LAMPIRAN A DATA PERHITUNGAN

1) Perhitungan KOH 10% dan 15%

- KOH 10% untuk 1000mL

  % $= \frac{Massa\ KOH}{Volume}$

  10% $= \frac{Massa\ KOH}{1000\ ml}$

  Massa KOH = 100 gram

- KOH 15% untuk 1000mL

  % $= \frac{Massa\ KOH}{Volume}$

  15% $= \frac{Massa\ KOH}{1000\ ml}$

  Massa KOH = 150 gram

2) Perhitungan HCl 10% dan 15 %

- HCl 5% untuk 250 ml

  $M_1.V_1 = M_2.V_2$

  32% .V_1 = 5% . 250 ml

  $V_1 = \frac{12,5}{32}$ = 39,06 ml

- HCl 10% untuk 250 ml

  $M_1.V_1 = M_2.V_2$

  32%. V_1 = 10%.250 ml

  V_1 = 10%.250 ml

  $V_1 = \frac{25}{32\%}$ = 78,125 ml

- HCl 15% untuk 250 ml

  $M_1.V_1 = M_2.V_2$

  32%. V_1 = 15%.250 ml

  V_1 = 15%.250 ml

  $V_1 = \frac{37,5}{32\%}$ = 117,18 ml

3) Perhitungan NaOCl 12%

- NaOCl 9%

  $M_1.V_1 = M_2.V_2$

  12%. V_1 = 9%.250 ml

  V_1 = 9%.250 ml

  $V_1 = \frac{22,5}{12\%}$ = 187,5 ml

4) Perhitungan Larutan H_2SO_4 0,5M sebanyak 500ml

Diketahui : C = 98%

ρ = 1,84 g/ml

Mr = 98 g/mol

- $M = \frac{((10 \times \% \times \rho)}{Mr}$

  $= \frac{((10 \times 98\% \times 1,84)}{98\ g/mol}$

  $= \frac{1803,2}{98}$ M = 18,4 M

$M_1.V_1 = M_2.V_2$

18,4M . V_1 = 0,5M . 500 ml

$V_1 = \frac{250\ ml}{18,4}$ = 13,6 ml

- Larutan H_2SO_4 72% untuk 100 ml

  $C_1.V_1 = C_2.V_2$

  98%.V_1 = 72%.100 ml

  V_1 = 72%.`100 ml

  $V_1 = \frac{7200}{98}$ = 73,5 ml

➢ Perhitungan Analisis Kadar Hemiselulosa, Kadar Selulosa, Kadar Lignin

No	Simbol	Berat Kering Awal Sampel Selulosa (a)	Berat Kering Residu setelah direfluk dengan Air Panas (b)	Berat Kering Residu setelah direfluk dengan H2SO4 0,5 M (c)	Berat Kering Residu setelah disiram dengan H2SO4 74% dan direfluk dengan H2SO4 0,5M (d)	Berat Abu dari Residu Sampel (e)
1	$D_{10}H_5$(A1)	1	0,9352	0,8798	0,4360	0,0058
2	$D_{10}H_{10}$(A2)	1	0,9575	0,8731	0,4225	0,0168
3	$D_{10}H_{15}$(C1)	1	0,9516	0,8593	0,4444	0,1475
4	$D_{15}H_5$(B1)	1	0,9139	0,8623	0,4317	0,0082
5	$D_{15}H_{10}$(B2)	1	0,9656	0,9595	0,4861	0,0024
6	$D_{15}H_{15}$	1	0,9352	0,8870	0,4390	0,0019

Berdasarkan hasil analisis tersebut dapat dihitung masing – masing persen kadar hemiselulosa, kadar selulosa, kadar lignin sebagai berikut :

Kadar Hemiselulosa $= \frac{b-c}{a} \times 100\%$

- $D_{10}H_5$

$\frac{0,9352-0,8798}{1} \times 100\%$

$= \frac{0,0554}{1} \times 100\%$

$= 5,54\%$

- $D_{10}H_{10}$

$\frac{0,9575-0,8914}{1} \times 100\%$

$= \frac{0,0661}{1} \times 100\%$

$= 6,61\%$

- $D_{10}H_{15}$

$\frac{0,9516-0,8593}{1} \times 100\%$

- $D_{15}H_5$

$\frac{0,9139-0,8623}{1} \times 100\%$

$= \frac{0,0516}{1} \times 100\%$

$= 5,16\%$

- $D_{15}H_10$

$\frac{0,9656-0,9595}{1} \times 100\%$

$= \frac{0,0061}{1} \times 100\%$

$= 0,61\%$

- $D_{15}H_{15}$

$\frac{0,9352-0,8870}{1} \times 100\%$

$= \frac{0,0923}{1} \times 100\%$

$= 9,23\%$

$= \frac{0,0482}{1} \times 100\%$

$= 4,82\%$

Kadar Selulosa $= \frac{c-d}{a} \times 100\%$

- $D_{10}H_5$

$\frac{0,8798-0,4360}{1} \times 100\%$

$= \frac{0,4438}{1} \times 100\%$

$= 44,38\%\%$

- $D_{15}H_5$

$\frac{0,8623-0,4317}{1} \times 100\%$

$= \frac{0,4306}{1} \times 100\%$

$= 43,06\%$

- $D_{10}H_{10}$

$\frac{0,8914-0,4225}{1} \times 100\%$

$= \frac{0,4689}{1} \times 100\%$

$= 46,89\%$

- $D_{15}H_10$

$\frac{0,9595-0,4861}{1} \times 100\%$

$= \frac{0,4734}{1} \times 100\%$

$= 47,34\%$

- $D_{10}H_{15}$

$\frac{0,8593-0,4444}{1} \times 100\%$

$= \frac{0,4149}{1} \times 100\%$

$= 41,49\%$

- $D_{15}H_{15}$

$\frac{0,8870-0,4390}{1} \times 100\%$

$= \frac{0,4480}{1} \times 100\%$

$= 44,80\%$

Kadar Lignin $= \frac{c-d}{a} \times 100\%$

- $D_{10}H_5$

$\frac{0,4360-0,0058}{1} \times 100\%$

$= \frac{0,4302}{1} \times 100\%$

$= 43,60\%\%$

- $D_{15}H_5$

$\frac{0,4317-0,0082}{1} \times 100\%$

$= \frac{0,4235}{1} \times 100\%$

$= 42,35\%$

- $D_{10}H_{10}$

$\frac{0,4225-0,0168}{1} \times 100\%$

$= \frac{0,4057}{1} \times 100\%$

- $D_{15}H_10$

$\frac{0,4861-0,0024}{1} \times 100\%$

$= \frac{0,4837}{1} \times 100\%$

= 40,57%

= 48,37%

- $D_{10}H_{15}$

$\frac{0,4444-0,1475}{1} \times 100\%$

$= \frac{0,2969}{1} \times 100\%$

= 29,69%

- $D_{15}H_{15}$

$\frac{0,4390-0,0019}{1} \times 100\%$

$= \frac{0,4371}{1} \times 100\%$

= 48,37%

5) Perhitungan Analisis Kadar Air Biokoagulan Selulosa

Simbol	Cawan Kurs Kosong (g)	Berat Sampel (g) (w)	Cawan Kurs +sampel setelah di oven (g)	(Cawan Kurs Konstan – Cawan Kurs Kososng) (g) (w_1)
$D_{10}H_5$	39,9169	1,0034	40,8972	0,9803
$D_{10}H_{10}$	40,0226	1,0047	40,9993	0,9767
$D_{10}H_{15}$	45,8923	1,0037	46,8681	0,9758
$D_{15}H_5$	38,5209	1,0093	39,4995	0,9786
$D_{15}H_{10}$	46,2292	1,0088	47,1984	0,9692
$D_{15}H_{15}$	47,2047	1,0082	47,1984	0,9702

Rumus Kadar Air = $\frac{w}{w1} \times 100\%$

- $D_{10}H_5 = \frac{1,0034\ g}{0,9803\ g} \times 100\%$

  = 1,0236%

- $D_{10}H_{10} = \frac{1,0047\ g}{0,9767\ g} \times 100\%$

  = 1,0287%

- $D_{10}H1_5 = \frac{1,0037\ g}{0,9758\ g} \times 100\%$

  = 1,0286%

- $D_{15}H_5 = \frac{1,0093\ g}{0,9786\ g} \times 100\%$

  = 1,0314%

- $D_{15}H_{10} = \frac{1,0088\ g}{0,9692\ g} \times 100\%$

  = 1,0409%

- $D_{15}H1_5 = \frac{1,0082\ g}{0,9702\ g} \times 100\%$

  = 1,0392%

6) Perhitungan Analisis Kadar Air Biomembran Selulosa

Simbol	Cawan Kurs Kosong (g)	Berat Sampel (g) (w)	Cawan Kurs +sampel setelah di oven (g)	(Cawan Kurs Konstan – Cawan Kurs Kososng) (g) (w_1)
P_2E_1	41,0517	1,0001	42,0272	0,9755
$P_2E_{1,5}$	46,9768	1,0004	47,9465	0,9697
P_4E_1	46,9768	1,0088	18,7565	0,9867
$P_4E_{1,5}$	27,1607	1,0016	28,0679	0,9072

Rumus Kadar Air = $\frac{w}{w1} \times 100\%$

- $P_2E_1 = \frac{1,0001\ g}{0,9755\ g} \times 100\%$
  $= 1,0252\%$
- $P_2E_{1,5} = \frac{1,0004\ g}{0,9697\ g} \times 100\%$
  $= 1,0317\%$
- $P_4E_1 = \frac{1,0088\ g}{0,9867\ g} \times 100\%$
  $= 1,0224\%$
- $P_4E_{1,5} = \frac{1,0016\ g}{0,9072\ g} \times 100\%$
  $= 1,1041\%$

7) Perhitungan Rendemen

Sampel Biokoagulan Selulosa Terbaik	Variasi & Waktu Aplikasi	Sampel Awal (gr)	Sampel Akhir + Awal	Hasil Akhir Rendemen	Persentase (%)
$D_{15}H_{10}$	$B_{1,5}T_{30}$	1,5	2,5343	1,0343	31,04%
	$B_{1,5}T_{60}$	1,5	2,5292	1,0292	31,78%
	B_3T_{30}	3	4,2594	1,2594	58,02%
	$B_{1,5}T_{60}$	3	3,9868	0,3868	87,10%
	$B_{4,5}T_{30}$	4,5	4,8860	0,386	91,42%
	$B_{4,5}T_{60}$	4,5	4,7226	0,2226	95,05%

