

The stages of extracting chitosan from fish scales can be carried out through 5 stages, namely (Susanti and Purwanti, 2020): Material preparation, Deproteinization Stage, Demineralization Stage, and Deacetylation Stage.



Figure 4. Processes for preparation of chitin from fish scales
(Source: Kumar al., 2021)

The preparation stage is carried out as follows: Fish scales are washed thoroughly and then dried for 1 day. Fish scales that have been dried, blended until smooth.

The deproteinization step was carried out as follows: The fish scale powder was weighed and put into a glass beaker and 3.5% NaOH solution was added with a ratio of solid: solvent = 1:10. Then heated and stirred using a magnetic stirrer constantly for 2 hours at a temperature of 65°C (deproteinization stage), then filtered. The precipitate was then neutralized with distilled water until the pH was neutral and then dried.

The demineralization step was carried out as follows: The dried precipitate was then put into a glass beaker and then 1 N HCl solution was added with a ratio of solid: solvent = 1: 15 for 30 minutes at room temperature. The precipitate was then filtered, neutralized with distilled water until the pH was neutral and then dried. The product of this process is called chitin.

The last stage is the deacetylation stage, the dried chitin is then put into a glass beaker and added 50% NaOH solution and heated at 90°C for 1 hour with a ratio of solid: solvent = 1: 10. After that it is filtered until the pH is neutral, and dried (chitosan).

Chitosan has the potential to be used as a food preservative, because chitosan has a positive charge so that it can inhibit microbial growth and is able to bind to negatively charged compounds such as proteins, polysaccharides, nucleic acids, heavy metals and others. In addition, the chitosan molecule has an N group which is able to form amino compounds which are components of protein formation and has an H atom in the amine group which makes it easier for chitosan to interact with water through hydrogen bonds. (Rochima, 2007).

One of the processed fish products that can be preserved with chitosan is fish balls. Meatballs are a food product that is favored by many people because of the relatively cheap price, made from fish meat, or beef which is mashed and added with sago flour. The meatballs are shaped round either manually or by using a ball-making machine.

The application of chitosan as preservation of fish balls is by coating the fish balls, known as edible coating. The procedure was first to make a solution of chitosan. The preparation of a chitosan solution was carried out based on the method carried out by Wulandari (2015), namely as follows: Chitosan obtained from fish scales was dissolved in 1% acetic acid solution. The next stage is coating the fish balls by soaking the fish balls in a chitosan solution for 60 minutes at room temperature.

Erlina (2021) research results show that fish balls coated with chitosan are more durable than fish balls that are not coated. The benefit of chitosan in general is that it can increase the durability of various food products such as sausages, nuggets, fruit/vegetable juices, tofu, salted fish, wet noodles, processed fish products, fruits, and luncheon.

Conclusion

Based on the literature study, information was obtained that fish scales can be used as food products directly or indirectly. The direct use of fish scales into food products is made of snack chips. Indirect use as food products, namely 1) Fish scales are extracted into gelatin and the gelatin is used as raw material for jelly candy. 2) Fish scales are extracted into chitosan and the chitosan is used as a preservative for food products such as fish balls, fish sausages and others.

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