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Study of Alginate *Sargassum Filipendula* with FTIR Confirmation

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ABSTRACT: The purpose of this study is to get a combination of treatment and duration of extraction and purification with isopropanol to obtain a high yield of alginate from seaweed thallus part *Sargassum filipendula*. This study uses RAK with two factors, the first part of the plant: intact, tip, root and leaf. The second factor is the length of extraction that is: 1, 1.5 and 2 hours with 3 replications. The best results were purified by isopropanol 85%, 90% and 95%. The best treatment is at the base with a 2 hour long extraction with fresh seaweed conditions and purification with 95% isopropanol produce alginate salt to yield 26.96%, 14.31 cps viscosity and ash content of 35.25. Hg content of 0.27 ± 0.05 ppm, and Pb of 6.30 ± 0.05 ppm, still under provisions in force. Confirmation FTIR, OH hydroxyl group around 3354 cm-1. The presence of the carbonyl group (CO) at 1618 cm-1, in the area of 1487 cm-1 for the bond between (CC) at 1068 cm-1 and the building blocks of salt alginate is the presence of carbonyl C = 0 and the hydroxyl group (OH) and the Association of carbon and carbon COC.

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INTRODUCTION

Brown algae are often called kelp or rockweed, sources for alginate product, the type of polysaccharide consisting of units of mannuronic acid and guluronic acid [1]. In Indonesia, found a lot of seaweed producer of alginate (Alginofit) considerable potential to be developed as an industrial raw material alginate. Alginate is a compound pikokloid produced from brown seaweed (Phaeophyceae), that Macrocytis, Laminaria, Aschophyllum, Nerocytis, Eklonia, Fucus, Turbinaria, and Sargassum [2].

Utilization of alginate in the form of sodium alginate, which is an alginate salts are soluble in water. Another type of alginate is a water-soluble potassium or ammonium alginate. While alginate insoluble in water are calcium alginate and alginic acid and derivatives or derivative products are important is *propylene glycol* alginate.

Efforts in producing alginate has been carried out through research, but the constraints are still not achieving an optimization of the extraction process. According to Winarno [3], the optimization of the extraction process is very important, especially because the acid hydrolysis process if the extraction is done in acidic conditions and the temperature is too high causing the alginate susceptible to hydrolysis thereby decreasing the yield and quality of flour.

MATERIAL AND METHODS

This research was conducted with the experimental method as a = factorial RAK end A2- A1 = A3 = = base of the leaf, A4 = intact. Time in use yaiu B1, B2, B3 = 2 hours, 1.5 hours, and taken the best 1hr continued for Fresh and Dry for P1, P2 and P3 = isopropanol 85%, 90%, 95% .Analisa data by test F ..perhitungan two stages.

Phase I study procedures include Sargassum filipedula on the whole, tip, root and leaf immersion performed using a 0.5% HCl for 30 minutes (ratio 10: 1, v/w), then continued immersion in NaOH 0.5% during 30 minutes (ratio 10: 1, v/w). Next is the extraction treatment with Na2CO3 7.5% (ratio 10: 1, the temperature of 500C, for 1 hour, 1.5 hours, and 2 hours), and then carried out the destruction (blended for 5 minutes), followed by filtration, which then produces filtrate and residue. The filtrate was carried further step of acidification (pH 2.8) for 5 hours with a solution of HCl 5% (ratio 10: 1, v/w), then blanching process with CaOCl2 1% (ratio 10: 1, v/w), further precipitation (pH 10.2) for 5 hours NaOH 10% (ratio 10: 1, v/w). After that in the centrifuge for 5 minutes will result in the form of liquid sludge are then added Isopropanol 95%, then dried at a temperature of ± 500C for 17 hours until the salt produced alginate.

Phase II study procedures include *Sargassum filipendula* wet conditions or dry soaking using a 0.5% HCl for 30 minutes (ratio 10: 1, v/w), then continued immersion in 0.5% NaOH for 30 minutes (ratio 10: 1, v/w). Next is the extraction treatment with Na2CO3 7.5% (ratio 10: 1, the temperature of 500C, for 1 hour, 1.5 hours, and 2 hours), then the destruction is done by way of blended for 5 minutes, followed by filtration, which was then produce filtrate and residue. The filtrate was carried further step of acidification (pH 2.8) for 5 hours with a solution of HCl 5% (ratio 10: 1, v/w), then blanching process with CaOCl2 1% (ratio 10: 1, v/w), further precipitation (pH 10.2) for 5 hours with 10% NaOH (ratio 10: 1, v/w). After that in the centrifuge for 5 minutes will result in the form of liquid fluid and sediment deposition. Where sediment is added Isopropanol 95%, then dried at a temperature of ± 500C for 17 hours until the salt produced alginate.

RESULTS AND DISCUSSION

The Yield of Salt Alginate

The mean yield of salt alginate research results ranged from 16.62 to 24.94%. From Figure 1, it appears that the longer the immersion time thallus with HCl, the value of the alginate extraction yield increases, because HCl will break down the cell walls of seaweed. The use of HCl in alginate, will facilitate the solution of the cell wall so as to facilitate the extraction, HCl is a strong acid will be ionized perfect [3].

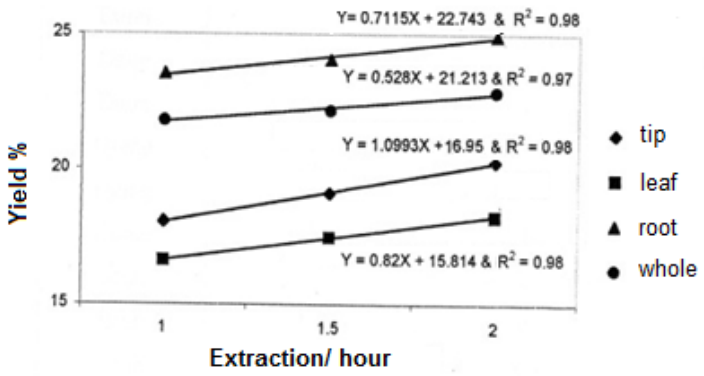

Figure 1. Graph long influence of extraction to the yield condition of seaweed Sargassum flipendula.

