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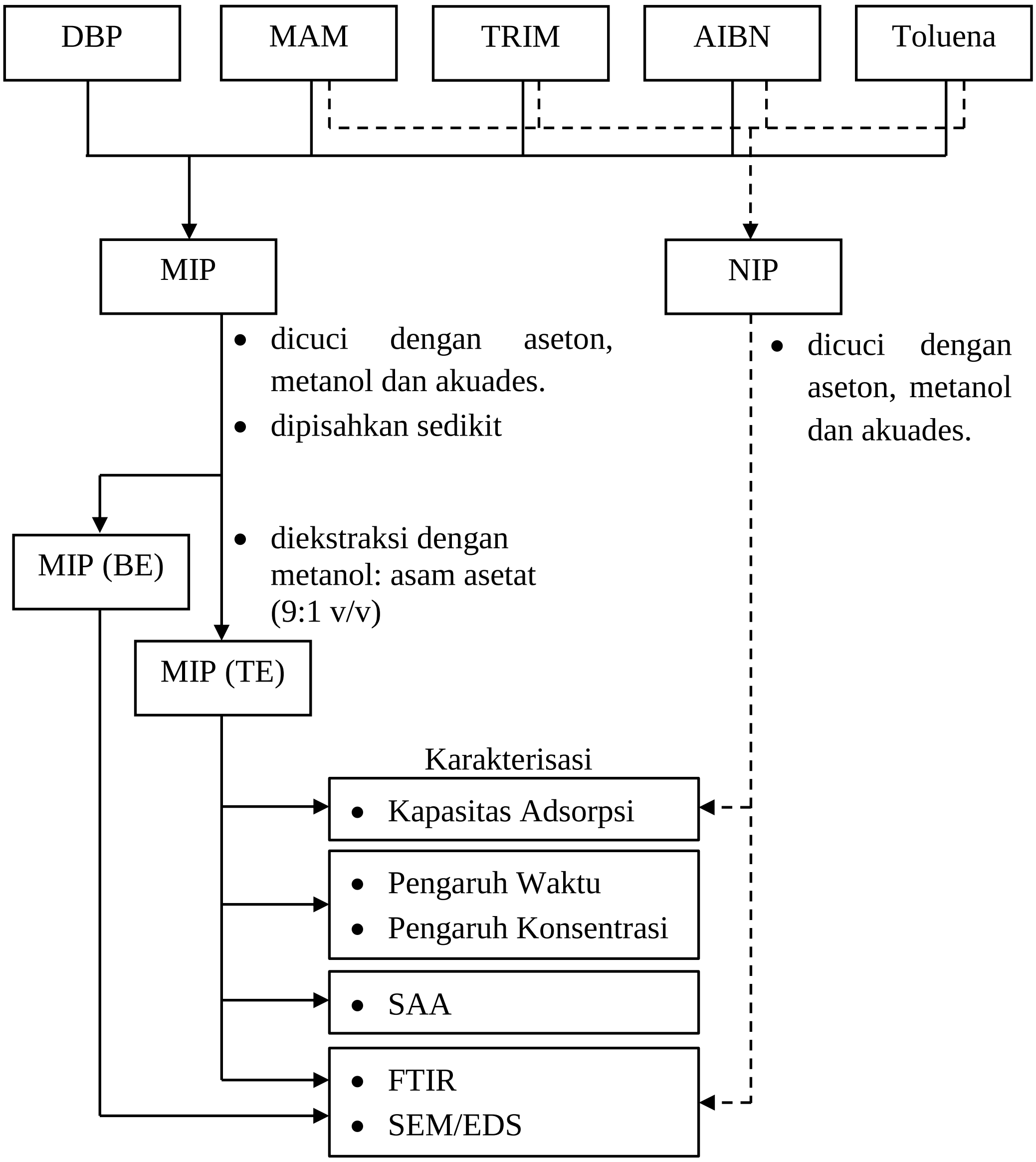
Lampiran 1. Diagram Alir Penelitian



Lampiran 2. Prosedur Penelitian

1. Sintesis MIP dan NIP

0,2651 mL (1 mmol) DBP	0,34 g (4 mmol) MAM

- dimasukkan ke dalam labu alas bulat
- ditambahkan pengikat silang TRIM sebanyak 6,39 mL (20 mmol)
- ditambahkan toluena sebanyak 50 mL
- disonikasi selama 15 menit
- dialiri nitrogen selama 15 menit
- ditambahkan AIBN sebanyak 5 mL (1 mmol)
- disonikasi selama 15 menit
- dialiri nitrogen selama 15 menit
- dimasukkan dalam *water bath* pada suhu 60°C selama 24 jam

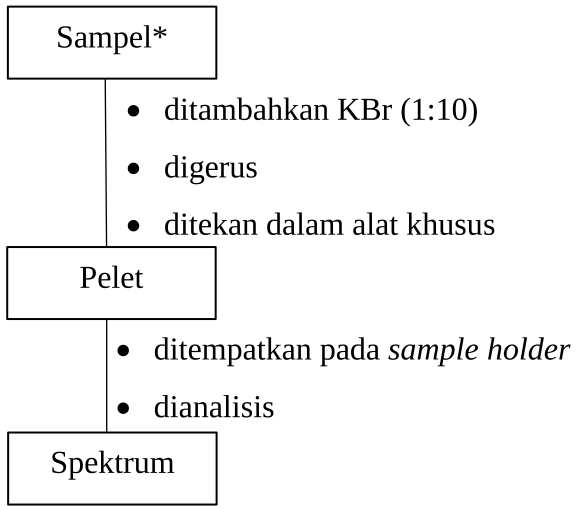
Polimer

- diambil polimer yang terbentuk dan dikeringkan
- dicuci dengan aseton, metanol dan akuades secara berurutan
- diekstraksi dengan campuran metanol:asam asetat (9:1 v/v) selama 30 menit
- dicuci dengan metanol dan akuades hingga pH netral
- dikeringkan

MIP

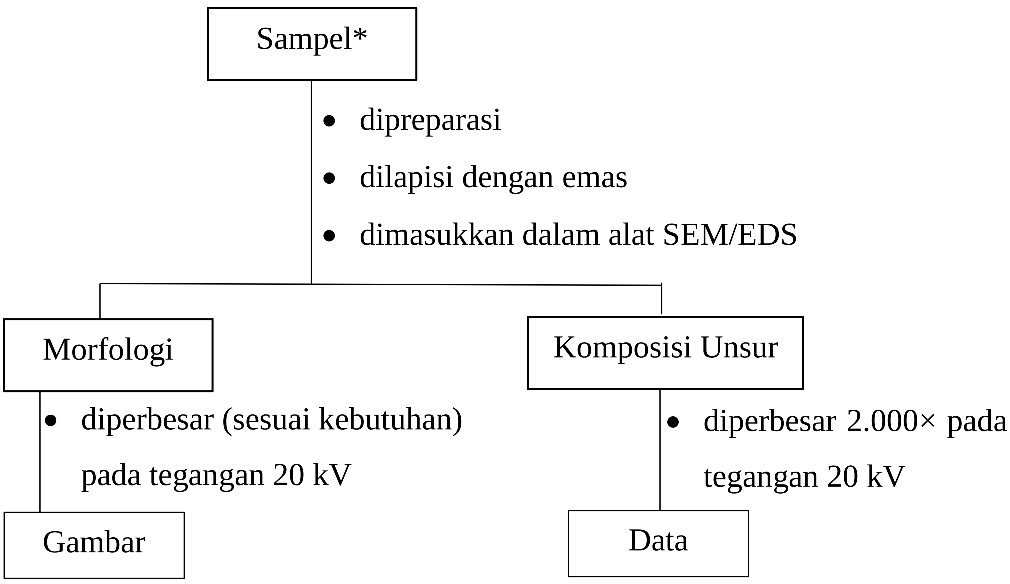
Catatan:Sintesis NIP dibuat dengan metode yang sama tanpa penggunaan DBP dan proses ekstraksi.

2. Analisis Struktur (Gugus Fungsi)



*Jenis sampel yaitu metakrilamida, MIP_DBP_MAM-co-TRIM$_{(TE)}$, MIP_DBP_MAM-co-TRIM$_{(BE)}$, dan NIP_MAM-co-TRIM. Analisis dilakukan secara bergantian pada setiap sampel.

3. Analisis Morfologi dan Komposisi Unsur



*Jenis sampel yaitu NIP_MAM-co-TRIM, MIP_DBP_MAM-co-TRIM$_{(BE)}$ dan MIP_DBP_MAM-co-TRIM$_{(TE)}$. Analisis dilakukan secara bergantian pada setiap sampel.

