

**LAMPIRAN A**  
**GAMBAR ALAT DAN BAHAN**

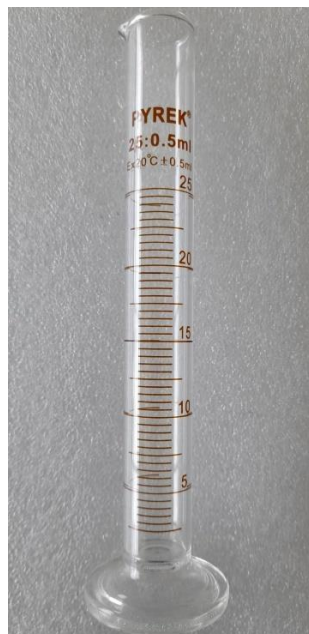
**Lampiran A. Gambar alat dan bahan**



**Gambar A.1 Gelas Beker**



**Gambar A.2 Labu Ukur**



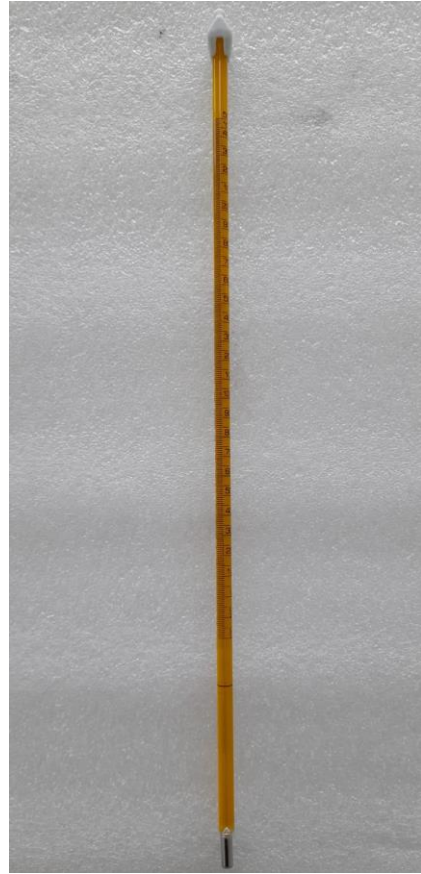
**Gambar A.3 Gelas Ukur**



**Gambar A.4 Corong**



**Gambar A.5 Pipet Tetes**



**Gambar A.6 Thermometer**



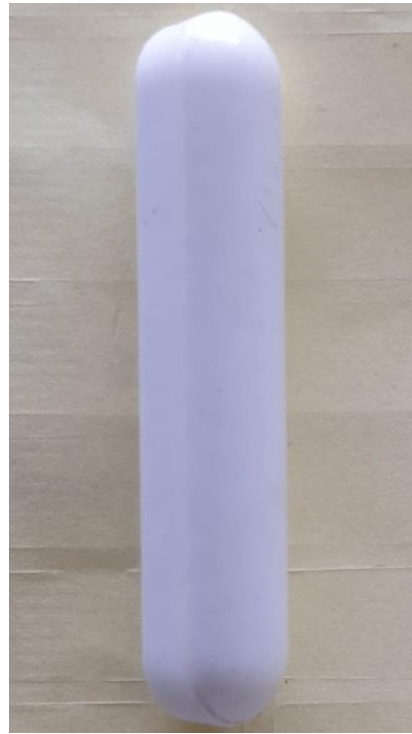
**Gambar A.7 Mikropipet**



**Gambar A.8 Tip Pipet**



**Gambar A.9 Indikator Universal**



**Gambar A.10 Magnetik Stirrer**



**Gambar A.11 Hotplate Stirrer**



**Gambar A.12 Neraca Digital**



**Gambar A.13 Magnet Permanen**



**Gambar A.14 Sarung Tangan**

**Kimia**



**Gambar A.15 Wrapping Plastik**



**Gambar A.16 Wadah Sampel**



**Gambar A.17 Botol Sampel**



**Gambar A.18 Spatula**



**Gambar A.19 Masker**



**Gambar A.20 Tisu**



**A.21 Sarung Tangan Karet**



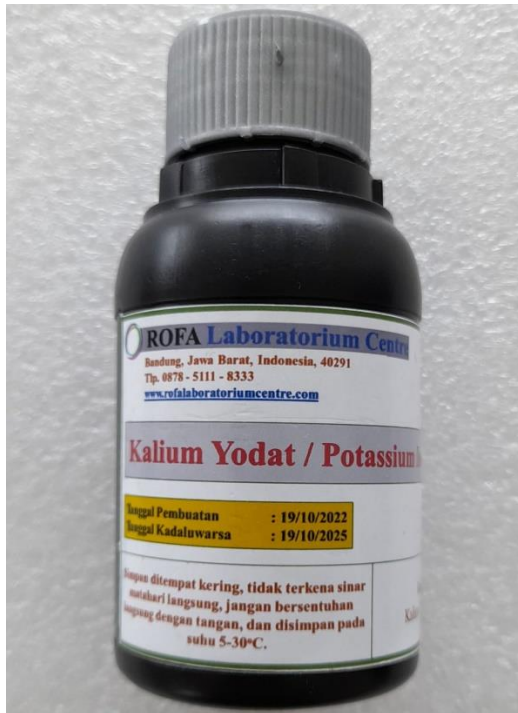
**A.22 Spektrometer UV-Vis**



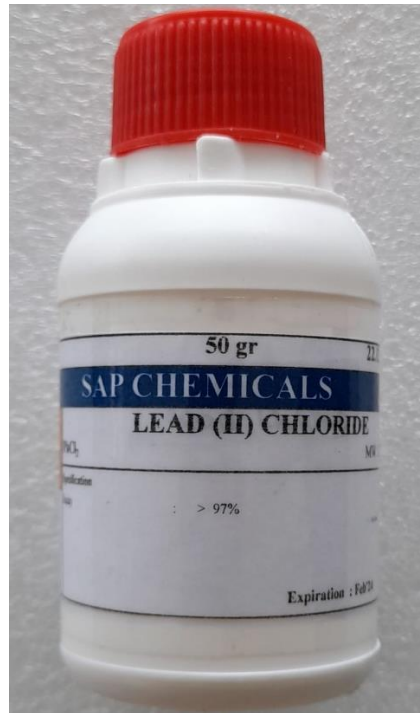
**Gambar A.23 NH<sub>4</sub>OH**



**Gambar A.24 Fe<sub>3</sub>O<sub>4</sub>**



**Gambar A.25  $KIO_3$**



**Gambar A.26 Ion Pb**

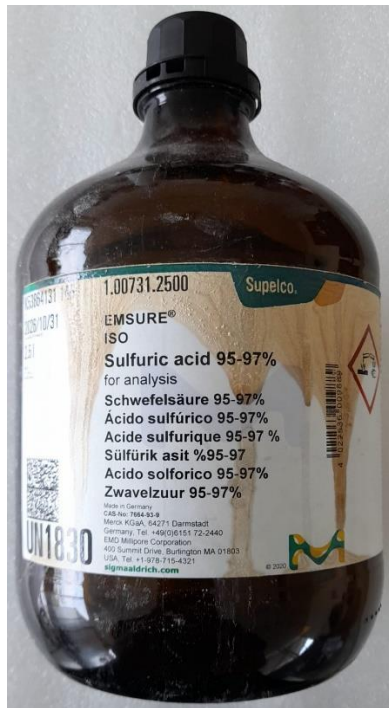


**Gambar A.26 Anilin**

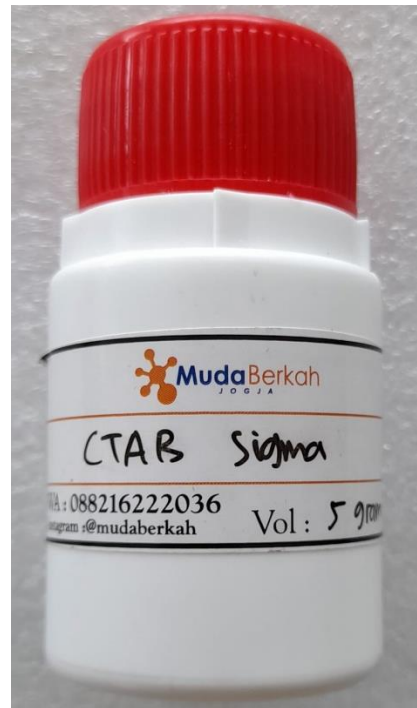


**Gambar A.27 Aquades**





**Gambar A.28 H<sub>2</sub>SO<sub>4</sub>**



**Gambar A.29 CTAB**



**Gambar A.30 Aseton**

**LAMPIRAN B**  
**HASIL KARAKTERISASI**



KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN  
INSTITUT PERTANIAN BOGOR  
UNIT LABORATORIUM JASA PENGUJIAN, KALIBRASI DAN SERTIFIKASI

Sertifikat Akreditasi KAN No. LP-156-IDN ; LK-336-IDN ; LSP-030-IDN ; LSHACCP-009-IDN ; LSSMKP-009-IDN  
Gedung Pascasarjana Wing Kimia Lantai Dasar, Kampus IPB Baranangsiang, Jl. Pajajaran Bogor 16129  
Phone 0251-8319894, 8323571 Website : www.ilab-ipb.org Email : labterpadu@apps.ipb.ac.id



LP-156-IDN  
LK-336-IDN

## LABORATORY TEST REPORT

Certificate No. : LT-10-23-0451  
Customer : HANIF FAUZAN NADIF  
Address : Universitas Sultan Ageng Tirtayasa, Cilegon,  
Banten  
