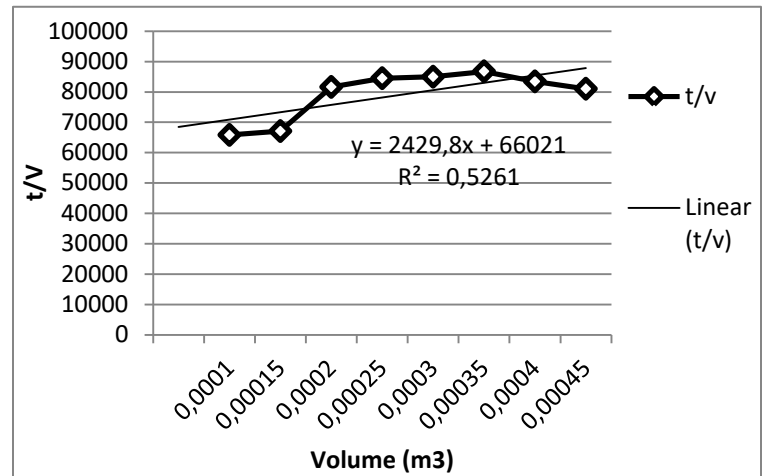


LAMPIRAN

Lampiran 1

Perhitungan

Percobaan I		
Volume (m ³)	Waktu (s)	t/v
0,0001	6,58	65800
0,00015	10,06	67066,667
0,0002	16,32	81600
0,00025	21,12	84480
0,0003	25,49	84966,667
0,00035	30,36	86742,857
0,0004	33,37	83425
0,00045	36,45	81000
0,0005	40,39	80780



Diketahui :

$$Y = 2429,8x + 66021$$

$$\begin{aligned} \text{Slope} = K_p &= 1793,9 \text{ s/m}^6 \\ \text{Intersep (B)} &= 70571 \text{ s/m}^3 \\ C_s &= 2 \text{ kg /10liter} \\ &= 2 \text{ kg/0,01m}^3 \\ &= 200 \text{ kg/m}^3 \\ A &= 470 \times 470 \text{ mm} \\ &= 220900 \text{ mm}^2 \\ &= 0,2209 \text{ m}^2 \\ -\Delta P &= 2 \text{ kg/cm}^2 \\ &= 20000 \text{ kg/ms}^2 \\ \text{Viskositas} &= 2,00008 \text{ cP} \\ &= 0,0020001 \text{ kg/ms} \\ \text{Volume} &= 10 \text{ liter} \\ &= 0,01 \text{ m}^3 \end{aligned}$$

Ditanya :

- Harga tahanan spesifik ampas (α) dan tahanan ampas (R_c)?
- Harga tahanan medium filter (R_m)?
- Nilai Laju Filtrasi (dv/dt) ?
- Konsentrasi filtrat sari jahe?

Penyelesaian

$$\begin{aligned}
 \text{a. Harga } \alpha &= \frac{(Kp \times A^2 \times (-\Delta P))}{\mu \times Cs} \\
 &= \frac{\left(1793 \frac{s}{m^6} \times (0,2209m^2)^2 \times 200000 \frac{kg}{ms^2}\right)}{0,00200001 \frac{kg}{ms} \times 200kg/m^3} \\
 &= 4,38 \times 10^6 \text{ m/kg}
 \end{aligned}$$

$$\begin{aligned}
 \text{Harga Rc} &= \frac{(\alpha \times Cs \times V)}{A} \\
 &= \frac{\left(4,38 \times 10^6 \frac{m}{kg} \times 200 \frac{kg}{m^3} \times 0,01 m^3\right)}{0,2209m^2} \\
 &= 3,96 \times 10^7 m^{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. Harga Rm} &= \frac{(B \times A (-\Delta P))}{\mu} \\
 &= \frac{\left(70571 \frac{s}{m^3} \times 0,2209m^2 \times 200000 \frac{kg}{ms^2}\right)}{0,00200001 \frac{kg}{ms}} \\
 &= 1,559 \times 10^{11} m^{-1}
 \end{aligned}$$