4. Analisis Luas dan Pori Permukaan

Sampel*

- dilakukan *degassing* (3 jam)
- dimasukkan ke dalam batang kwarsa
- diletakkan pada *holder station*
- dimasukkan nitrogen cair ke dalam tabung
- dilakukan analisis selama 869 menit (14,5 jam)

Data

*Jenis sampel yaitu MIP_DBP_MAM-co-TRIM$_{(TE)}$

5. Pembuatan Larutan Standar DBP 100 mg/L

Cairan DBP

- dipipet sebanyak 0,952 mL ke dalam labu ukur 10 mL
- ditambahkan metanol sampai tanda batas
- dihomogenkan

Larutan Standar DBP 100 mg/L

- divariasikan konsentrasinya menjadi 1, 4, 10, 13, 16 dan 19 mg/L

Deret Standar DBP

6. Uji Adsorpsi DBP pada MIP dan NIP

MIP dan NIP

- ditimbang masing-masing sebanyak 30 mg
- dimasukkan masing-masing ke dalam botol vial yang berbeda
- ditambahkan masing-masing 5 mL larutan DBP 10 mg/L
- diaduk dengan *shaker* selama 60 menit pada suhu ruang
- disaring

Endapan | Filtrat

Filtrat

- dianalisis dengan spektrofotometer UV-Vis pada panjang gelombang 266,3 nm

Data

7. Uji Pengaruh Waktu terhadap Adsorpsi DBP pada MIP

MIP

- ditimbang masing-masing sebanyak 30 mg
- dimasukkan masing-masing ke dalam 6 botol vial yang berbeda
- ditambahkan masing-masing 5 mL larutan DBP 10 mg/L
- diaduk dengan variasi waktu 30, 60, 90, 120, 150, dan 180 menit pada suhu ruang
- disaring

Endapan | Filtrat

Filtrat

- dianalisis dengan spektrofotometer UV-Vis pada panjang gelombang 266,3 nm

Data

8. Uji Pengaruh Konsentrasi terhadap Adsorpsi DBP pada MIP

MIP

- ditimbang masing-masing sebanyak 30 mg
- dimasukkan masing-masing ke dalam 6 botol vial yang berbeda
- ditambahkan larutan DBP sebanyak 5 mL dengan variasi konsentrasi 9, 12, 15, 18, dan 21 mg/L
- diaduk dengan *shaker* selama waktu optimum pada suhu ruang
- disaring

Endapan | Filtrat

Filtrat

- dianalisis dengan spektrofotometer UV-Vis pada panjang gelombang 266,3 nm

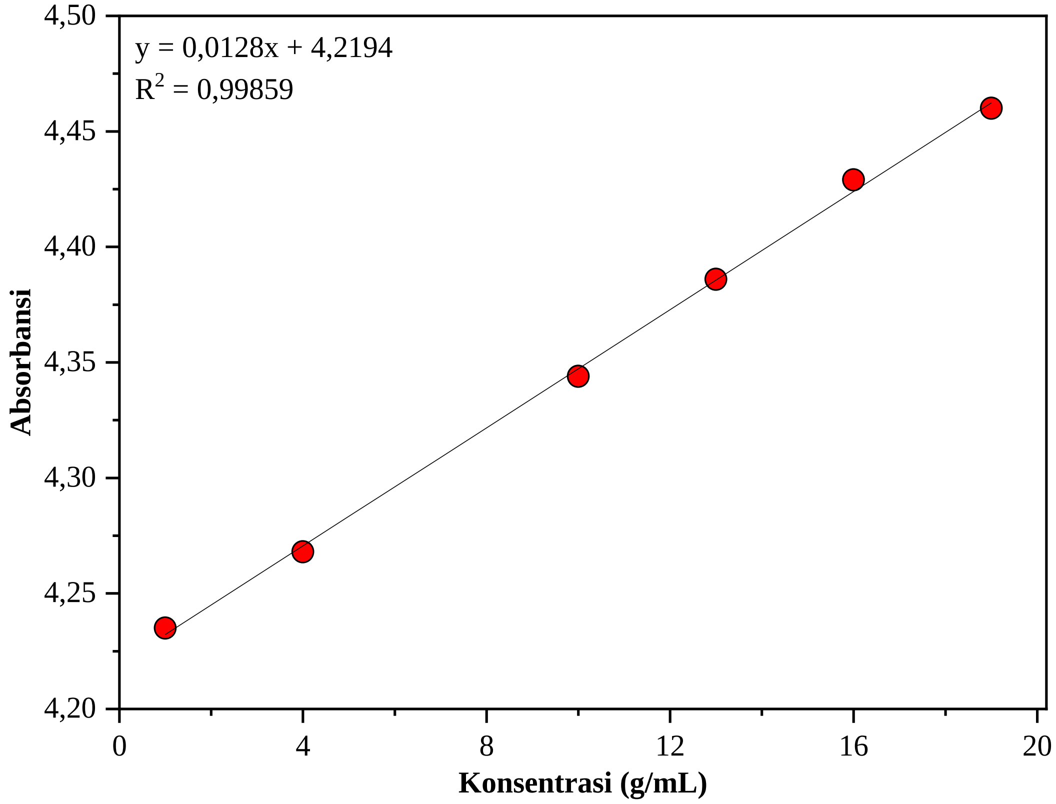
Data

Lampiran 3. Data Spektrofotometer UV-Vis

1. Data Absorbansi Larutan Standar DBP

No.	Sampel	Konsentrasi (mg/L)	Absorbansi
1	DBP	1	4,235
2	DBP	4	4,268
3	DBP	10	4,344
4	DBP	13	4,386
5	DBP	16	4,429
6	DBP	19	4,460

2. Kurva Hubungan antara Absorbansi dan Konsentrasi Larutan Standar DBP



3. Data Absorbansi Larutan setelah Adsorpsi MIP dan NIP

No.	Sampel	Absorbansi	q_t (mg/g)	Δq_t (mg/g)
1	MIP	4,278	0,9036	0,6901
2	NIP	4,331	0,2135	

4. Absorbansi Larutan setelah Adsorpsi DBP pada MIP sebagai Fungsi Waktu

No.	**Sampel**	**Waktu (menit)**	**Absorbansi**
1	DBP	30	4,282
2	DBP	60	4,262
3	DBP	90	4,253
4	DBP	120	4,231
5	DBP	150	4,236
6	DBP	180	4,241

5. Data Penentuan Kinetika Adsorpsi Orde Satu Semu dan Orde Dua Semu

No.	**Waktu (menit)**	**C_t (mg/L)**	**q_t (mg/g)**	**q_e-q_t**	**ln (q_e-q_t)**	**t/q_t**
1	30	4,891	0,852	0,664	-0,409	35,229
2	60	3,328	1,112	0,404	-0,907	53,958
3	90	2,625	1,229	0,286	-1,250	73,220
4	120	0,906	**1,516**	0	0	79,175
5	150	1,297	1,451	0,065	-2,732	103,411
6	180	1,687	1,385	0,130	-2,039	129,925

Keterangan:
qe adalah nilai qt tertinggi

6. Adsorpsi Larutan setelah DBP pada MIP sebagai Fungsi Konsentrasi

No.	**Sampel**	**Konsentrasi (mg/L)**	**Absorbansi**
1	DBP	9	4,268
2	DBP	12	4,300
3	DBP	15	4,331
4	DBP	18	4,367
5	DBP	21	4,399

7. Data Penentuan Isoterm Langmuir dan Freundlich

No.	**Sampel**	**C_o (mg/L)**	**C_e (mg/L)**	**q_e (mg/g)**	**Log C_e**	**Log q_e**	**1/C_e**	**1/q_e**
1	DBP	9	3,79687	0,86719	0,57943	-0,06189	0,26337	1,15315
2	DBP	12	6,29687	0,95052	0,79913	-0,02204	0,15881	1,05205
3	DBP	15	8,71875	1,04688	0,94045	0,01989	0,11470	0,95522
4	DBP	18	11,53125	1,07813	1,06188	0,03267	0,08672	0,92754
5	DBP	21	14,03125	1,16146	1,14710	0,06500	0,07127	0,86099

Lampiran 4. Perhitungan

1. Nilai Konsentrasi DBP setelah Adsorpsi pada MIP dan NIP

Digunakan persamaan,

$$y = 0{,}0128x + 4{,}2194$$

dengan y adalah nilai absorbansi dan x adalah nilai konsentrasi sisa (mg/L).

a. Adsorpsi oleh MIP

$$y = 4{,}278$$
$$4{,}278 = 0{,}0128x + 4{,}2194$$
$$x = 4{,}5781 \text{ mg/L}$$

b. Adsorpsi oleh NIP

$$y = 4{,}331$$
$$4{,}331 = 0{,}0128x + 4{,}2194$$
$$x = 8{,}7188 \text{ mg/L}$$

2. Nilai Kapasitas Adsorpsi DBP pada MIP dan NIP

Digunakan persamaan,

$$q_t = \frac{(C_o - C_t)}{m} V$$

dengan, C_o = 10 mg/L, m = 0,03 g

V = 0,005 L, C_t = Konsentrasi setelah adsorpsi

a. Kapasitas Adsorpsi pada MIP

$$q_t = \frac{(10 - 4{,}5781)}{0{,}03} 0{,}005$$
$$= 0{,}9036 \text{ mg/g}$$

b. Kapasitas Adsorpsi pada NIP

$$q_t = \frac{(10 - 8{,}7188)}{0{,}03} 0{,}005$$
$$= 0{,}2135 \text{ mg/g}$$

3. Nilai Konsentrasi dan Kapasitas Adsorpsi DBP pada MIP Akibat Pengaruh Waktu

Waktu (menit)	**y (absorbansi)**	**x (mg/L)**	**q_t (mg/g)**
30	4,282	4,891	0,852
60	4,262	3,328	1,112
90	4,253	2,625	1,229
120	4,231	0,906	1,516
150	4,236	1,297	1,451
180	4,241	1,687	1,385

Data contoh perhitungan yang akan diambil adalah data pada menit ke-30.

a. Nilai Konsentrasi DBP setelah Adsorpsi pada MIP

$$y = 4,282$$
$$4,282 = 0,0128x + 4,2194$$
$$x = 4,891 \text{ mg/L}$$

b. Nilai Kapasitas Adsorpsi DBP pada MIP

$$q_t = \frac{(10 - 4,891)}{0,03} 0,005$$
$$= 0,852 \text{ mg/g}$$

4. Nilai Konsentrasi dan Kemampuan Adsorpsi DBP pada MIP Akibat Pengaruh Konsentrasi

C_o (mg/L)	**y (absorbansi)**	**x (mg/L)**	**q_e (mg/g)**
9	4,268	3,79687	0,86719
12	4,300	6,29687	0,95052
15	4,331	8,71875	1,04688
21	4,367	11,53125	1,07813
24	4,399	14,03125	1,16146

Data contoh perhitungan yang akan diambil adalah data pada konsentrasi awal 9 mg/L.

