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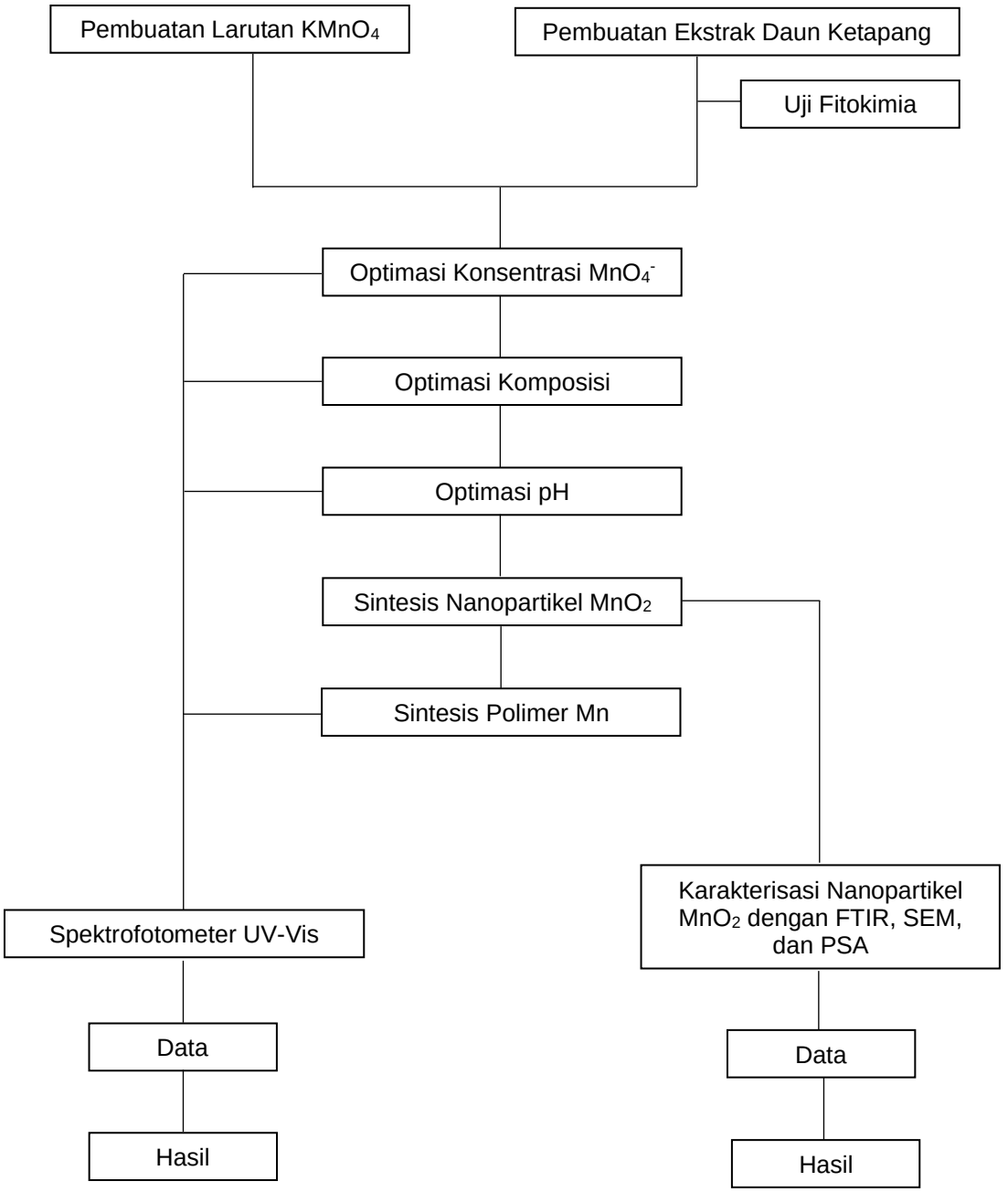
Lampiran 1. Diagram Alir Penelitian



Lampiran 2. Perhitungan Pembuatan Larutan

1. Pembuatan larutan $KMnO_4$ 1 mM

W = Mr × V × M

= 158 g/mol × 0,25 L × 0,001 mol/L

= 0,0395 g

2. Pembuatan Larutan $KMnO_4$ 0,75 mM

$V_1 \times C_1 = V_2 \times C_2$

$V_1 \times 1\ mM = 50\ mL \times 0{,}75\ mM$

$$V_1 = \frac{50\ mL \times 0{,}75\ mM}{1\ mM}$$

$V_1 = 37{,}5\ mL$

3. Pembuatan Larutan $KMnO_4$ 0,5 mM

$V_1 \times C_1 = V_2 \times C_2$

$V_1 \times 1\ mM = 50\ mL \times 0{,}5\ mM$

$$V_1 = \frac{50\ mL \times 0{,}5\ mM}{1\ mM}$$

$V_1 = 25\ mL$

4. Pembuatan Larutan $KMnO_4$ 0,25 mM

$V_1 \times C_1 = V_2 \times C_2$

$V_1 \times 1\ mM = 50\ mL \times 0{,}25\ mM$

$$V_1 = \frac{50\ mL \times 0{,}25\ mM}{1\ mM}$$

$V_1 = 12{,}5\ mL$

5. Pembuatan Larutan NaOH 0,5 N

W = BE × V × N

$= 40 \text{ g/eq} \times 0{,}05 \text{ L} \times 0{,}5 \text{ eq/L}$

$= 1 \text{ g}$

6. Pembuatan Larutan HCl 0,5 N

$$N = \frac{\% \times BJ \times 1000}{BE}$$

$$= \frac{37\% \times 1{,}19 \text{ g/mL} \times 1000 \text{ mL/L}}{36{,}5 \text{ g/eq}}$$