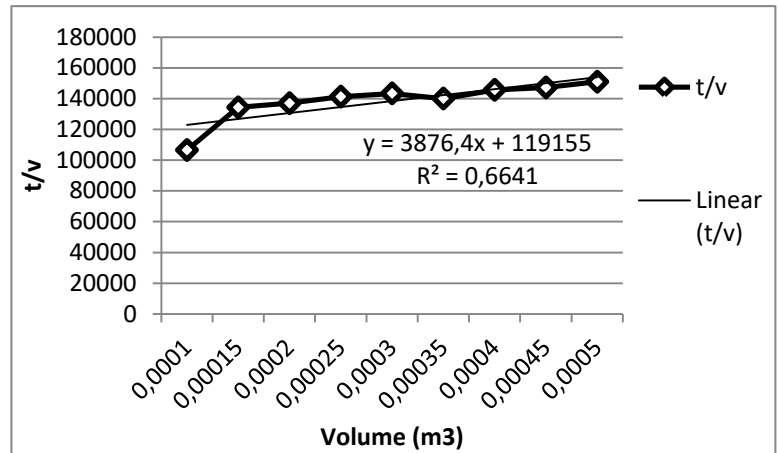
$$\begin{aligned}
 \text{c. Laju Filtrasi} &= \frac{A (-\Delta P)}{Rm + Rc \times \mu} \\
 \text{(dv/dt)} &= \frac{0,2209m^2 (200000 \frac{kg}{ms^2})}{(1,559 \times 10^{11}m^{-1} + 3,96 \times 10^7m^{-1}) \times 0,00200001 \frac{kg}{ms}} \\
 &= 5,667 \times 10^{-11} m^3/s
 \end{aligned}$$

d. Konsentrasi Filtrat

$$\begin{aligned}
 \text{- Centrifuge} &= 0,9 \text{ cm sari jahe dari } 18 \text{ cm tinggi larutan}
 \end{aligned}$$

$$\begin{aligned}
 \text{- TSS} &= \frac{(B - A) \times 1000}{Volume \text{ sampel}} \\
 &= \frac{(45,17 - 42,63)gr}{10 ml} \times 1000 \\
 &= 254 \text{ mg/L}
 \end{aligned}$$

Percobaan II		
Volume (m ³)	Waktu (s)	t/v
0,0001	10,66	106600
0,00015	20,15	134333,33
0,0002	27,41	137050
0,00025	35,33	141320
0,0003	43,03	143433,33
0,00035	49,03	140085,71
0,0004	58,29	145725
0,00045	66,28	147288,89
0,0005	75,5	151000



Diketahui :

$$Y = 3876,4x + 119155$$

Slope = $K_p = 3876,4 \text{ s/m}^6$
 Intersep (B) = 119155 s/m^3
 $C_s = 4 \text{ kg/10liter} = 4 \text{ kg/0,01m}^3 = 400 \text{ kg/m}^3$
 $A = 470 \times 470 \text{ mm} = 220900 \text{ mm}^2 = 0,2209 \text{ m}^2$
 $-\Delta P = 2 \text{ kg/cm}^2 = 20000 \text{ kg/ms}^2$
 Viskositas = $2,12839 \text{ cP} = 0,00212839 \text{ kg/ms}$
 Volume = $10 \text{ liter} = 0,01 \text{ m}^3$

Ditanya :

- Harga tahanan spesifik ampas (α) dan tahanan ampas (R_c)?
- Harga tahanan medium filter (R_m)?
- Nilai Laju Filtrasi (dv/dt) ?
- Konsentrasi filtrat sari jahe?

