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LAMPIRAN

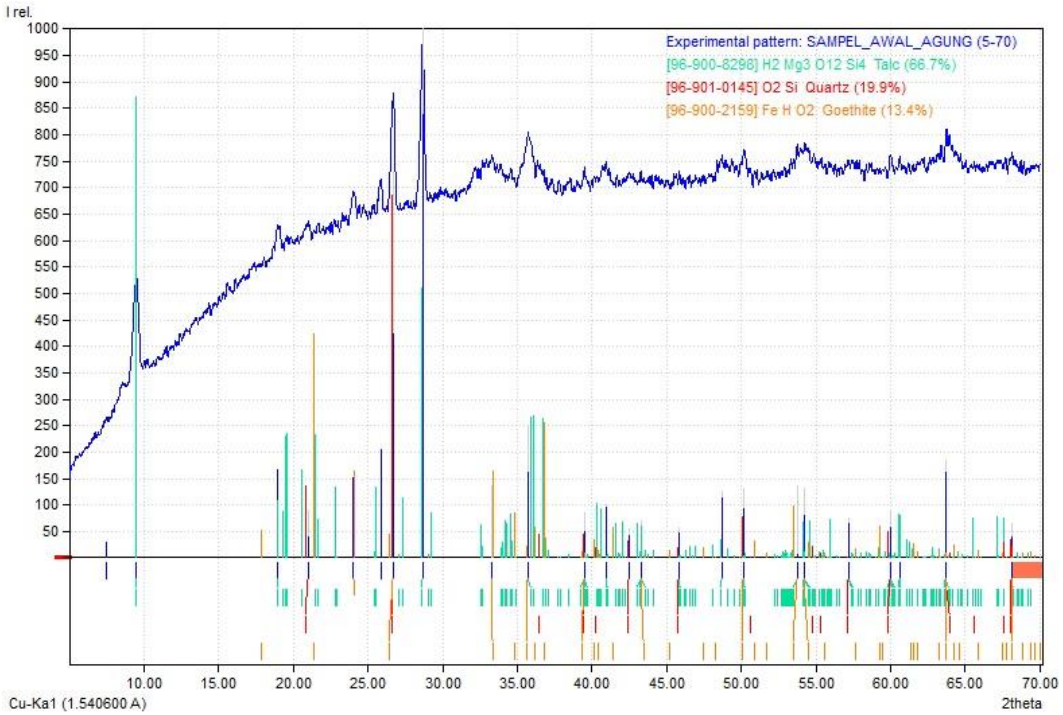
Lampiran A

Hasil XRD

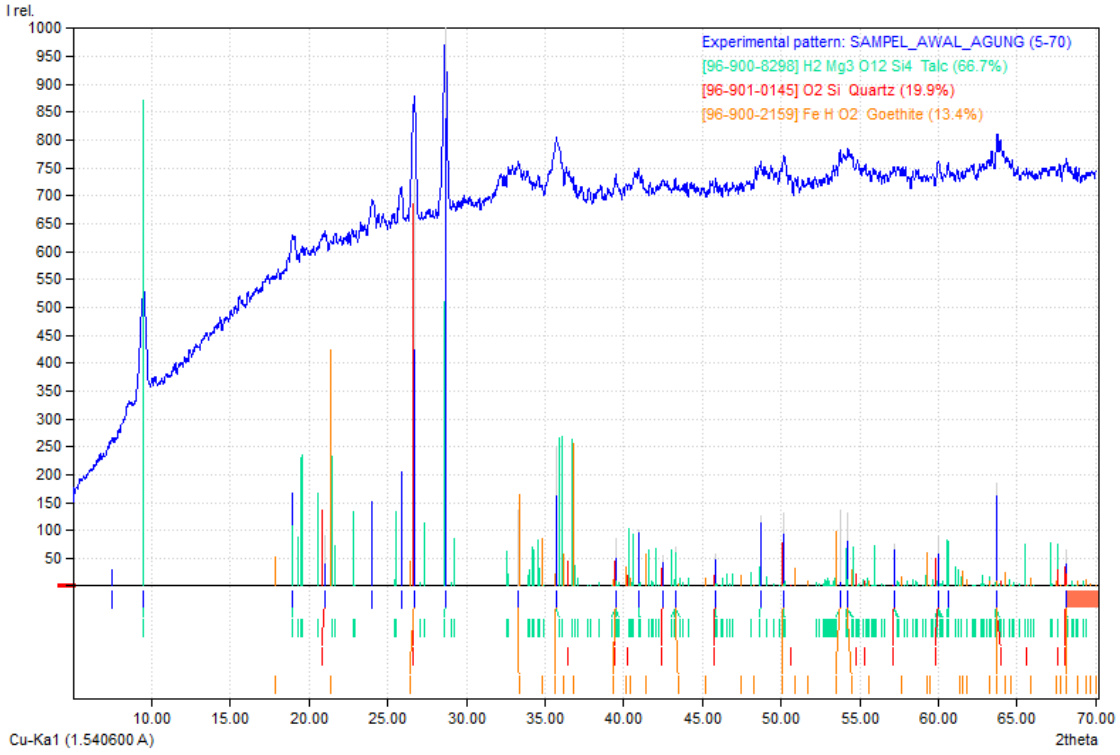
LAMPIRAN A

HASIL XRD

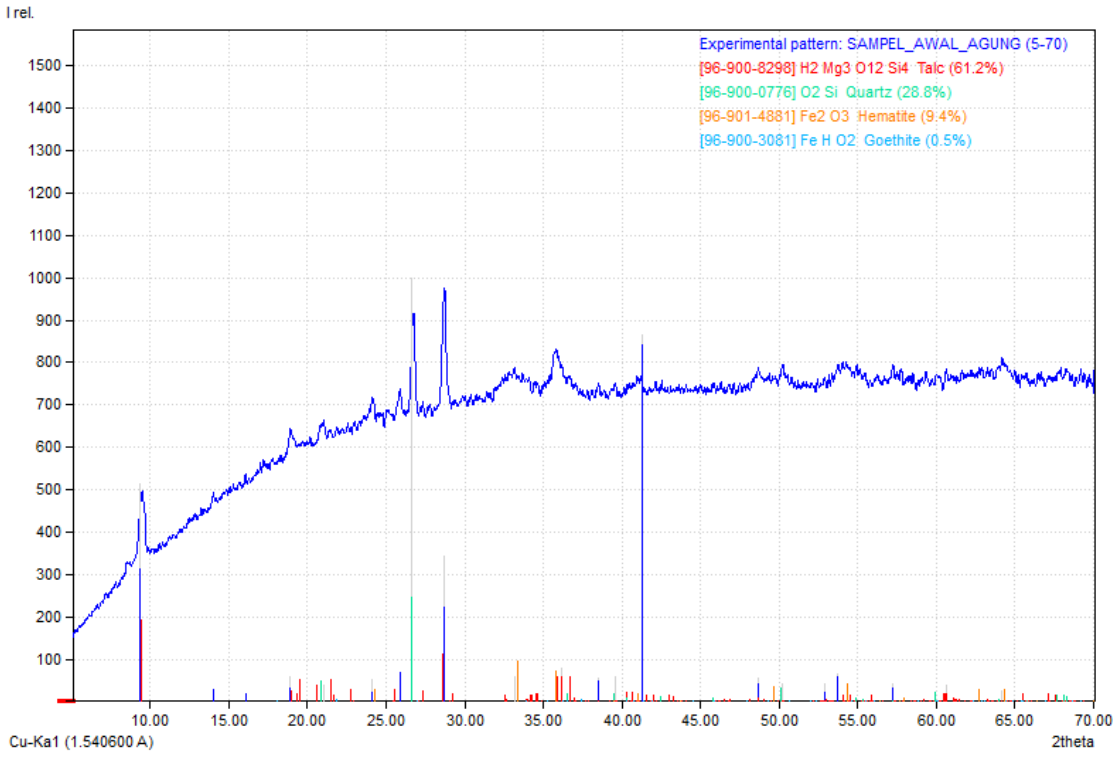
1. Sampel Awal



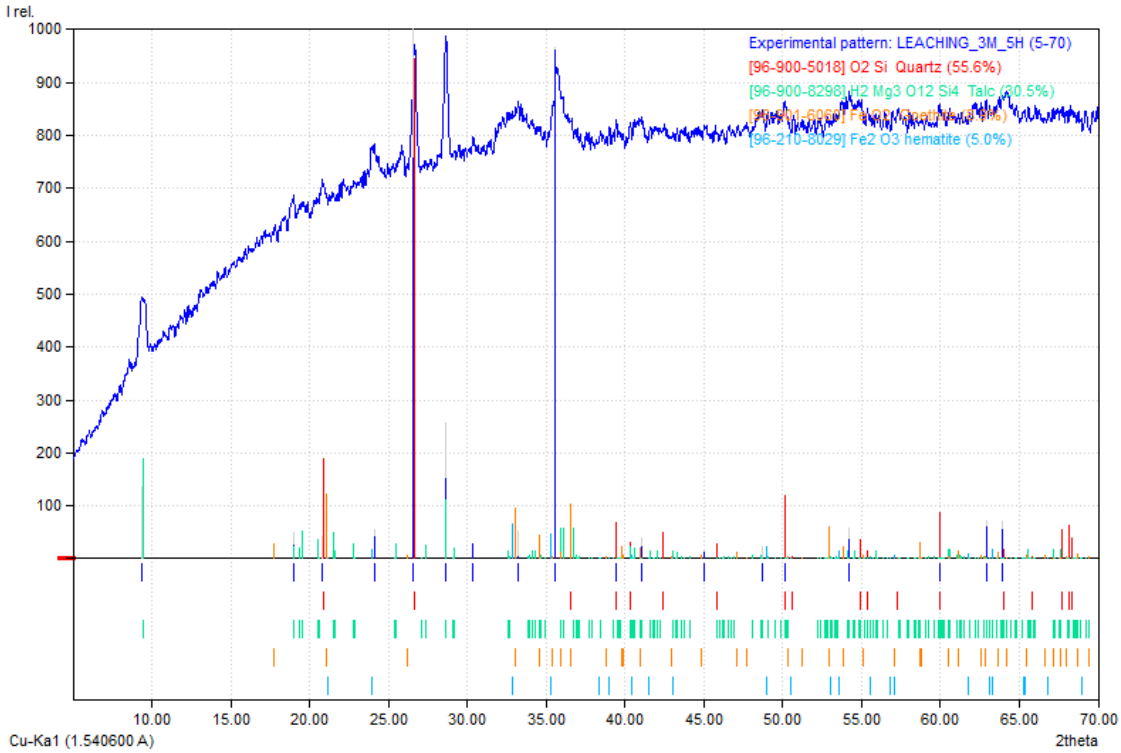
2. Sampel Kalsinasi



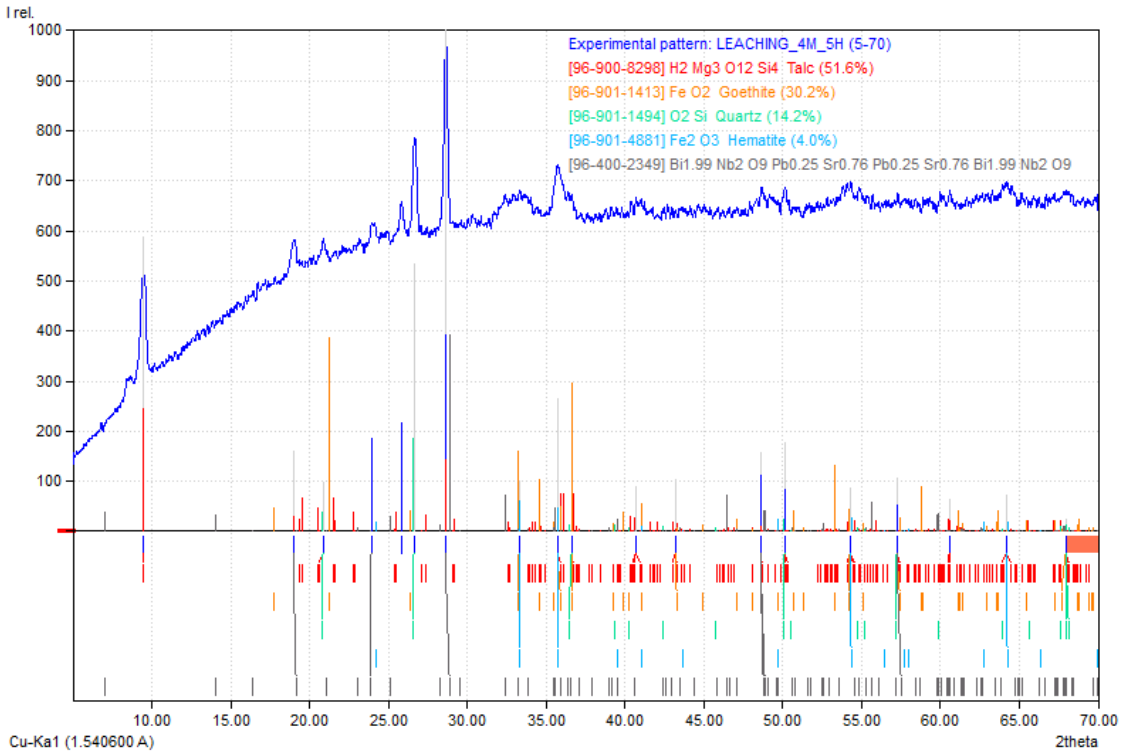
3. Sampel 2M 5H



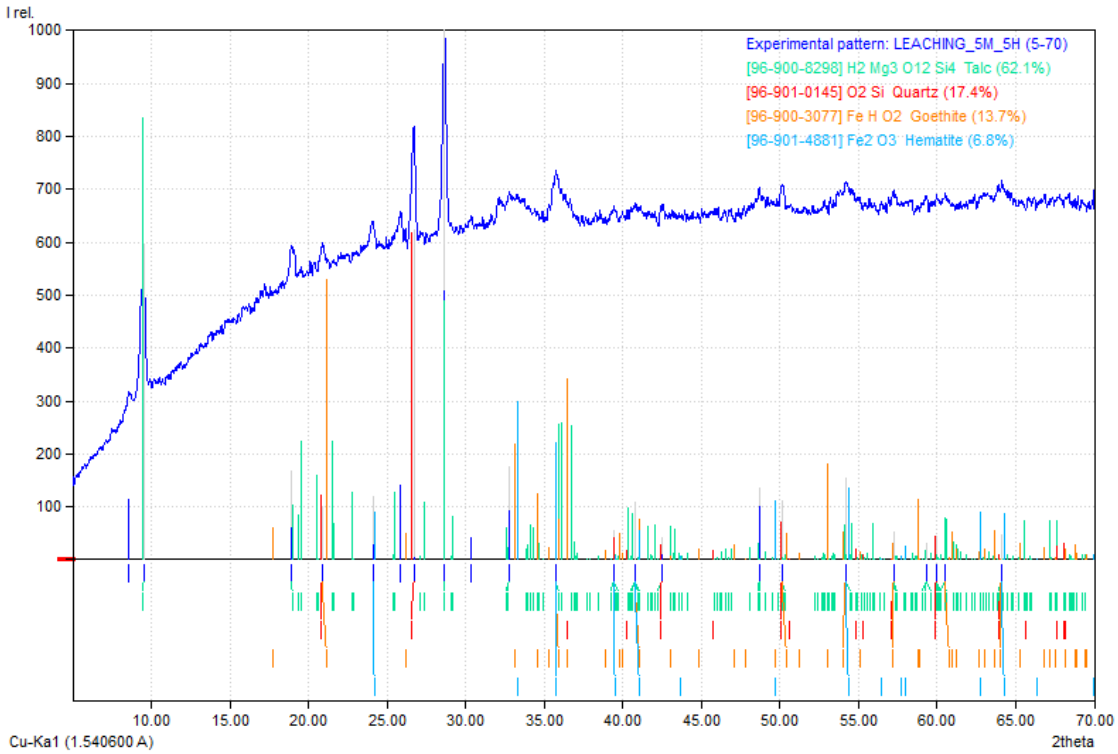
4. Sampel 3M 5H