$= 12{,}06 \text{ N}$

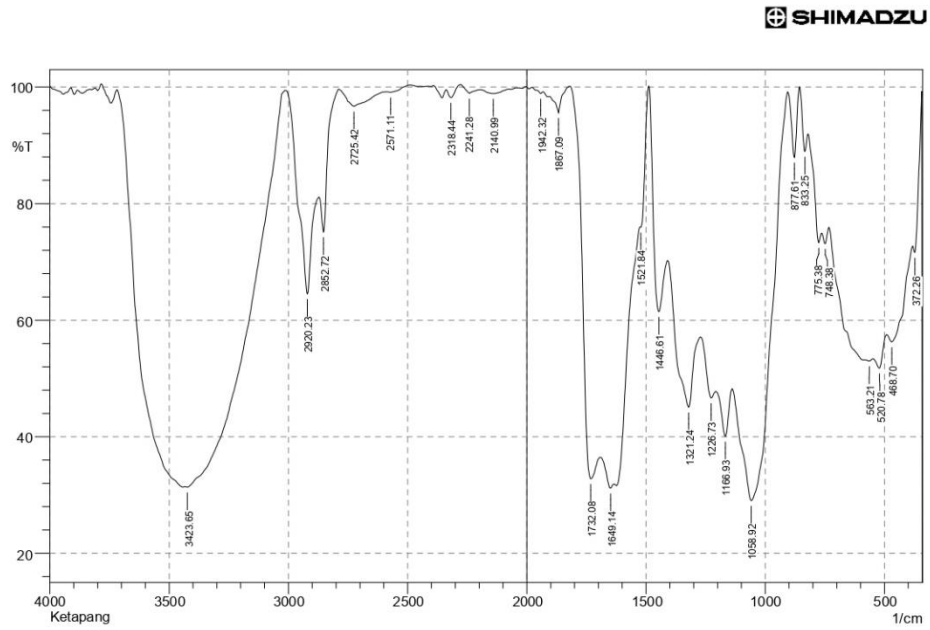
$V_1 \times C_1 = V_2 \times C_2$

$V_1 \times 12{,}06 \text{ N} = 50 \text{ mL} \times 0{,}5 \text{ N}$

$$V_1 = \frac{50 \text{ mL} \times 0{,}5 \text{ N}}{12{,}06 \text{ N}}$$

$V_1 = 2{,}07 \text{ mL}$

Lampiran 3. Hasil Karakterisasi FTIR Daun Ketapang dan MnO_2



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	372.26	71.6382	6.3116	379.98	345.26	3.3356	0.7809
2	468.7	56.2812	4.2129	489.92	381.91	22.7193	2.367
3	520.78	51.7712	3.5887	547.78	491.85	15.073	0.7562
4	563.21	52.9907	0.3	584.43	549.71	9.5355	0.0414
5	748.38	73.1531	2.2218	761.88	732.95	3.7355	0.1943
6	775.38	73.3281	5.139	819.75	763.81	5.1064	0.5525
7	833.25	88.9422	5.7682	854.47	821.68	1.12	0.4744
8	877.61	87.9298	11.7083	904.61	856.39	1.2889	1.2054
9	1058.92	29.0451	36.5665	1138	906.54	75.1378	38.3518
10	1166.93	40.0631	7.959	1207.44	1139.93	23.8687	2.3403
11	1226.73	46.6602	3.7193	1271.09	1209.37	18.3652	0.9319
12	1321.24	45.0694	16.7099	1408.04	1273.02	36.6976	9.8104
13	1446.61	61.4566	22.9178	1487.12	1409.96	11.6391	5.5732
14	1521.84	75.9453	2.5831	1525.69	1489.05	2.3719	0.3945
15	1649.14	31.1905	1.7923	1691.57	1635.64	26.674	0.5389
16	1732.08	32.7922	23.266	1818.87	1693.5	33.43	8.0061
17	1867.09	95.6114	3.5797	1905.67	1820.8	0.6961	0.4253
18	1942.32	98.9048	0.3671	1961.61	1932.67	0.1018	0.0166
19	2140.99	98.876	0.7171	2196.92	2075.41	0.4189	0.2059
20	2241.28	98.913	1.1178	2277.93	2196.92	0.1792	0.1748
21	2318.44	98.1939	1.6261	2337.72	2277.93	0.2028	0.1975
22	2571.11	99.1234	0.2778	2588.47	2490.1	0.1665	0.0707
23	2725.42	96.7039	2.7478	2789.07	2605.83	1.644	1.1485
24	2852.72	75.1718	9.9635	2870.08	2791	4.0719	0.9733
25	2920.23	64.5461	22.8474	3012.81	2872.01	13.4189	6.8223
26	3423.65	31.3602	1.6277	3433.29	3014.74	121.3179	16.3572