Rumus : $\frac{awal-akhir}{awal} \times 100\%$

- $B_{1,5}T_{30}$

  $= \frac{1,5-1,0343}{1,5} \times 100\%$

  $= 0,3104 \times 100\%$

  $= 31,04\%$

- $B_{1,5}T_{60}$

  $= \frac{1,5-1,0292}{1,5} \times 100\%$

  $= 0,3178 \times 100\%$

  $= 31,78\%$

- B_3T_{30}

  $= \frac{3-1,294}{3} \times 100\%$

  $= 0,5802 \times 100\%$

  $= 58,02\%$

- B_3T_{60}

  $= \frac{3-0,3868}{3} \times 100\%$

  $= 0,8710 \times 100\%$

  $= 87,10\%$

- $B_{4,5}T_{30}$

  $= \frac{4,5-0,386}{4,5} \times 100\%$

  $= 0,9142 \times 100\%$

  $= 91,42\%$

- $B_{4,5}T_{60}$

  $= \frac{4,5-0,2226}{4,5} \times 100\%$

  $= 0,9505 \times 100\%$

  $= 95,05\%$

8) Perhitungan Analisis Ammoniak pada Biokogaulan Selulosa

Rumus : C × fp

- Limbah Batik

  $= 0,285 \times 10$

  $= 2,85$ mg/L

- $B_{1,5}T_{30}$

  $= 0,159 \times 10$

  $= 1,59$ mg/L

- $B_{1,5}T_{60}$

  $= 0,124 \times 10$

  $= 1,24$ mg/L

- B_3T_{30}

  $= 0,106 \times 10$

  $= 1,06$ mg/L

- B_3T_{60}

  $= 0,086 \times 10$

  $= 0,86$ mg/L

- $B_{4,5}T_{30}$

  $= 0,084 \times 10$

  $= 0,84$ mg/L

- $B_{4,5}T_{60}$

  $= 0,081 \times 10$

  $= 0,81$ mg/L

➢ **% Removal Ammoniak Biokoagulan Selulosa**

Rumus : $\frac{awal-akhir}{awal} \times 100\%$

- $B_{1,5}T_{30}$

  $= \frac{2,85-1,59}{2,85} \times 100\%$

  $= 0,4421 \times 100\%$

  $= 44,21\%$

- $B_{1,5}T_{60}$

  $= \frac{2,85-1,24}{2,85} \times 100\%$

  $= 0,5649 \times 100\%$

  $= 56,49\%$

- B_3T_{30}

  $= \frac{2,85-1,06}{2,85} \times 100\%$

  $= 0,5579 \times 100\%$

  $= 55,79\%$

- B_3T_{60}

  $= \frac{2,85-0,86}{2,85} \times 100\%$

  $= 0,6982 \times 100\%$

  $= 69,82\%$

- $B_{4,5}T_{30}$

  $= \frac{2,85-0,84}{2,85} \times 100\%$

  $= 0,7052 \times 100\%$

  $= 70,52\%$

- $B_{4,5}T_{60}$

  $= \frac{2,85-0,81}{2,85} \times 100\%$

  $= 0,7157 \times 100\%$

  $= 71,57\%$

9) Perhitungan Analisis COD Biokoagulan Selulosa

Rumus : C × f

- Limbah Batik awal

  $= 2,102 \times 10$

  $= 21,02$ mg/L

- $B_{1,5}T_{30}$

  $= 0,202 \times 10$

  $= 2,02$ mg/L

- $B_{1,5}T_{60}$

  $= 0,184 \times 10$

  $= 1,84$ mg/L

- B_3T_{30}

  $= 0,194 \times 10$

  $= 1,94$ mg/L

- B_3T_{60}

  $= 0,1,49 \times 10$

  $= 1,49$ mg/L

- $B_{4,5}T_{30}$

  $= 0,164 \times 10$

  $= 1,64$ mg/L

- $B_{4,5}T_{60}$

  $= 0,080 \times 10$

  $= 0,8$ mg/L

➢ **% Removal COD Biokoagulan Selulosa**

Rumus : $\frac{awal-akhir}{awal} \times 100\%$

- $B_{1,5}T_{30}$

  $= \frac{21,02-2,02}{21,02} \times 100\%$

  $= 0,9039 \times 100\%$

  $= 90,39\%$

- $B_{1,5}T_{60}$

  $= \frac{21,02-1,84}{21,02} \times 100\%$

  $= 0,9124 \times 100\%$

  $= 91,24\%$

- B_3T_{30}

  $= \frac{21,02-1,94}{21,02} \times 100\%$

  $= 0,9077 \times 100\%$

  $= 90,77\%$

- B_3T_{60}

  $= \frac{21,02-1,49}{21,02} \times 100\%$

  $= 0,9291 \times 100\%$

  $= 92,91\%$

- $B_{4,5}T_{30}$

  $= \frac{21,02-1,64}{21,02} \times 100\%$

  $= 0,9219 \times 100\%$

  $= 92,19\%$

- $B_{4,5}T_{60}$

  $= \frac{21,02-0,80}{21,02} \times 100\%$

  $= 0,9619 \times 100\%$

  $= 96,19\%$

10) Perhitungan Analisis Ammoniak pada Biomembran Selulosa

Rumus : C × fp

- Limbah Batik

  $= 0,285 \times 10$

  $= 2,85$ mg/L

- P_2E_1

  $= 0,159 \times 10$

  $= 1,59$ mg/L

- $P_2E_{1,5}$

  $= 0,124 \times 10$

  $= 1,24$ mg/L

- P_4E_1

  $= 0,086 \times 10$

  $= 0,86$ mg/L

- P_2E_1

  $= 0,084 \times 10$

  $= 0,84$ mg/L

➢ **% Removal Ammoniak Biomembran Selulosa**

Rumus : $\frac{awal-akhir}{awal} \times 100\%$

- P_2E_1

  $= \frac{2,85-1,59}{2,85} \times 100\%$

  $= 0,4421 \times 100\%$

  $= 44,21\%$

- $P_2E_{1,5}$

  $= \frac{2,85-1,24}{2,85} \times 100\%$

  $= 0,5649 \times 100\%$

  $= 56,49\%$

- P_4E_1

  $= \frac{2,85-0,86}{2,85} \times 100\%$

  $= 0,6982 \times 100\%$

  $= 69,82\%$

- $P_4E_{1,5}$

  $= \frac{2,85-0,84}{2,85} \times 100\%$

  $= 0,7052 \times 100\%$

  $= 70,52\%$

11) Perhitungan Analisis COD Biomembran Selulosa

Rumus : C × f

- Limbah Batik awal

  $= 2,102 \times 10$

  $= 21,02$ mg/L

- P_2E_1

  $= 0,202 \times 10$

  $= 2,02$ mg/L

- $P_2E_{1,5}$

  $= 0,184 \times 10$

  $= 1,84$ mg/L

- P_4E_1

  $= 0,1,49 \times 10$

  $= 1,49$ mg/L

- $4_2E_{1,5}$

  $= 0,164 \times 10$

  $= 1,64$ mg/L

➢ **% Removal COD Biomembran Selulosa**

Rumus : $\frac{awal-akhir}{awal} \times 100\%$

- P_2E_1

  $= \frac{21,02-2,02}{21,02} \times 100\%$

  $= 0,9039 \times 100\%$

- P_4E_1

  $= \frac{21,02-1,49}{21,02} \times 100\%$

  $= 0,9291 \times 100\%$

= 90,39%

- $P_2E_{1,5}$

  $= \frac{21,02-1,84}{21,02} \times 100\%$

  $= 0,9124 \times 100\%$

  = 91,24%

= 92,91%

- $P_4E_{1,5}$

  $= \frac{21,02-1,64}{21,02} \times 100\%$

  $= 0,9219 \times 100\%$

  = 92,19%

12) Pertitungan Kadar TSS Biokoagulan Selulosa

Simbol	**Kertas Saring kosong (g) (B)**	**Berat Kertas Saring + Residu Kering (g) (A)**
Limbah Awal	0,7931	0,7992
$B_{1,5}T_{30}$	0,7944	0,7975
$B_{1,5}T_{60}$	0,7832	0,7857
B_3T_{30}	0,7856	0,7880
B_3T_{60}	0,7897	0,7918
$B_{4,5}T_{30}$	0,7923	0,7943
$B_{4,5}T_{60}$	0,7912	0,7926

Rumus TSS : $\frac{(A-B)\times 1000}{volume\ contoh\ uji,L}$

- Limbah Awal = $\frac{(0,7992-0,7931)}{0,02} \times 1000$

  = 305 mg/L

- $B_{1,5}T_{30}$

  $= \frac{(0,7975-0,7944)}{0,02} \times 1000$

  = 155 mg/L

- $B_{1,5}T_{60}$

  $= \frac{(0,7857-0,7832)}{0,02} \times 1000$

  = 125 mg/L

- B_3T_{60}

  $= \frac{(0,7918-0,7897)}{0,02} \times 1000$

  = 105 mg/L

- $B_{4,5}T_{30}$

  $= \frac{(0,7943-0,7923)}{0,02} \times 1000$

  = 100 mg/L

- B_3T_{30}

  $= \frac{(0,7880-0,7856)}{0,02} \times 100\%$

  = 120 mg/L

- $B_{4,5}T_{60}$

  $= \frac{(0,7926-0,7912)}{0,02} \times 1000$

  = 70 mg/L

13) Perhitungan Kadar TSS Biomembran Selulosa

Simbol	Kertas Saring kosong (g) (B)	Berat Kertas Saring + Residu Kering (g) (A)
Limbah Awal	0,7931	0,7992
P_2E_1	0,7656	0,7686
$P_2E_{1,5}$	0,7544	0,7572
P_4E_1	0,7859	0,7883
$P_4E_{1,5}$	0,7676	0,7687

Rumus TSS : $\frac{(A-B)\times 1000}{volume\ contoh\ uji,L}$

- Limbah Awal = $\frac{(0,7992-0,7931)}{0,02} \times 1000$

  = 305 mg/L

- P_2E_1

  $= \frac{(0,7686-0,7656}{0,02} \times 1000$

  = 150 mg/L

- $P_2E_{1,5}$

  $= \frac{(0,7572-0,7544)}{0,02} \times 1000$

  = 125 mg/L

- P_4E_1

  $= \frac{(0,7883-0,7859)}{0,02} \times 1000$

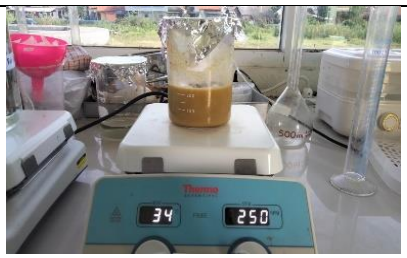
  = 120 mg/L

- $P_4E_{1,5}$

  $= \frac{(0,7687-0,7676)}{0,02} \times 1000$

  = 55 mg/L

LAMPIRAN B PEMBUATAN BIOKOAGULAN SELULOSA DAN BIOMEMBRAN NA_2-EDTA DARI LIMBAH DAUN KETAPANG

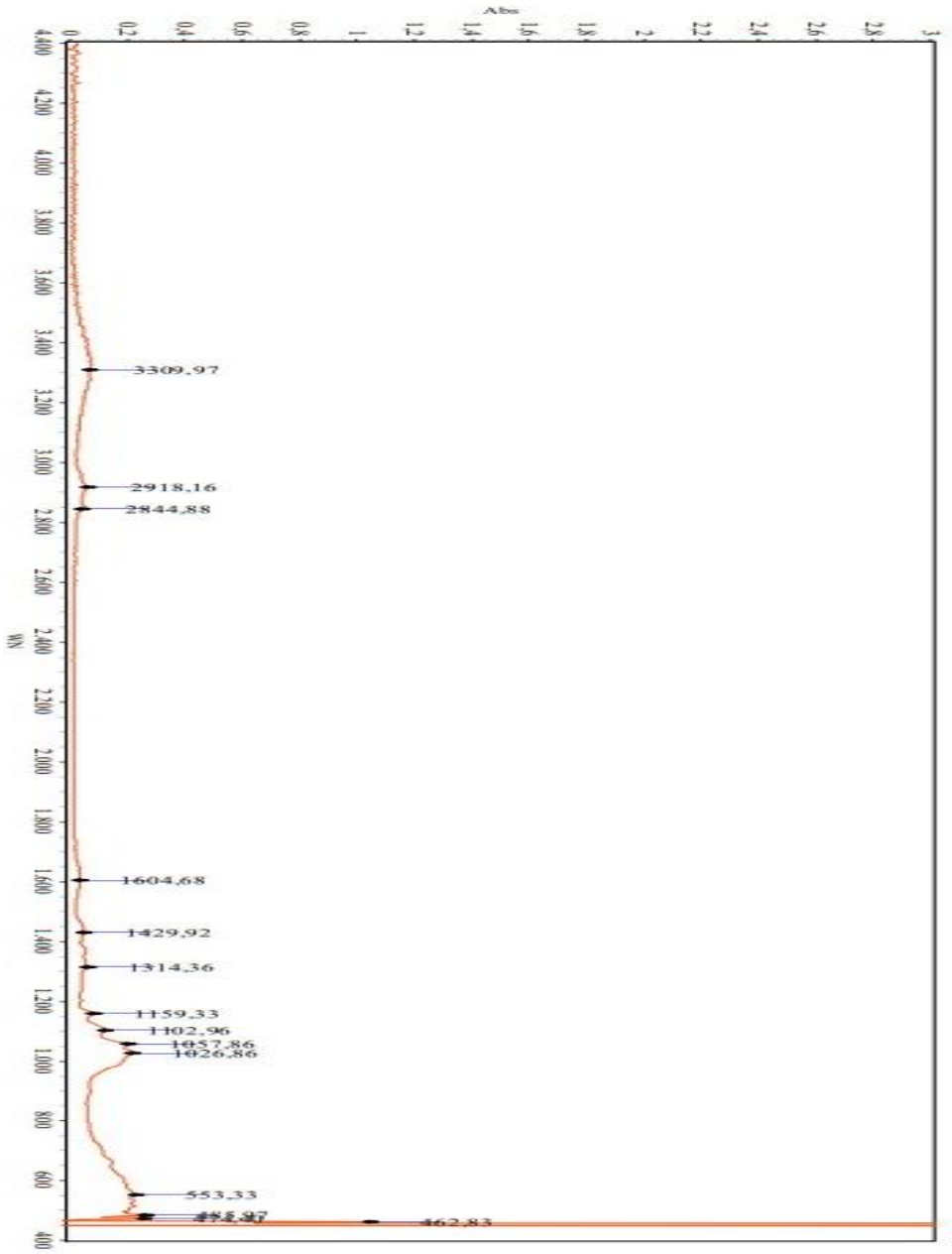
 Menghaluskan daun ketapang	 Mengayak daun ketapang	 Menimbang KOH
 Membuat Larutan KOH	 Delignifikasi	 Menyaring Hasil Delignifikasi
 Menghaluskan hasil delignifikasi	 Hidrolisis menggunakan HCl	 Bleaching menggunakan NaOCl
 Pengaplikasian Biokoagulan Selulosa Menggunakan Jartest	 Pengenceran PVA dengan asam nitrat 1M dan aquadesr 150 ml	 Pembuatan Membran Selulosa Na_2-EDTA/PVA/PEG

 Pencetakan Biomembran Selulosa Na_2-EDTA/PVA/PEG	 Aplikasi Biomembran Selulosa Na_2-EDTA/PVA/PEG	 Analisis Selulosa
 Analisis COD	 Analisis Ammoniak	 Analisis Morfologi