Contact Person : Hanif  
Issue Date : 10-05-2023

Laporan ini dibuat berdasarkan hasil observasi yang objektif dan independen terhadap sampel pelanggan yang bersifat khusus dan rahasia. Data hasil pengujian, interpretasi dan pendapat-pendapat yang ada di dalamnya mewakili penilaian terbaik Laboratorium Jasa Pengujian, Kalibrasi dan Sertifikasi IPB. Dalam hal penggunaan laporan ini, Laboratorium Jasa Pengujian, Kalibrasi dan Sertifikasi IPB tidak membuat jaminan secara tersirat maupun tersurat dan tidak bertanggung jawab terhadap produktivitas, penelitian, kegiatan operasional ataupun kerugian lainnya yang bersifat material maupun immaterial. Laporan ini tidak diperbolehkan untuk digandakan, kecuali secara utuh keseluruhannya dan atas persetujuan tertulis dari Laboratorium Jasa Pengujian, Kalibrasi dan Sertifikasi IPB. Pemusnahan sampel akan dilakukan 14 hari setelah laporan ini diterima kecuali jika sampel akan diminta kembali.



FR-20.2-LT-1.0

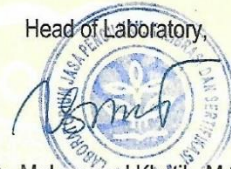
**LABORATORY TEST REPORT**

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**SAMPLE INFORMATION**

Certificate No. : LT-10-23-0451  
Lab. No. : AU/IV/23/0820-0828  
Customer : HANIF FAUZAN NADIF  
Contact Person : Hanif  
Address : Universitas Sultan Ageng Tirtayasa,  
Cilegon, Banten  
Sample Matrix : Liquid Material  
Sample Number : 9  
Test for : Metal Content  
Received Date : 03-04-2023  
Sampling Date : -  
Analysis Date : (03-04-2023)-(10-05-2023)  
Issued Date : 10-05-2023

Head of Laboratory,



Dr. Mohammad Khôtib, M.Si  
NIP. 19781018 200701 1 002



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Certificate No. : LT-10-23-0451	Received Date : 03-04-2023
Laboratory No. : AU/IV/23/0820	Finished Date : 10-05-2023
Sample Matrix : Liquid Material	
Sample Id : 1 gr Fe3O4/PANI + 1 jam	


Parameter*	Result	Unit	Method
Lead, Pb	3.62	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)
REMARKS: *) Outside the scope of accreditation Laboratory is not responsible for the sampling process			