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Apodization;

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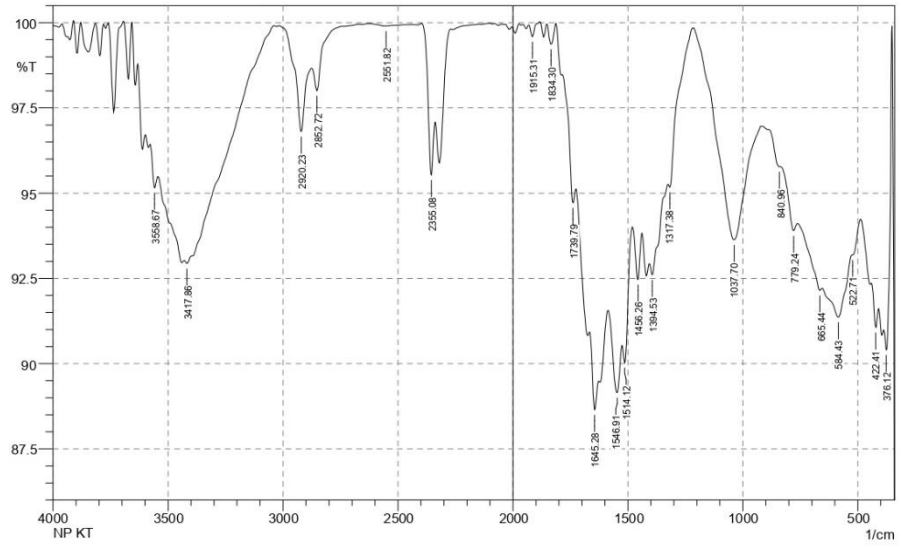

No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	376.12	90.405	3.129	385.76	352.97	1.103	0.446
2	422.41	91.063	0.836	439.77	410.84	1.111	0.056
3	522.71	93.187	0.055	524.64	487.99	1.041	0.015
4	584.43	91.363	1.372	653.87	524.64	4.68	0.429
5	665.44	92.15	0.235	759.95	655.8	3.232	0.032
6	779.24	93.903	0.594	837.11	761.88	1.762	0.075
7	840.96	95.779	0.058	916.19	837.11	1.22	-0.05
8	1037.7	93.635	4.456	1213.23	923.9	4.693	2.639
9	1317.38	95.174	0.412	1325.1	1219.01	0.977	-0.18
10	1394.53	92.607	0.661	1406.11	1327.03	2.178	0.104
11	1456.26	92.471	1.405	1479.4	1440.83	1.184	0.128
12	1514.12	90.032	1.265	1523.76	1481.33	1.579	0.117
13	1546.91	89.153	1.742	1585.49	1525.69	2.705	0.264
14	1645.28	88.648	1.484	1666.5	1627.92	1.865	0.131
15	1739.79	94.721	1.16	1786.08	1726.29	0.91	0.062
16	1834.3	99.37	0.596	1853.59	1813.09	0.061	0.055
17	1915.31	99.594	0.357	1930.74	1897.95	0.031	0.025
18	2355.08	95.539	2.357	2399.45	2337.72	0.584	0.184
19	2551.82	99.904	0.01	2567.25	2443.81	0.04	0.001
20	2852.72	98.01	0.866	2875.86	2740.85	0.419	-0.006
21	2920.23	96.81	2.249	3016.67	2875.86	0.829	0.392
22	3417.86	92.94	0.136	3429.43	3398.57	0.968	0.009
23	3558.67	95.159	0.747	3577.95	3543.23	0.678	0.056

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Resolution;
Apodization;

Lampiran 4. Hasil Karakterisasi UV-Vis

A. Data UV-Vis Variasi Konsentrasi

1. 0,25 mM

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	0,546
		525	0,634
		485	0,608
		370	1,829
		350	1,535
2	1	525	0,593
		505	0,623
		370	2,090
3	2	370	2,269
4	5	370	2,322
5	10	370	2,347
6	15	370	2,395
7	**30**	**370**	**2,499**
8	60	370	2,056
9	90	370	1,999
10	120	370	1,824

2. 0,5 mM

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	0,715
		525	0,811
		370	2,003
		350	1,383
2	1	545	0,648
		525	0,758
		505	0,758
		370	2,202
3	3	525	0,702
		375	2,360
4	5	380	2,420
5	10	385	2,463
6	15	385	2,518
7	**30**	410	2,270
		395	**2,627**
		350	1,507
8	60	405	2,290
		390	2,586
		220	3,114
9	90	390	2,570
		235	3,156
10	120	395	2,518

3. 0,75 mM

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,047
		525	1,217
		380	2,826
2	5	545	0,926
		525	1,115
		505	1,164
		405	2,503
		395	2,827
3	10	525	1,078
		410	2,545
		395	2,855
4	15	425	2,700
		395	2,880
5	30	425	2,742
		395	2,865
		350	1,519
6	**60**	425	1,754
		395	**2,909**
7	90	420	2,659
		395	2,772
8	120	415	1,600
		395	2,839