Alginate Purity Test

Alginate purity test done by eliminating other compounds such as the laminarian, mannitol, and other salts, leaving only alginic acid. Qualitative testing alginic acid can be seen in Table 1 that shows the fresh seaweed has the highest yield when compared with dried seaweed. Due to the fresh seaweed, HCl effectively penetrate the cell wall due to H2O as media, so that the alginic acid soluble extract materials and yield increases. Phenomenon in the process of making a liquid syrup from starch material if given HCl will produce syrup with a mixed composition of simple sugars [4].

Table 1. Yield of Alginate Seaweed

No.	Alginate Seaweed	Salt Ingredients (grams)	Alginate Acid (%)
1.	Dry	51,23	25,16
2.	Fresh	53,92	26,96

Test of Functional Groups

Functional group test conducted by using infrared spectrophotometer. Principle when infrared light is passed through the footage of organic compounds, the number of frequencies to be absorbed. While other frequencies will be forwarded each compound only absorbs infrared rays with a certain frequency. The light absorbed will increase the amplitude of vibrational motion in molecules. Therefore every different type of bond has a different characteristic vibration frequency, then this method can be used to analyze the functional groups in a compound [5]. Region at infrared spectrum above 1200 cm-1 shows the spectrum or the peak caused by the vibrations of chemical bonds or functional groups in the molecule chemistry, whereas the area under the 1200 cm-1 shows the band due to vibrations throughout the molecule and its complexity is known as the area fingerprint. The fact which indicates that functional groups can be identified by using typical vibration

frequencies, resulting in spectophotometric Infrared is the simplest and often the most reliable detection in determining the class of compounds.

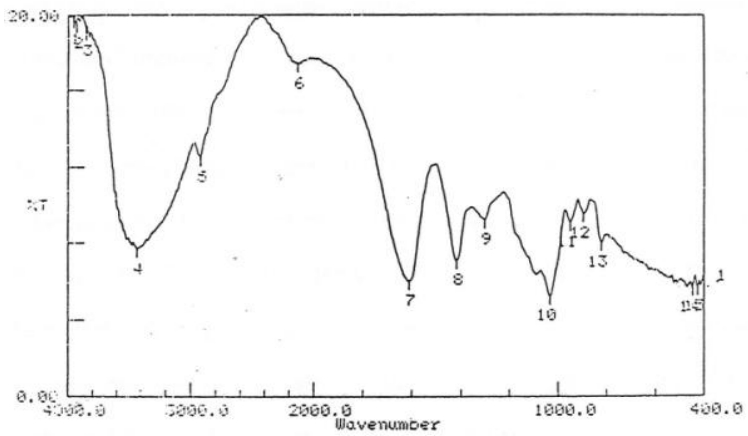

Figure 2. IR spectra of alginate salt footage standard preparative use infra-red spectrophotometer.

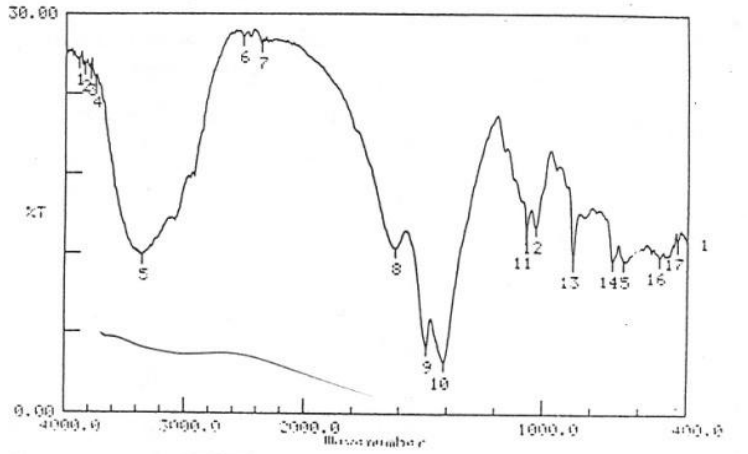

Figure 3. IR spectra of alginate salt footage preparative sample using an infrared spectrophotometer.

From Figure 3, shows that the infrared spectrum of the sample (no. 5) with overtones of about 3354 cm-1, absorption bands indicate presence of hydroxyl (OH) and no. 6-7 no air. Uptake in the area of 1618 cm-1 absorption bands indicate presence of the carbonyl group (CO) (in no. 8), whereas no. 9 with absorption bands at 1487 cm-1 region showed a bond between the carbon (CC). At no. 10, absorption at 1413 cm-1 region showed a bond between the carbon (CC) and the no. 11 with absorption 1068 cm-1 indicate the presence of COC bond, ether (ketones). While at no.12 with absorption 1030 cm-1 indicate the presence of COC bond, and at no. 13 absorption at 873 cm-1 area is no C-H bond. It can be concluded that the compound constituent is a compound having a carbonyl group (C = O), hydroxyl (OH) and carboxyl group (C = O) and COC bond.

CONCLUSION

The best treatment is obtained on the base of fresh seaweed are extracted for 2 hours with 95% isopropanol. The resulting powder was tested alginate salt functional group by IR spectrophotometer having COOH groups, OH, and COC identical with alginates. For further research can be used as a thickener emulsifier

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