Penyelesaian

a. Harga α =
$$\frac{(K_p \times A^2 \times (-\Delta P))}{\mu \times C_s}$$

$$= \frac{\left(3876,4 \frac{s}{m^6} \times (0,2209m^2)^2 \times 200000 \frac{kg}{ms^2}\right)}{0,00212839 \frac{kg}{ms} \times 400kg/m^3}$$

$$= 4,44 \times 10^6 \text{ m/kg}$$

$$\begin{aligned} \text{Harga Rc} &= \frac{(\alpha \times Cs \times V)}{A} \\ &= \frac{\left(4,44 \times 10^6 \frac{m}{kg} \times 400 \frac{kg}{m^3} \times 0,01 m^3\right)}{0,2209m^2} \\ &= 8,05 \times 10^7 m^{-1} \end{aligned}$$

$$\begin{aligned} \text{b. Harga Rm} &= \frac{(B \times A (-\Delta P))}{\mu} \\ &= \frac{\left(119155 \frac{s}{m^3} \times 0,2209m^2 \times 200000 \frac{kg}{ms^2}\right)}{0,00212839 \frac{kg}{ms}} \\ &= 2,473 \times 10^{11} m^{-1} \end{aligned}$$

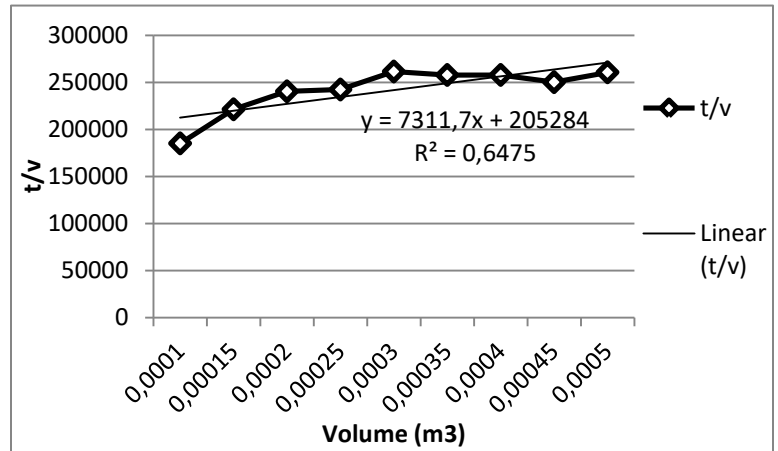
$$\begin{aligned} \text{c. Laju Filtrasi} &= \frac{A (-\Delta P)}{Rm + Rc \times \mu} \\ (\text{dv/dt}) &= \frac{0,2209m^2 (200000 \frac{kg}{ms^2})}{(2,473 \times 10^{11}m^{-1} + 8,05 \times 10^7m^{-1}) \times 0,00212839 \frac{kg}{ms}} \\ &= 3,83 \times 10^{-11} m^3/s \end{aligned}$$

d. Konsentrasi Filtrat

- Centrifuge = 0,11 cm sari jahe dari 18 cm tinggi larutan

$$\begin{aligned} \text{- TSS} &= \frac{(B - A) \times 1000}{\text{Volume sampel}} \\ &= \frac{(57,62 - 54,92)gr}{10 ml} \times 1000 \\ &= 270 \text{ mg/L} \end{aligned}$$

Percobaan III		
Volume (m ³)	Waktu (s)	t/v
0,0001	18,51	185100
0,00015	33,19	221266,67
0,0002	48,07	240350
0,00025	60,57	242280
0,0003	78,42	261400
0,00035	90,21	257742,86
0,0004	103,11	257775
0,00045	112,54	250088,89
0,0005	130,29	260580



Diketahui :

$$\begin{aligned}
 Y &= 7311,7x + 205284 \\
 \text{Slope} = K_p &= 7311,7 \text{ s/m}^6 \\
 \text{Intersep (B)} &= 205284 \text{ s/m}^3 \\
 C_s &= 6 \text{ kg / 10 liter} \\
 &= 6 \text{ kg / 0,01 m}^3 \\
 &= 600 \text{ kg/m}^3 \\
 A &= 470 \times 470 \text{ mm} \\
 &= 220900 \text{ mm}^2 \\
 &= 0,2209 \text{ m}^2 \\
 -\Delta P &= 2 \text{ kg/cm}^2 \\
 &= 20000 \text{ kg/ms}^2 \\
 \text{Viskositas} &= 2,38867 \text{ cP} \\
 &= 0,00238867 \text{ kg/ms} \\
 \text{Volume} &= 10 \text{ liter} \\
 &= 0,01 \text{ m}^3
 \end{aligned}$$

Ditanya :

- Harga tahanan spesifik ampas (α) dan tahanan ampas (R_c)?
- Harga tahanan medium filter (R_m)?
- Nilai Laju Filtrasi (dv/dt) ?
- Konsentrasi filtrat sari jahe?

