

## **KARAKTERISASI KIMIAWI DAN KINETIKA SIFAT FISIK NIRA SELAMA PROSES PEMBUATAN GULA KELAPA**

### **INTISARI**

Oleh:

**ILHAM DWI CAHYO**

**20/456488/TP/12683**

Gula kelapa merupakan salah satu pemanis alternative selain gula tebu. Gula kelapa memiliki profil rasa yang khas sehingga memiliki keunikan dari pemanis yang lain. Gula kelapa masih banyak diproduksi secara tradisional menggunakan kompor kayu dan alat sederhana lainnya sehingga dalam pemrosesannya, gula kelapa memiliki banyak kelemahan. Penelitian ini bertujuan untuk menganalisis kinetika sifat fisik nira selama proses pengolahan gula kelapa yang dilakukan secara konvensional dan mengkarakterisasi kualitas kimiawi gula kelapa. Selama proses pembuatan gula kelapa diamati perubahan suhu, brix dan densitas nira encer hingga menjadi gula dan dianalisis menggunakan kinetika Avrami. Konstanta avrami yang diperoleh digunakan sebagai informasi untuk desain proses pembuatan gula kelapa. Kualitas gula kelapa dikarakterisasi yang meliputi pH, kadar air (%db), warna (lightness, redness, dan yellowness), gula reduksi, gula total, dan kadar abu. Data pengolahan gula kelapa diteliti kualitas kimiawi dan fisiknya untuk kemudian dianalisis menggunakan visualisasi data dan *Principal component analysis* (PCA). Konstanta Avrami (k) perubahan suhu bahan selama proses evaporasi berada pada kisaran  $2,32 \times 10^{-1} \pm 3,4 \times 10^{-2}$  °C/menit. Perubahan brix  $1,28 \times 10^{-5} \pm 3,2 \times 10^{-5}$  %/menit dan perubahan densitas  $5,76 \times 10^{-5} \pm 1,91 \times 10^{-4}$  g/ml.menit. Hasil karakterisasi kualitas gula kelapa menunjukkan brix sebesar  $92,92 \pm 1,75\%$ , densitas  $1,38 \pm 0,06$  g/mL, kadar air  $9,07 \pm 0,41\%$ , kadar abu  $2,34 \pm 0,08\%$ , gula reduksi  $8,21 \pm 0,72\%$ , gula total  $88,5 \pm 3,52\%$  dan pH  $4,39 \pm 0,39$ . Secara keseluruhan kualitas gula kelapa yang memenuhi standar SNI.

Kata kunci : nira kelapa, gula kelapa, kinetika avrami, kualitas gula.

Dosen Pembimbing: Dr. Sri Rahayoe, S.TP., M.P.

Dr. Arifin Dwi Saputro, S.T.P., M.Sc. IPM, ASEAN Eng.

## **CHEMICAL CHARACTERIZATION AND PHYSICAL PROPERTY KINETICS OF SAP DURING THE COCONUT SUGAR PRODUCTION PROCESS**

### **ABSTRACT**

**By:**

**ILHAM DWI CAHYO**

**20/456488/TP/12683**

Coconut sugar is an alternative sweetener to cane sugar. It has a distinctive flavor profile, giving it uniqueness compared to other sweeteners. Coconut sugar is still largely produced traditionally using wood-fired stoves and simple tools, which results in several weaknesses during its processing. This study aims to analyze the kinetic physical properties of sap during the processing of coconut sugar conducted conventionally and to characterize the chemical quality of coconut sugar. During the coconut sugar production process, changes in temperature, brix, and the density of diluted sap to sugar were observed and analyzed using Avrami kinetics. The Avrami constant obtained will serve as information for designing the coconut sugar production process. The quality of coconut sugar was characterized, including pH, moisture content (%db), color (lightness, redness, and yellowness), reducing sugars, total sugars, and ash content. The data from the processing of coconut sugar were studied for their chemical and physical quality, then analyzed using data visualization and Principal Component Analysis (PCA). The Avrami constant (k) for temperature changes in the material during the evaporation process was found to be in the range of  $2.32 \times 10^{-1} \pm 3.4 \times 10^{-2} \text{ } ^\circ\text{C}/\text{min}$ . The change in brix was  $1.28 \times 10^{-5} \pm 3.2 \times 10^{-5} \text{ } \%/ \text{min}$ , and the change in density was  $5.76 \times 10^{-5} \pm 1.91 \times 10^{-4} \text{ g/mL}\cdot\text{min}$ . The results of the coconut sugar quality characterization showed a brix of  $92.92 \pm 1.75\%$ , density of  $1.38 \pm 0.06 \text{ g/mL}$ , moisture content of  $9.07 \pm 0.41\%$ , ash content of  $2.34 \pm 0.08\%$ , reducing sugars of  $8.21 \pm 0.72\%$ , total sugars of  $88.5 \pm 3.52\%$ , and pH of  $4.39 \pm 0.39$ . Overall, the quality of coconut sugar meets the SNI standards.

**Keywords :** coconut sap, coconut sugar, Avrami kinetics, sugar quality.