Certificate No. : LT-10-23-0451	Received Date : 03-04-2023
Laboratory No. : AU/IV/23/0821	Finished Date : 10-05-2023
Sample Matrix : Liquid Material	
Sample Id : 1 gr Fe3O4/PANI + 2 jam	

Parameter*	Result	Unit	Method
Lead, Pb	3.54	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)
REMARKS: *) Outside the scope of accreditation Laboratory is not responsible for the sampling process			

Certificate No. : LT-10-23-0451	Received Date : 03-04-2023
Laboratory No. : AU/IV/23/0822	Finished Date : 10-05-2023
Sample Matrix : Liquid Material	
Sample Id : 1 gr Fe3O4/PANI + 3 jam	

Parameter*	Result	Unit	Method
Lead, Pb	0.27	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)
REMARKS: *) Outside the scope of accreditation Laboratory is not responsible for the sampling process			

May 10, 2023  
 Head of Laboratory  
  
 Dr. Mohammad Khotib, M.Si  
 NIP. 19781018 200701 1 002



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Certificate No. : LT-10-23-0451	Received Date : 03-04-2023
Laboratory No. : AU/IV/23/0823	Finished Date : 10-05-2023
Sample Matrix : Liquid Material	
Sample Id : 2 gr Fe3O4/PANI + 1 jam	

Parameter*	Result	Unit	Method
Lead, Pb	0.21	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)

REMARKS:  
 \*) Outside the scope of accreditation  
 Laboratory is not responsible for the sampling process

Certificate No. : LT-10-23-0451	Received Date : 03-04-2023
Laboratory No. : AU/IV/23/0824	Finished Date : 10-05-2023
Sample Matrix : Liquid Material	
Sample Id : 2 gr Fe3O4/PANI + 2 jam	


Parameter*	Result	Unit	Method
Lead, Pb	0.13	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)

REMARKS:  
 \*) Outside the scope of accreditation  
 Laboratory is not responsible for the sampling process

Certificate No. : LT-10-23-0451	Received Date : 03-04-2023
Laboratory No. : AU/IV/23/0825	Finished Date : 10-05-2023
Sample Matrix : Liquid Material	
Sample Id : 2 gr Fe3O4/PANI + 3 jam	

Parameter*	Result	Unit	Method
Lead, Pb	0.15	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)

REMARKS:  
 \*) Outside the scope of accreditation  
 Laboratory is not responsible for the sampling process

May 10, 2023  
 Head of Laboratory  
  
 Dr. Mohammad Khotib, M.Si  
 NIP. 19781018 200701 1 002



KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN

INSTITUT PERTANIAN BOGOR

UNIT LABORATORIUM JASA PENGUJIAN, KALIBRASI DAN SERTIFIKASI

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Kampus IPB Baranangsiang, Jl. Pejajaran Bogor 16129  
Phone 0251-8319894, 8323571 Website : www.ilab-ipb.org  
Email : labterpadu@apps.ipb.ac.id

FR-20.2-LT-1.0	<b>LABORATORY TEST REPORT</b>	Page 4 of 4
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Certificate No. : LT-10-23-0451 Received Date : 03-04-2023  
 Laboratory No. : AU/IV/23/0826 Finished Date : 10-05-2023  
 Sample Matrix : Liquid Material  
 Sample Id : 3 gr Fe3O4/PANI + 1 jam

Parameter*	Result	Unit	Method
Lead, Pb	0.60	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)

REMARKS:

\*) Outside the scope of accreditation

Laboratory is not responsible for the sampling process

Certificate No. : LT-10-23-0451 Received Date : 03-04-2023  
 Laboratory No. : AU/IV/23/0827 Finished Date : 10-05-2023  
 Sample Matrix : Liquid Material  
 Sample Id : 3 gr Fe3O4/PANI + 2 jam

Parameter*	Result	Unit	Method
Lead, Pb	0.33	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)

REMARKS:

\*) Outside the scope of accreditation

Laboratory is not responsible for the sampling process

Certificate No. : LT-10-23-0451 Received Date : 03-04-2023  
 Laboratory No. : AU/IV/23/0828 Finished Date : 10-05-2023  
 Sample Matrix : Liquid Material  
 Sample Id : 3 gr Fe3O4/PANI + 3 jam

Parameter*	Result	Unit	Method
Lead, Pb	1.01	mg/Kg	APHA 23 <sup>rd</sup> (2017): 3111 B (AAS-GF)

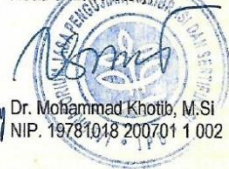
REMARKS:

\*) Outside the scope of accreditation

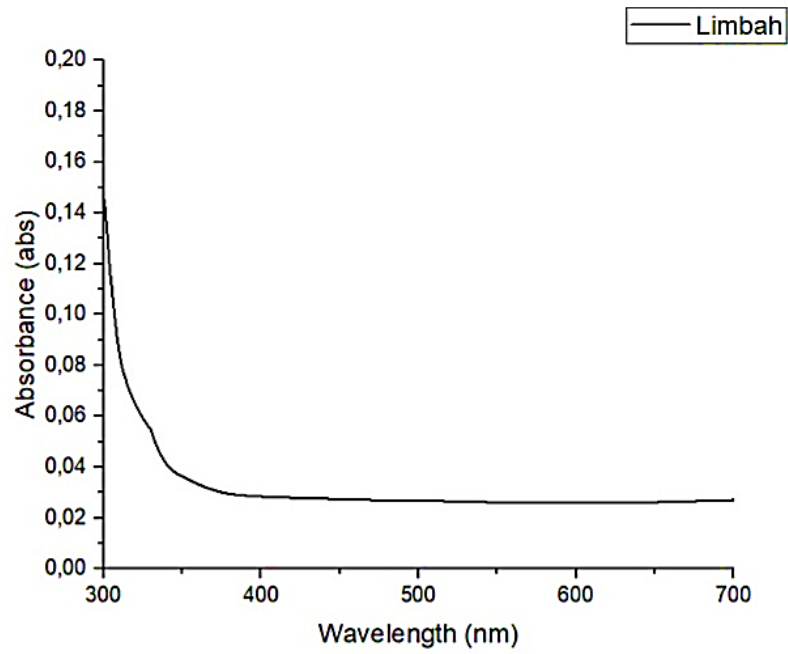
Laboratory is not responsible for the sampling process