4. 1 mM

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,426
		525	1,660
		405	2,477
		385	2,623
2	5	545	1,294
		525	1,550
		505	1,529
		485	1,501
		415	2,581
		395	2,763
3	10	545	1,226
		525	1,488
		505	1,541
		425	2,716
		395	2,885
4	15	525	1,435
		420	2,759
		395	2,905
		240	3,362
5	30	430	2,850

		395	2,950
		350	1,535
6	**60**	435	2,960
		395	**3,026**
7	90	425	1,860
		395	2,852
8	120	425	1,770
		395	2,940

B. Data UV-Vis Variasi Komposisi

1. 1:10 mL

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,325
		525	1,556
		410	2,575
		395	2,756
2	1	525	1,388
		425	2,731
		395	2821
3	3	425	2,763
		395	2,846
		350	1,447
4	5	425	2,831
		395	2,911
5	10	430	2,863
		395	2,867
6	15	425	2,892
		395	2,940
7	**30**	430	2,895
		395	**2,970**
8	60	425	2,861
		395	2,933
9	90	430	2,764
		395	2,854
10	120	425	2,752
		395	2,814

2. 1:20 mL

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,316
		525	1,549
		485	1,480
		410	2,65
		395	2,814
2	3	545	1,180
		525	1,441

		505	1,520
		420	2,786
		390	2,830
3	5	520	1,393
		420	2,817
		395	2,965
4	10	420	3,131
		395	2,862
5	15	420	2,755
		390	2,835
6	30	450	2,782
		415	2,548
		395	2,959
7	**60**	450	2,746
		415	2,921
		395	**3,032**
8	90	425	2,900
		395	2,948
9	120	425	2,828
		395	2,823
		350	1,673

3. 1:30 mL

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,389
		525	1,627
		405	2,643
		390	2,849
2	3	545	1,245
		525	1,502
		505	1,554
		425	2,763
		395	2,960
3	5	525	1,451
		425	2,780
		395	3,030
4	10	520	1,422
		425	2,860
		395	3,190
5	15	435	2,927
		395	2,987
6	**30**	450	2,818
		425	2,976
		395	**3,188**
7	60	430	2,957
		390	3,098
8	120	425	2,913

		395	3,017

4. 1:40 mL

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,426
		525	1,660
		405	2,477
		385	2,623
2	5	545	1,294
		525	1,550
		505	1,529
		485	1,501
		415	2,581
		395	2,763
3	10	545	1,226
		525	1,488
		505	1,541
		425	2,716
		395	2,885
4	15	525	1,435
		420	2,759
		395	2,905
5	30	430	2,850
		395	2,950
		350	1,535
6	**60**	435	2,960
		395	**3,026**
7	90	425	1,860
		395	2,852
8	120	425	1,770
		395	2,940

C. Data UV-Vis Variasi pH

1. pH 8

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,343
		525	1,572
		410	2,600
		390	2,866
2	5	545	1,185
		525	1,440
		505	1,509
		425	2,741
		395	2,961
3	10	525	1,395
		425	2,761

		395	3,017
4	**15**	425	2,890
		395	**3,007**
5	30	435	2,919
		395	2,987
6	60	420	2,808
		395	2,926
7	90	425	2,801
		395	2,837
		350	1,467
8	120	420	2,757
		395	2,854

2. pH 9

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,505
		525	1,791
		485	1,733
		420	2,781
		410	2,786
		395	3,012
2	5	545	1,396
		525	1,690
		505	1,739
		410	2,863
		395	2,983
3	10	525	1,610
		505	1,714
		425	2,863
		395	3,003
4	15	425	3,029
		395	3,128
		350	1,887
5	30	455	2,850
		445	2,920
		435	2,999
		395	3,140
6	**60**	430	3,013
		395	**3,171**
7	90	445	2,720
		425	2,945
		395	3,036
8	120	430	2,895
		395	2,986

3. pH 10

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	545	1,402
		525	1,584
		380	2,560
2	5	545	1,212
		525	1,399
		380	2,777
3	10	545	1,132
		525	1,322
		405	2,514
		390	2,848
4	15	545	0,962
		525	1,164
		505	1,220
		405	2,579
		390	2,962
5	30	420	2,672
		395	2,999
6	**60**	425	2.767
		395	**3,233**
7	90	425	1,792
		395	3,179
		350	2,009
8	120	430	2,788
		395	3,087

4. pH 12

Pengukuran Ke-	Menit	Panjang Gelombang	Absorbansi
1	0	595	0,534
		375	2,595
2	5	390	2,792
3	10	405	2,462
		385	2,775
4	**15**	410	2,484
		390	**2,889**
5	30	370	2,199
6	60	370	1,250

