STUDY OF RHEOLOGICAL EFFECT OF
CONCENTRATED CANE JUICE ON
FALLING FILM EVAPORATOR
PERFORMANCE

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ABSTRACT

Evaporator is a tool widely used in chemical industry for concentrating a solution. The principle of evaporator is heat transfer. One type evaporators that are used for concentrating heat-sensitive solution is falling film evaporator. To design a falling film evaporator with appropriate and predict it performance, specific evaporation capacity is needed.

This research is for study the rheological effect of concentrated cane juice on falling film evaporator performance. This research used a falling film evaporator with 2 meters in column height and 5 cm in diameter. The variables of this study is the liquid flow rate varied 154 l/hr; 243 l/hr; 301 l/hr, the air flow rate varied 2 m$^3$/hr; 4 m$^3$/hr; 6 m$^3$/hr; 8 m$^3$/hr and 10 m$^3$/hr. The liquid initial concentration was 51 °Brix, 59 °Brix and 63 °Brix. Liquida feed from the top of the evaporator and fall down, form a thin film, through a heated pipe. The film falls due to gravity. In counter current, air is feed from bottom of the evaporator.

This study has been obtained by the relationship between the flow rate (Q) and film thickness (δ). The equation is $Q = B \delta^C$, where $B$ dan $C$ are function of Brix, $B = 0.9977$ Brix$^{-0.000235}$ and $C = 0.668$ Brix$^{0.01}$. Flow rate of liquid effect on the film thickness, the flow rate increase then film is getting
thicker. Flow rate also affects the final concentration. Flow rate of liquid 301 l/hr, has a final concentration (°Brix) smaller than the flow rate of 243 l/hr and 154 l/hr. The film is getting thicker because the evaporation process is not maximum. The evaporation capacity in this falling film evaporator has a value ranging between 56.5 – 91.8 kg/m$^2$/hr.

**Keywords:** evaporator, falling film evaporator, cane juice, rheology, evaporation capacity.