a. Nilai Konsentrasi DBP setelah Adsorpsi pada MIP

$$y = 4,268$$
$$4,268 = 0,0128x + 4,2194$$
$$x = 3,79687 \text{ mg/L}$$

b. Nilai Kapasitas Adsorpsi DBP pada MIP

$$q_t = \frac{(9 - 3{,}79687)}{0{,}03} 0{,}005$$

$$= 0{,}86719 \text{ mg/g}$$

5. Persamaan Kinetika Orde Satu Semu dan Orde Dua Semu

a. Persamaan Kinetika Orde Satu Semu

Jika persamaan kinetika orde satu semu pada persamaan (5),

$$\ln(q_e - q_t) = -k_1 t + \ln q_e$$

dikorelasikan dengan persamaan garis pada Gambar 15A,

$$y = -0{,}0118x + 0{,}0141$$

maka nilai q_e dan k_1 dapat ditentukan dengan cara berikut,

- $\ln q_e = 0{,}0141$

  $q_e = 1{,}0142$ mg/g

- $-k_1 = -0{,}0118$

  $k_1 = 0{,}0118$ menit^{-1}

b. Persamaan Kinetika Orde Dua Semu

Jika persamaan kinetika orde dua semu pada persamaan (8),

$$\frac{t}{q_t} = \frac{t}{q_e} + \frac{1}{k_2 q_e^2}$$

dikorelasikan dengan persamaan garis pada Gambar 15B,

$$y = 0{,}5979x + 16{,}374$$

maka nilai q_e dan k_2 dapat ditentukan dengan cara berikut,

- $1/q_e = 0{,}5979$

  $q_e = 1{,}6725$ mg/g

- $-1/k_2 q_e^2 = 16{,}374$

  $k_2 = 1/(16{,}374 \times (1{,}6725)^2)$

  $= 0{,}0218$ g/mg.menit

6. Model Persamaan Isoterm Langmuir dan Isoterm Freundlich

a. Isoterm Langmuir

Jika persamaan laju orde dua semu pada persamaan (2),

$$\frac{1}{q_e}=\frac{1}{K_L q_m}\times\frac{1}{C_e}+\frac{1}{q_m}$$

dikorelasikan dengan persamaan garis pada Gambar 17,

$$y = 1,4458x + 0,7889$$

maka nilai q_m dan K_L dapat ditentukan dengan cara berikut,

- $1/q_m$ = 0,7889
  q_m = 1,2676 mg/g

- $1/K_L q_m$ = 1,4458
  K_L = 1/(1,4458×1,2676)
  = 0,54565 L/mg

b. Isoterm Freundlich

Jika persamaan laju orde dua semu pada persamaan (3),

$$\log q_e = \frac{1}{n}\log C_e + \log K_F$$

dikorelasikan dengan persamaan garis pada Gambar 18,

$$y = 0,2183x - 0,191$$

maka nilai K_F dan n dapat ditentukan dengan cara berikut,

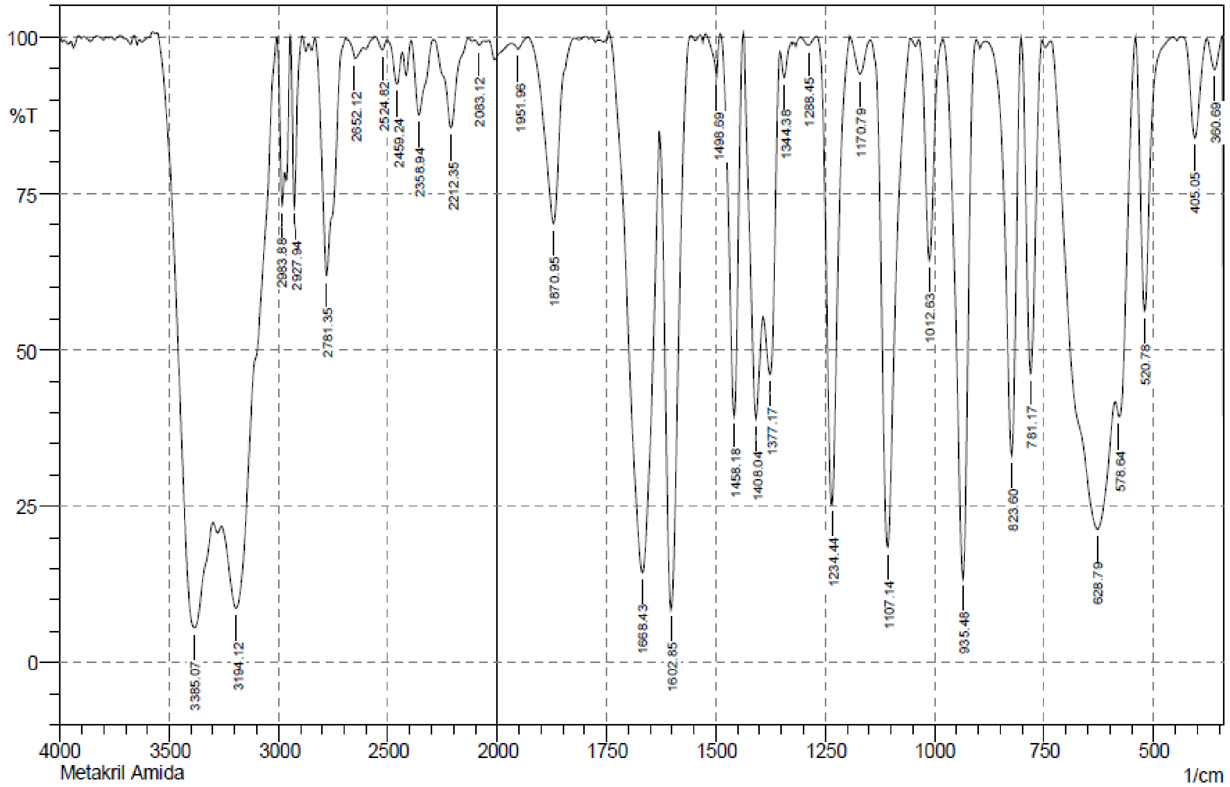
- log K_F = -0,191
  K_F = 0,64417 mg/g

- 1/n = 0,2183
  n = 4,5809

Lampiran 5. Hasil Analisis FTIR

1. Metakrilamida (MAM)

SHIMADZU



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	360.69	94.836	5.125	378.05	341.4	0.429	0.425
2	405.05	83.92	15.941	433.98	379.98	1.75	1.719
3	520.78	56.248	43.885	540.07	457.13	5.663	5.691
4	578.64	39.307	12.474	586.36	542	9.943	2.043
5	628.79	21.321	36.483	732.95	588.29	57.625	29.555
6	781.17	46.194	52.961	800.46	756.1	6.872	6.719
7	823.6	33.083	66.628	883.4	802.39	11.387	11.241
8	935.48	13.451	85.972	979.84	906.54	19.987	19.802
9	1012.63	64.391	35.253	1035.77	981.77	3.944	3.864
10	1107.14	18.462	81.114	1145.72	1056.99	19.934	19.779
11	1170.79	94.086	5.762	1193.94	1147.65	0.621	0.59
12	1234.44	25.28	74.864	1269.16	1193.94	14.025	14.073
13	1288.45	98.717	1.335	1305.81	1271.09	0.099	0.107
14	1344.38	93.585	4.687	1354.03	1327.03	0.433	0.253
15	1377.17	46.105	24.578	1390.68	1354.03	7.917	3.229
16	1408.04	39.012	32.058	1436.97	1392.61	10.752	4.867
17	1458.18	39.453	60.86	1489.05	1438.9	8.269	8.343
18	1498.69	93.419	7.15	1523.76	1490.97	0.294	0.376
19	1602.85	8.464	81.318	1627.92	1558.48	25.435	22.893
20	1668.43	14.37	75.957	1743.65	1629.85	39.056	35.144
21	1870.95	70.221	29.711	1928.82	1824.66	5.615	5.586
22	1951.96	98.063	1.323	1967.39	1928.82	0.17	0.084
23	2083.12	98.742	0.692	2102.41	2063.83	0.151	0.056
24	2212.35	85.518	14.181	2289.5	2131.34	4.222	4.018
25	2358.94	87.574	11.924	2393.66	2291.43	2.934	2.722
26	2459.24	92.506	5.692	2503.6	2436.09	1.203	0.757
27	2524.82	97.98	1.8	2559.54	2503.6	0.245	0.209
28	2652.12	96.577	2.424	2692.63	2613.55	0.656	0.316
29	2781.35	61.892	37.875	2833.43	2694.56	12.248	12.102
30	2927.94	72.93	27.225	2945.3	2893.22	2.822	2.86
31	2983.88	73.097	12.454	3007.02	2972.31	2.928	1.005
32	3194.12	8.693	33.535	3259.7	3008.95	127.625	45.621
33	3385.07	5.567	42.518	3554.81	3302.13	143.779	64.221

