

Hong Kong Student Science Project Competition 2022

Template of Extended Abstract (Investigation)

(Word Limit: 1,000 words, Pages: 2 pages only)

Team Number: SABC 245

Project Title: 蝦 To Do - “Chito 神”

Project Type: Investigation

To our best knowledge and after thorough literature research, as at 30/06/2022 , there ~~are~~/ are no* similar works. If there are, the reference links are as below:

***Please delete if not applicable. HKSSPC values the originality of works. Students must conduct literature research thoroughly to ensure that their works are unique, and to list relevant reference materials to complement the research or invention.**

I. Background

Perform extraction of chitosan from the crab and shrimp shell waste that reduces the cost of purchasing the expensive commercial product. Numerous related studies has been made regarding the usefulness of chitosan.

II. Objectives

We aim to investigate the potential of transforming useless food waste into effective indigent as chitosan for water treatment material.

III. Hypothesis

Chitosan facilitates not only the adsorption of pollutants such as dyes and metals, but also the sedimentation owing to its flocculating properties.

IV. Methodology

Materials used when extraction of chitosan:

Shrimp shells, crab shells, 0.5M NaOH, 2M HCl, 12.5M NaOH

experimental protocol:

Deproteinization, demineralization, and deacetylation.

Materials used when testing for flocculating property

Our extraction, chitosan pills powder, mud water

Materials used when testing for methylene blue:

Colorimeter, methylene blue solutions our extraction, chitosan pills powder

Materials used when testing for copper:

Colorimeter, 0.001M, 0.0015M, 0.002M and 0.0025M copper(II) sulphate solutions, copper(II) indicator, our extraction, chitosan pills powder

experimental protocol of testing for flocculating property

Adding our product and chitosan pills into two beakers of mud water respectively

experimental protocol of testing for methylene blue:

The color intensity of the solutions after absorption were measured by a colorimeter.

experimental protocol of testing for copper:

The color intensity of the solutions after adsorption were measured by a colorimeter.

V. Results

Result for the test of flocculating property:

There is a significant separation of water and the impurities. Even though the water is still muddy, it has become clearer than the control setup.

Result for the test of methylene blue:

The result showed that both our product and the commercial chitosan pills can adsorb methylene with 9% and 90% absorption respectively. The ability of our chitosan product to adsorb methylene blue is weaker than the commercial chitosan pills. It is considered to be normal since our product contains higher water content which lowers the concentration of chitosan in our product.

Result for the test of copper:

The result showed that both our product and the commercial chitosan pills can adsorb copper (II) ion with 40% absorption respectively. Colour changed when the chitosan pills powder was added into the water. Therefore the absorption percentage of adding chitosan pills powder in the solution became -20%. That said, the colour of the solution was evidently cleared.

VI. Conclusion

Numerous studies reported favorable effects of chitosan-based materials for a wide range of applications. In this study, the source of chitosan was originated from the waste shell which is much cheaper source compared to purchase the expensive commercial chitosan products. The efficiency of water treatment by chitosan is well demonstrated through the whole studies. Comparing to the commercial product, the chitosan is extracted from waste seafood shells.