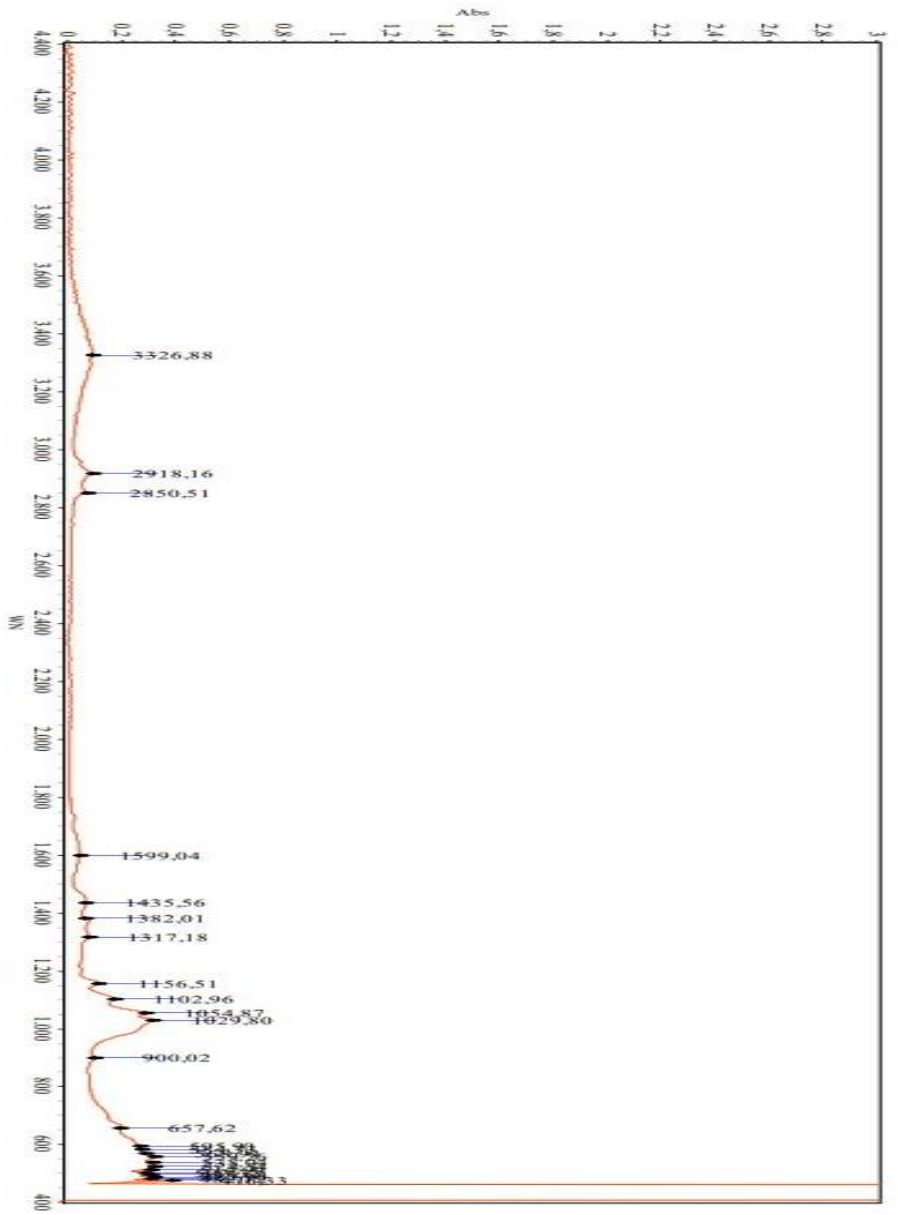
LAMPIRAN C DATA ANALISIS

1) Hasil Pengujian Gugus Fungsi Biokoagulan Selulosa Dari Limbah Daun Ketapang

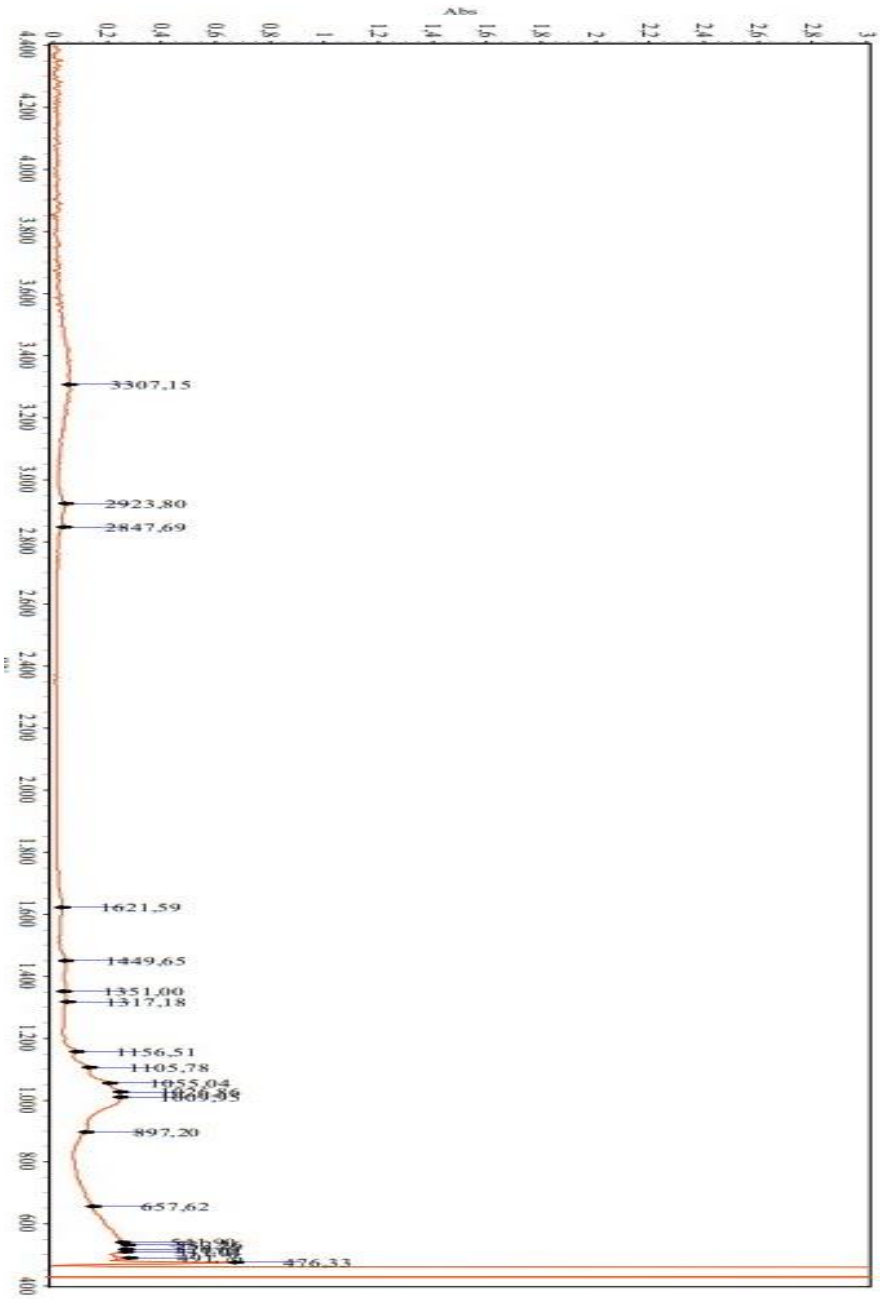
- Hasil analisis gugus fungsi biokoagulan selulosa pada sampel $D_{10}H_5$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 5%, *Bleaching* NaOCl 9%)



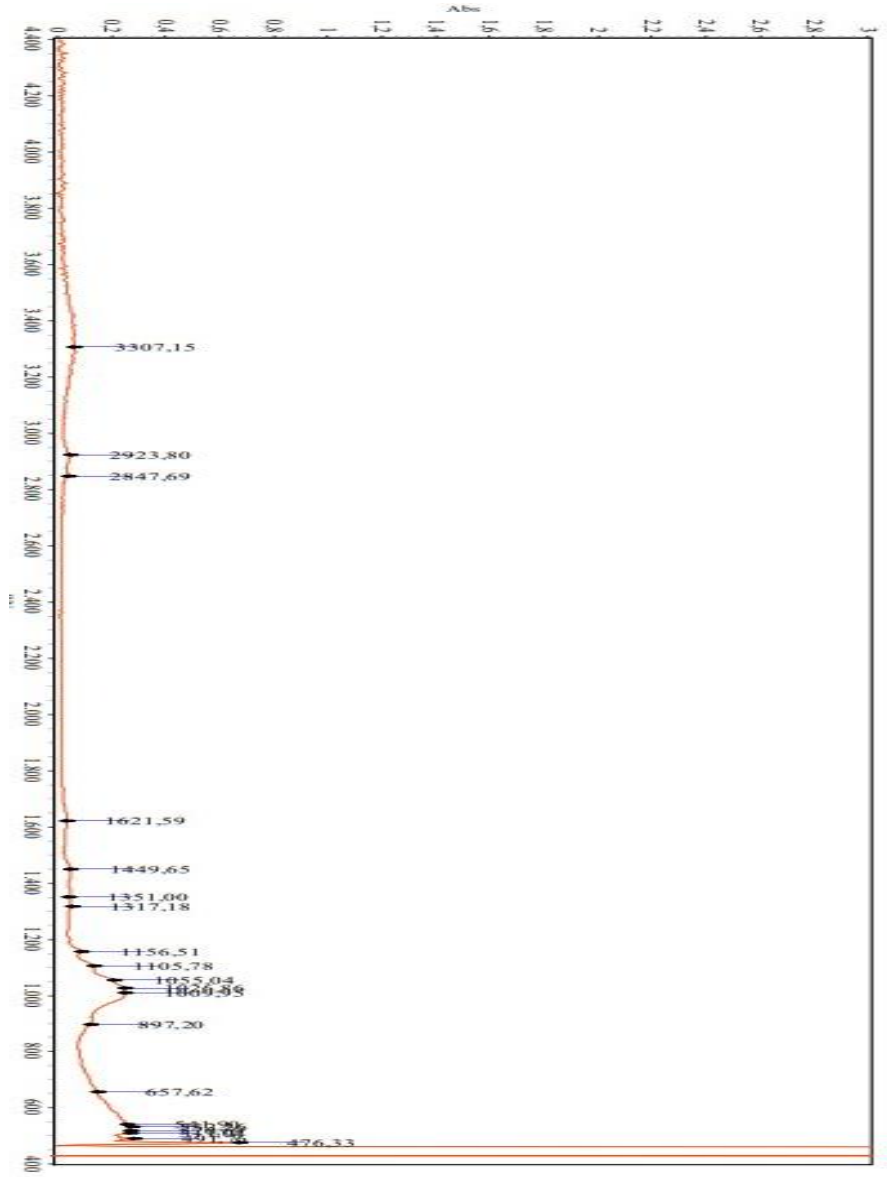
➢ Hasil analisis gugus fungsi biokoagulan selulosa pada sampel $D_{10}H_{10}$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 10%, *Bleaching* NaOCl 9%)



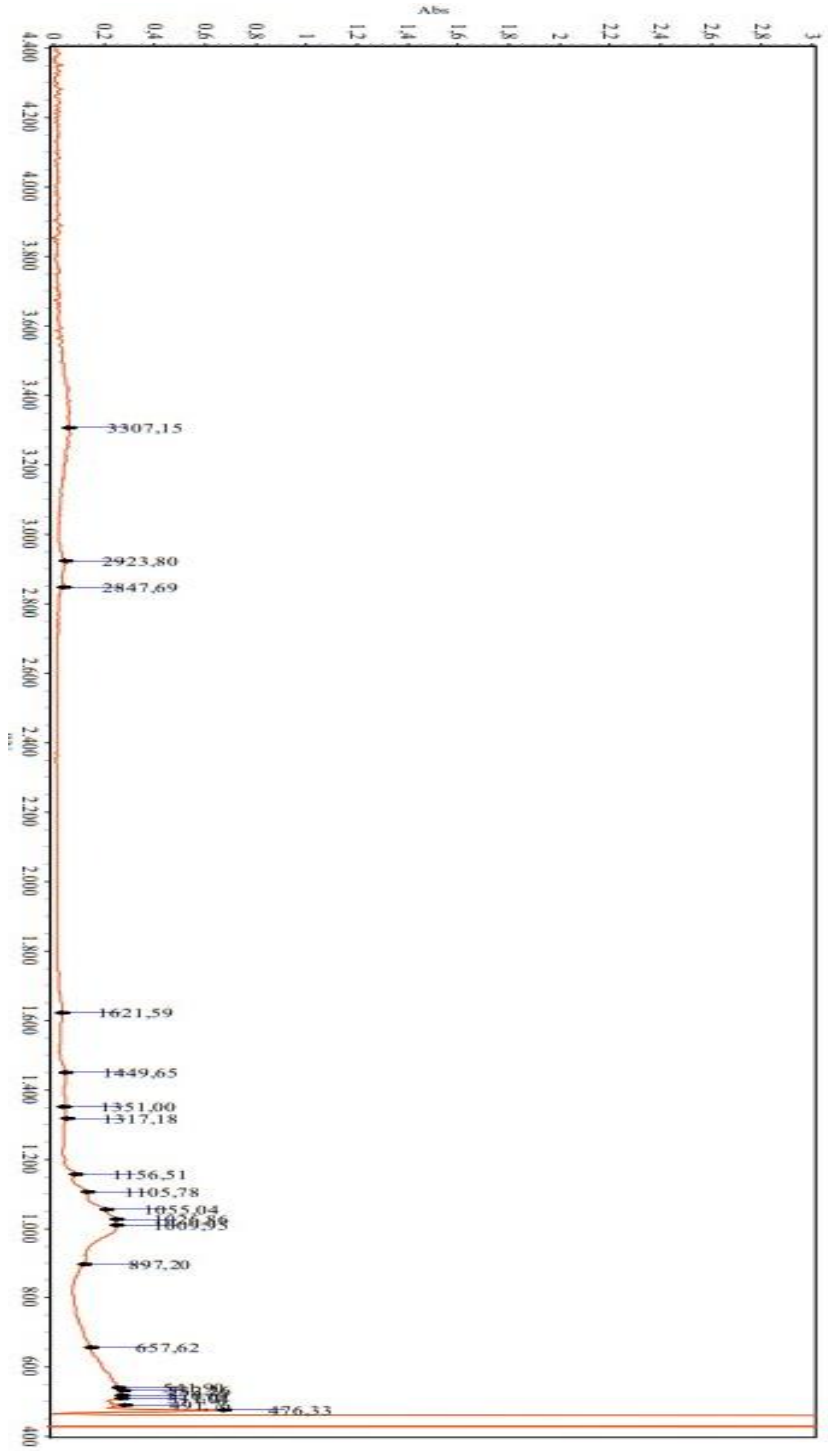
- Hasil analisis gugus fungsi biokoagulan selulosa pada sampel $D_{10}H_{15}$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 15%, *Bleaching* NaOCl 9%)