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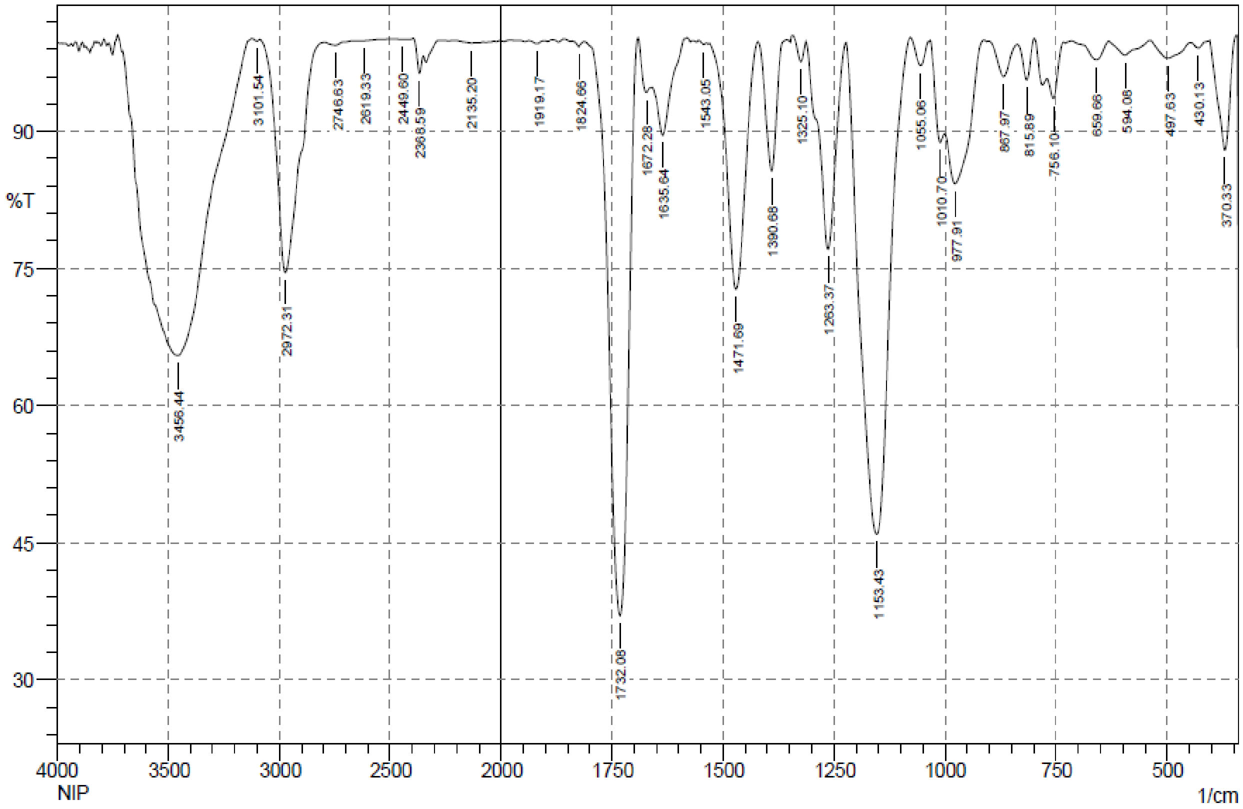
No. of Scans;

2. NIP_MAM-co-TRIM

SHIMADZU



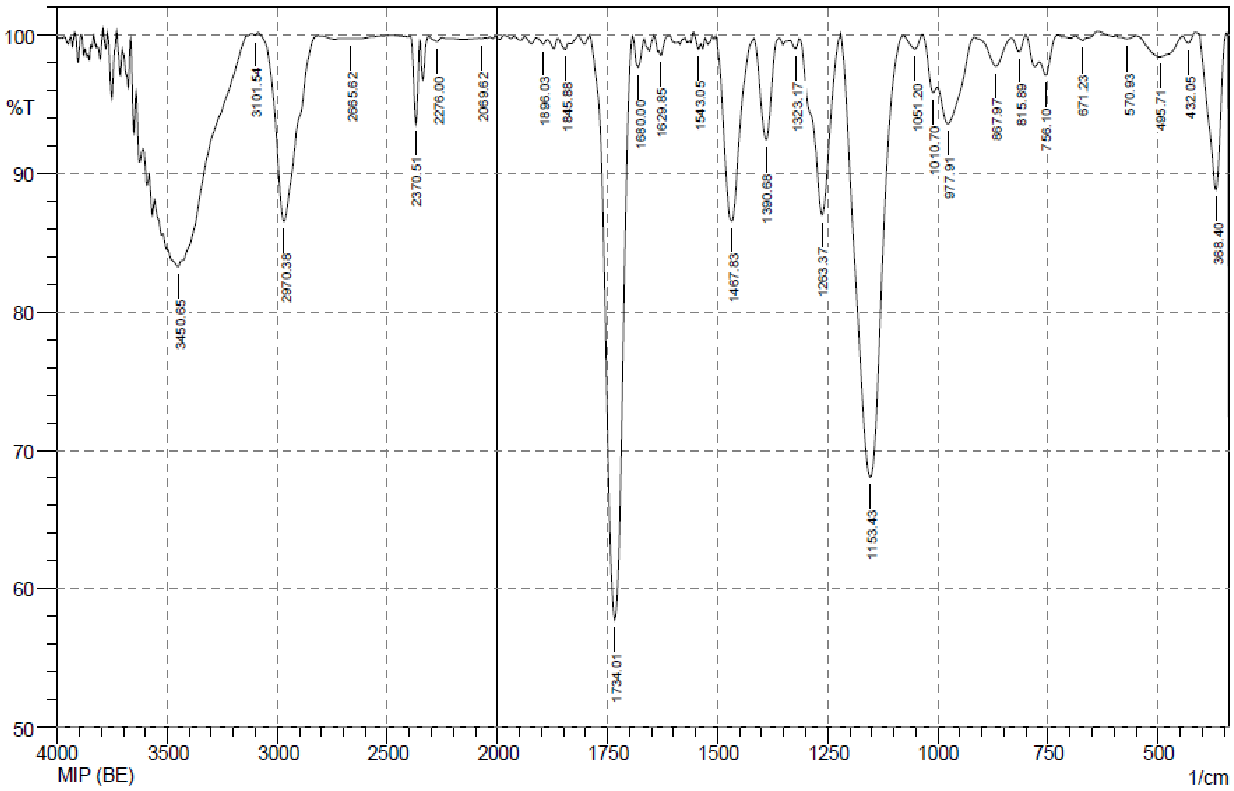
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	370.33	87.922	12.33	403.12	343.33	1.592	1.653
2	430.13	99.117	0.668	447.49	403.12	0.091	0.055
3	497.63	97.992	1.847	536.21	447.49	0.493	0.424
4	594.08	98.335	1.581	632.65	536.21	0.368	0.336
5	659.66	97.826	1.904	694.37	632.65	0.345	0.266
6	756.1	93.599	3.769	771.53	732.95	0.671	0.29
7	815.89	95.628	4.234	837.11	798.53	0.363	0.334
8	867.97	95.999	3.677	902.69	837.11	0.566	0.477
9	977.91	84.232	8.172	1001.06	912.33	4.087	2.055
10	1010.7	88.729	3.645	1031.92	1002.98	1.073	0.33
11	1055.06	97.222	2.787	1078.21	1037.7	0.258	0.265
12	1153.43	45.954	53.997	1222.87	1080.14	21.784	21.76
13	1263.37	77.096	22.498	1311.59	1224.8	4.526	4.371
14	1325.1	97.613	2.465	1344.38	1313.52	0.14	0.161
15	1390.68	85.607	14.254	1419.61	1357.89	1.734	1.701
16	1471.69	72.71	27.006	1529.55	1421.54	6.192	6.056
17	1543.05	99.505	0.259	1554.63	1537.27	0.024	0.01
18	1635.64	89.562	6.868	1658.78	1581.63	1.76	0.937
19	1672.28	94.281	2.558	1691.57	1660.71	0.561	0.218
20	1732.08	36.972	62.954	1813.09	1693.5	18.397	18.344
21	1824.66	99.237	0.608	1840.09	1813.09	0.044	0.026
22	1919.17	99.592	0.311	1938.46	1903.74	0.036	0.022
23	2135.2	99.665	0.161	2212.35	2081.19	0.139	0.05
24	2368.59	96.345	2.637	2395.59	2351.23	0.383	0.226
25	2449.6	100.048	0.027	2490.1	2434.17	-0.018	0.003
26	2619.33	99.895	0.004	2621.26	2544.11	0.005	-0.002
27	2746.63	99.43	0.357	2794.85	2673.34	0.185	0.081
28	2972.31	74.534	25.386	3086.11	2796.78	13.834	13.689
29	3101.54	99.867	0.218	3122.75	3088.03	0.002	0.016
30	3456.44	65.49	33.855	3705.26	3122.75	57.591	56.186

Comment;
NIP

Date/Time; 1/27/2023 4:19:34 PM
No. of Scans;
Resolution;
Apodization;