May 10, 2023

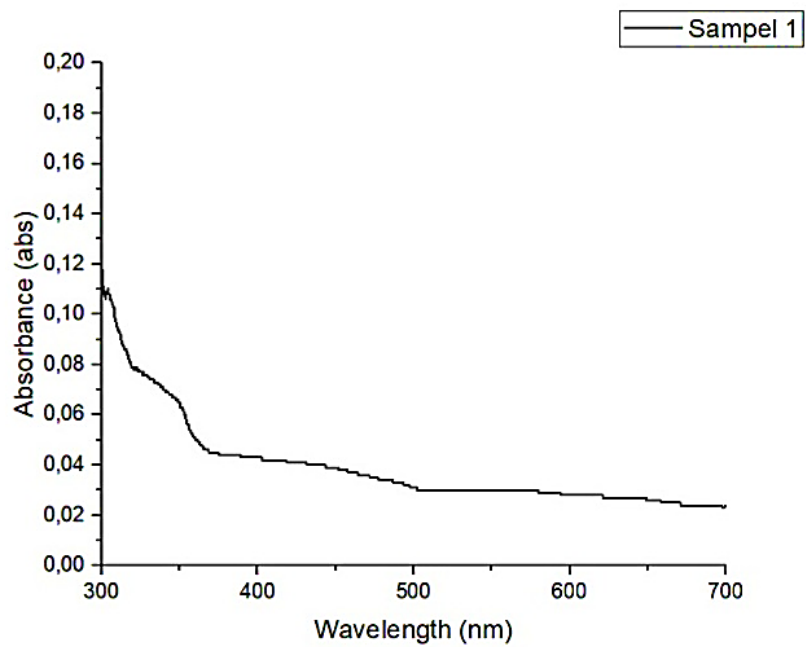
Head of Laboratory



Dr. Mohammad Khotib, M.Si  
NIP. 19781018 200701 1 002

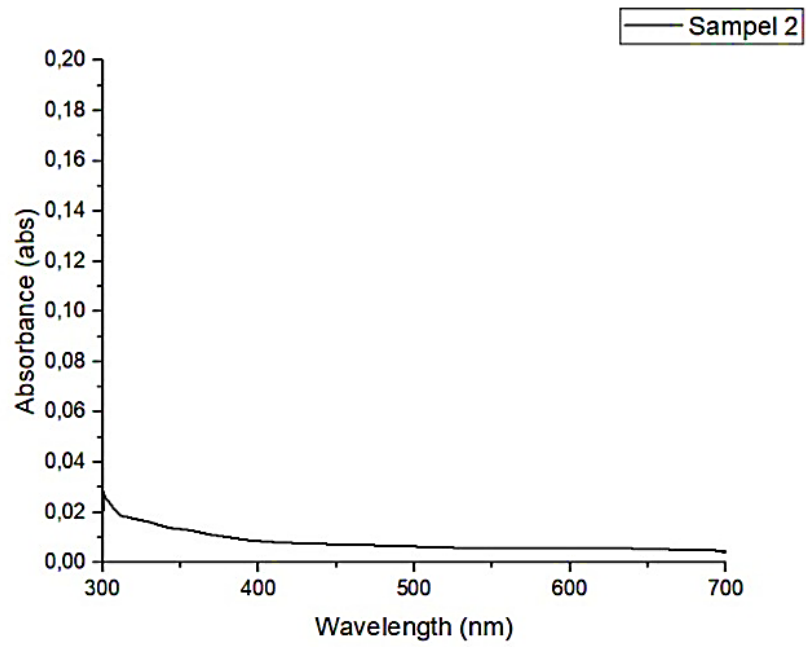


**Gambar B.1** Grafik Absorbance Limbah

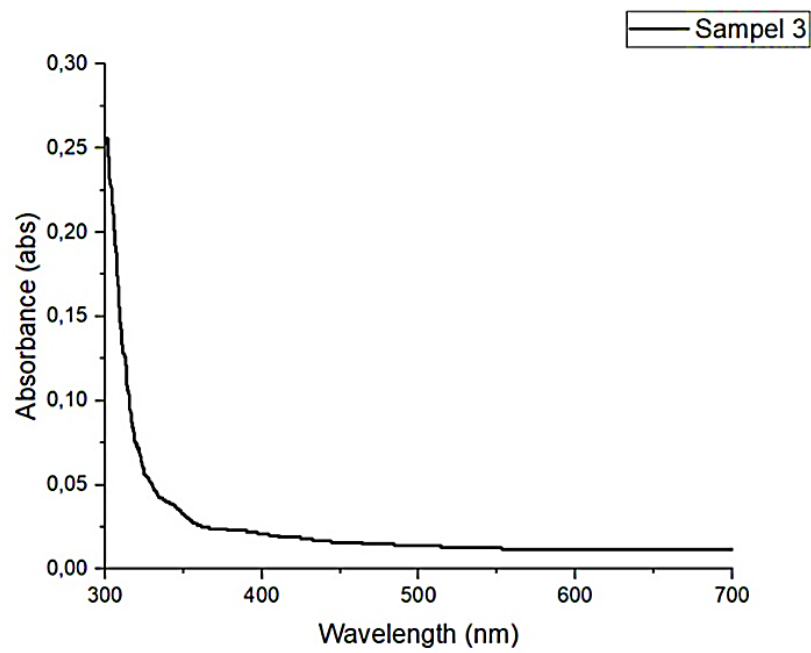