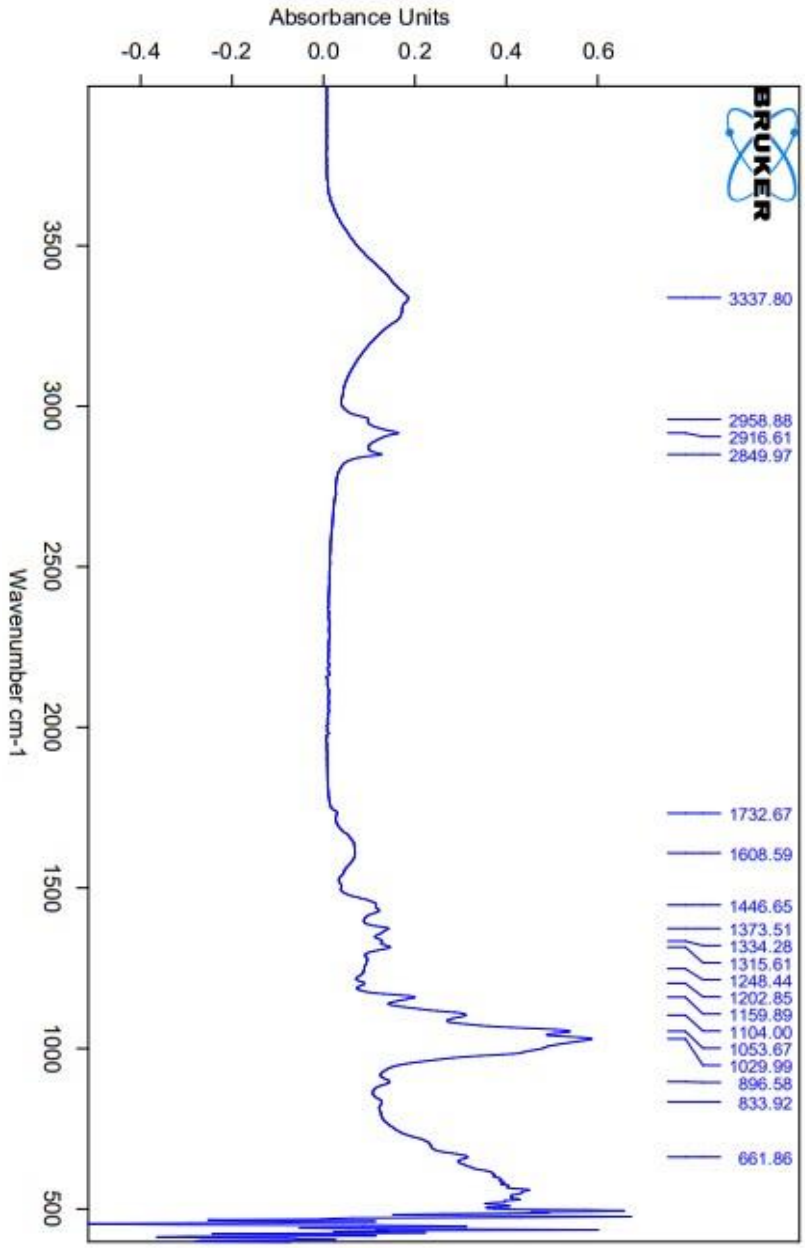
- Hasil analisis gugus fungsi biokoagulan selulosa pada sampel $D_{10}H_{15}$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 10%, *Bleaching* NaOCl 9%)



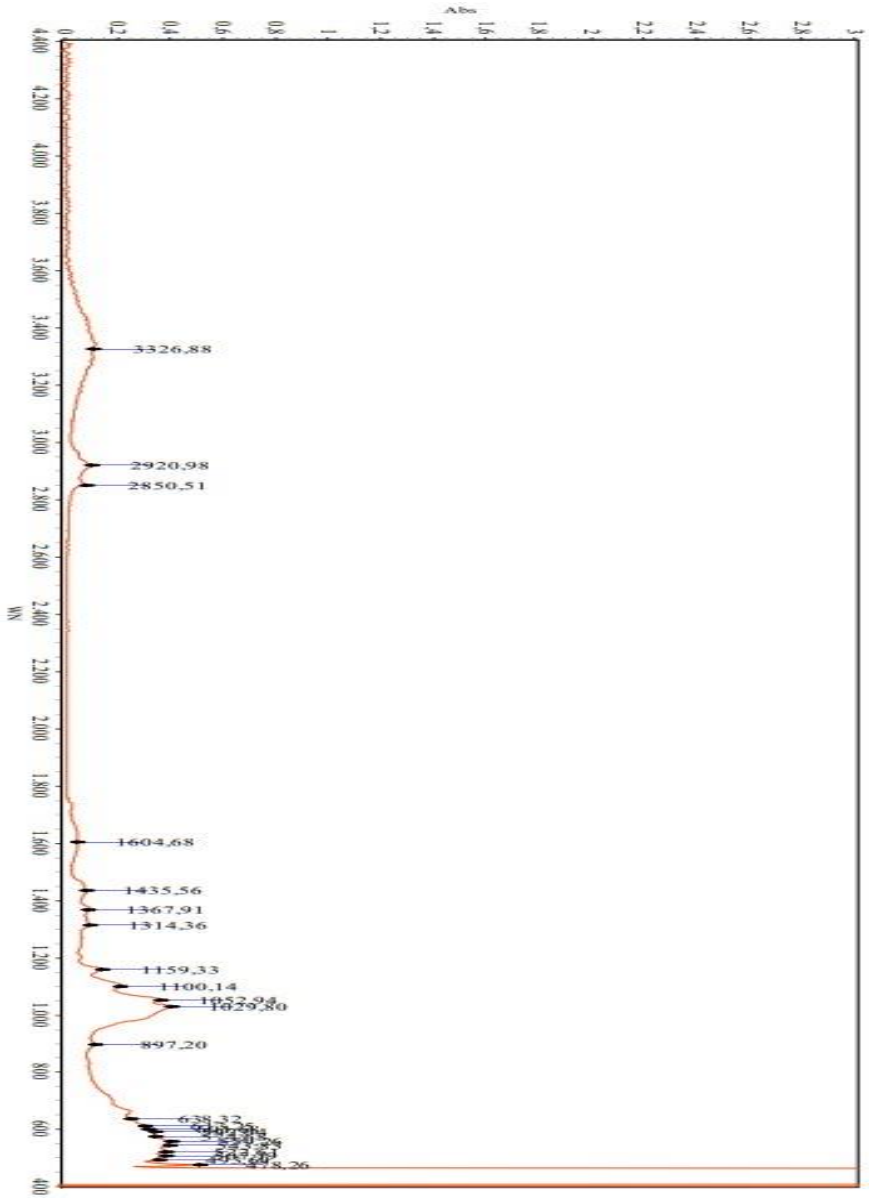
- Hasil analisis gugus fungsi biokoagulan selulosa pada sampel $D_{15}H_5$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 5%, *Bleaching* NaOCl 9%)



- Hasil analisis gugus fungsi biokoagulan selulosa pada sampel $D_{15}H_{10}$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 10%, *Bleaching* NaOCl 9%)

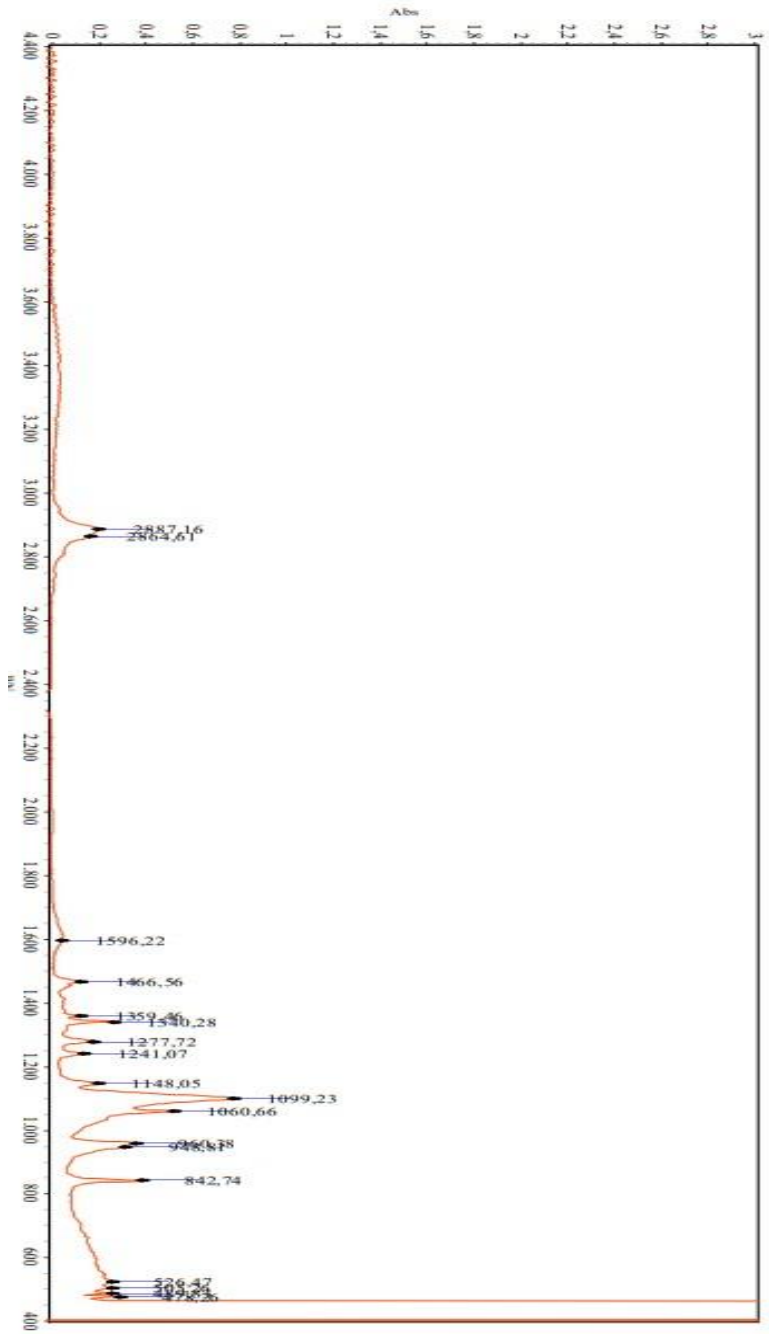


- Hasil analisis gugus fungsi biokoagulan selulosa pada sampel $D_{15}H_{15}$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 15%, *Bleaching* NaOCl 9%)

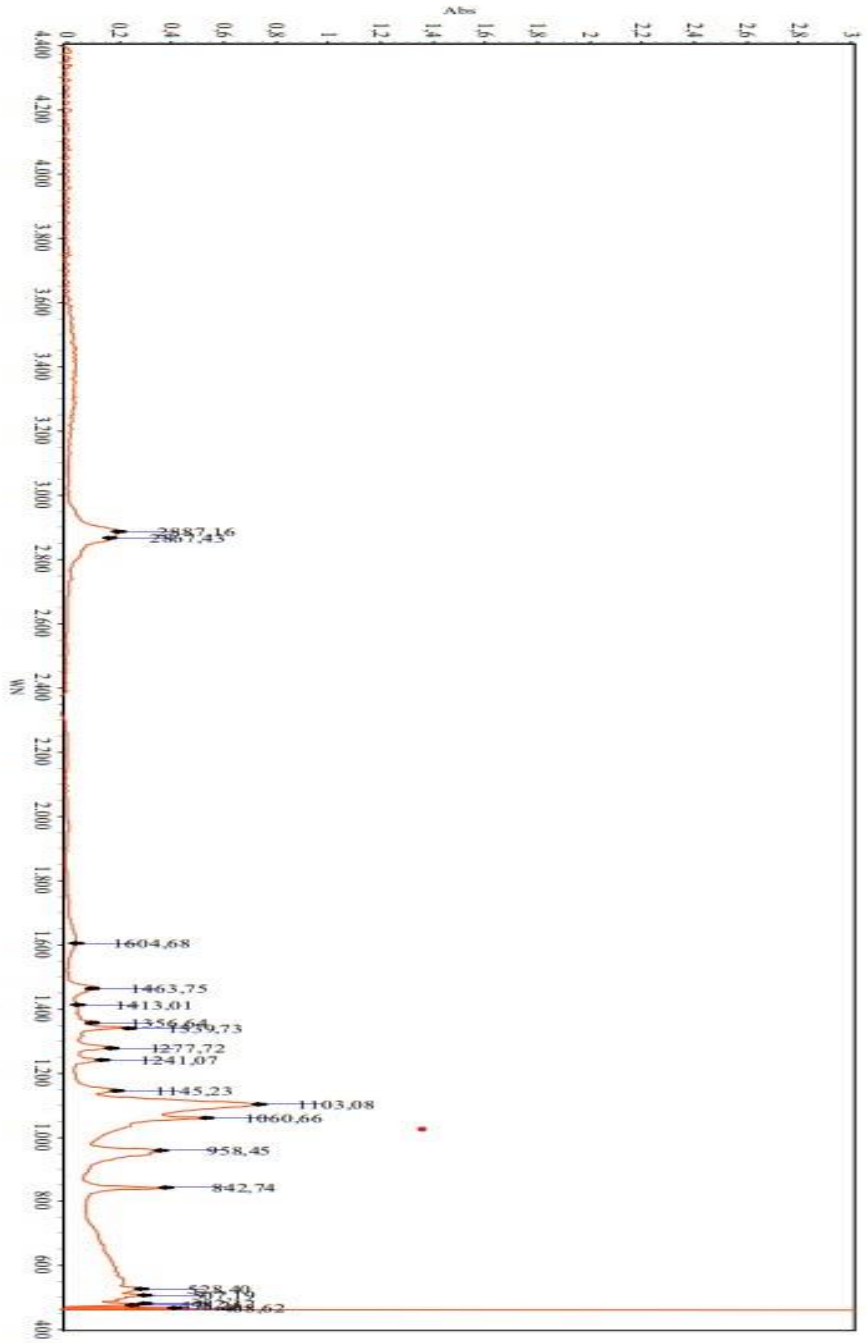


2) Hasil Pengujian Gugus Fungsi Biomembran Selulosa Na_2-EDTA/PVA/PEG Dari Limbah Daun Ketapang

