Academic Journal of Polymer Science
ISSN: 2641-8282

Juniper Publishers
key to the Researchers

Mini Review
Volume 3 Issue 1 - August 2019
DOI: 10.19080/AJOP.2019.03.555601

Academ J Polym Sci

Aggregation of Values for Shrimp Shell

Saboya JPS[1,2]*, Silveira CLL[2], Silva GGN[2], Nascimento FA[2] and Barros FAQ[1,2]

[1]*Institute Technological Education Center (Centec), Brazil*

[2]*Marta Maria Giffoni de Sousa State Vocational School, Brazil*

Submission: July 25, 2019; **Published:** August 06, 2019

***Corresponding author:** Saboya JPS, Institute Technological Education Center (Centec), Brazil

Abstract

The discarding of the head and shrimp carapace by the fishing industries represents a great waste, because besides these parts are nutritious, values can be added to these tailings by extracting chitin converted to chitosan. Considering the losses during the extraction process, about 7.0 thousand tons of chitosan could be generated. However, less than half of this waste is reused. Chitin and chitosan have several biological benefits and high potential properties for the industry.

Keywords: Chitin; Chitosan; Deacetylation; Environmental problems; Biopolymer

Introduction

An industry concern today is the proper disposal of their waste, so that environmental damage is increasingly reduced. As shrimp and crab waste generation is significant and such waste is chitin, proteins, calcium carbonate and pigments, there has been great interest in their reuse, as an alternative to their final disposal, with a view to the development of value-added products [1]. These wastes are usually clandestinely buried (landfilled) or thrown into the sea or rivers, causing environmental problems [2]. Only 5% of shrimp waste is used in any way, mainly for animal feed, the rest is discarded and represents an environmental problem. Limitations to the use of this type of waste include its perishability and seasonal production and decomposition usually occurs before any possible use. The β-(1-4) -N-acetyl-D-glucosamine biopolymer is the most abundant found in nature after cellulose. Its usual name is chitin, which derives from the Greek word chiton, meaning a protective coating for invertebrates. Chitin is found in crustacean exoskeleton, fungal cell wall and other biological materials. Due to its versatility, it can be used as a flocculating agent in wastewater treatment, as an adsorbent in oil clarification and mainly for chitosan production. Chitin's main commercial sources are shrimp, crab and lobster waste. Shrimp have in its composition about 5-7% of chitin, and crab, of 15-20%. From the alkaline deacetylation of chitin is obtained chitosan, a biodegradable copolymer consisting of D-glucosamine units containing a free amino group. Chitosan can be used in many industrial applications, including biocompatibility, biodegradability, bactericidal, emulsifying and chelating properties [1,3].

Over the past decade, much interest has been developed in biopolymer-based materials due to their biocompatibility, biodegradability, non-toxic and non-allergic nature. Studies have been done on the main features of the inherent properties of chitosan, its modification and use in biomedical engineering particularly towards anti-inflammatory and wound healing. Chitin and chitosan have biological benefits and antimicrobial properties and high valuable potential for wound healing, are attractive for wound care. Applications of chitin nano whiskers are mainly used as reinforcing polymer nanocomposites, but also to prepare scaffolding, hydrogels and dressings, as industry adsorbents, water purification, for protein immobilization, transformation of bacteria by exogenous genes, emulsion stabilization oil-in-water and nematic gels, formation of CaCO3 / chitin-whisker hybrids and as carbon precursors [4].

The deacetylation reaction of chitin for conversion to chitosan occurs by digestion in sodium hydroxide solution (40-60%) using times ranging from 30 minutes to 24 hours and relatively high temperature from 50 to 130°C [5]. The scientific and economic interest allowed for these polymers and their derivatives continues to grow. Its sales went from 2 billion in 2000 to nearly 63 billion in 2015. This interest is closely related to its physicochemical and biological properties, which allow for many common and potential applications in various and diverse fields [6].

Due to growing interest in this biopolymer - the worldwide demand for chitin (chitosan is its deacetylated derivative) in 2015 was 60,000t new sources of chitosan as well as new ex-

traction methods are currently under research by many scientists. An important issue is the development of methodologies according to the recommendations of the trend of sustainable production, i.e. considering issues such as, for example, reduction in energy consumption, reagent reuse and recycling or reduction in the amount of waste generated [7].

Conclusion

Due to the growth of shrimp farming and the expansion of the crustacean processing industry, it is of paramount importance to reduce the environmental impact resulting from the disposal of waste generated by these industries. Thus, the use of shrimp shells for chitin and chitosan production has become a low-cost alternative for the use of these residues.

References

1. Moura C, Muszinski P, Schmidt C, Almeida J, Pinto LAA (2006) Quitina e quitosana produzidas a partir de resíduos de camarão e siri: avaliação do processo em escala piloto. Vetor, Rio Grande16(1-2): 37-45.
2. Bessa-Junior AP, Gonçalves AA (2013) Análises econômica e produtiva da quitosana extraída do exoesqueleto de camarão. Acta Fish Aquat Res 1(1): 13-28.
3. Cira LA, Huerta S, Hall GM, Shirai K (2002) Pilot scale latic acid fermentations of shrimp waste for chitin recovery. Process Biochemistry 37: 1359-1366.
4. Gokarneshan N (2017) Review Article-Role of Chitosan in Wound Healing-a Review of the Recent Advances. Global Journal of Addiction & Rehabilitation Medicine 4(3): 555636.
5. De Moura CM, De Moura JM, Soares NM, Pinto LAA (2011) Evaluation of molar weight and deacetylation degree of chitosan during chitin deacetylation reaction: Used to produce biofilm. Chemical Engineering and Processing 50(4): 351-355.
6. Arrouze F, Desbrieres J, Rhazi M, Essahli M, Tolaimate A (2019) Valorization of chitins extracted from North Morocco shrimps: Comparison of chitin reactivity and characteristics. Journal of Applied Polymer Science 136(30): 47804.
7. Tyliszczak B, Drabczyk A, Kudłacik-Kramarczyk S, Sobczak-Kupiec A (2020) Sustainable production of chitosan. Studies in Systems, Decision and Control 198: 45-60.

DOI: 10.19080/AJOP.2019.03.555601

How to cite this article: Saboya JPS, Silveira CLL, Silva GGN, Nascimento FA, Barros FAQ. Aggregation of Values for Shrimp Shell. Academ J Polym Sci. 2019; 3(1): 555601. DOI: 10.19080/AJOP.2019.03.555601