**Gambar B.2** Grafik Absorbance Sampel 1

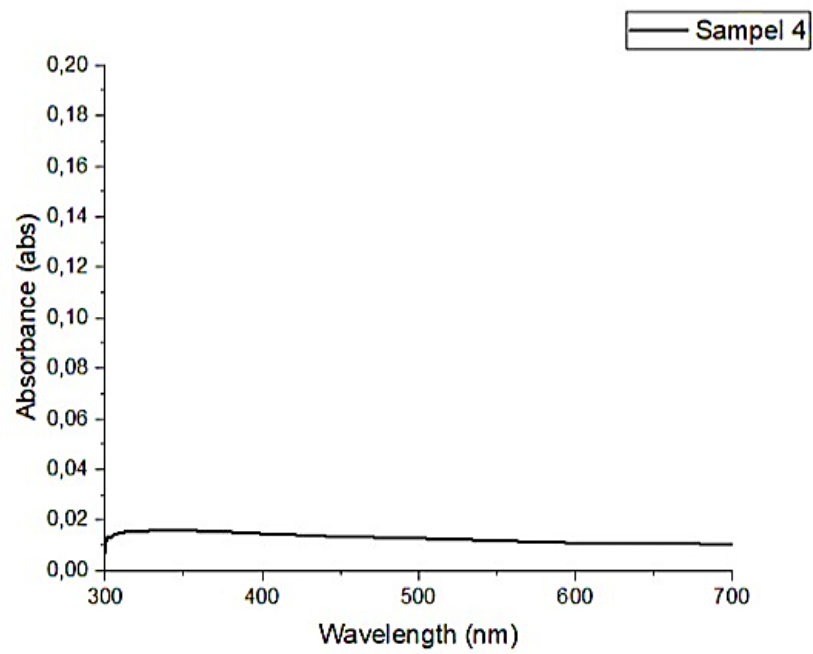




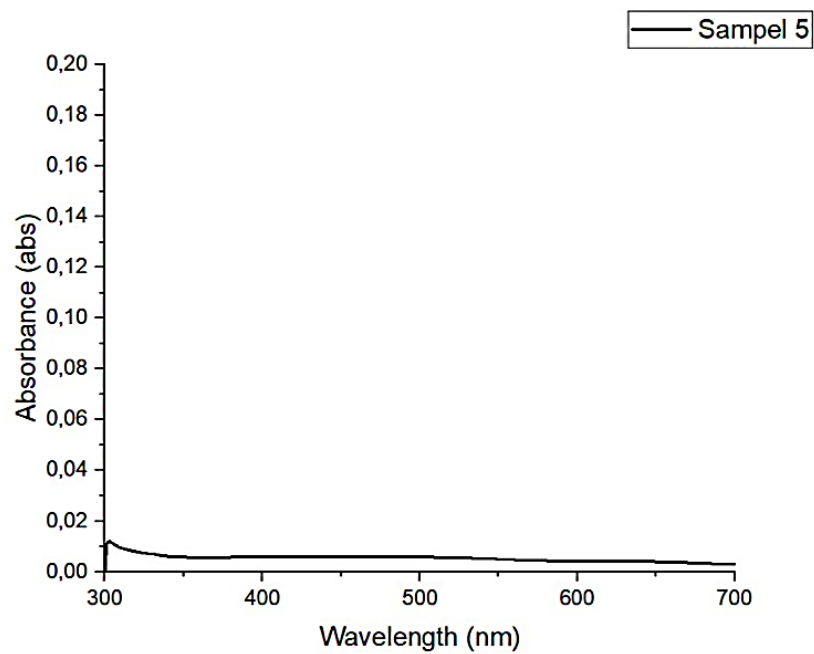
**Gambar B.3** Grafik Absorbance Sampel 2



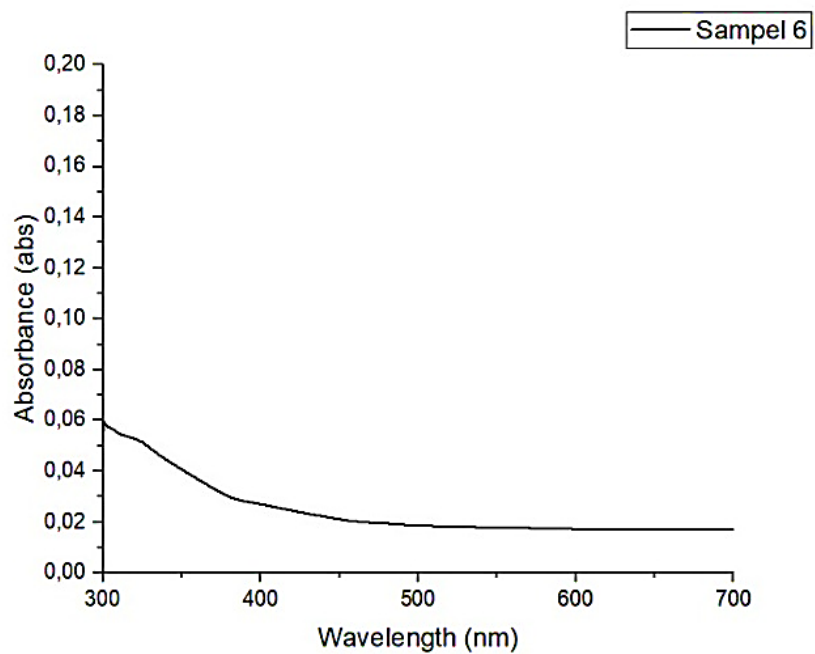
**Gambar B.4** Grafik Absorbance Sampel 3