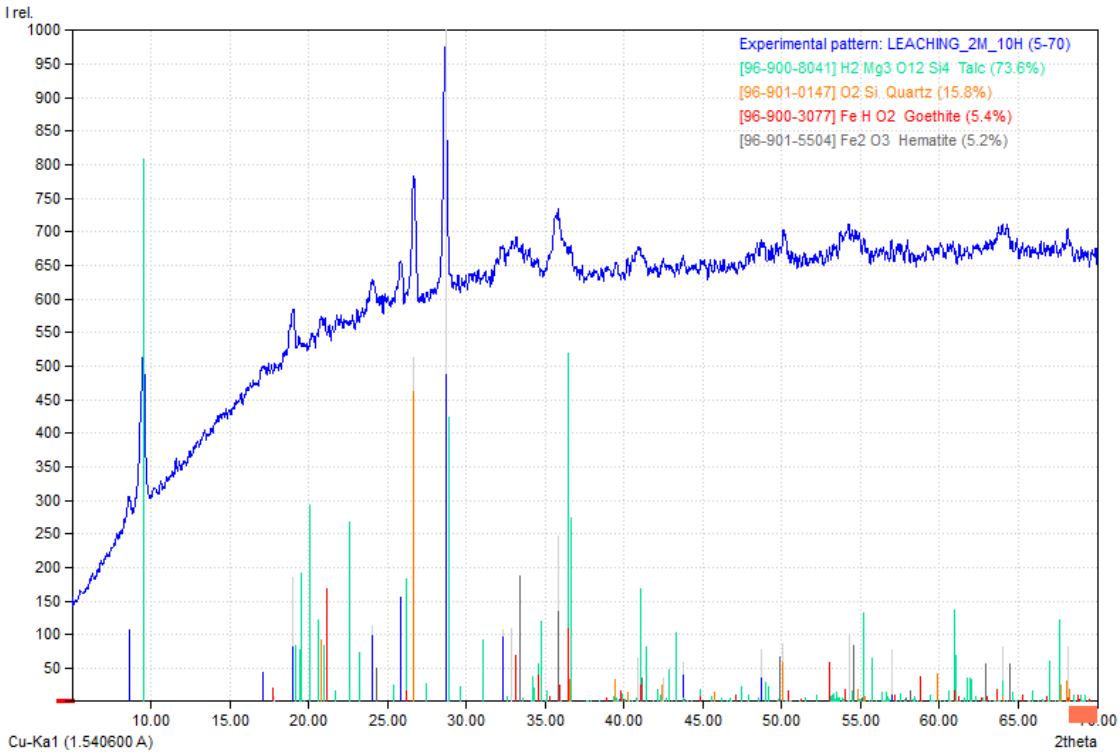
5. Sampel 4M 5H



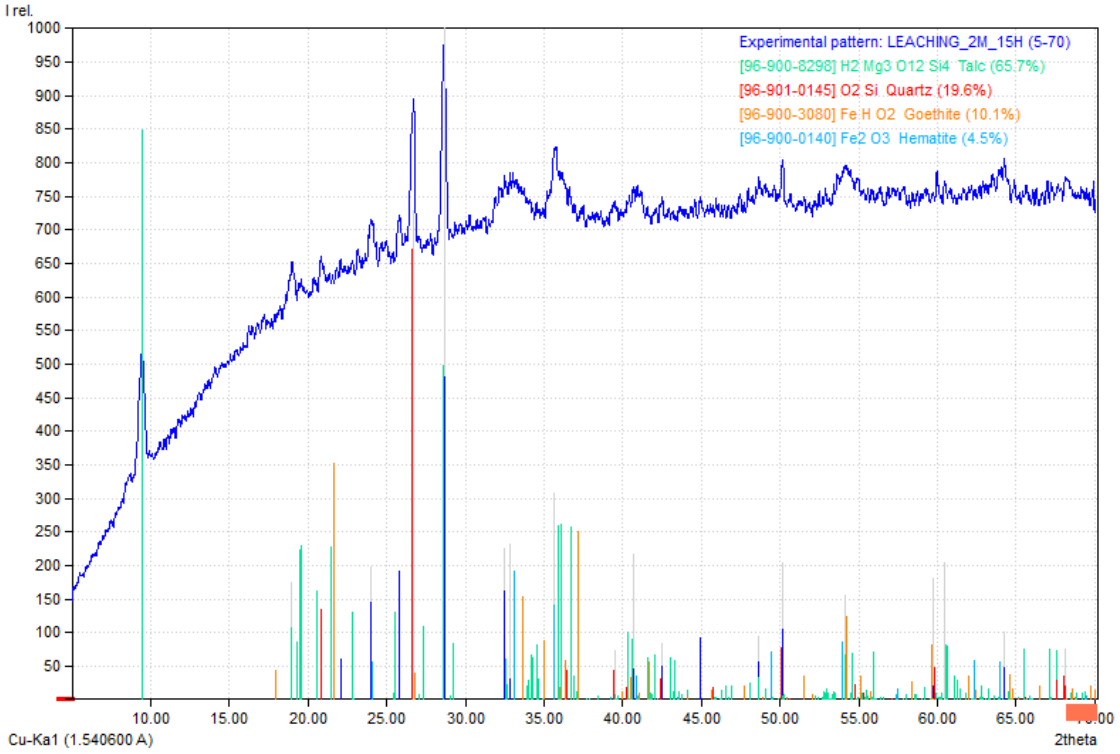
6. Sampel 5M 5H



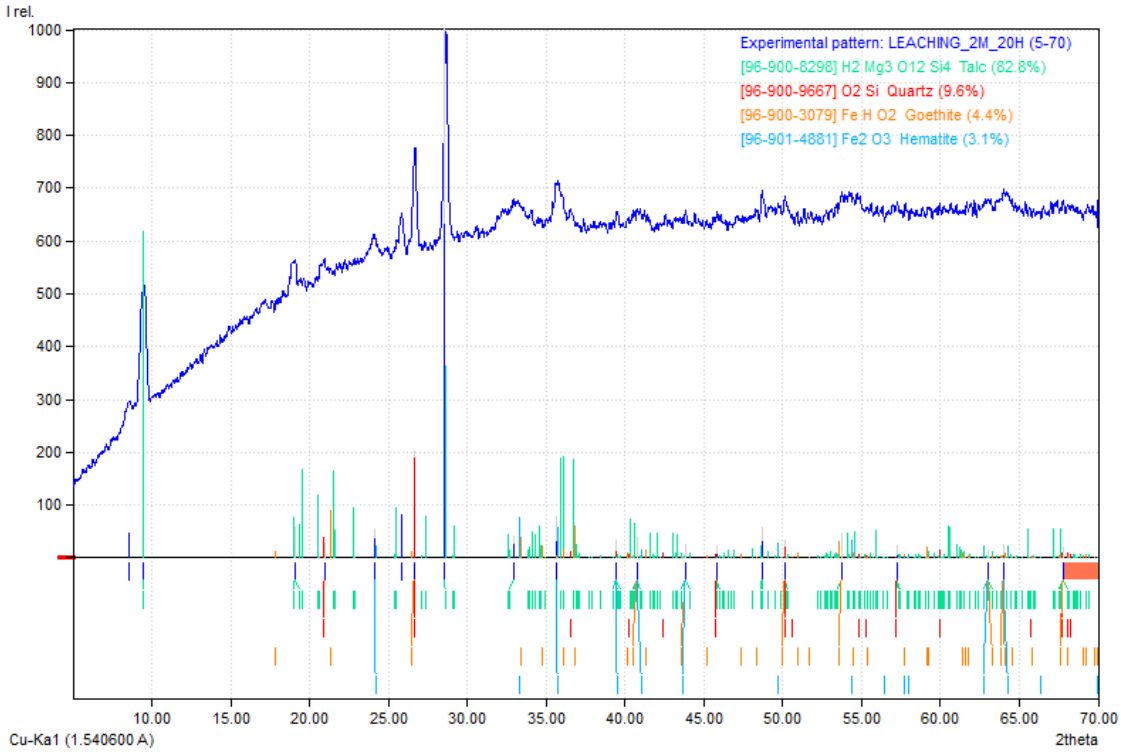
7. Sampel 2M 10H



8. Sampel 2M 15H



9. Sampel 2M 20H



Lampiran B

Hasil AAS

LABORATORIUM KIMIA ANALITIK
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UNIVERSITAS HASANUDDIN
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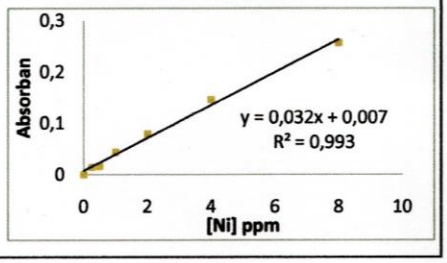