3. MIP_DBP_MAM-co-TRIM(BE)

SHIMADZU



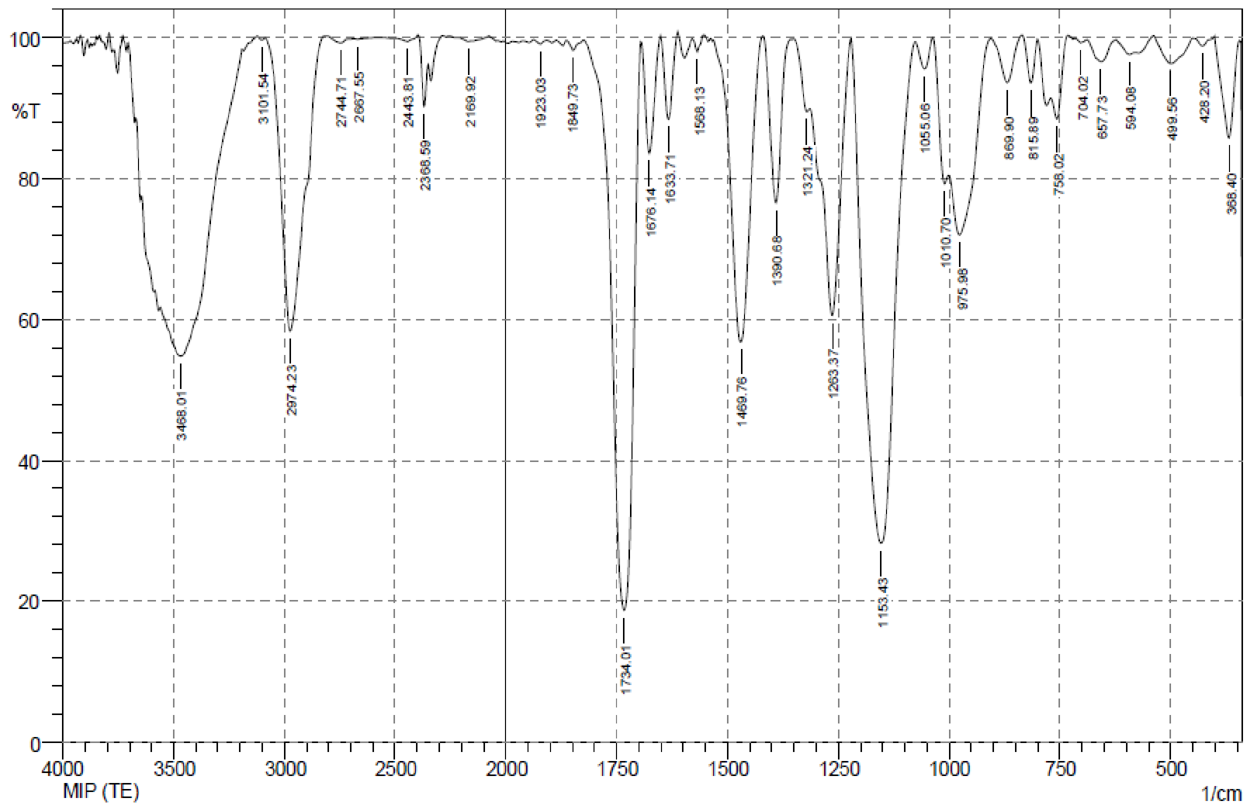
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	368.4	88.836	11.33	405.05	343.33	1.5	1.543
2	432.05	99.447	0.654	445.56	416.62	0.032	0.046
3	495.71	98.462	1.518	549.71	445.56	0.424	0.415
4	570.93	99.754	0.173	588.29	549.71	0.026	0.015
5	671.23	99.619	0.463	688.59	638.44	0.024	0.053
6	756.1	97.145	1.554	769.6	727.16	0.295	0.12
7	815.89	98.819	1.12	833.25	800.46	0.09	0.081
8	867.97	97.77	2.062	916.19	833.25	0.375	0.317
9	977.91	93.609	3.639	1001.06	918.12	1.467	0.767
10	1010.7	95.877	1.485	1033.85	1001.06	0.384	0.115
11	1051.2	99.021	1.014	1078.21	1033.85	0.098	0.103
12	1153.43	68.078	31.844	1219.01	1078.21	10.373	10.328
13	1263.37	87.047	12.915	1313.52	1220.94	2.544	2.523
14	1323.17	99.05	0.661	1334.74	1315.45	0.058	0.033
15	1390.68	92.467	7.321	1417.68	1359.82	0.919	0.866
16	1467.83	86.596	13.273	1504.48	1419.61	2.425	2.368
17	1543.05	99.003	0.66	1554.63	1537.27	0.04	0.025
18	1629.85	98.567	0.498	1633.71	1612.49	0.067	0.013
19	1680	97.7	2.151	1693.5	1666.5	0.155	0.138
20	1734.01	57.776	42.218	1789.94	1693.5	9.443	9.444
21	1845.88	98.986	0.53	1863.24	1840.09	0.069	0.029
22	1896.03	99.362	0.385	1911.46	1886.38	0.043	0.017
23	2069.62	99.763	0.059	2085.05	2058.05	0.025	0.003
24	2276	99.547	0.353	2310.72	2250.93	0.075	0.051
25	2370.51	93.612	6.161	2397.52	2353.16	0.577	0.54
26	2665.62	99.761	0.013	2677.2	2655.98	0.021	0.001
27	2970.38	86.577	13.529	3086.11	2816.07	6.45	6.554
28	3101.54	100.03	0.137	3115.04	3088.03	-0.011	0.008
29	3450.65	83.283	0.66	3498.87	3435.22	4.916	0.143

Comment;
MIP (BE)

Date/Time; 1/27/2023 4:03:22 PM
No. of Scans;
Resolution;
Apodization;

4. MIP_DBP_MAM-co-TRIM(TE)

SHIMADZU



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	368.4	85.72	14.181	401.19	343.33	1.916	1.899
2	428.2	98.86	1.215	449.41	401.19	0.103	0.122
3	499.56	96.359	3.793	538.14	449.41	0.822	0.871
4	594.08	97.665	0.831	623.01	580.57	0.304	0.085
5	657.73	96.63	3.094	688.59	623.01	0.541	0.462
6	704.02	99.293	0.521	717.52	688.59	0.053	0.029
7	758.02	88.494	5.723	769.6	732.95	1.115	0.472
8	815.89	93.556	6.474	835.18	800.46	0.485	0.494
9	869.9	93.61	6.525	906.54	835.18	0.874	0.914
10	975.98	72.057	13.586	1001.06	906.54	8.128	3.781
11	1010.7	79.304	5.712	1035.77	1002.98	2.133	0.511
12	1055.06	95.574	4.162	1076.28	1035.77	0.44	0.391
13	1153.43	28.274	71.383	1220.94	1078.21	35.674	35.449
14	1263.37	60.562	34.75	1313.52	1222.87	9.928	7.815
15	1321.24	89.536	2.486	1350.17	1313.52	0.976	0.117
16	1390.68	76.586	23.432	1419.61	1359.82	2.99	2.99
17	1469.76	56.868	43.044	1529.55	1421.54	10.907	10.851
18	1568.13	98.061	2.055	1579.7	1554.63	0.095	0.11
19	1633.71	88.462	11.932	1651.07	1614.42	0.983	1.047
20	1676.14	83.623	15.863	1693.5	1653	1.685	1.603
21	1734.01	18.714	80.801	1822.73	1695.43	31.044	30.792
22	1849.73	98.237	1.41	1863.24	1824.66	0.163	0.106
23	1923.03	99.127	0.561	1938.46	1907.6	0.076	0.034
24	2169.92	99.493	0.622	2222	2075.41	0.137	0.228
25	2368.59	90.288	7.376	2395.59	2353.16	0.989	0.643
26	2443.81	99.464	0.7	2495.89	2395.59	0.092	0.159
27	2667.55	99.804	0.087	2686.84	2617.4	0.036	0.008
28	2744.71	99.268	0.715	2810.28	2711.92	0.137	0.159
29	2974.23	58.345	41.741	3086.11	2819.93	25.194	25.323
30	3101.54	99.691	0.387	3122.75	3088.03	0.013	0.029
31	3468.01	54.888	15.894	3558.67	3192.19	58.886	19.368

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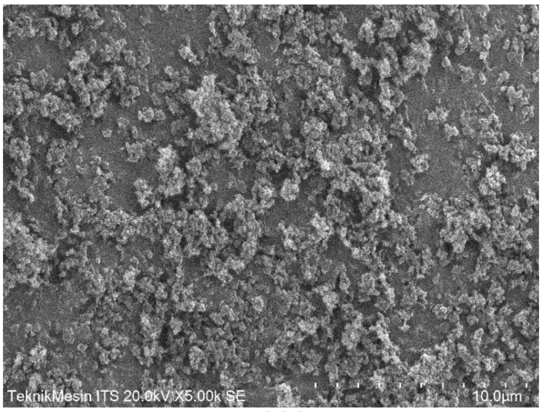
No. of Scans;
Resolution;
Apodization;

Lampiran 6. Hasil Analisis SEM

1. NIP_MAM-co-TRIM



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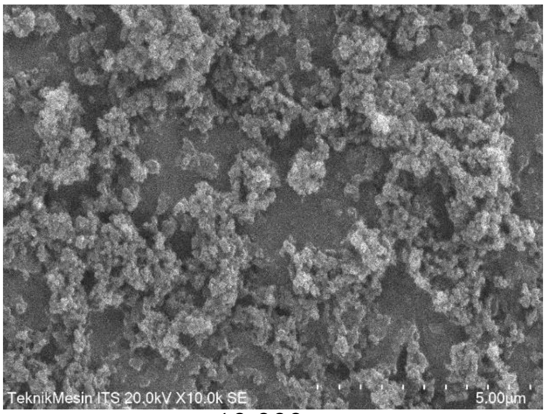

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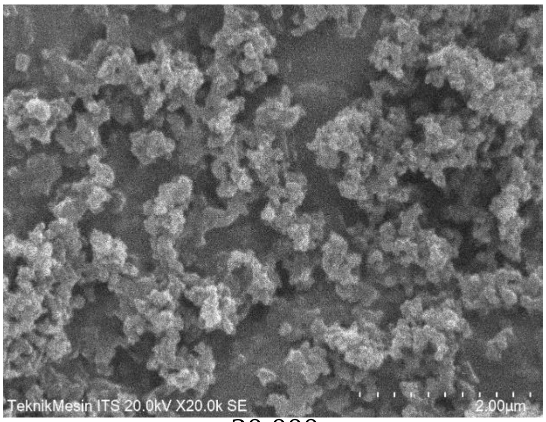

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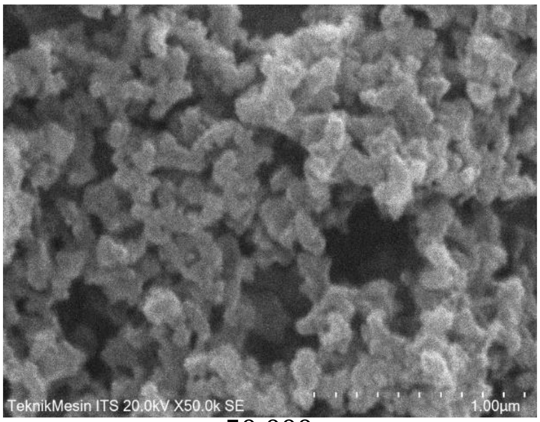

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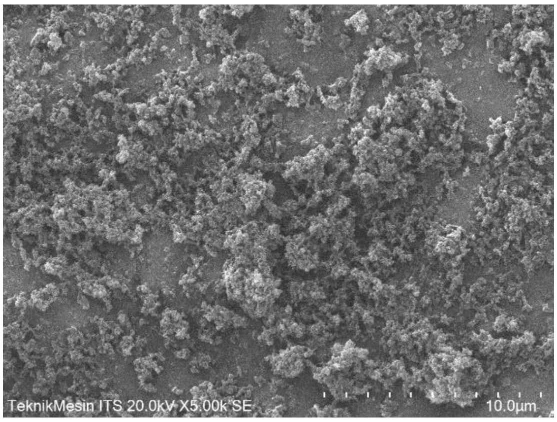
2. MIP_DBP_MAM-co-TRIM(BE)



