CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)

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Project Number

S0902

Project Title

M. oleifera: Elucidation of the Physicochemical Properties of the Active Protein and Optimization of Water Purification

Abstract

Objectives/Goals

The seeds of the tropical and subtropical plant, Moringa oleifera, have undergone studies in environmental science as a primary coagulant for water treatment. This investigation attempts to account for the coagulation abilities of the Moringa oleifera seed by elucidating the physicochemical properties. Furthermore, using analyses of particle size and zeta potential, optimum environmental conditions were proposed.

Methods/Materials

The protein was isolated by filtrating a permeate of crushed Moringa oleifera seeds and deionized water through a 0.45 micrometer membrane. The size of the protein was analyzed by Dynamic Light Scattering, and the same computer program was used to determine the zeta potential of the protein at different levels of pH. Jar testing was used to simulate water coagulation with Moringa oleifera as the primary coagulant.

Results

From the particle size analyses, the active protein of Moringa oleifera had an approximate size of 100 to 450 micrometers. This supports the assertion that a larger sized protein increases the ability to agglomerate with other particles. Furthermore, as the pH level increased, the zeta potential of the protein generally decreased. Consequently, the zeta potential of the protein was zero around a pH of 4.00; thus, jar test simulations of water coagulation were conducted at pH=4.00, the optimum environmental condition. From simulated water coagulation, the investigation concluded that Moringa oleifera has an influential effect on the color and turbidity of contaminated water, and works at optimum conditions of pH=7.00 and medium dosages of Moringa oleifera.

Conclusions/Discussion

The conclusions of this investigation demonstrated three essential concepts. First, the large size of the protein accounts for the ability to agglomerate with other particles. Secondly, though zeta potential analyses demonstrated optimum conditions at a pH of 4.00, simulated water coagulation supported optimum conditions at neutral pH. Finally, optimum dosages of Moringa oleifera solely depend on the number of colloids present in the water.

Summary Statement

This investigation utilizes the physicochemical properties of the active protein in Moringa oleifera to optimize the results of water purification with Moringa oleifera acting as a primary water coagulant.

Help Received

Used lab equipment at UCLA under the supervision of Dr. Eric Hoek and Anna Jawor; Mother and Father helped in mounting the project board