Lampiran 5. Hasil Karakterisasi PSA

Distribusi ukuran nanopartikel pada pengukuran 1

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

MnO2-H_1026.nsz

Measurement Results

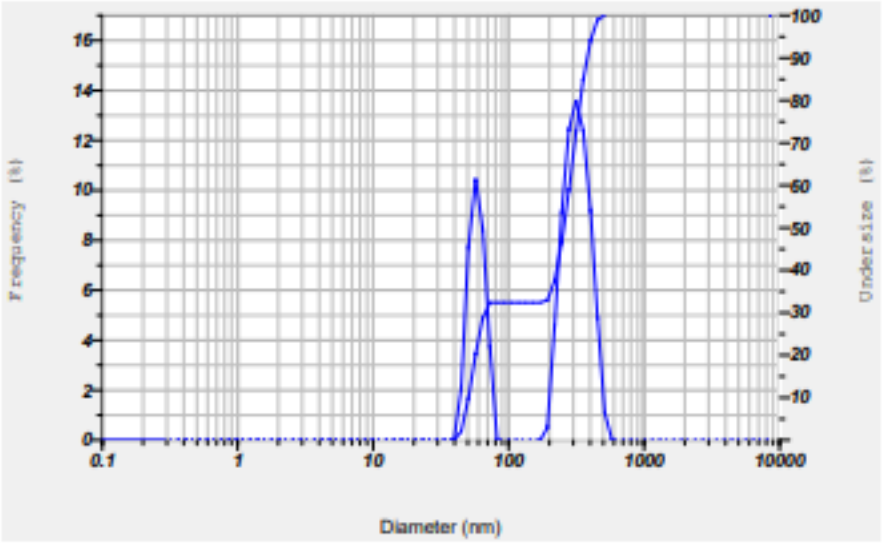
Date	:	31 July 2024 14:19:59
Measurement Type	:	Particle Size
Sample Name	:	MnO2-H
Scattering Angle	:	90
Temperature of the Holder	:	25.0 deg. C
Dispersion Medium Viscosity	:	0.894 mPa.s
Transmission Intensity before Meas.	:	26126
Distribution Form	:	|Standard|
Distribution Form(Dispersity)	:	Polydisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	86 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	0.32	55.0 nm	7.3 nm	53.9 nm
2	0.68	305.4 nm	65.7 nm	296.5 nm
3	---	--- nm	--- nm	--- nm
Total	1.00	224.3 nm	129.1 nm	296.5 nm

Cumulant Operations

Z-Average	:	152.0 nm
PI	:	0.582



Distribusi ukuran nanopartikel pada pengukuran 2

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

MnO2-H_1022.nsz

Measurement Results

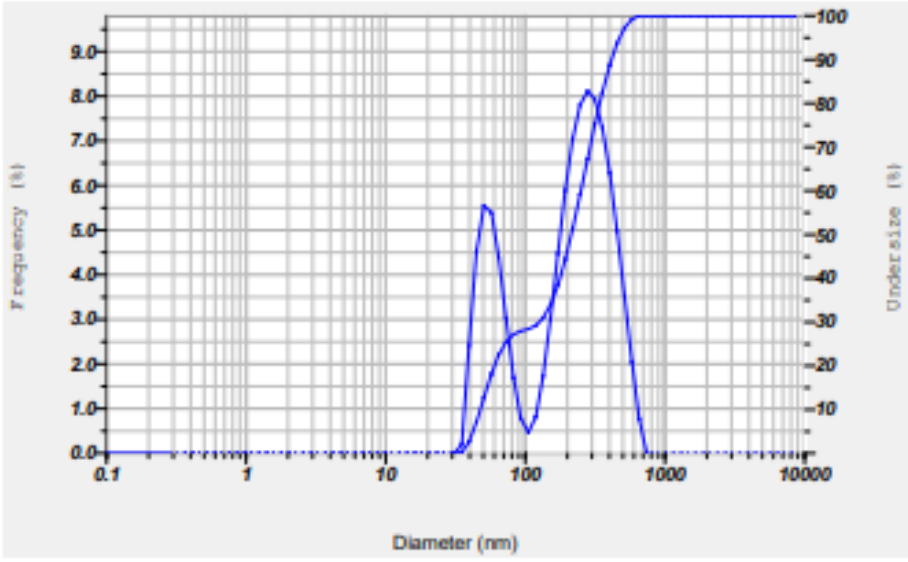
Date	:	31 July 2024 14:11:42
Measurement Type	:	Particle Size
Sample Name	:	MnO2-H
Scattering Angle	:	90
Temperature of the Holder	:	25.0 deg. C
Dispersion Medium Viscosity	:	0.896 mPa.s
Transmission Intensity before Meas.	:	28072
Distribution Form	:	|Standard|
Distribution Form(Dispersity)	:	Polydisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	66 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	0.28	54.3 nm	12.7 nm	48.0 nm
2	0.72	285.3 nm	110.5 nm	262.8 nm
3	---	--- nm	--- nm	--- nm
Total	1.00	220.5 nm	140.0 nm	262.8 nm

