) March 2011, pp 10-18.
3. ShekharPandharipande, HarshalMakodeb ―separation of oil and pectin from orange peeland study of effect of ph of extracting mediumon the yield of pectin, Journal of Engineering Research and Studies E-ISSN 0976-7916
4. Beli R. Thakur, Rakesh K. Singh , Avtar K. Handa& Dr. M. A. Rao ―Chemistry and uses of pectin — A review, http://www.tandfonline.com/loi/bfsn20.
5. PornsakSriamornsak, ―Chemistry of Pectin and Its Pharmaceutical Uses: A Review‖.
6. Dalia A. Abdul, ―preparation and characterization of pectin from peel of kabad (citrus medica) fruit in sulaimani city, Iraqi Kurdistan Region.
7. Colin D. May, H.P. Bulmer Pectin, Plough Lane, Hereford HR4 0LE, ―UK Industrial Pectins: Sources, Production and Applications, Carbohydrate Polymers 12 (1990) 79-99.
8. Devanooru Krishnamurthy Bhavya, Shrilakshmi and Rao Suraksha, ―Value Added Products from Agriculture: Extraction of Pectin from Agro Waste Product Musa Acuminata and Citrus Fruit, Research Journal of Agriculture and Forestry Sciences __ Vol. 3(3), 13-18, March (2015)