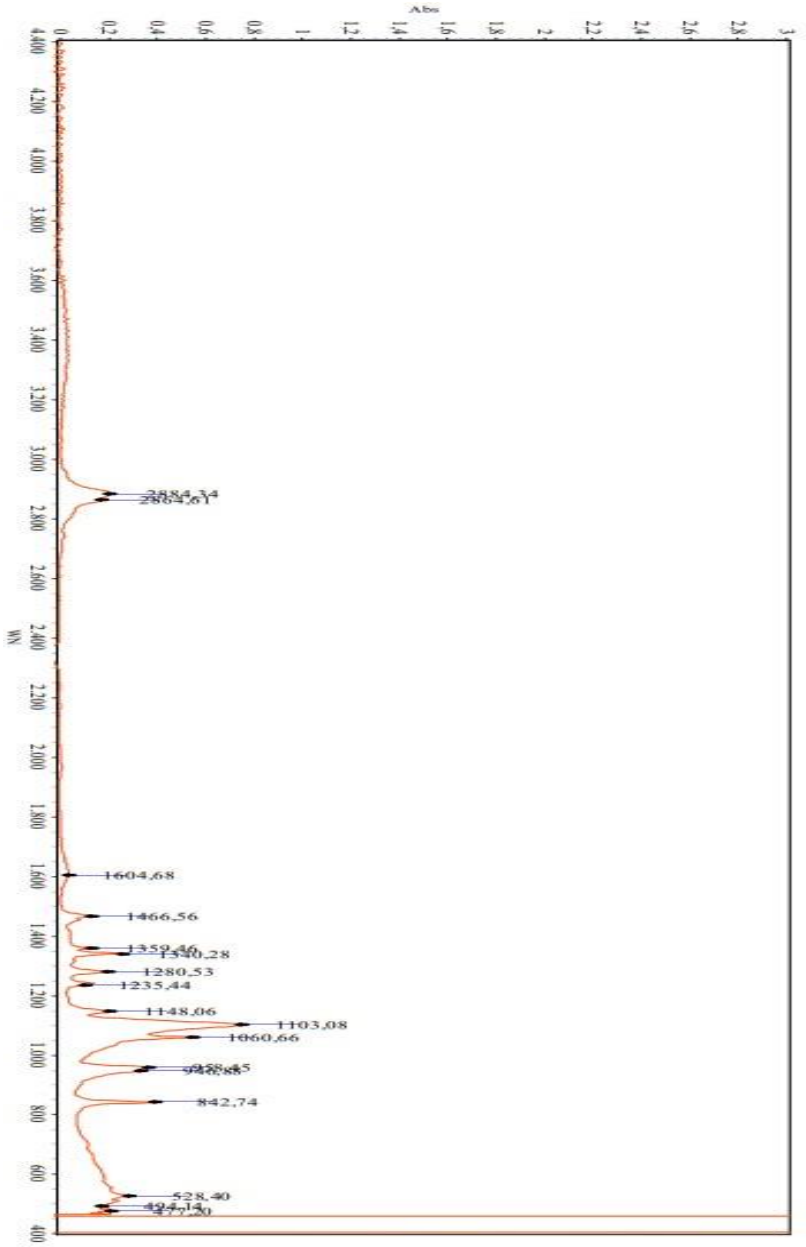
- Hasil analisis gugus fungsi biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel P_2E_1 (PVA + Asam Nitrat 4 ml, PEG 2 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1 gram)



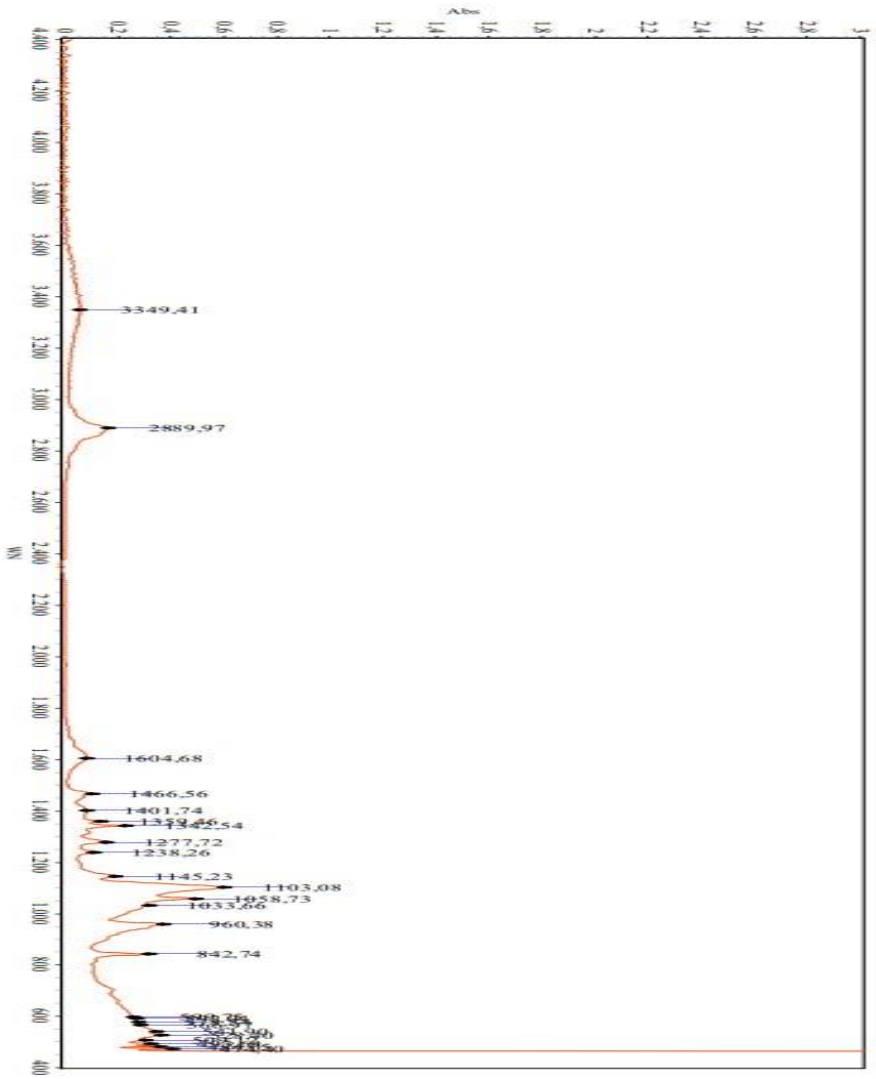
- Hasil analisis gugus fungsi biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel $P_2E_{1,5}$ (PVA + Asam Nitrat 4 ml, PEG 2 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1,5 gram)



- Hasil analisis gugus fungsi biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel P_4E_1 (PVA + Asam Nitrat 4 ml, PEG 4 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1 gram)



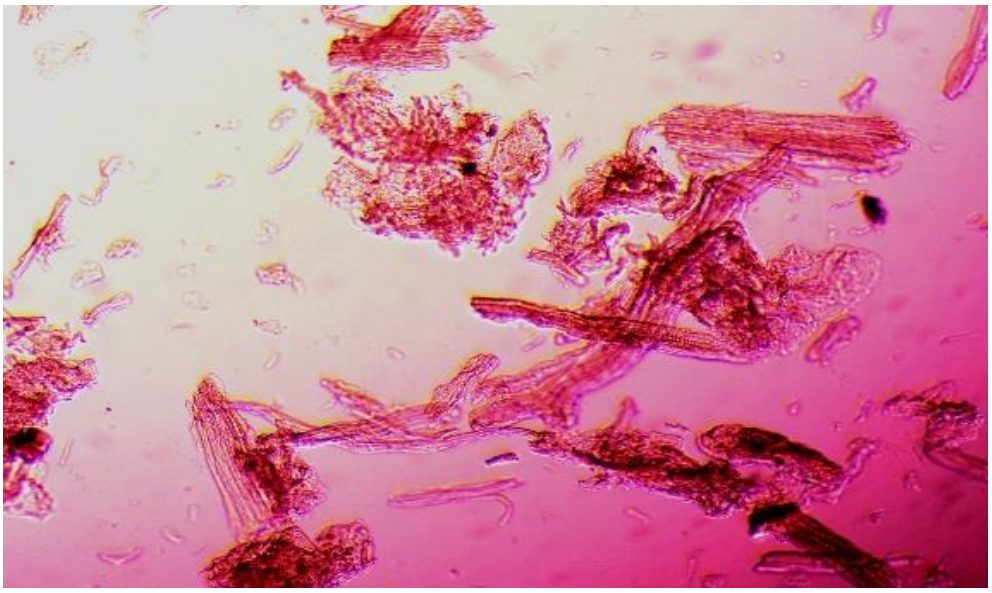
- Hasil analisis gugus fungsi biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel $P_4E_{1,2}$ (PVA + Asam Nitrat 4 ml, PEG 4 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1,2 gram)



3) Hasil Pengujian Struktur Permukaan Biokoagulan Selulosa Dari Limbah Daun Ketapang Menggunakan Mikroskop Multimedia

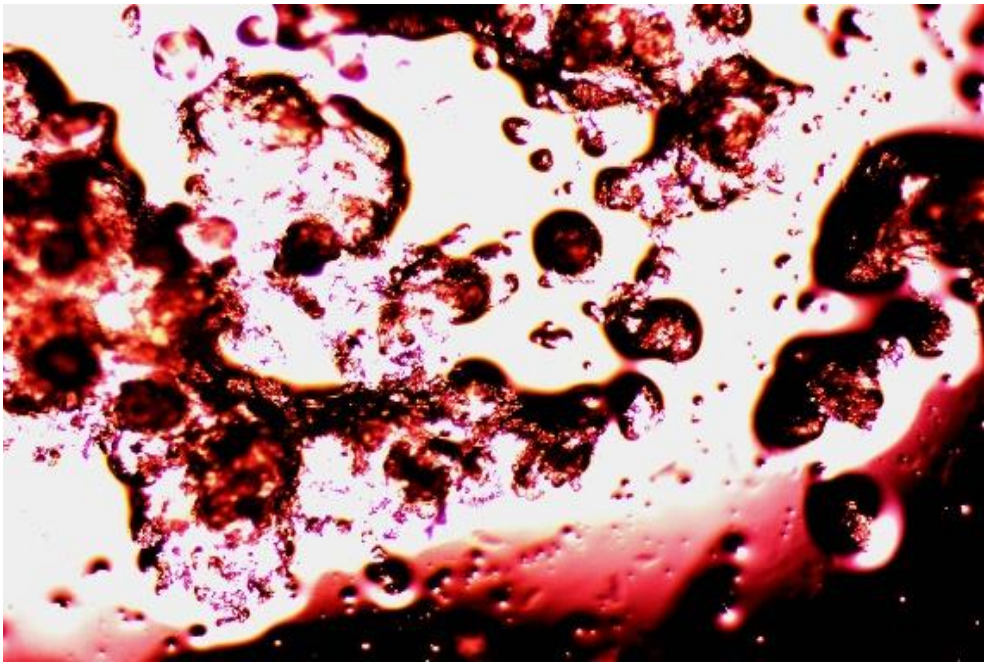
- Hasil analisis struktur permukaan biokoagulan selulosa pada sampel $D_{10}H_5$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 5%, *Bleaching* NaOCl 9%)