Cumulant Operations

Z-Average	:	153.3 nm
PI	:	0.521



Distribusi ukuran nanopartikel pada pengukuran 3

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.20

SZ-100

MnO2-H_1027.nsz

Measurement Results

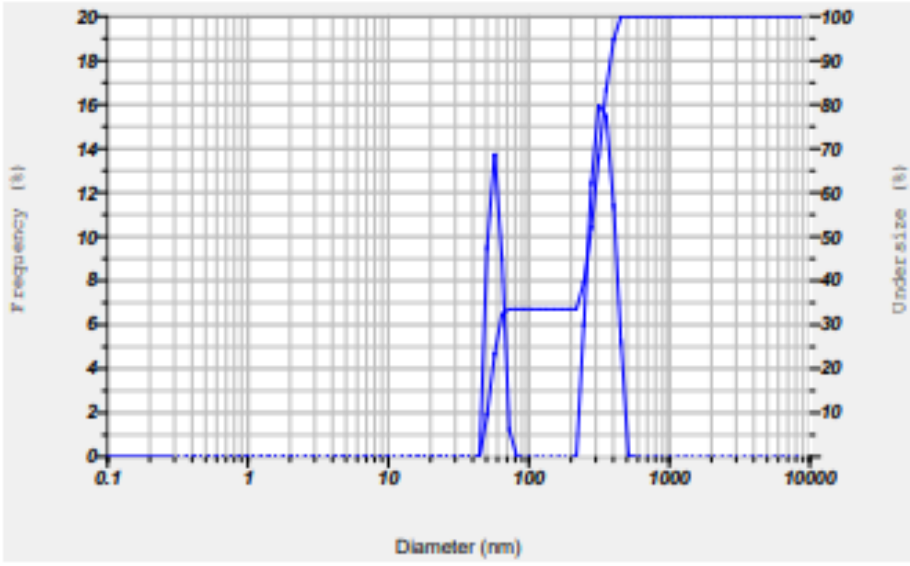
Date	:	31 July 2024 14:20:49
Measurement Type	:	Particle Size
Sample Name	:	MnO2-H
Scattering Angle	:	90
Temperature of the Holder	:	24.9 deg. C
Dispersion Medium Viscosity	:	0.897 mPa.s
Transmission Intensity before Meas.	:	26126
Distribution Form	:	[Standard]
Distribution Form(Dispersity)	:	Polydisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	51 kCPS

Calculation Results

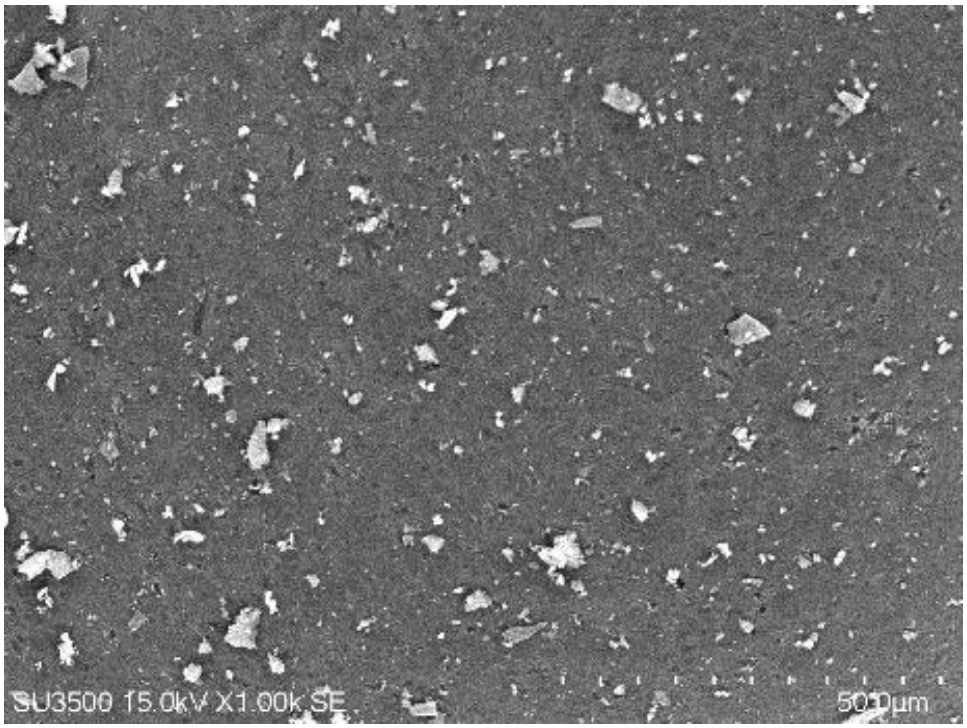
Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	0.34	54.4 nm	5.6 nm	53.6 nm
2	0.66	317.7 nm	54.8 nm	300.0 nm
3	---	--- nm	--- nm	--- nm
Total	1.00	229.5 nm	132.1 nm	300.0 nm