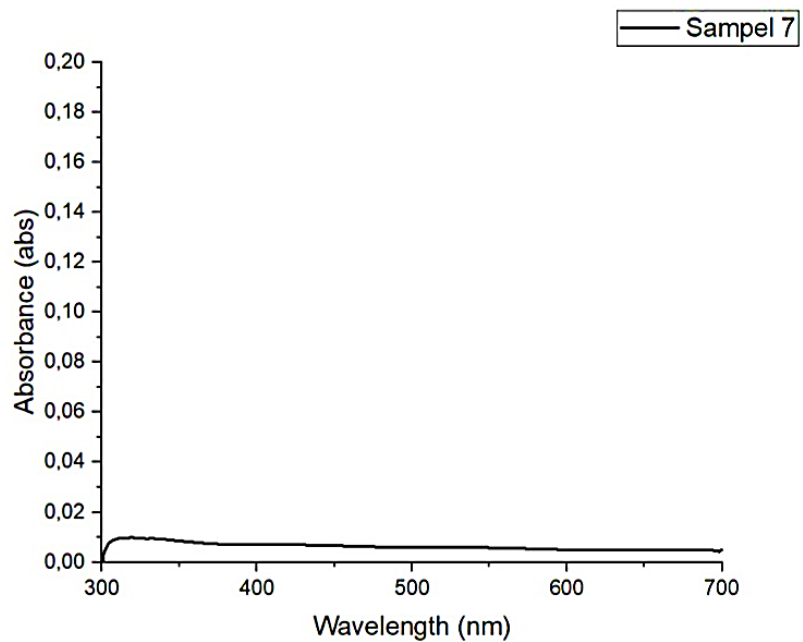
**Gambar B.5** Grafik Absorbance Sampel 4



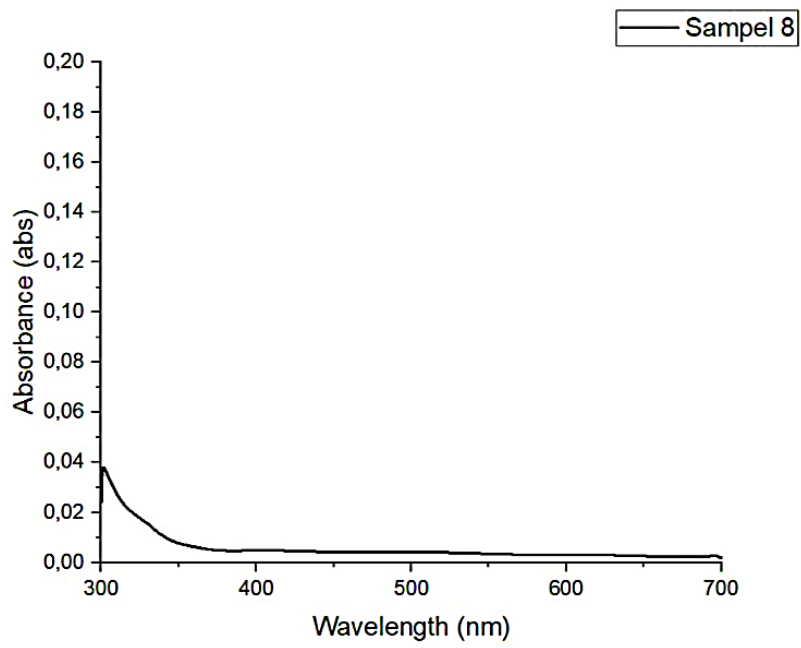
**Gambar B.6** Grafik Absorbance Sampel 5



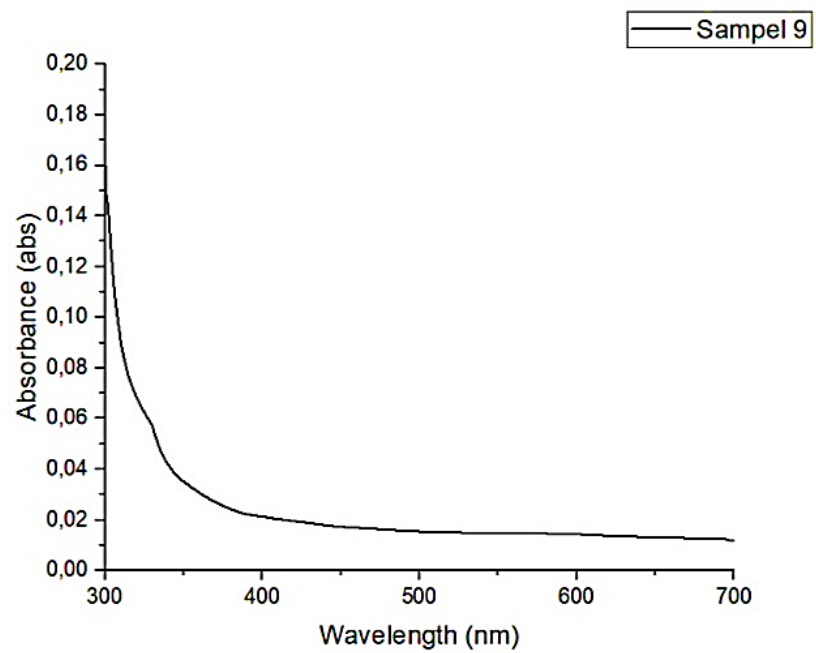
**Gambar B.7** Grafik Absorbance Sampel 6



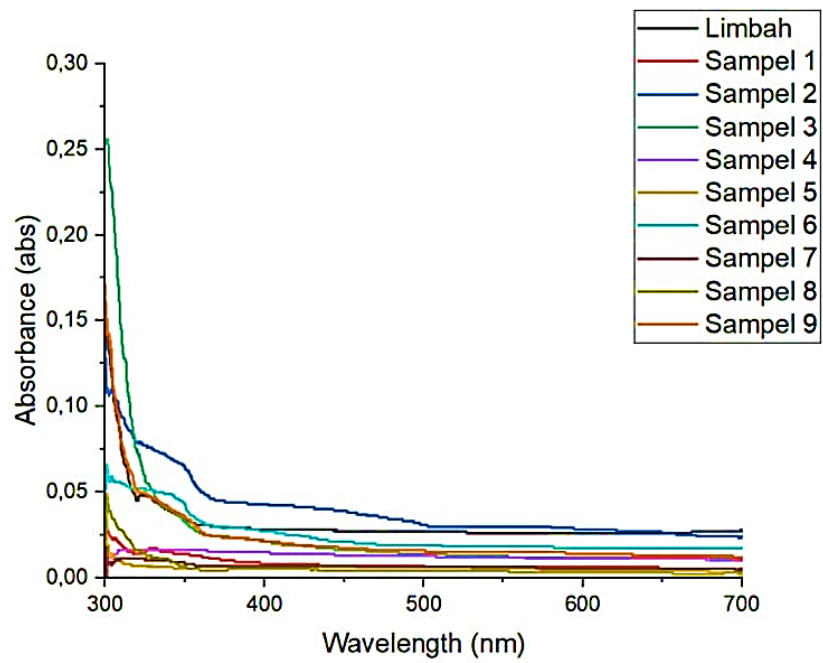
**Gambar B.8** Grafik Absorbance Sampel 7