Tlp/fax:0411-586498, Alamat E-mail :L kimiauh@indosat.net.id

No. : 11/LKA/HA-AAS/III/2020
Nama : Muhammad Agung Riyadi
NIM : D62115011
Jurusan / Fakultas : Teknik Pertambangan / Fakultas Teknik UH
Jumlah sampel : 9
Analisa : Nikel (Ni)
Tgl surat masuk : 03-Mar-20 Tanggal Analisa : 04-Mar-20
Tgl terima sampel : 03-Mar-20 Tanggal selesai : 09-Mar-20

Optimasi Analisa Nikel (Ni)			
Type Alat: AAS Buck Scientific 205			
Version 3.94C			
HCL Ni Buck Scientific			
P. gel.	: 232,0 nm		
No Bkgnd Compensation			
Intgr Time	: 3,0 S	Bkg Gain	: 1
Data Times	: 56 mS	Energy	: 3,052
Ave HCL	: 7 mA	DC Suppr	: on
Peak HCL	: 28 mA	Slit	: 0,2 nm
Min HCL Curr	: 0,0 mA	Meth.	: Air/Acet

[Ni] ppm	Absorban
0	0
0,25	0,014237
0,5	0,015924
1	0,04341
2	0,078686
4	0,146505
8	0,256731

Kurva Kalibrasi Nikel



Kode Sampel	Absorban	[Ni] (mg/L)	fp (kali)	[Ni] x fp (mg/L)	B.sampel (G)	Vol. Sampel (mL)	Kadar Ni (mg/kg=ppm)	Kadar Ni (%)