Perbesaran 4x $D_{10}H_5$

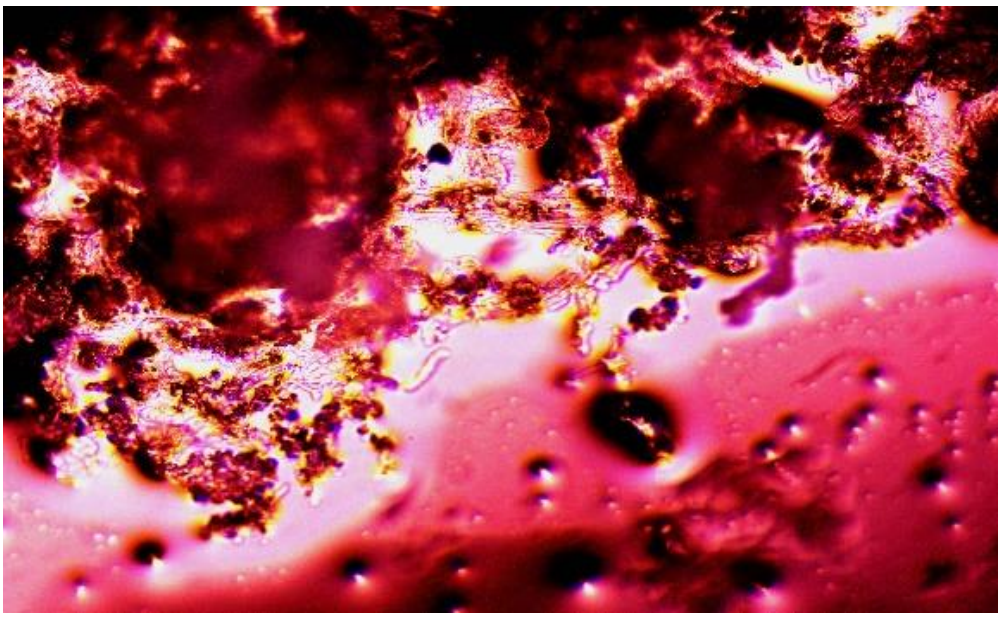


Perbesaran 10x $D_{10}H_5$

- Hasil analisis struktur permukaan biokoagulan selulosa pada sampel $D_{10}H_{10}$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 10%, *Bleaching* NaOCl 9%)

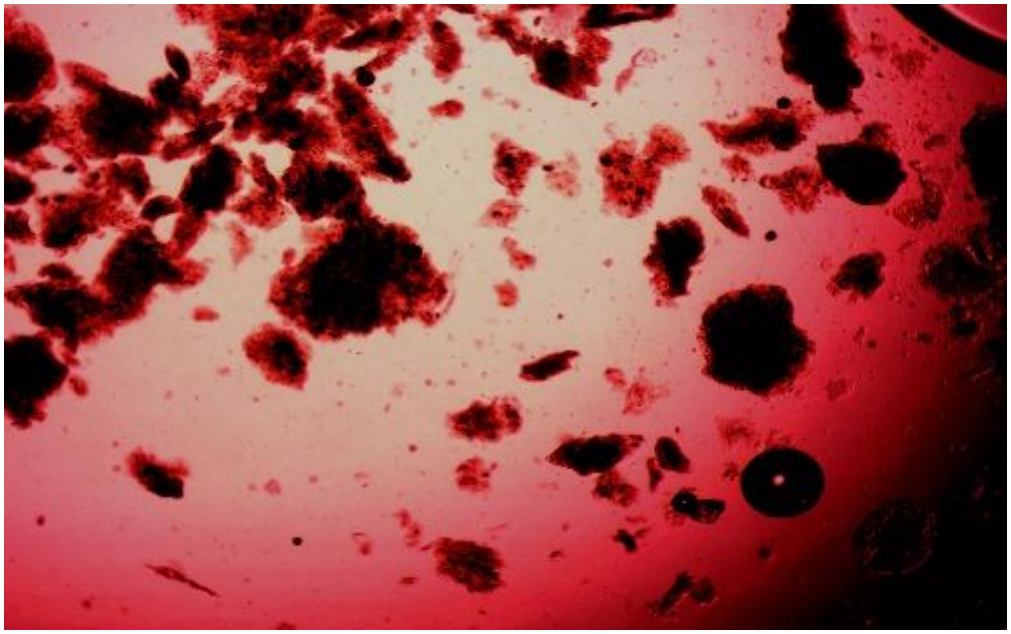


Perbesaran 4x $D_{10}H_{10}$

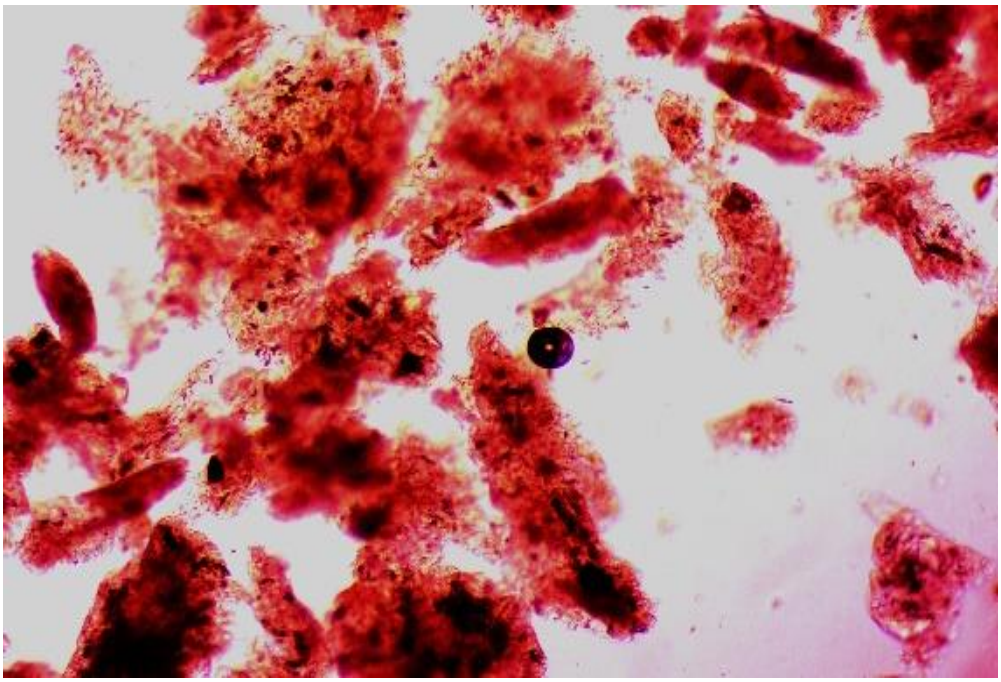


Perbesaran 10x $D_{10}H_{10}$

- Hasil analisis struktur permukaan biokoagulan selulosa pada sampel $D_{10}H_{15}$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 15%, *Bleaching* NaOCl 9%)

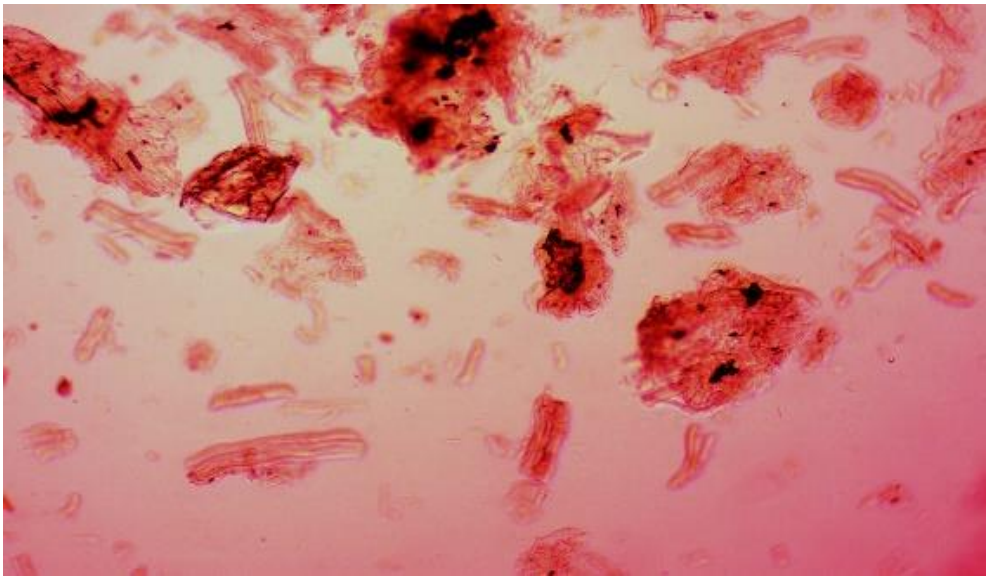


Perbesaran 4x $D_{10}H_{15}$



Perbesaran 10x $D_{10}H_{15}$

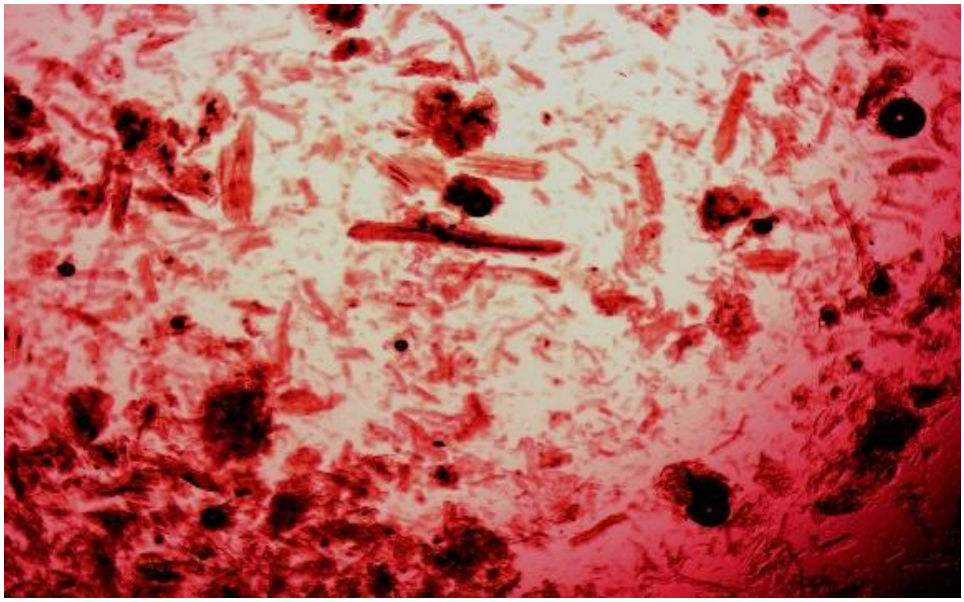
- Hasil analisis struktur permukaan biokoagulan selulosa pada sampel $D_{15}H_5$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 5%, *Bleaching* NaOCl 9%)



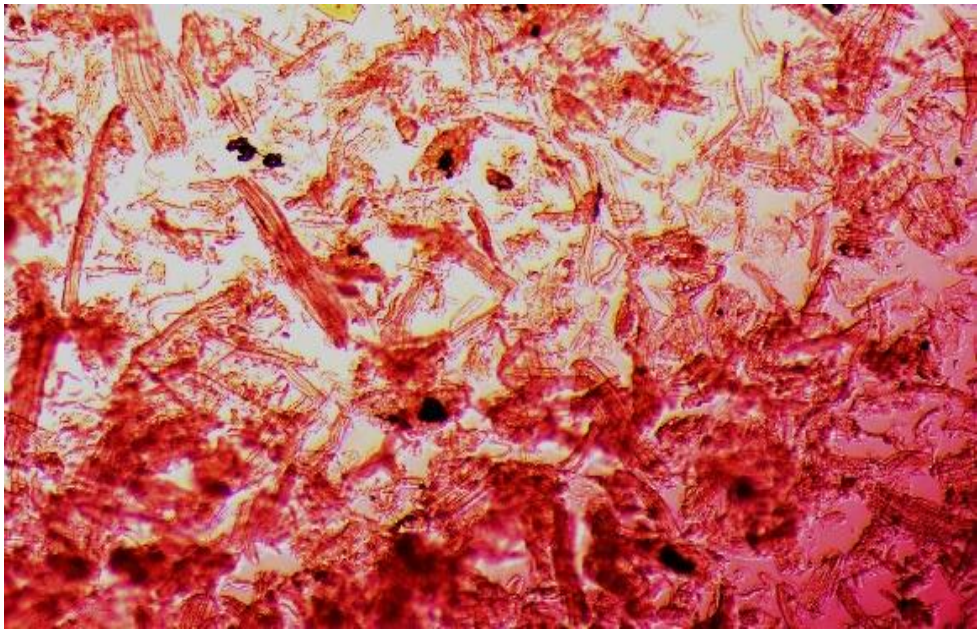
Perbesaran 4x $D_{15}H_5$

Perbesaran 10x $D_{15}H_5$

- Hasil analisis struktur permukaan biokoagulan selulosa pada sampel $D_{15}H_{10}$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 10%, *Bleaching* NaOCl 9%)