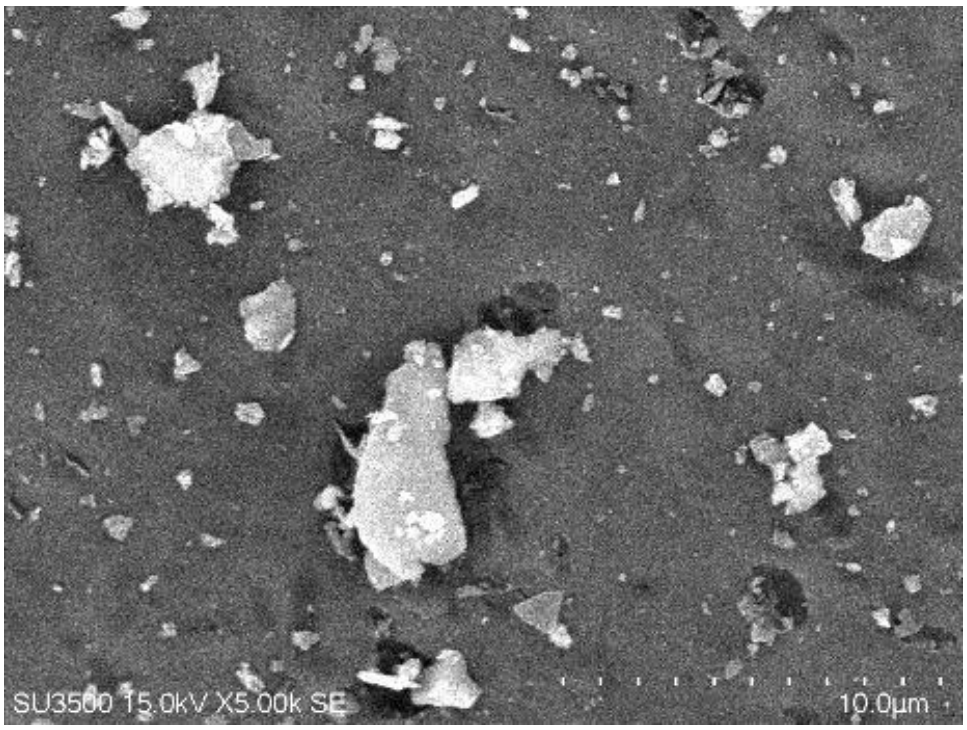
Cumulant Operations

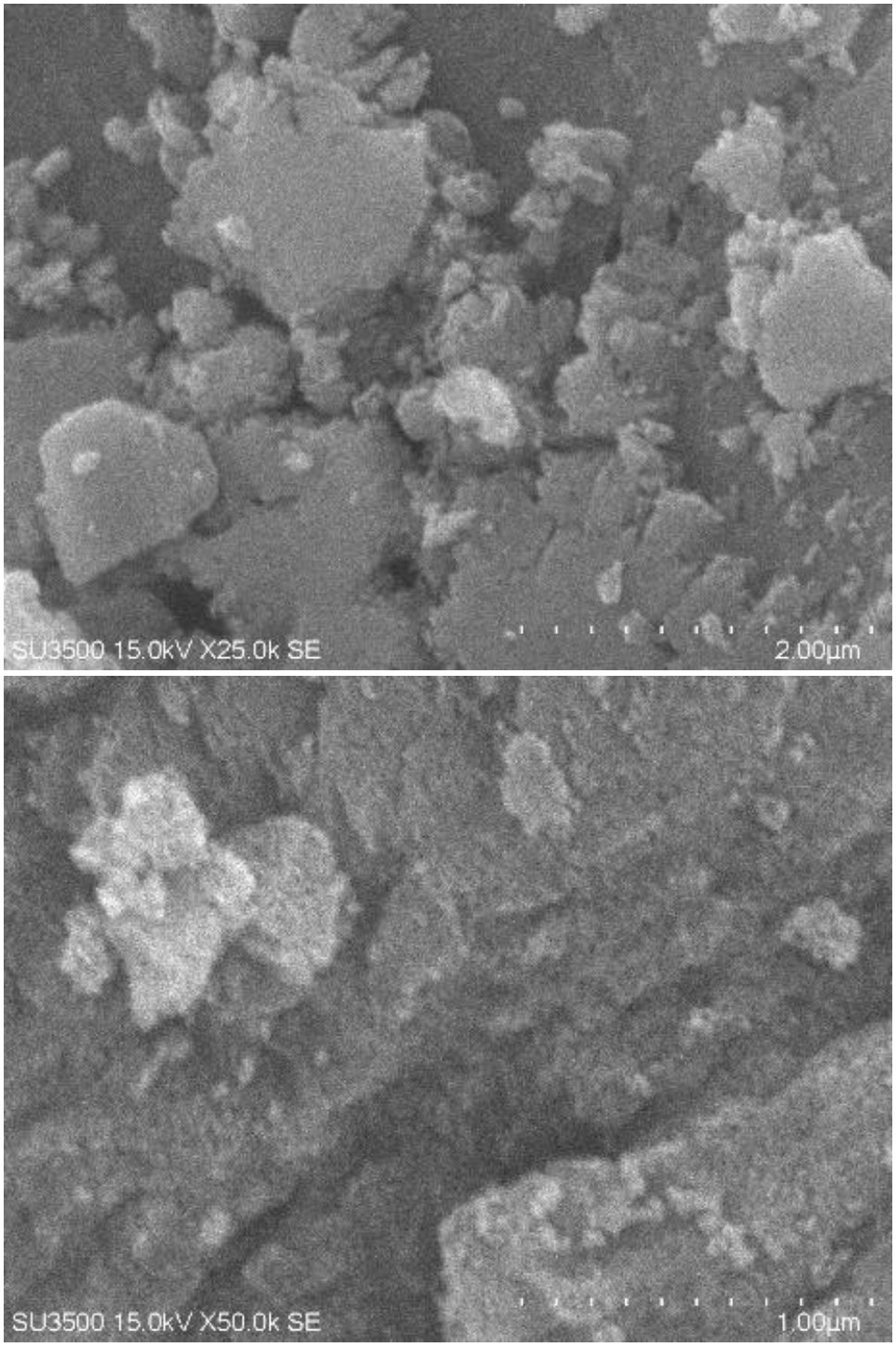
Z-Average	:	152.0 nm
PI	:	0.608



Lampiran 6. Hasil Karakterisasi SEM-EDX






SU3500 15.0kV X25.0k SE
2.00µm
SU3500 15.0kV X50.0k SE
1.00µm

EDAX TEAM

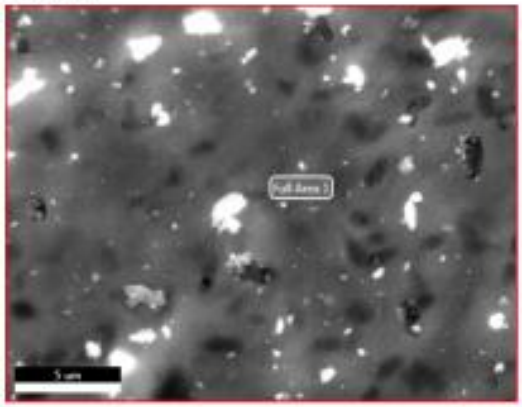
2024

Author: gita

Creation: 8/14/2024 2:58:48 AM

Sample Name: New Sample

Area 238

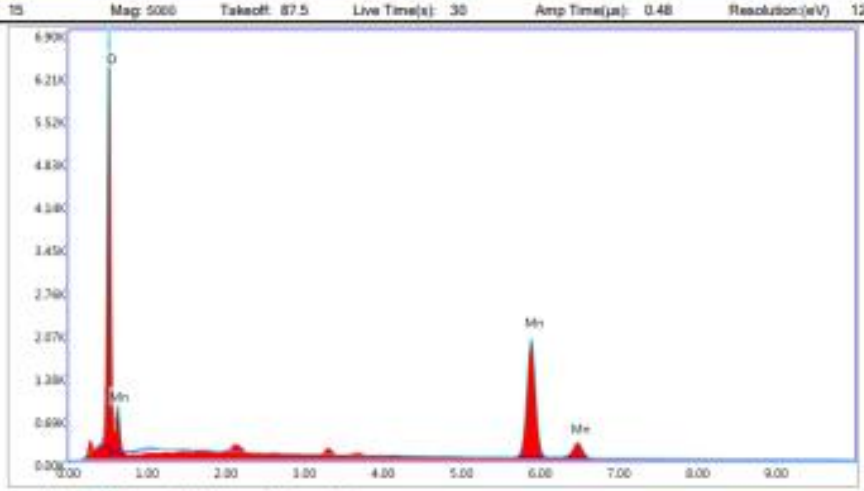


eZAF Smart Quant Results

Element	Weight %	Atomic %	Net Int.
O K	25.8	54.42	3038.53
MnK	74.2	45.58	1826.13

Full Area 1

kV: 15 Mag: 5000 Takeoff: 87.5 Live Time(s): 30 Amp Time(µs): 0.48 Resolution:(eV) 129.7

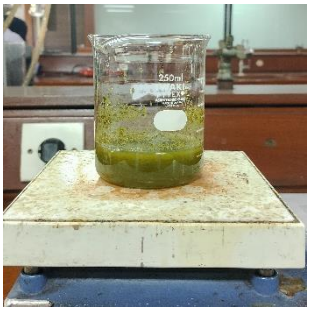