Sampel Awal	0,0190	0,423	100	42,26	1,0079	100	4193,25	0,419
	0,0140							
	0,0150							
Rata-Rata =	**0,0160**							
Sampel Setelah Kalsinasi	0,0270	0,619	100	61,88	1,0058	100	6152,31	0,615
	0,0160							
	0,0190							
Rata-Rata =	**0,0206**							

Kode Sampel	Absorban	[Ni] (mg/L)	fp (kali)	Konst Ni (mg/L)
2M, 5H	0,0280	0,988	100	98,750
	0,0260			
	0,0330			
Rata-Rata =	**0,0290**			
3M, 5H	0,0260	0,706	100	70,625
	0,0150			
	0,0190			
Rata-Rata =	**0,0200**			
4M, 5H	0,0230	0,810	100	81,042
	0,0240			
	0,0230			
Rata-Rata =	**0,0233**			
5M, 5H	0,0150	0,758	100	75,833
	0,0310			
	0,0190			
Rata-Rata =	**0,0217**			

Kode Sampel	Absorban	[Ni] (mg/L)	fp (kali)	Konst Ni (mg/L)
2M,10H	0,0270	0,863	100	86,250
	0,0290			
	0,0310			
Rata-Rata =	**0,0250**			
2M,20H	0,0230	0,738	100	73,750
	0,0210			
	0,0190			
Rata-Rata =	**0,0210**			
5M,15H	0,0200	0,758	100	75,833
	0,0210			
	0,0240			
Rata-Rata =	**0,0217**			

