
EXPERIMENT 18 EXTRACTION OF CHITIN FROM PRAWN SHELL

Structure

18.1 Introduction

Objective

18.2 Experiment

18.2.1 Principle

18.2.2 Requirements

18.2.3 Procedure

18.2.4 Observations

18.2.5 Results

18.3 Precautions

18.1 INTRODUCTION

The waste material obtained on dressing prawn consists of the fleshy matter and shell. The chitin contained in the shell could be extracted free of other components which in turn could be used for making various commercially important products.

Objective

After performing this experiment, you will be able to:

- prepare chitin from prawn shell on a laboratory scale

18.2 EXPERIMENT

18.2.1 Principle

Prawn shell consists of proteins, pigments, minerals, water, etc., in addition to chitin. These are to be removed to obtain pure chitin. For this, the shell is treated with alkali and heat. The flesh, particularly proteins and pigments get hydrolyzed and are removed (deproteinization process). This material is further treated with an inorganic acid to remove minerals such as calcium carbonate (demineralization). The material remaining is dried to obtain chitin. The treatment conditions are standardized such that the chitin molecule is not adversely affected.

18.2.2 Requirements

- Prawn shell waste
- Sodium hydroxide, hydrochloric acid
- pH paper
- Glassware- beakers, glass rod, thermometer, etc.
- Cloth, plastic bag
- Balance
- Stove
- Drier
- Grinder

18.2.3 Procedure

- 1) The raw material can be either fresh or dry prawn shell. Take its weight.
- 2) Wash thoroughly with water and squeeze to remove maximum amount of water.
- 3) Prepare a 3% sodium hydroxide solution in a glass beaker sufficient enough to immerse all the shell.
- 4) Add the shell and heat at a temperature not exceeding 100°C for a period of 30 minutes with stirring using a glass rod.
- 5) Stop heating, cool to room temperature and allow the residue to settle.
- 6) Decant off the supernatant. Wash the residue repeatedly with water until free of alkali. This can be checked by testing the pH of the wash water using a pH paper. Stop washing when the pH has come down to nearly neutral value.
- 7) Squeeze the material in a piece of nylon cloth to remove excess water.
- 8) Prepare a solution of hydrochloric acid of 1.25 N concentration sufficient enough to immerse the material. (You can dilute concentrated hydrochloric acid about 8 times to obtain a 1.25 N solution).
- 9) Add the shell and treat for a period of 30 minutes at room temperature with occasional stirring. Prevent any floatation of material on account of gas production so as to keep under the acid and confirm whether the solution is still acidic.
- 10) Allow the residue to settle and decant off the supernatant.
- 11) Wash the material repeatedly with water until free of acid. Check pH of wash water using a pH paper.
- 12) Squeeze the material in a piece of cloth.
- 13) Separate the pieces, spread in trays and dry at about 60°C in a tray drier until the moisture content is reduced to about 5%.
- 14) Pulverize to a coarse powder in a dry grinder.
- 15) Weigh and pack in polyethylene bag.

18.2.4 Observations

Weight of prawn shell (x) = _____
 Weight of chitin (y) = _____
 Yield of chitin = $y/x \times 100$ =%

18.2.5 Results

The yield of chitin from dry (or wet) prawn shell waste is %.

18.3 PRECAUTIONS

- Acid and alkali must be handled with care. For diluting concentrated acid, add acid to the required volume of water slowly.
- When shell is treated with acid (add acid slowly), carbon dioxide gas will be produced which may result in floatation of some shell pieces. Take care to see that the entire material is well immersed in the acid.