



Hernández Carmona, G., D.J. McHugh, D.L. Arvizu Higuera & Y.E. Rodríguez Montesinos (2002). Pilot plant scale extraction of alginates from *Macrocystis pyrifera*. 4. Conversion of alginic acid to sodium alginate, drying and milling. *Journal of Applied Phycology*, 14(6): 445-451. DOI: 10.1023/A:1022372807813

## Pilot plant scale extraction of alginates from *Macrocystis pyrifera*. 4. Conversion of alginic acid to sodium alginate, drying and milling

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The last three steps of the alginate production process were studied: conversion of alginic acid to sodium alginate, drying, and milling. Three methods were used to follow the conversion reaction: measuring the pH (a) in the ethanol-water liquid of the reaction mixture, (b) after dissolving a sample of the fiber taken from the reaction mixture, (c) after dissolving the dried sodium alginate obtained from the reaction. To obtain a neutral dried sodium alginate, in the first method the pH should be adjusted to 9, and in the second the pH should be adjusted to 8. The best method to control the reaction was to dissolve a sample of the fiber and adjust the pH to 8. The best proportion to reach the critical point, where pH just begins to rise, was 0.25 parts of sodium carbonate to 1 part of alginate in the initial dry algae. A pH above 7 may produce a breakdown of the molecule, reducing significantly the viscosity of the final alginate. Four different temperatures were used to dry the alginate: 50, 60, 70, and 80 °C. Drying time to reach 12% moisture ranged from 1.5 h at 80 °C to 3 h at 50 °C. The best drying temperature was 60 °C for 2.5 h. The effect of drying temperature on alginate viscosity was dependent on the alginate type. Low and medium viscosity alginates were not significantly affected, but alginate with high viscosity was reduced by 40 to 54% using the temperature range of 60 to 80 °C. A fixed hammermill was used to reduce the particle size of the dried sodium alginate. Particle size measurements showed that after a first milling the product contained 76% large particles (20–60 mesh) and 24% fine particles (80–120 mesh). After a third milling the product still contained 42.9% large particles. No significant effect was found on alginate viscosity because of the milling steps.

Palabras clave: alginate, Alginic acid, Conversion, Drying, *Macrocystis pyrifera*, Milling, Pilot plant process, Sodium alginate

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