

## KARAKTERISTIK FISIK BUBUK MINUMAN COKELAT INSTAN DENGAN PEMROSESAN MENGGUNAKAN *BATCH-TYPE STEAM AGGLOMERATOR*

### INTISARI

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Proses instanisasi minuman cokelat menggunakan *steam agglomerator* sudah sering dilakukan, namun belum mengkaji minuman cokelat dengan campuran gula semut dan susu pada suhu *steam* 87°C di rentang waktu aglomerasi selama 4,5 menit – 6 menit. Penelitian ini bertujuan untuk mengkaji pengaruh perlakuan komposisi bahan, durasi pemberian uap panas, dan posisi rak terhadap karakteristik minuman cokelat, mengetahui kombinasi perlakuan pada sampel terbaik, dan mempelajari kinetika perubahan karakteristik minuman cokelat selama proses aglomerasi. Proses aglomerasi dilakukan menggunakan *batch-type steam agglomerator* dengan variasi perlakuan komposisi bahan, durasi pemberian uap panas, dan posisi rak. Adapun variabel yang diamati meliputi karakteristik fisik, instan, dan alir minuman cokelat yang kemudian dilakukan analisa data statistik, *Principal Component Analysis (PCA)*, kinetika laju perubahan, dan *Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS)*. Ketiga perlakuan menunjukkan pengaruh yang signifikan pada hampir seluruh variabel serta menghasilkan minuman cokelat instan dengan karakteristik yang lebih baik dibandingkan sampel kontrol (tidak melalui aglomerasi). Hasil menunjukkan terjadi peningkatan *solubility* (>28% (0GS) dan >55% (35GS)) dan *dispersibility* (>4,1% (0GS) dan >5,1% (35GS)), serta berada dalam kategori *excellent* untuk karakteristik alirnya. Bubuk mengalami peningkatan nilai *fineness modulus*, diameter rerata, *a\** dan *b\** yang berbanding terbalik dengan kadar air, densitas, dan *lightness*. Hubungan antara perlakuan dan karakteristik minuman cokelat yang dikaji menggunakan PCA yang memiliki total varians lebih dari 98% (98,324%). Pemodelan kinetika orde 1 digunakan untuk menggambarkan perubahan *lightness* dan *solubility* sedangkan pemodelan kinetika orde 2 digunakan untuk menggambarkan perubahan kadar air, *dispersibility*, dan *bulk density*. Sampel dengan perlakuan terbaik berdasarkan analisis TOPSIS adalah sampel 35GSR1W6 (35% gula semut, rak atas, dan durasi pemberian uap selama 6 menit).

Kata kunci: aglomerasi, *batch-type steam agglomerator*, minuman cokelat instan, kelarutan, karakteristik bubuk instan.

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## **PHYSICAL CHARACTERISTICS OF INSTANT CHOCOLATE BEVERAGE POWDER PROCESSED USING BATCH-TYPE STEAM AGGLOMERATOR**

### **ABSTRACT**

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The process of instantiating chocolate drinks using a steam agglomerator has often been carried out but has not studied chocolate drinks with a mixture of ant sugar and milk at a steam temperature of 87°C in the agglomeration time range of 4.5 minutes – 6 minutes. This study aims to examine the effect of the treatment on the composition of the ingredients, the duration of hot steam application, and the position of the shelf on the characteristics of the chocolate drink, to find out the best combination of treatments for the sample, and to study the kinetics of changes in the characteristics of the chocolate drink during the agglomeration process. The agglomeration process is carried out using a batch-type steam agglomerator with variations in the treatment of material composition, duration of hot steam application, and shelf position. The variables observed included physical, instant, and flow characteristics of the chocolate drink, which were then analyzed using statistical data, Principal Component Analysis (PCA), the kinetics of the rate of change, and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). The three treatments significantly affected almost all variables and produced instant chocolate drinks with better characteristics than the control sample (not through agglomeration). The results show an increase in solubility (> 28% (0GS) and > 55% (35GS)) and dispersibility (> 4.1% (0GS) and > 5.1% (35GS)) and are in the excellent category for their flow characteristics. The powder experienced an increase in fineness modulus, average diameter,  $a^*$  and  $b^*$ , which was inversely proportional to the moisture content, density, and lightness. The relationship between treatment and characteristics of the chocolate drink was studied using PCA, which had a total variance of more than 98% (98.324%). First-order kinetic modeling describes changes in lightness and solubility, while second-order kinetic modeling describes changes in water content, dispersibility, and bulk density. The sample with the best treatment based on the TOPSIS analysis was sample 35GSR1W6 (35% and sugar, top shelf, and duration of steaming for 6 minutes).

**Keywords** : agglomeration, batch-type steam agglomerator, instant chocolate drink solubility, characteristic of instant powder.

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