**Gambar B.9** Grafik Absorbance Sampel 8



**Gambar B.10** Grafik Absorbance Sampel 9



**Gambar B.11** Grafik perbandingan absorbansi konsentrasi adsorben

# Match! Phase Analysis Report

Sample: 000000-0000 - Converted with PowDLL

## Sample Data

File name 2.xrdm  
File path C:/Users/Agnes Lavalome S/Downloads/Powder Fe3O4 Pani xrdm  
Data collected 2023-07-14T14:52:56+00:00  
Data range 15.000° - 99.954°  
Original data range 15.000° - 99.954°  
Number of points 8906  
Step size 0.010  
Rietveld refinement converged No  
Alpha2 subtracted No  
Background subtr. No  
Data smoothed No  
Radiation X-rays  
Wavelength 1.541874 Å

## Matched Phases

Index	Amount (%)	Name	Formula sum
A	100.0	Iron diiron(III) oxide	Fe3 O4
	50.2	Unidentified peak area	

### A: Iron diiron(III) oxide (100.0 %)

Formula sum Fe3 O4  
Entry number 96-101-0370  
Figure-of-Merit (FoM) 0.883189  
Total number of peaks 62  
Peaks in range 62  
Peaks matched 9  
Intensity scale factor 0.71  
Space group F d -3 m  
Crystal system cubic  
Unit cell a= 8.3840 Å  
I/lc 6.17  
Calc. density 5.219 g/cm<sup>3</sup>  
Reference Montoro V, "Miscibilita fra gli ossidi salini di ferro e di manganese", Gazzetta Chimica Italiana **68**, 728-733 (1938)

## Search-Match

### Settings

Reference database used COD-Inorg REV218120 2019.09.10  
Automatic zeropoint adaptation Yes  
Minimum figure-of-merit (FoM) 0.60  
2theta window for peak corr. 0.30 deg.  
Minimum rel. int. for peak corr. 0  
Parameter/influence 2theta 0.50  
Parameter/influence intensities 0.50  
Parameter multiple/single phase(s) 0.50

## Selection Criteria

### Elements:

**Elements that must be present:** O, Fe  
**Elements that must NOT be present:** All elements not mentioned above

## Peak List

No.	2theta [°]	d [Å]	I/I0	FWHM	Matched
1	30.01	2.9780	330.17	0.1030	A
2	35.34	2.5399	1000.00	0.1049	A
3	42.92	2.1071	105.15	0.0572	A
4	53.33	1.7178	117.51	0.0794	A
5	56.89	1.6185	203.93	0.2354	A
6	62.43	1.4875	352.94	0.1003	A

## Integrated Profile Areas

### Based on calculated profile

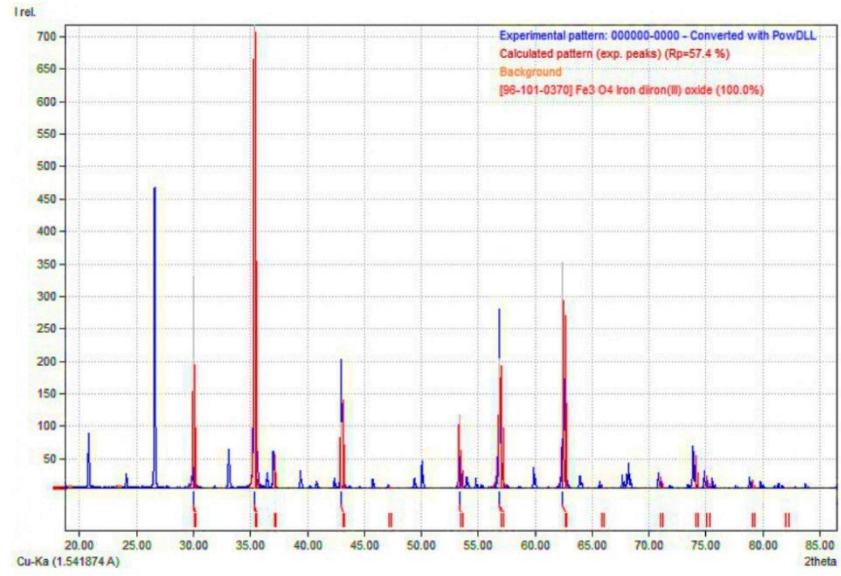
Profile area	Counts	Amount
Overall diffraction profile	1692337	100.00%
Background radiation	495634	29.29%
Diffraction peaks	1196703	70.71%
Peak area belonging to selected phases	346711	20.49%
Peak area of phase A (Iron diiron(III) oxide)	346711	20.49%
Unidentified peak area	849991	50.23%