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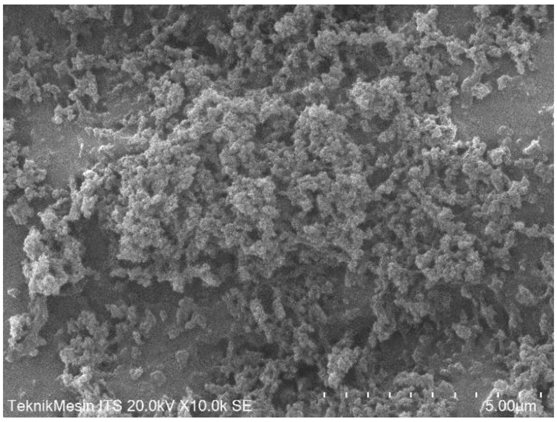

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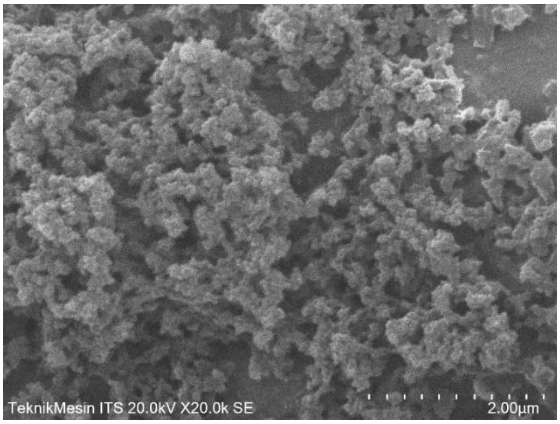

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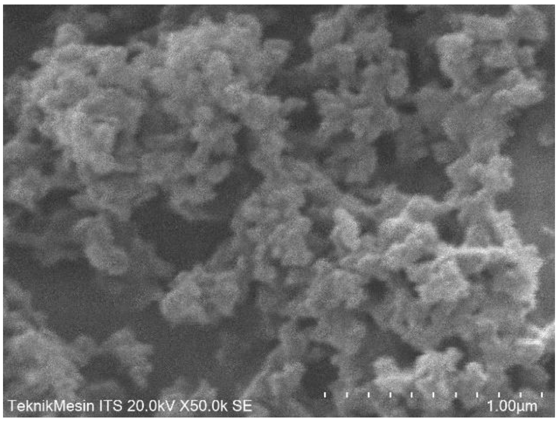

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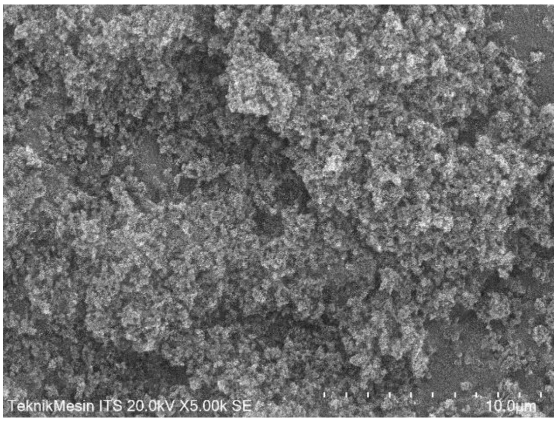
3. MIP_DBP_MAM-co-TRIM$_{(TE)}$



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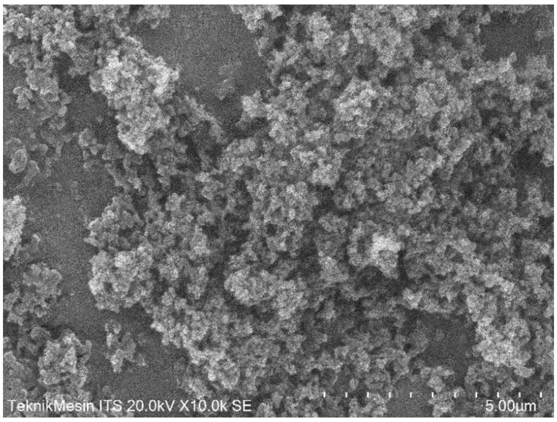

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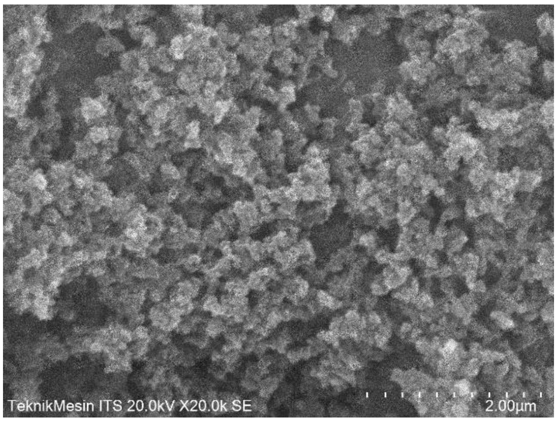
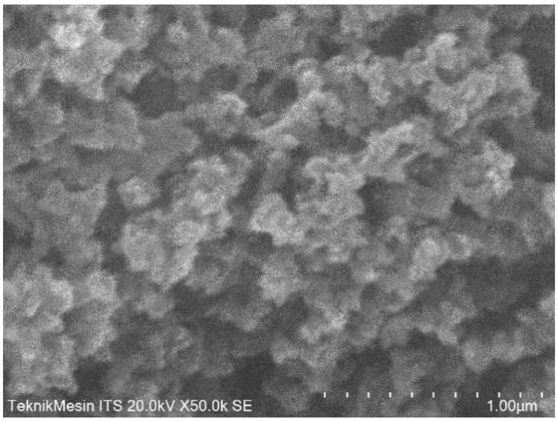


20.000×



50.000×

Lampiran 7. Hasil Analisis EDS

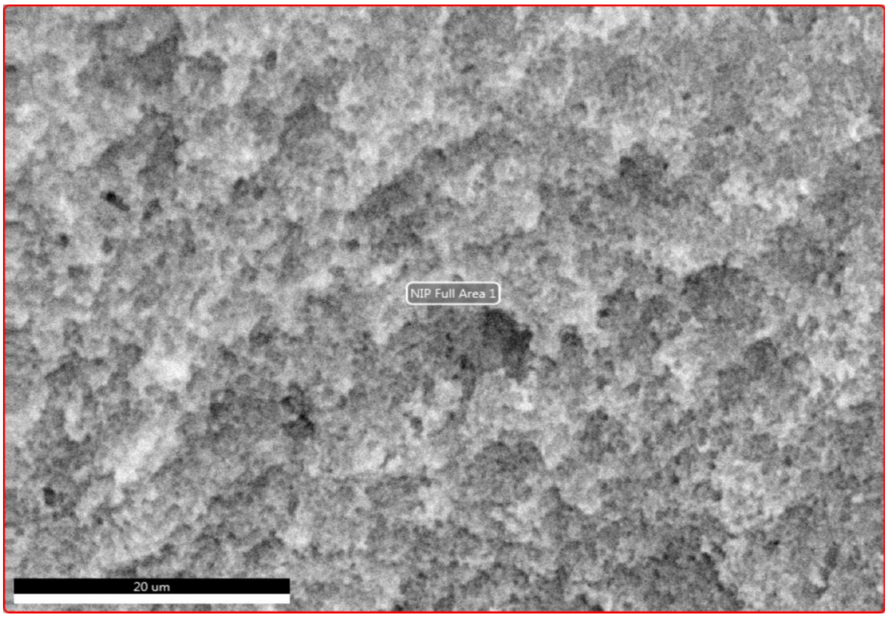
1. NIP_MAM-co-TRIM

EDAX APEX *Page 1*

10022023

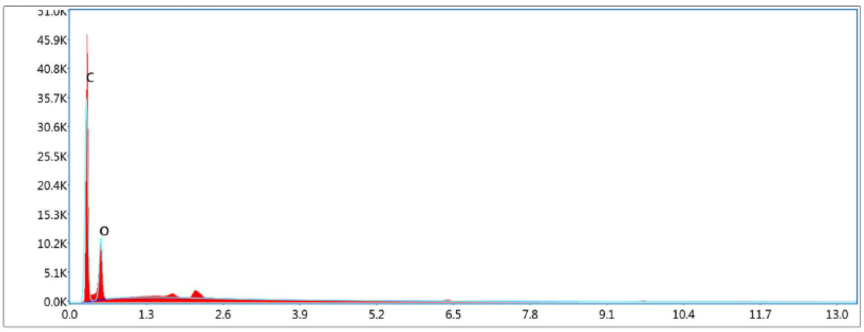
Author: Teknik Mesin ITS
Creation: 02/13/2023 2:56:37 PM
Sample Name: Hendrik Unhas

NIP



Full Area 1

kV:20	Mag: 2000	Takeoff: 30	Live Time(s): 96.4	Amp Time(µs): 3.84	Resolution:(eV) 133.6



Smart Quant Results

Element	Weight %	Atomic %	Net Int.	Error %	Kratio	Z	A	F
C K	58.72	65.45	2323.34	4.82	0.3766	1.0182	0.6298	1.0000
O K	41.28	34.55	787.44	9.70	0.0652	0.9727	0.1622	1.0000