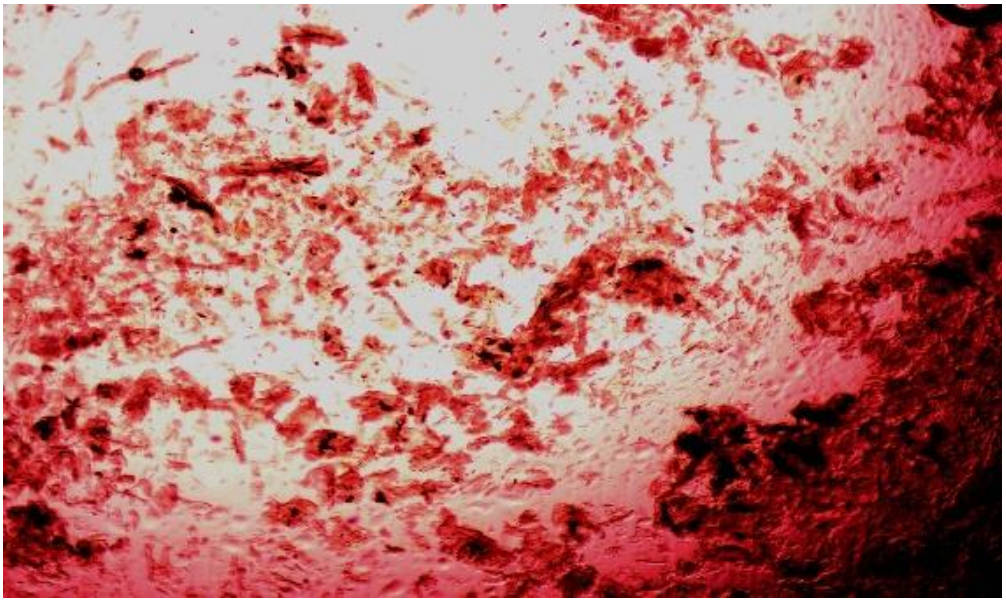


Perbesaran 4x $D_{15}H_{10}$

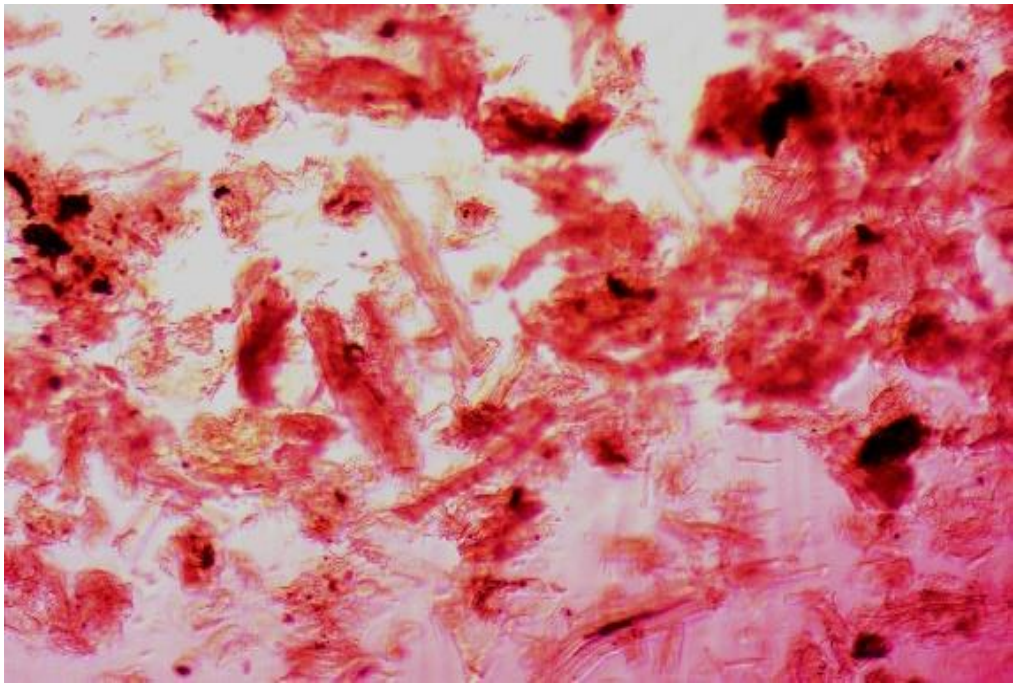


Perbesaran 10x $D_{15}H_{10}$

- Hasil analisis struktur permukaan biokoagulan selulosa pada sampel $D_{15}H_{15}$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 15%, *Bleaching* NaOCl 9%)



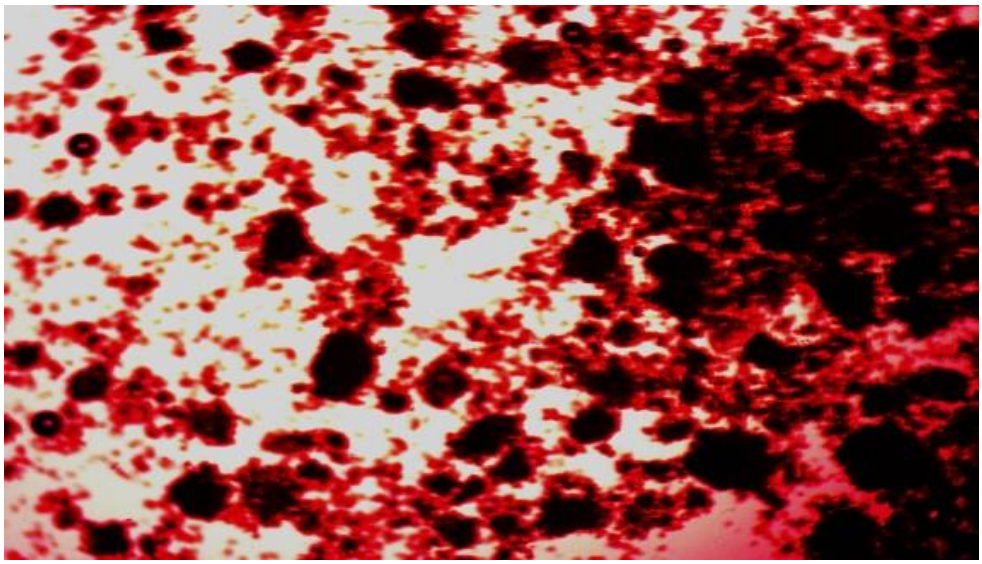
Perbesaran 4x $D_{15}H_{15}$



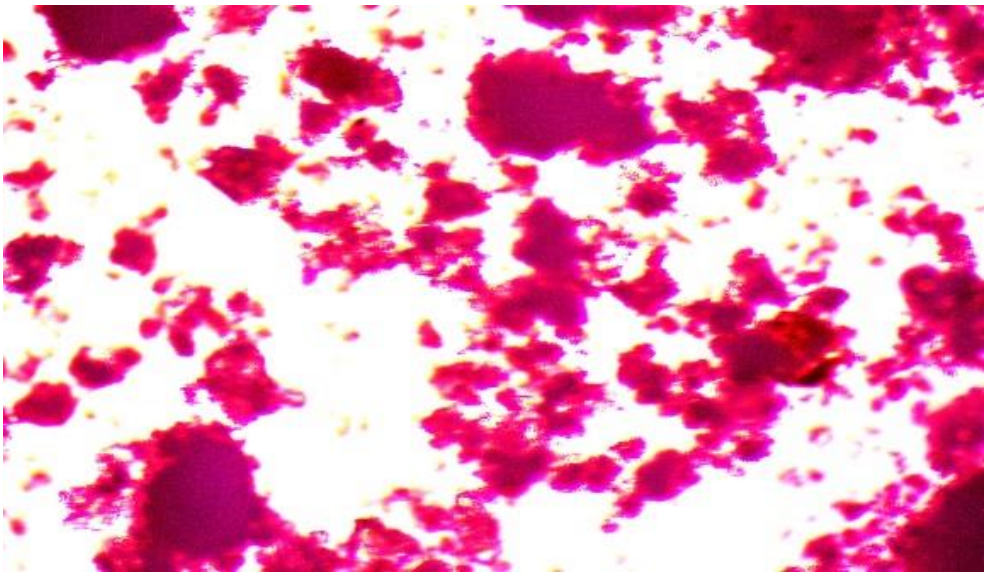
Perbesaran 10x $D_{15}H_{15}$

4) Hasil Pengujian Struktur Permukaan Biomembran Selulosa Na_2-EDTA/PVA/PEG Dari Limbah Daun Ketapang Menggunakan Mikroskop Multimedia

- Hasil analisis struktur pemukaan biomembran Na_2-EDTA/PVA/PEG selulosa pada sampel P_2E_1 (PVA + Asam Nitrat 4 ml, PEG 2 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1 gram)

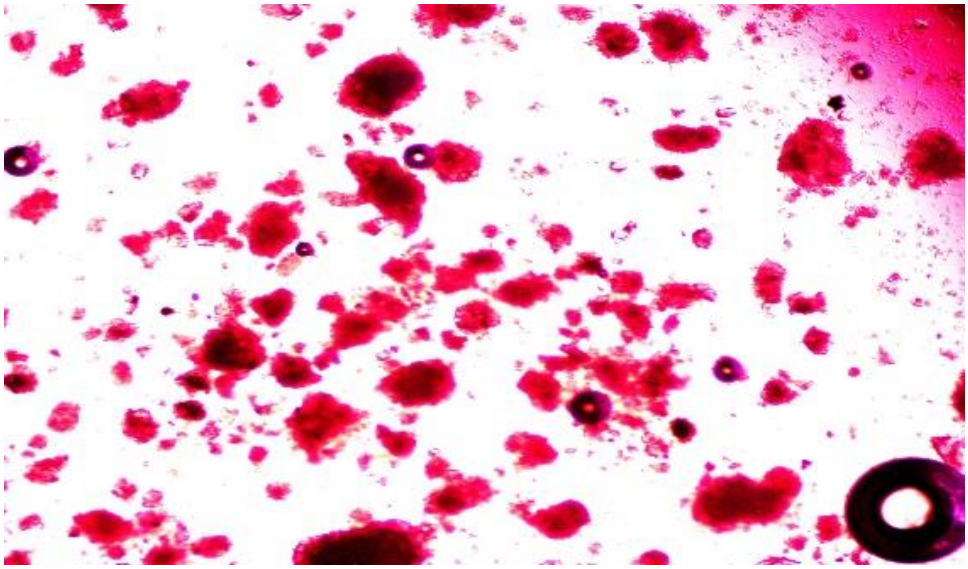


Perbesaran 4x P_2E_1

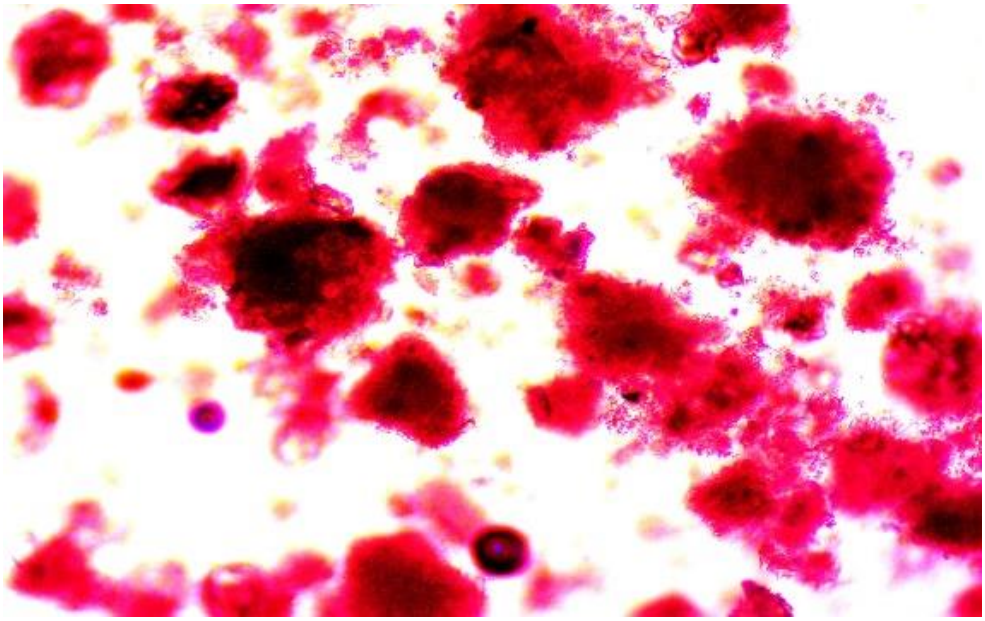


Perbesaran 10x P_2E_1

- Hasil analisis struktur pemukaan biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel $P_2E_{1,5}$ (PVA + Asam Nitrat 4 ml, PEG 2 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1,5 gram)

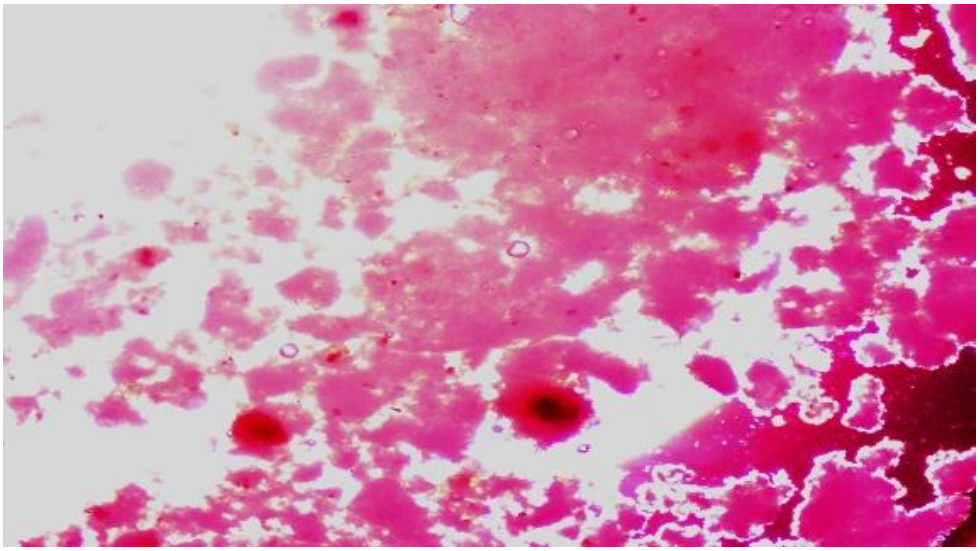


Perbesaran 4x $P_2E_{1,5}$

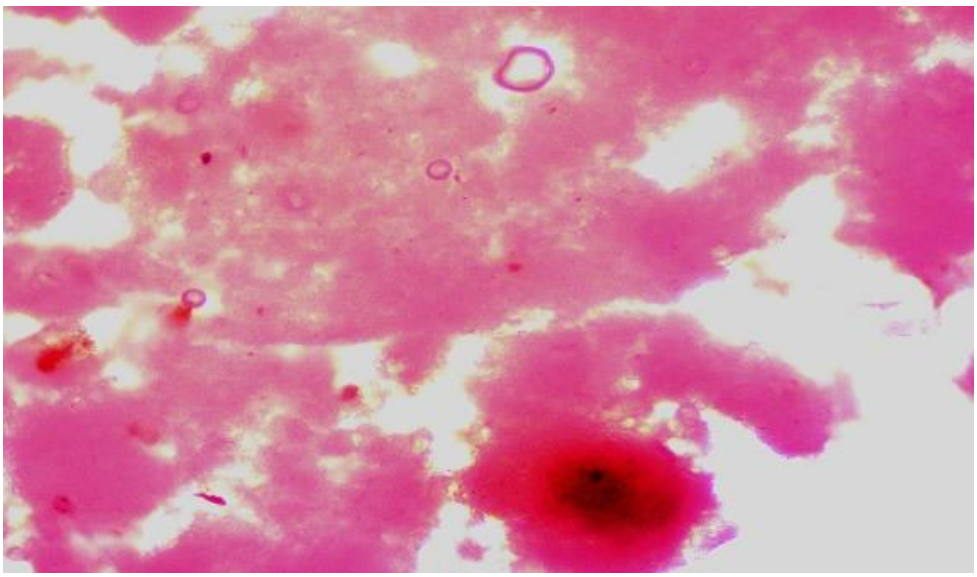


Perbesaran 10x $P_2E_{1,5}$

- Hasil analisis struktur pemukaan biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel P_4E_1 (PVA + Asam Nitrat 4 ml, PEG 4 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1 gram)