## Peak Residuals

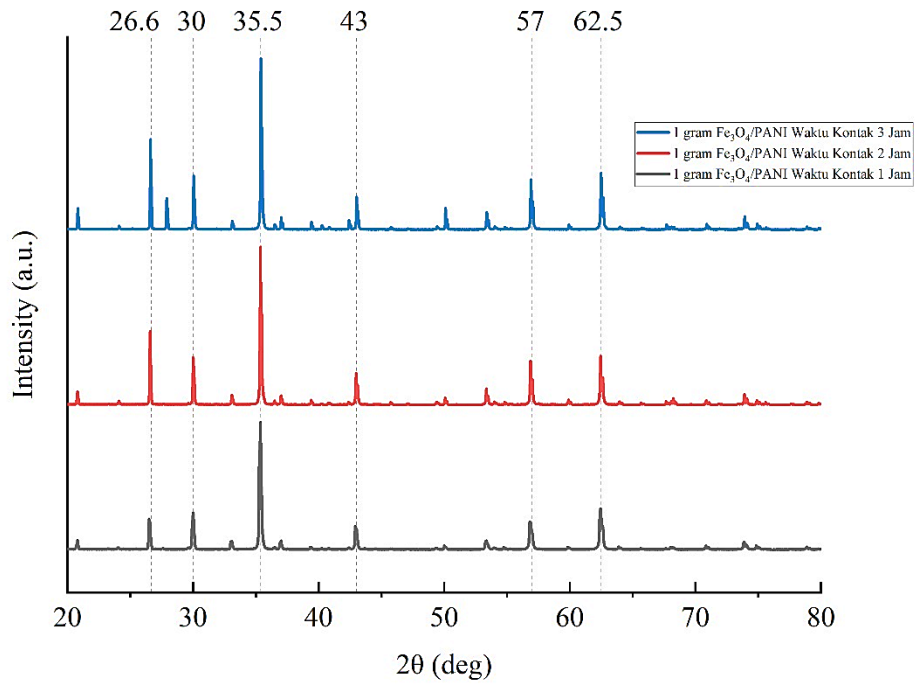
Peak data	Counts	Amount
Overall peak intensity	4855	100.00%

Peak intensity belonging to selected phases 4806 98.98%  
Unidentified peak intensity 50 1.02%

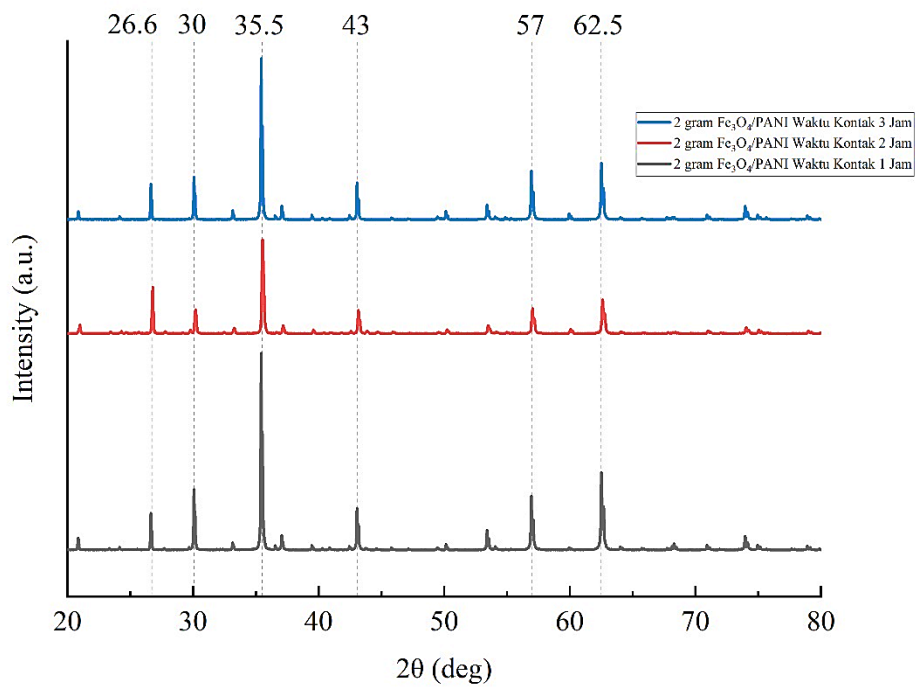
### Diffraction Pattern Graphics



Match! Copyright © 2003-2019 CRYSTAL IMPACT, Bonn, Germany

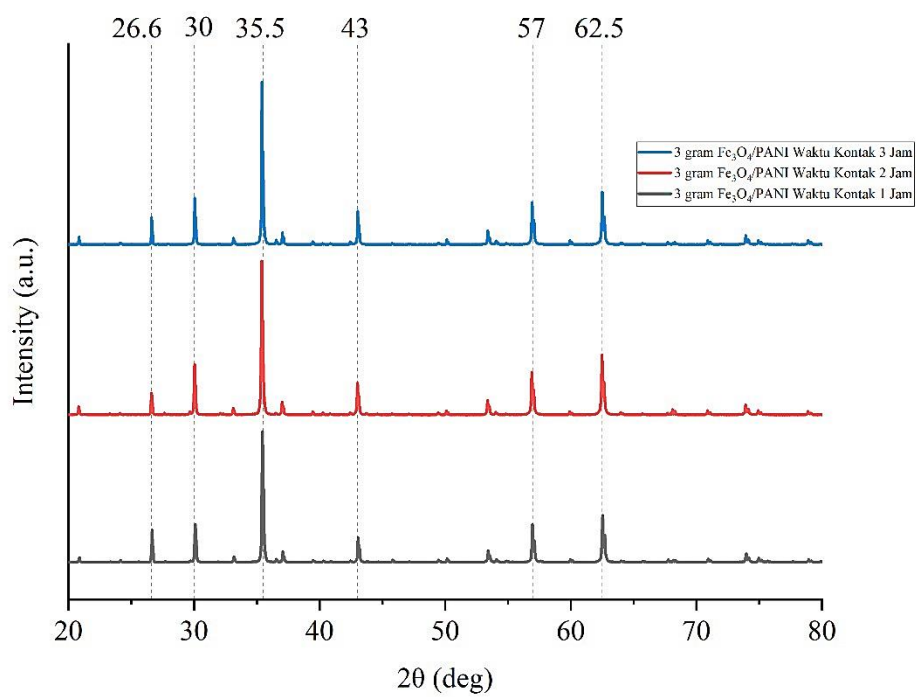


Puncak XRD 1 gram  $\text{Fe}_3\text{O}_4/\text{PANI}$  dengan variasi waktu kontak 1 jam, 2 jam, dan 3 jam.



Puncak XRD 2 gram  $\text{Fe}_3\text{O}_4/\text{PANI}$  dengan variasi waktu kontak 1 jam, 2 jam, dan 3 jam.





Puncak XRD 3 gram Fe<sub>3</sub>O<sub>4</sub>/PANI dengan variasi waktu kontak 1 jam, 2 jam, dan 3 jam.