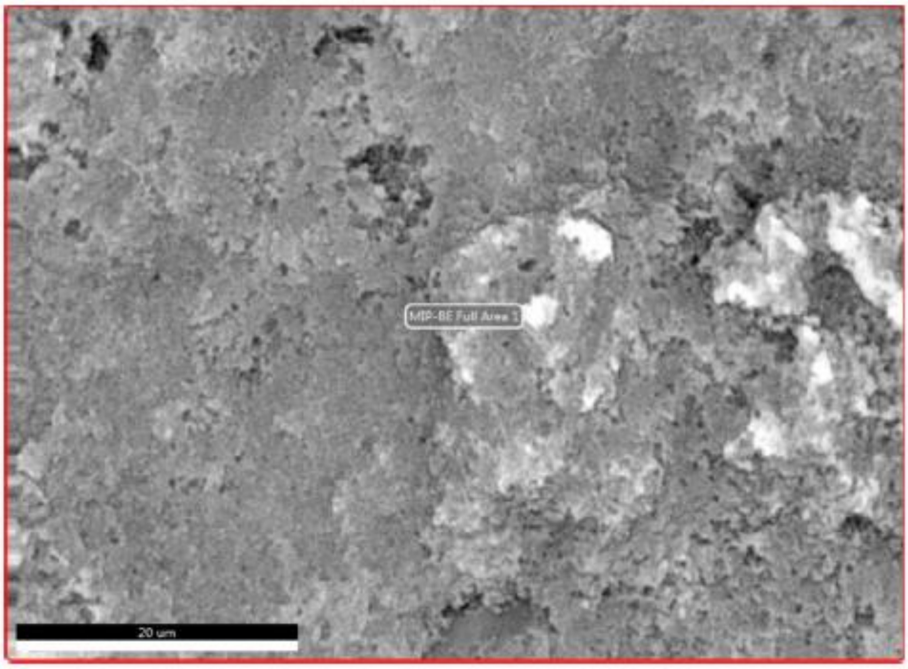
2. MIP_DBP_MAM-co-TRIM(BE)

EDAX APEX

10022023

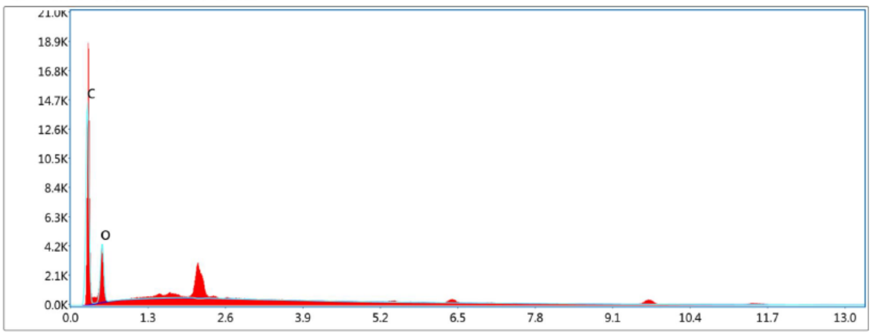
Author:	Teknik Mesin ITS
Creation:	02/13/2023 2:59:05 PM
Sample Name:	Hendrik Unhas

MIP-BE



Full Area 1

kV: 20	Mag: 2000	Takeoff: 30	Live Time(s): 95.7	Amp Time(µs): 3.84	Resolution:(eV) 133.6



Smart Quant Results

Element	Weight %	Atomic %	Net Int.	Error %	Kratio	Z	A	F
C K	59.65	66.32	955.37	4.91	0.3854	1.0178	0.6350	1.0000
O K	40.35	33.68	304.51	10.13	0.0627	0.9723	0.1599	1.0000

3. MIP_DBP_MAM-co-TRIM(TE)

EDAX APEX

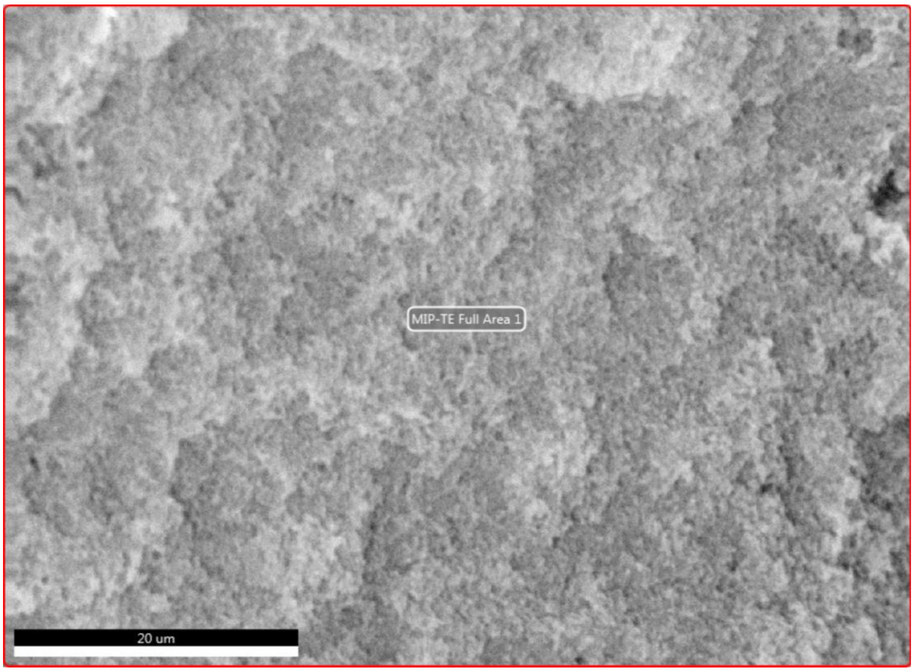
Page 1

10022023

Author: Teknik Mesin ITS
Creation: 02/13/2023 3:01:39 PM

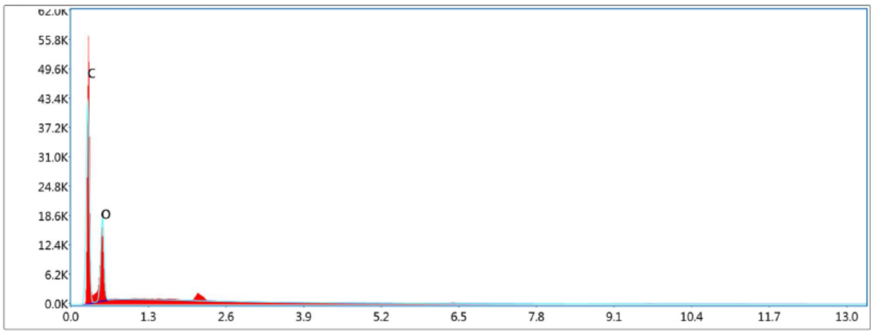
Sample Name: Hendrik Unhas

MIP-TE



Full Area 1

kV: 20	Mag: 2000	Takeoff: 30	Live Time(s): 96.8	Amp Time(µs): 3.84	Resolution:(eV) 133.6



Smart Quant Results

Element	Weight %	Atomic %	Net Int.	Error %	Kratio	Z	A	F
C K	54.53	61.50	2816.07	5.04	0.3371	1.0201	0.6058	1.0000
O K	45.47	38.50	1265.17	9.49	0.0773	0.9745	0.1744	1.0000

Lampiran 8. Hasil Analisis SAA

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version 11.03

Analysis			**Report**		
Operator:	quantachrome	**Date:**2023/03/16	**Operator:**	quantachrome	**Date:**2023/03/16
Sample ID:	79012	**Filename:**	sttn_A_15032023_7821_BET_EK_79012.qps		
Sample Desc:	MIP (TE) Ulang	**Comment:**			
Sample weight:	0.0882 g	**Sample Volume:**	0.02587 cc	**Sample Density:**	3.41 g/cc
Outgas Time:	3.0 hrs	**OutgasTemp:**	250.0 C		
Analysis gas:	Nitrogen	**Bath Temp:**	273.0 K		
Press. Tolerance:	0.100/0.100 (ads/des)	**Equil time:**	60/60 sec (ads/des)	**Equil timeout:**	240/240 sec (ads/des)
Analysis Time:	869.0 min	**End of run:**	2023/03/16 8:18:54	**Instrument:**	Nova Station A
Cell ID:	9				

Area-Volume Summary

Data Reduction Parameters Data

	Thermal Transpiration: on	**Eff. mol. diameter (D):** 3.54 Å	**Eff. cell stem diam. (d):** 4.0000 mm
t-Method	**Calc. method:** de Boer		
BJH/DH method	**Moving pt. avg.:** off	**Ignoring P-tags below 0.35 P/Po**	
HK method	**Tabulated data interval:** 1		
SF method	**Tabulated data interval:** 1		
DFT method	**Calc. Model:** N2 at 77 K on carbon (slit pore, NLDFT equilibrium model)		
	Rel. press. range: 0.0000 - 1.0000		**Moving pt. avg:** off
Adsorbate	**Nitrogen**	**Temperature** 77.350K	
	Molec. Wt.: 28.013	**Cross Section:** 16.200 Å²	**Liquid Density:** 0.808 g/cc
Adsorbent	**Carbon**		

Surface Area Data

SinglePoint BET	3.340e+02 m²/g
MultiPoint BET	3.455e+02 m²/g
Langmuir surface area	5.609e+02 m²/g
BJH method cumulative adsorption surface area	1.688e+02 m²/g
BJH method cumulative desorption surface area	2.188e+02 m²/g
DH method cumulative adsorption surface area	1.717e+02 m²/g
DH method cumulative desorption surface area	2.226e+02 m²/g
t-method external surface area	3.455e+02 m²/g
DFT cumulative surface area	2.674e+02 m²/g

Pore Volume Data

Total pore volume for pores with Radius less than 1362.57 Å at P/Po = 0.992921	1.035e+00 cc/g
BJH method cumulative adsorption pore volume	9.359e-01 cc/g
BJH method cumulative desorption pore volume	9.353e-01 cc/g
DH method cumulative adsorption pore volume	9.089e-01 cc/g
DH method cumulative desorption pore volume	9.124e-01 cc/g
HK method micropore volume	1.379e-01 cc/g
SF method micropore volume	9.200e-02 cc/g
DFT method cumulative pore volume	7.610e-01 cc/g