Livec 30.0 234 Cnts 2.170 keV Det: Octane Pro A

Lampiran 7. Dokumentasi Penelitian

A. Preparasi Sampel





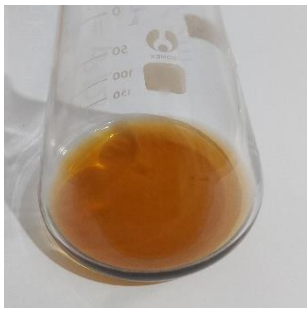
B. Pembuatan Larutan $KMnO_4$


C. Penentuan Optimasi Konsentrasi

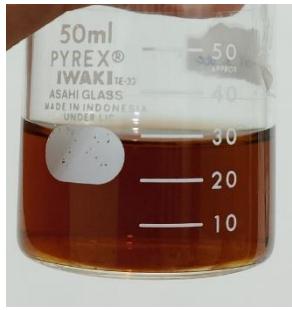
D. Penentuan Optimasi Komposisi

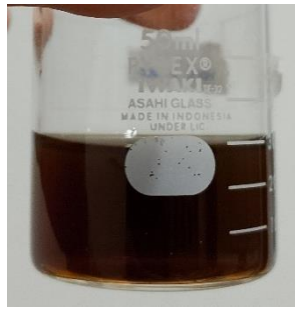
E. Penentuan Optimasi pH

F. Sintesis Nanopartikel MnO_2




G. Pembentukan Polimer Mn-acac






SINTESIS DAN KARAKTERISASI NANOPARTIKEL MnO_2 MELALUI BIOREDUKSI $KMnO_4$ DENGAN EKSTRAK DAUN KETAPANG (*Terminalia catappa*)

HANIFA FUADA

H031201023

PROGRAM STUDI KIMIA
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MAKASSAR
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