Penyelesaian

$$\begin{aligned}
 \text{a. Harga } \alpha &= \frac{(K_p \times A^2 \times (-\Delta P))}{\mu \times C_s} \\
 &= \frac{\left(7331,7 \frac{\text{s}}{\text{m}^6} \times (0,2209 \text{ m}^2)^2 \times 200000 \frac{\text{kg}}{\text{ms}^2}\right)}{0,00238867 \frac{\text{kg}}{\text{ms}} \times 600 \text{ kg/m}^3} \\
 &= 4,98 \times 10^6 \text{ m/kg}
 \end{aligned}$$

$$\begin{aligned}
 \text{Harga } R_c &= \frac{(\alpha \times C_s \times V)}{A} \\
 &= \frac{\left(4,98 \times 10^6 \frac{\text{m}}{\text{kg}} \times 600 \frac{\text{kg}}{\text{m}^3} \times 0,01 \text{ m}^3\right)}{0,2209 \text{ m}^2} \\
 &= 1,35 \times 10^8 \text{ m}^{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. Harga } R_m &= \frac{(B \times A (-\Delta P))}{\mu} \\
 &= \frac{(205284 \frac{\text{s}}{\text{m}^3} \times 0,2209 \text{ m}^2 \times 200000 \frac{\text{kg}}{\text{ms}^2})}{0,00238867 \frac{\text{kg}}{\text{ms}}} \\
 &= 3,79 \times 10^{11} \text{ m}^{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{c. Laju Filtrasi} &= \frac{A (-\Delta P)}{R_m + R_c \times \mu} \\
 (\text{dv/dt}) &= \frac{0,2209 \text{ m}^2 (200000 \frac{\text{kg}}{\text{ms}^2})}{(3,79 \times 10^{11} \text{ m}^{-1} + 1,35 \times 10^8 \text{ m}^{-1}) \times 0,00238867 \frac{\text{kg}}{\text{ms}}} \\
 &= 2,77 \times 10^{-11} \text{ m}^3/\text{s}
 \end{aligned}$$

$$\begin{aligned}
 \text{d. Konsentrasi Filtrat} & \\
 \text{- Centrifuge} &= 0,12 \text{ cm sari jahe dari } 18 \text{ cm tinggi larutan} \\
 \text{- TSS} &= \frac{(B - A) \times 1000}{\text{Volume sampel}} \\
 &= \frac{(64,68 - 61,91) \text{ gr}}{10 \text{ ml}} \times 1000 \\
 &= 277 \text{ mg/L}
 \end{aligned}$$

Lampiran 2

Foto

Foto	Keterangan
	Tekanan Kompresor 2 kg/cm ²
	Tekanan Pompa Hydrolic 100kg/cm ²
	Bukaan valve ½ bukaan untuk mengatur laju alir
	Indikator suhu menunjukkan suhu proses 34°C

Foto	Keterangan
	Panel proses filtrasi
	Pengukuran t/V filtrat proses filtrasi
	Ampas yang tertahan di filter cloth

Foto	Keterangan
	Pengukuran densitas filtrat
	Pengukuran viskositas filtrat
	Uji TSS pada filtrat
	Uji konsentrasi dengan centrifuge



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Tanggal Penilaian : 2-7-2019

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- Bahasa Inggris : Effect of Concentration Different on Plate and Frame Filter Press Performance on Ginger Pulp

Semarang, 1 Juli 2018

Dosen Pembimbing,

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