

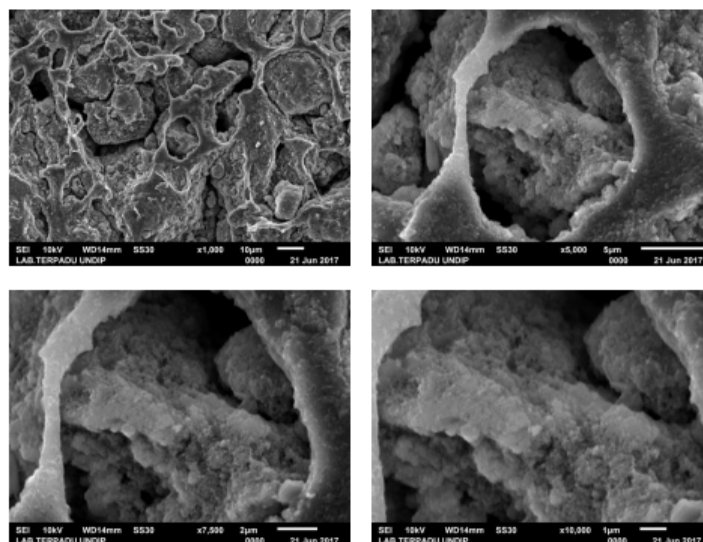
## LAMPIRAN A

Tabel 5. Konsentrasi Kromium dalam Limbah Artifisial tiap Satuan Waktu

Waktu Kontak (Menit)	Konsentrasi (ppm)		
	3 ppm	3,5 ppm	4 ppm
0	3,04	3,36	4,60
30	2,80	3,28	4,40
60	2,93	3,34	4,69
90	3,04	3,33	4,53
120	3,09	3,38	4,67

Tabel 6. Rejeksi Membran terhadap Logam Krom pada Limbah Artifisial tiap Satuan Waktu

Waktu Kontak (Menit)	Rejeksi (%R)		
	3 ppm	3,5 ppm	4 ppm
0	0	0	0
30	7.9	2.4	4.3
60	3.6	0.6	-2
90	0	0.9	1.5
120	-1.6	-0.6	-1.5



Gambar 5. Hasil Analisa Pori dengan SEM (*Scanning Electron Microscopy*)

## LAMPIRAN B

- Perhitungan Larutan HCl 1M

Dik

$$M_1 \text{ HCl} = 1 \text{ mol/L}$$

$$\% \text{ HCl} = 37\%$$

$$\text{BM HCl} = 36,5 \text{ gr/mol}$$

Dit

$$M_2 \text{ dan } V_2$$

$$\begin{aligned} M_2 &= \frac{\% \times \rho \times 1000}{\text{BM}} \\ &= \frac{0,37 \times 1,15 \frac{\text{gr}}{\text{mL}} \times 1000}{36,5 \frac{\text{gr}}{\text{mol}}} \\ &= 11,66 \frac{\text{mol}}{\text{L}} \end{aligned}$$

$$V_1 \times M_1 = V_2 \times M_2$$

$$100 \text{ mL} \times 1 \text{ mol/L} = V_2 \times 11,66 \text{ mol/L}$$

$$V_2 = 8,57 \text{ mL}$$

- Perhitungan Larutan NaOH 1M

Dik

$$M \text{ NaOH} = 1 \text{ mol/L}$$

$$\text{BM NaOH} = 39,98 \text{ gr/mol}$$

$$\text{Volume} = 100 \text{ mL}$$

Dit

$$\text{gr NaOH}$$

$$\begin{aligned} \text{gr NaOH} &= M \times V \times \text{BM} \\ &= 1 \text{ mol/L} \times 0,1 \text{ L} \times 39,98 \text{ gr/mol} \\ &= 3,9 \text{ gr} \end{aligned}$$