Mengetahui,
Kepala,

Dr. Hj. Nursiah La Nafie, M.Sc
NIP. 19580523 198710 2 001

Makassar, 16 Maret 2020
PLP,

Fibiyanthy, S.Si
NIP. 19810202 200604 2 001

LABORATORIUM KIMIA ANALITIK
DEPARTEMEN KIMIA
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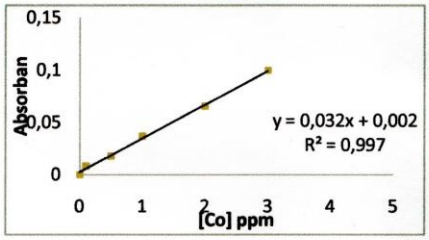
Tlp/fax:0411-586498, Alamat E-mail :L kimiauh@indosat.net.id

No. : 11/LKA/HA-AAS/III/2020
Nama : Muhammad Agung Riyadi
NIM : D62115306
Jurusan / Fakultas : Teknik Pertambangan / Fakultas Teknik UH
Jumlah sampel : 9
Analisa : Kobal (co)
Tgl surat masuk : 03-Mar-20 Tanggal Analisa : 04-Mar-20
Tgl terima sampel : 03-Mar-20 Tanggal selesai : 09-Mar-20

Optimasi Analisa Kobal (Co)			
Type Alat: AAS Buck Scientific 205			
Version 3.94C			
HCL Co Jarrel Ash			
P. gel.	: 240,7 nm		
No Bkgnd Compensation			
Intgr Time	: 3,0 S	Bkg Gain	: 1
Data Times	: 56 mS	Energy	: 2,969
Ave HCL	: 7 mA	DC Suppr	: on
Peak HCL	: 50 mA	Slit	: 0,2 nm
Min HCL Curr	: 0,0 mA	Meth.	: Air/Acet

[Co] ppm	Absorban
0	0
0,1	0,008395
0,5	0,017638
1	0,036659
2	0,065434
3	0,099789

Kurva Kalibrasi Kobal



Kode Sampel	Absorban	[Co] (mg/L)	fp (kali)	[Co] x fp (mg/L)	B.sampel (G)	Vol. Sampel (mL)	Kadar Co (mg/kg=ppm)	Kadar Co (%)
Sampel Awal	0,2130	6,672	1	6,67	1,0079	100	661,95	0,066
	0,2200							
	0,2210							
Rata-Rata =	**0,2180**							
Sampel Setelah Kalsinasi	0,1890	6,728	1	6,73	1,0058	100	668,92	0,067
	0,2410							
	0,2520							
Rata-Rata =	**0,2273**							

Kode Sampel	Absorban	[Co] (mg/L)	Konst Co (mg/L)
2M, 5H	0,1210	3,677	3,677
	0,1100		
	0,1280		
Rata-Rata =	**0,1197**		
3M, 5H	0,1010	3,021	3,021
	0,0990		
	0,0960		
Rata-Rata =	**0,0987**		
4M, 5H	0,1070	3,344	3,344
	0,1070		
	0,1130		
Rata-Rata =	**0,1090**		
5M, 5H	0,1100	3,260	3,260
	0,1000		
	0,1090		
Rata-Rata =	**0,1063**		

Kode Sampel	Absorban	[Co] (mg/L)	Konst Co (mg/L)
2M,10H	0,1270	0,719	0,719
	0,1600		
	0,1470		
Rata-Rata =	**0,0250**		
2M,20H	0,1520	5,104	5,104
	0,1710		
	0,1730		
Rata-Rata =	**0,1653**		
5M,15H	0,1570	4,802	4,802
	0,1580		
	0,1520		
Rata-Rata =	**0,1557**		

Mengetahui,
Kepala,

Dr. Hj. Nursiah La Nafie, M.Sc
NIP. 19580523 198710 2 001

Makassar, 16 Maret 2020
PLP,

Fibryanthy, S.Si
NIP. 19810202 200604 2 001

Lampiran C

Perhitungan Kadar Ni dan Co

Kadar Nikel dan Kobalt dihitung dengan menggunakan rumus:

$$\text{Kadar (\%)} = = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

1. Nikel

   a. Kadar Awal

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}423\ \text{(mg/L)} \times 100 \times 0{,}1\ \text{(L)}}{1.007{,}9\ \text{(mg)}} \times 100\%$$

$$\text{Kadar (\%)} = 0{,}419\%$$

   b. Pelindian 2 Molar 5 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}988\ \text{(mg/L)} \times 100 \times 0{,}1\ \text{(L)}}{10.000\ \text{(mg)}} \times 100\%$$

$$\text{Kadar (\%)} = 0{,}0988\%$$

   c. Pelindian 3 Molar 5 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}706\ \text{(mg/L)} \times 100 \times 0{,}1\ \text{(L)}}{10.000\ \text{(mg)}} \times 100\%$$

$$\text{Kadar (\%)} = 0{,}0706\%$$

   d. Pelindian 4 Molar 5 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}810\ (\text{mg/L}) \times 100 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,0810%

e. Pelindian 5 Molar 5 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}758\ (\text{mg/L}) \times 100 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,0758%

f. Pelindian 2 Molar 10 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}863\ (\text{mg/L}) \times 100 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,0863%

g. Pelindian 2 Molar 15 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}758\ (\text{mg/L}) \times 100 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,0758%

h. Pelindian 2 Molar 20 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}738\ (\text{mg/L}) \times 100 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,0738%