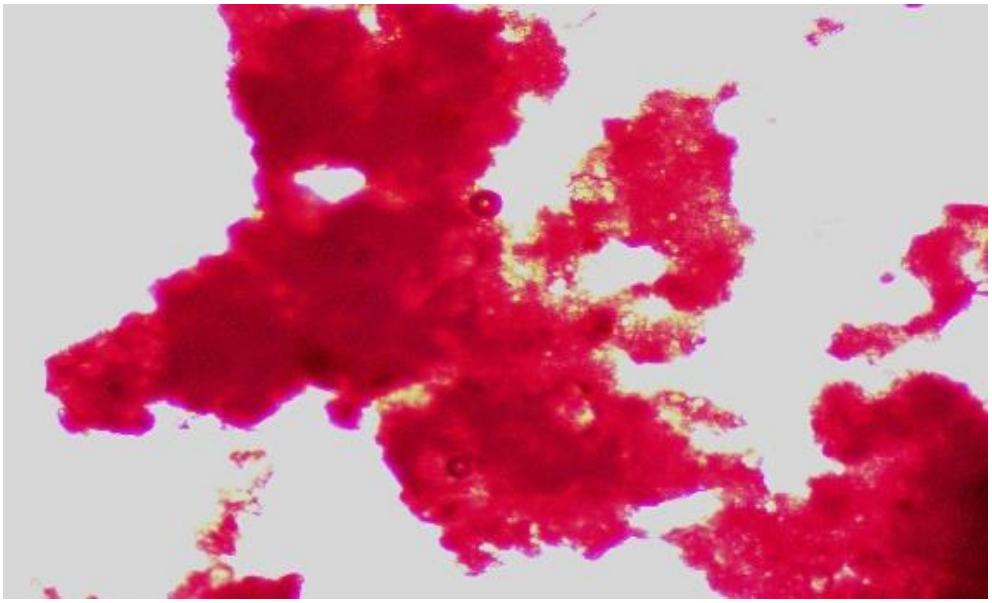


Perbesaran 4x P_4E_1

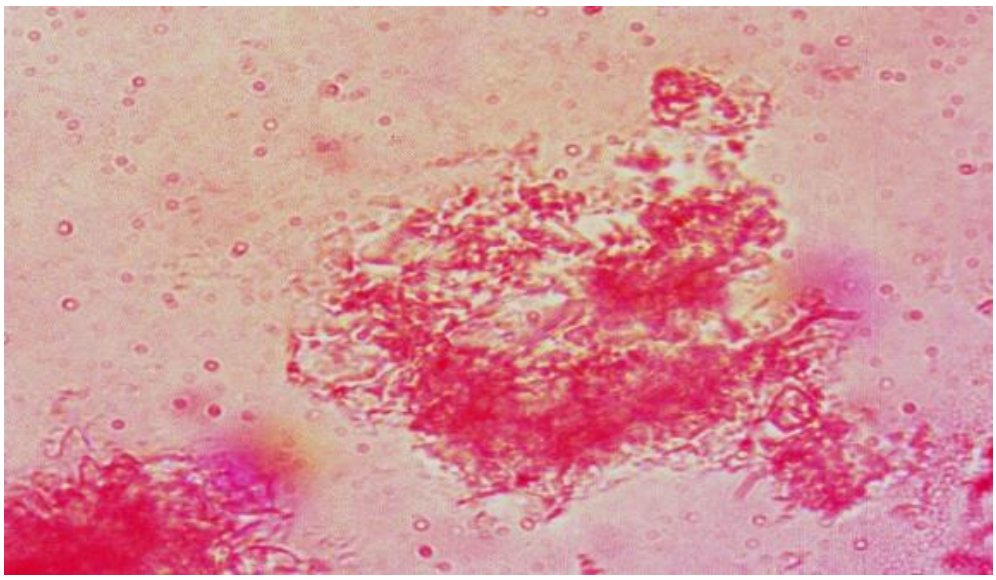


Perbesaran 10x P_4E_1

- Hasil analisis struktur pemukaan biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel $P_4E_{1,5}$ (PVA + Asam Nitrat 4 ml, PEG 4 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1,5 gram)



Perbesaran 4x $P_4E_{1,5}$



Perbesaran 10x $P_4E_{1,5}$

LAMPIRAN D FOTO PRODUK BIOKOAGULAN SELULOSA DAN BIOMEMBRAN SELULOSA Na_2-EDTA/PVA/PEG

1) Produk Biokoagulan Selulosa

- Produk biokoagulan selulosa pada sampel $D_{10}H_5$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 5%, *Bleaching* NaOCl 9%).

- Produk biokoagulan selulosa pada sampel $D_{10}H_{10}$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 10%, *Bleaching* NaOCl 9%).

- Produk biokoagulan selulosa pada sampel $D_{10}H_{15}$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 15%, *Bleaching* NaOCl 9%).

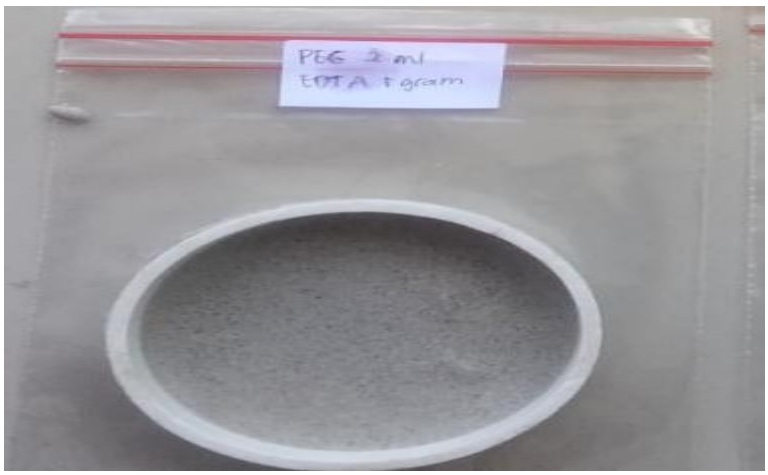
- Produk biokoagulan selulosa pada sampel $D_{15}H_{5}$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 5%, *Bleaching* NaOCl 9%).

- Produk biokoagulan selulosa pada sampel $D_{15}H_{10}$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 10%, *Bleaching* NaOCl 9%).

- Produk biokoagulan selulosa pada sampel $D_{15}H_{15}$ (*Delignifikasi* KOH 15%, Hidrolisis HCl 15%, *Bleaching* NaOCl 9%).

2) Produk Biomembran Selulosa Na_2-EDTA/PVA/PEG

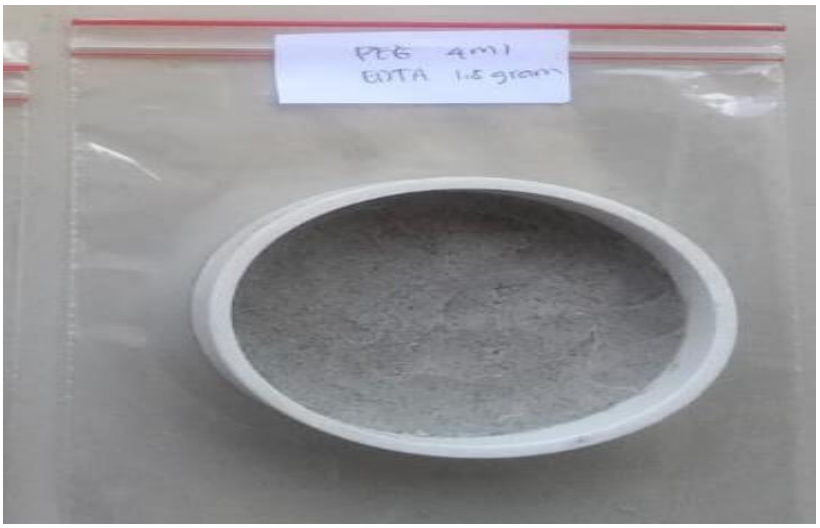
- Produk biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel P_2E_1 (PVA + Asam Nitrat 4 ml, PEG 2 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1 gram)



- Produk biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel $P_2E_{1,5}$ (PVA + Asam Nitrat 4 ml, PEG 2 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1,5 gram)

- Produk biomembran selulosa Na_2-EDTA/PVA/PEG pada sampel P_4E_1 (PVA + Asam Nitrat 4 ml, PEG 4 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1 gram)

- Produk biomembran selulosa pada sampel $P_4E_{1,5}$ (PVA + Asam Nitrat 4 ml, PEG 4 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1,5 gram)



LAMPIRAN E LABEL PRODUK

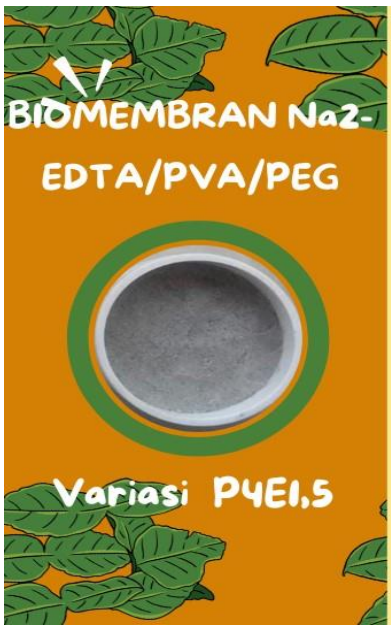
1) Label Produk biokoagulan selulosa pada sampel $D_{10}H_5$ (*Delignifikasi* KOH 10%, Hidrolisis HCl 5%, *Bleaching* NaOCl 9%)

Proses Delignifikasi KOH 15%, Hidrolisis HCl 10%, Bleaching NaOCl 9%

Karakteristik	Nilai
Kadar Selulosa	41,49% %
Gugus Fungsi	O-H, C-H, -CH_2, C-O
Morfologi Struktur Permukaan	Berserat
Kadar Air	1,04%

Karakteristik	Nilai
Ammoniak	0,43 mg/L
pH	8,2
Chemical Oxygen Demand (COD)	2,9 mg/L
KadarTSS	55mg/L

2) Label Produk biomembran selulosa pada sampel $P_4E_{1,5}$ (PVA + Asam Nitrat 4 ml, PEG 4 gram, Serbuk Biokoagulan Selulosa 2 gram, Na_2-EDTA 1,5 gram)



Proses Pencampuran Biokoagulan Selulosa 2 gram, Asam Nitrat + PVA4 ml, PEG 4000 4 gram, Na2-EDTA 1,5 gram.

Karakteristik	Nilai
Gugus Fungsi	-O-H, C-H, O=H, C-O, C-N
Morfologi Struktur Permukaan	Berserat dan Padat
Kadar Air	1,10%

Karakteristik	Nilai
Ammoniak	0,43 mg/L
pH	8,2
Chemical Oxygen Demand (COD)	2,9 mg/L
KadarTSS	55mg/L

BIODATA PENULIS

Nama	: Rahma Julia Agusti
Tempat /Tanggal Lahir	: Cilacap, 24 Juli 2002
Alamat	: Jl. Cendrawasih RT 05/RW 06, Kel. Tegalreja, Kec. Cilacap Selatan, Kab. Cilacap.
Telepon	: 0895359690622
Hobi	: Memasak
Motto	: Orang tua dirumah menanti kepulanganmu dengan hasil yang membanggakan, jangan kecewakan mereka. Simpan keluhmu, sebab letihmu tak sebanding dengan perjuangan mereka menghidupimu

Riwayat Pendidikan :

SD Negeri Tegalreja 04	Tahun 2008-2014
SMP Negeri 2 Cilacap	Tahun 2014-2017
SMA Muhammadiyah 1 Cilacap	Tahun 2017-2020
Politeknik Negeri Cilacap	Tahun 2020-2024