- Perhitungan Limbah Artifisial

Dik

$$\begin{aligned} \text{BM K}_2\text{Cr}_2\text{O}_7 &= 78,18 + 103,98 + 111,93 \\ &= 294,09 \text{ gr/mol} \end{aligned}$$

$$\text{BM Cr}_2 = 103,98 \text{ gr/mol}$$

$$\text{ppm Cr}_2 = 3 ; 3,5 ; \text{ dan } 4$$

Dit

$$\text{Ppm K}_2\text{Cr}_2\text{O}_7$$

$$\frac{\text{ppm Cr}_2}{\text{BM Cr}_2} = \frac{\text{ppm K}_2\text{Cr}_2\text{O}_7}{\text{BMK}_2\text{Cr}_2\text{O}_7}$$

$$\frac{3 \text{ ppm}}{103,98 \frac{\text{gr}}{\text{mol}}} = \frac{x}{294,09 \frac{\text{gr}}{\text{mol}}}$$

$$x = 8,48 \text{ ppm}$$

0,0084 gram dalam 1 L Air

$$\frac{3,5 \text{ ppm}}{103,98 \frac{\text{gr}}{\text{mol}}} = \frac{x}{294,09 \frac{\text{gr}}{\text{mol}}}$$

$$x = 9,89 \text{ ppm}$$

0,0098 gram dalam 1 L Air

$$\frac{4 \text{ ppm}}{103,98 \frac{\text{gr}}{\text{mol}}} = \frac{x}{294,09 \frac{\text{gr}}{\text{mol}}}$$

$$x = 11,31 \text{ ppm}$$

0,0113 gram dalam 1 L Air

- Perhitungan Rejeksi (R)

Dik

	Konsentrasi (ppm)		
	A	B	C
$C_f$	3,04	3,36	4,60
$C_{p1}$	2,80	3,28	4,40
$C_{p2}$	2,93	3,34	4,69
$C_{p3}$	3,04	3,33	4,53
$C_{p4}$	3,09	3,38	4,67

Dit

R = ...

$$R = \left(1 - \frac{C_p}{C_f}\right) \times 100\%$$

R = Rejeksi

$C_p$  = Konsentrasi permeat

$C_f$  = Konsentrasi feed

	Rejeksi (%R)		
	A	B	C
$C_f$	0	0	0
$C_{p1}$	7.9	2.4	4.3
$C_{p2}$	3.6	0.6	-2
$C_{p3}$	0	0.9	1.5
$C_{p4}$	-1.6	-0.6	-1.5

- Perhitungan Fluks (J)

Dik

Waktu Kontak (Menit)	Volume (mL)		
	3 ppm	3,5 ppm	4 ppm
0	0	0	0
30	140	139	140
60	140	140	140
90	138	110	122
120	122	102	103

Dengan A sebesar 0.0154 m<sup>2</sup>

Dit

J = ...

$$J = V_{sampel} \times \frac{1 L}{1000 mL} \times \frac{3600 s}{1 jam} \times \frac{1}{t_{sampel}} \times \frac{1}{A_{membran}}$$

J = Fluks volume (L/m<sup>2</sup>. jam)

V = Volume permeat

A = Luas permukaan

t = Waktu

Waktu Kontak (Menit)	Fluks (J) L/jam.m <sup>2</sup>		
	3 ppm	3,5 ppm	4 ppm
0	0	0	0
30	18.18	18.05	18.18
60	9.09	9.09	9.09
90	5.97	4.76	5.28
120	3.96	3.31	3.34

## LAMPIRAN C



*Bottom Ash* Setelah Preparasi



Perendaman *Bottom Ash* dalam HCl



Proses Pemisahan Cairan dengan *Bottom Ash*



Hasil Cairan Mengandung Silika



Hasil Cairan Mengandung Silika yang ditambahkan NaOH



Hasil Silika Padat



Pembuatan Membran Silika



Hasil Air Limbah Artifisial Setelah dikontakkan dengan Membran