2. Kobalt

a. Kadar Awal

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{6{,}672\ (\text{mg/L}) \times 1 \times 0{,}1\ (\text{L})}{1{,}0079\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,066%

b. Pelindian 2 Molar 5 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{3{,}677\ (\text{mg/L}) \times 1 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,003677%

c. Pelindian 3 Molar 5 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{3{,}021\ (\text{mg/L}) \times 1 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,003021%

d. Pelindian 4 Molar 5 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{3{,}344\ (\text{mg/L}) \times 1 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,003344%

e. Pelindian 5 Molar 5 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{3{,}260\ (\text{mg/L}) \times 1 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,003260%

f. Pelindian 2 Molar 10 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{0{,}719\ (\text{mg/L}) \times 1 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,000719%

g. Pelindian 2 Molar 15 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{4{,}802\ (\text{mg/L}) \times 1 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,004802%

h. Pelindian 2 Molar 20 jam

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L)} \times \text{fp} \times \text{volume (L)}}{\text{massa sampel (mg)}} \times 100\%$$

$$\text{Kadar (\%)} = \frac{5{,}104\ (\text{mg/L}) \times 1 \times 0{,}1\ (\text{L})}{10.000\ (\text{mg})} \times 100\%$$

Kadar (%) = 0,005104%

Lampiran D

Recovery Nikel dan Kobalt

Recovery Nikel dan Kobalt dapat dihitung dengan rumus:

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

1. Nikel

   a. Pelindian 2 Molar 5 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}0988\%}{0{,}419\%} \times 100\%$$

$$Recovery = 23{,}58\%$$

   b. Pelindian 3 Molar 5 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}0706\%}{0{,}419\%} \times 100\%$$

$$Recovery = 16{,}85\%$$

   c. Pelindian 4 Molar 5 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}0810\%}{0{,}419\%} \times 100\%$$

$$Recovery = 19{,}33\%$$

   d. Pelindian 5 Molar 5 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}0758\%}{0{,}419\%} \times 100\%$$

$$Recovery = 18{,}09\%$$

e. Pelindian 2 Molar 10 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}0863\%}{0{,}419\%} \times 100\%$$

$$Recovery = 20.60\%$$

f. Pelindian 2 Molar 15 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}0758\%}{0{,}419\%} \times 100\%$$

$$Recovery = 18{,}09\%$$

g. Pelindian 2 Molar 20 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}0738\%}{0{,}419\%} \times 100\%$$

$$Recovery = 17{,}61\%$$

2. Cobalt

a. Pelindian 2 Molar 5 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}003677\%}{0{,}066\%} \times 100\%$$

$$Recovery = 5{,}57\%$$

b. Pelindian 3 Molar 5 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}003021\%}{0{,}066\%} \times 100\%$$

$$Recovery = 4{,}58\%$$

c. Pelindian 4 Molar 5 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}003344\%}{0{,}066\%} \times 100\%$$

$$Recovery = 5{,}07\%$$

d. Pelindian 5 Molar 5 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}003260\%}{0{,}066\%} \times 100\%$$

$$Recovery = 4{,}93\%$$

e. Pelindian 2 Molar 10 jam

$$Recovery = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$Recovery = \frac{0{,}000719\%}{0{,}066\%} \times 100\%$$

Recovery = 1,08%

f. Pelindian 2 Molar 15 jam

$$\textit{Recovery} = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$\textit{Recovery} = \frac{0{,}004802\%}{0{,}066\%} \times 100\%$$

Recovery = 7,28%

g. Pelindian 2 Molar 20 jam

$$\textit{Recovery} = \frac{\text{Kadar hasil pelindian}}{\text{Kadar awal}} \times 100\%$$

$$\textit{Recovery} = \frac{0{,}005104\%}{0{,}066\%} \times 100\%$$

Recovery = 7,73%

Lampiran B 10

Kartu Konsultasi Tugas Akhir

JUDUL:

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
7 Maret 2020	Koreksi BAB I, II, dan III.	
7 Maret 2020.	Koreksi Diagram Alir.	
19 April 2020	Koreksi BAB IV.	
3 oktober 2020	koreksi lampiran.	
3oktober 2020	Koreksi Gambar.	
10 Oktober	Koreksi Lampiran.	
16 oktober.	Koreksi Daftar Pustaka.	
25 oktober.	koreksi Daftar Isi	
6 April 2021	Koreksi poster.	
6 April 2021.	Koreksi Artikel.	