Pore Size Data

Average pore Radius	5.991e+01 Å
BJH method adsorption pore Radius (Mode Dv(r))	1.696e+01 Å
BJH method desorption pore Radius (Mode Dv(r))	1.898e+01 Å
DH method adsorption pore Radius (Mode Dv(r))	1.696e+01 Å
DH method desorption pore Radius (Mode Dv(r))	1.698e+01 Å
HK method pore Radius (Mode)	1.838e+00 Å
SF method pore Radius (Mode)	2.261e+00 Å
DFT pore Radius (Mode)	9.660e+00 Å

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Analysis			**Report**			
Operator:	quantachrome	Date:2023/03/16	**Operator:**	quantachrome		Date:2023/03/16
Sample ID:	79012	**Filename:**	sttn_A_15032023_7821_BET_EK_79012.qps			
Sample Desc:	MIP (TE) Ulang	**Comment:**				
Sample weight:	0.0882 g	**Sample Volume:**	0.02587 cc		**Sample Density:**	3.41 g/cc
Outgas Time:	3.0 hrs	**OutgasTemp:**	250.0 C			
Analysis gas:	Nitrogen	**Bath Temp:**	273.0 K			
Press. Tolerance:	0.100/0.100 (ads/des)	**Equil time:**	60/60 sec (ads/des)		**Equil timeout:**	240/240 sec (ads/des)
Analysis Time:	869.0 min	**End of run:**	2023/03/16 8:18:54		**Instrument:**	Nova Station A
Cell ID:	9					

BJH Pore Size Distribution Adsorption

Data Reduction Parameters Data

t-Method	Calc. method:	de Boer				
BJH/DH method	Moving pt. avg.:	off	Ignoring P-tags below 0.35 P/Po			
Adsorbate	Nitrogen		Temperature	77.350K		
	Molec. Wt.:	28.013	Cross Section:	16.200 Å²	Liquid Density:	0.808 g/cc

BJH Pore Size Distribution Adsorption Data

Radius [Å]	Pore Volume [cc/g]	Pore Surf Area [m²/g]	dV(r) [cc/Å/g]	dS(r) [m²/Å/g]	dV(logr) [cc/g]	dS(logr) [cc/g]
16.9635	1.2285e-02	1.4484e+01	6.1545e-03	7.2561e+00	2.4012e-01	2.8310e+02
19.0996	2.4570e-02	2.7348e+01	5.3973e-03	5.6517e+00	2.3708e-01	2.4826e+02
21.4629	3.8130e-02	3.9984e+01	5.5336e-03	5.1564e+00	2.7317e-01	2.5455e+02
24.2855	5.3577e-02	5.2705e+01	4.8353e-03	3.9821e+00	2.7000e-01	2.2235e+02
27.7970	6.9577e-02	6.4217e+01	4.1793e-03	3.0070e+00	2.6707e-01	1.9216e+02
32.2454	8.7806e-02	7.5523e+01	3.5964e-03	2.2306e+00	2.6647e-01	1.6528e+02
38.2920	1.1035e-01	8.7301e+01	3.2100e-03	1.6766e+00	2.8223e-01	1.4741e+02
47.2363	1.4275e-01	1.0102e+02	2.9816e-03	1.2624e+00	3.2286e-01	1.3670e+02
60.3757	1.7831e-01	1.1280e+02	2.3071e-03	7.6425e-01	3.1898e-01	1.0567e+02
84.4510	2.3724e-01	1.2675e+02	1.8001e-03	4.2632e-01	3.4562e-01	8.1851e+01
143.7029	3.5152e-01	1.4266e+02	1.3325e-03	1.8545e-01	4.2749e-01	5.9496e+01
262.8729	5.0911e-01	1.5465e+02	1.0329e-03	7.8585e-02	6.0724e-01	4.6200e+01
375.4530	5.8567e-01	1.5873e+02	1.0546e-03	5.6178e-02	9.0888e-01	4.8415e+01
455.5969	6.5328e-01	1.6169e+02	7.7100e-04	3.3846e-02	8.0632e-01	3.5396e+01
574.8518	7.4485e-01	1.6488e+02	6.0716e-04	2.1124e-02	7.9903e-01	2.7800e+01
813.8182	8.3805e-01	1.6717e+02	2.8491e-04	7.0018e-03	5.2662e-01	1.2942e+01
1169.9728	9.3594e-01	1.6884e+02	2.5415e-04	4.3445e-03	6.7843e-01	1.1597e+01

BJH adsorption summary

Surface Area = 168.843 m²/g
Pore Volume = 0.936 cc/g
Pore Radius Dv(r) = 16.963 Å

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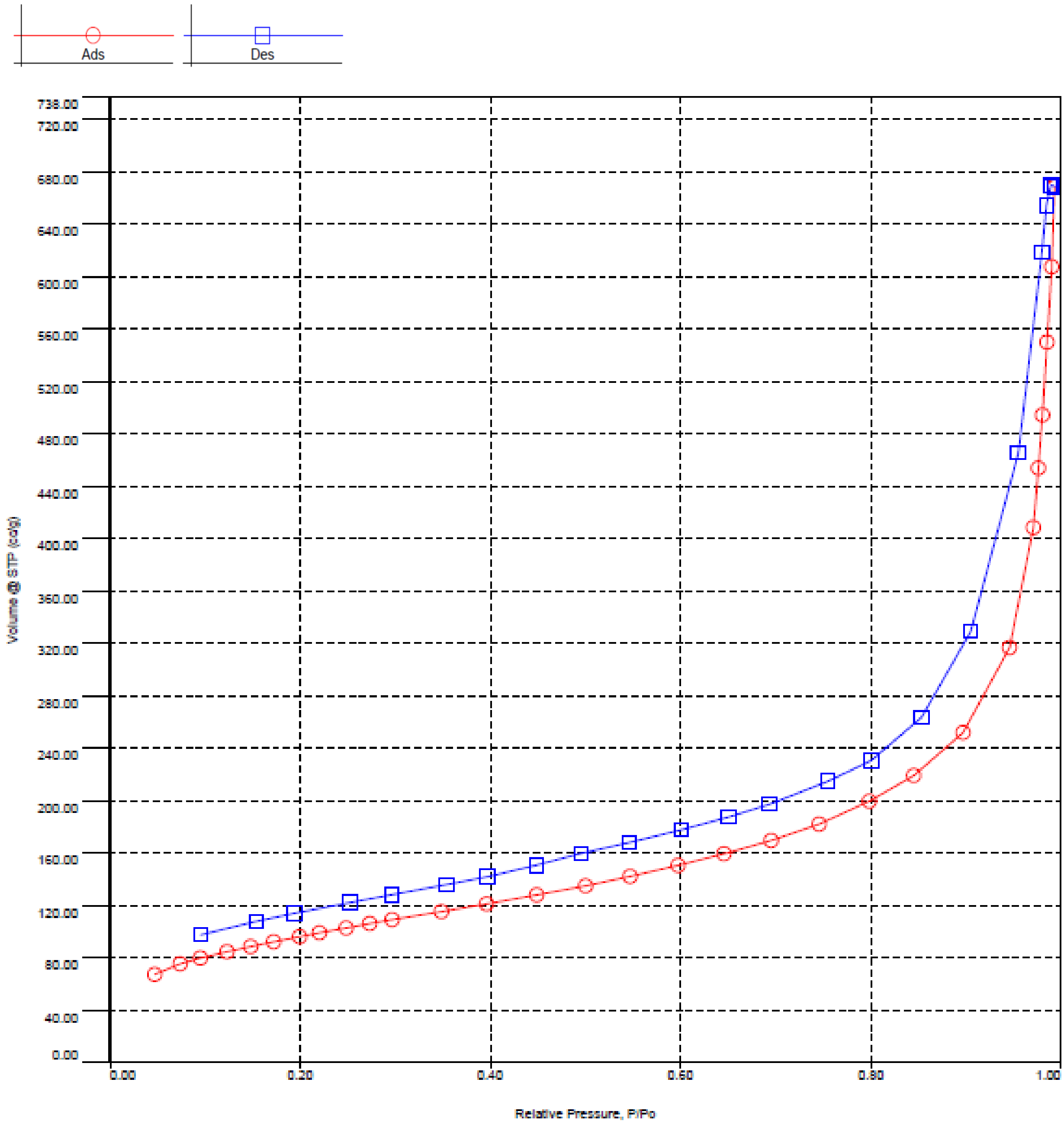
Analysis			**Report**		
Operator:	quantachrome	**Date:**2023/03/16	**Operator:**	quantachrome	**Date:**2023/03/16
Sample ID:	79012	**Filename:**	sttn_A_15032023_7821_BET_EK_79012.qps		
Sample Desc:	MIP (TE) Ulang	**Comment:**			
Sample weight:	0.0882 g	**Sample Volume:**	0.02587 cc	**Sample Density:**	3.41 g/cc
Outgas Time:	3.0 hrs	**OutgasTemp:**	250.0 C		
Analysis gas:	Nitrogen	**Bath Temp:**	273.0 K		
Press. Tolerance:	0.100/0.100 (ads/des)	**Equil time:**	60/60 sec (ads/des)	**Equil timeout:**	240/240 sec (ads/des)
Analysis Time:	869.0 min	**End of run:**	2023/03/16 8:18:54	**Instrument:**	Nova Station A
Cell ID:	9				

Isotherm : Linear

Data Reduction Parameters

Adsorbate	**Nitrogen**	**Temperature**	77.350K		
	Molec. Wt.: 28.013	**Cross Section:**	16.200 Å²	**Liquid Density:**	0.808 g/cc



Lampiran 9. Gambar Proses Penelitian


Persiapan Alat dan Bahan

Proses Pengaliran Gas Nitrogen

Proses Sonikasi

Proses Polimerisasi

Polimer yang Terbentuk

Pengeringan Polimer

Proses Pencucian Polimer yang Terbentuk

Pengukuran pH Hasil Pencucian

Deret Standar Larutan DBP

Rangkaian Alat dan Sampel untuk Melakukan Proses *Shaking*