

ABSTRAK

Pemurnian defekasi merupakan tahapan krusial dalam industri gula untuk menghilangkan kotoran pada nira tanpa menyebabkan kehilangan sukrosa. Penelitian ini bertujuan untuk mengoptimalkan dosis flokulan, derajat keasaman (pH), dan waktu tinggal pada proses pemurnian defekasi guna meningkatkan kualitas nira jernih di PG Glenmore. Simulasi proses dilakukan menggunakan metode uji *jar test*. Desain eksperimen dibangun menggunakan *Response Surface Methodology* (RSM) dengan rancangan *Box-Behnken Design* (BBD) yang terdiri dari 17 unit percobaan. Variabel bebas yang dianalisis meliputi dosis flokulan 3–7 ppm, pH nira 7,0–7,6, dan waktu tinggal 45–75 menit. Sementara itu, parameter kualitas yang diukur adalah warna larutan (IU), *turbidity* (ppm SiO₂), persentase endapan (%), dan persentase kenaikan kemurnian (%). Hasil penelitian menunjukkan bahwa ketiga variabel bebas memberikan pengaruh yang signifikan terhadap kualitas nira jernih. Parameter warna dan *turbidity* mengikuti model regresi kuadratik, sedangkan parameter endapan dan kenaikan kemurnian mematuhi model linier. Kondisi operasional paling optimal tercapai pada formulasi dosis flokulan 5,87 ppm, pH nira 7,56, dan waktu tinggal 69,51 menit. Pada kondisi tersebut, model memprediksi bahwa nira jernih memiliki nilai warna larutan 22.229 IU, *turbidity* 82,67 ppm SiO₂, persentase endapan 19,29%, dan kenaikan kemurnian sebesar 2,48%. Formulasi ini telah memenuhi dan melampaui standar baku mutu yang ditetapkan oleh perusahaan.

Kata Kunci: Pemurnian defekasi, Nira jernih, *Jar test*, *Response Surface Methodology* (RSM).

ABSTRACT

Defecation purification is a crucial stage in the sugar industry to remove impurities from sugarcane juice without causing sucrose loss. This study aims to optimize the flocculant dose, acidity (pH), and residence time in the defecation purification process to improve the quality of clear juice at PG Glenmore. Process simulation was conducted using the jar test method. The experimental design was developed using Response Surface Methodology (RSM) with a Box-Behnken Design (BBD), comprising 17 experimental runs. The independent variables analyzed were flocculant dose (3–7 ppm), juice pH (7.0–7.6), and residence time (45–75 minutes). Meanwhile, the quality parameters measured were solution color (IU), turbidity (ppm SiO₂), precipitate percentage (%), and purity increase percentage (%). The results showed that all three independent variables significantly influenced the quality of clear juice. Color and turbidity parameters followed a quadratic regression model, whereas the precipitate and purity increase parameters adhered to a linear model. The optimal operating conditions were achieved with a flocculant dose of 5.87 ppm, a juice pH of 7.56, and a residence time of 69.51 minutes. Under these conditions, the model predicts that the clear juice will have a solution color of 22,229 IU, a turbidity of 82.67 ppm SiO₂, a precipitate percentage of 19.29%, and a purity increase of 2.48%. This formulation has met and exceeded the company's quality standards.

Keywords: *Defecation purification, Clear juice, Jar test, Response Surface Methodology (RSM).*