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LAMPIRAN

LAMPIRAN A

MSDS ASAM NITRAT

Material Safety Data Sheet (MSDS) – Asam Nitrat (HNO_3)

Nomor Produk	C2169
Nama Produk	Nitric Acid Reagent A.C.S.
Nama Dagang	
Formula:	HNO3
RTECS:	QU5900000
C.A.S	CAS# 7697-37-2

Kesehatan	**3**
Kemungkinan terbakar	0
Reaktivitas	0

Bagian 2. Komposisi

Sara 313	Komponen	Nomor CAS	%	Dim	Batas penggunaan:
☐	Water, Deionized ASTM Type II	CAS# 7732-18-5	Balance	V/V	Tidak tersedia
☑	Nitric Acid	CAS# 7697-37-2	~70%	V/V	OSHA TWA 2 ppm (5mg/mf), STEL 4 ppm (10mg/mf)

Bagian 3. Pengenalan Bahaya

Panas, goncangan, gesekan, atau kontak dgn bahan lainnya dapat menyebabkan kebakaran atau ledakan. Berbahaya jika tertelan.
Hindari menghirup uap atau debu. Gunakan ventilasi yg memadai.
Hindari kontak dengan mata, kulit atau pakaian.
Cuci dengan bersih setelah menangani. Harus tetap tertutup.

Bagian 4. Tata Cara Pertolongan Pertama

Pertolongan pertama : panggil dokter

Kulit : bila terjadi kontak bilas kulit dgn air sekitar 15 menit dan singkirkan pakaian dan sepatu yang tercemar. Bersihkan secara menyeluruh pakaian dan sepatu sebelum digunakan kembali

MATA : cuci mata dengan air yang banyak sekitar 15 menit, buka tutup mata beberapa kali. Cari pertolongan medis.

Terhirup : Cari udara segar. Jika tidak bernapas berikan pernapasan buatan. Bila sulit bernapas berikan oksigen.

Tertelan: Berikan beberapa gelas susu atau air. Muntah dapat terjadi secara spontan, tetapi JANGAN DIBUAT MUNTAH !
Jangan pernah memberikan apapun melalui mulut kepada orang yang tidak sadar.

Bagian 5. Tata Cara Penanggulangan Kebakaran

Tipe Pemadam Kebakaran:	**Semua pemadam dapat digunakan untuk memadamkan api.**
Bahaya ledakan:	**Reaksi dengan logam menyebabkan gas hidrogen yang mudah terbakar.**
Prosedur pemadaman:	**Pakailah alat bantu pernapasan yang cukup untuk diri sendiri dan pakaian pelindung untuk mencegah kontak dengan kulit dan pakaian.**

Bagian 6. Tata Cara Penanggulangan Tumpahan

Serap tumpahan dengan bahan yang lunak, kemudian letakkan di sebuah wadah limbah kimia. Netralisir dengan larutan encer natrium karbonat atau basa lemah.

Bagian 7. Penanganan dan Penyimpanan

Simpan di tempat yang sejuk, kering, berventilasi baik dan jauhkan dari bahan-bahan yang sifatnya tidak sesuai. Cuci bersih dengan baik setelah menangani.

Bagian 8. Pengendalian dan Perlindungan Diri

Pelindung NIOSH / MSHA yang disetujui

Ventilasi: Mekanik : ☑ Proteksi tangan: Sarung tangan NIOSH
Exhaust Lokal: ☐ Proteksi mata: Kacamata dan pelindung muka

Perlindungan lain Peralatan: Kenakan pakaian yang tepat untuk mencegah paparan pada kulit

Bagian 9. Data Fisik dan Kimia

Titik Cair	-41°C	Gravitasi spesifik	1.408
Titik Didih	121°C	Persentase penguapan per Volume	>99
Tekanan Uap	6 kPa @ 20°C	Tingkat penguapan	Informasi tidak tersedia
Kepadatan Uap	2.5	Penguapan standard	-
Kelarutan dalam air:	Larut	Titik menyala	tidak dipakai
Tampilan dan bau:	Cairan bening dan sedikit beruap	Lower Flamm. Limit in Air:	tidak dipakai
Kemungkinan terbakar:	Informasi tidak tersedia	Upper Flamm. Limit in Air:	tidak dipakai

Bagian 10. Stabilitas dan Reaktivitas

Stabilitas: stabil — Keadaan yang harus dihindari: Bahan dapat bereaksi hebat dengan reduktor kuat, logam, alkali, basa kuat.

Bahan-bahan yang harus dihindari:
Basa terkonsentrasi, bahan air yang reaktif dan material oksidasi

Produk dekomposisi berbahaya:
Campuran Nitrogen, uap/asap asam.

Polimerisasi berbahaya: Tidak akan terjadi

Kondisi yang harus dihindari: tidak ada yang diketahui

Bagian 11. Informasi Lain

Kondisi yang buruk / target organ:
- **Korosif ! Pengoksida ! Racun !**
- **Terpapar mungkin berakibat fatal.**

Akut: parah luka bakar pada kulit, mata, saluran pernapasan, saluran pencernaan; luka bakar dalam jaringan dan borok; kebutaan.

Kronis: Dermatitis; kerusakan mata atau kebutaan.

Target organ: mukosa membran, sistem pernapasan, mata, kulit; sistemik racun.

DOT Classification: Nitric acid, 8, UN2031, PG II

Peraturan DOT dapat berubah dari waktu ke waktu.
Silahkan konsultasikan dengan versi terbaru dari kondisi yg ada.

Revisi No:0.1	Tanggal data masuk: 9/1/2006	Disetujui oleh: WPF

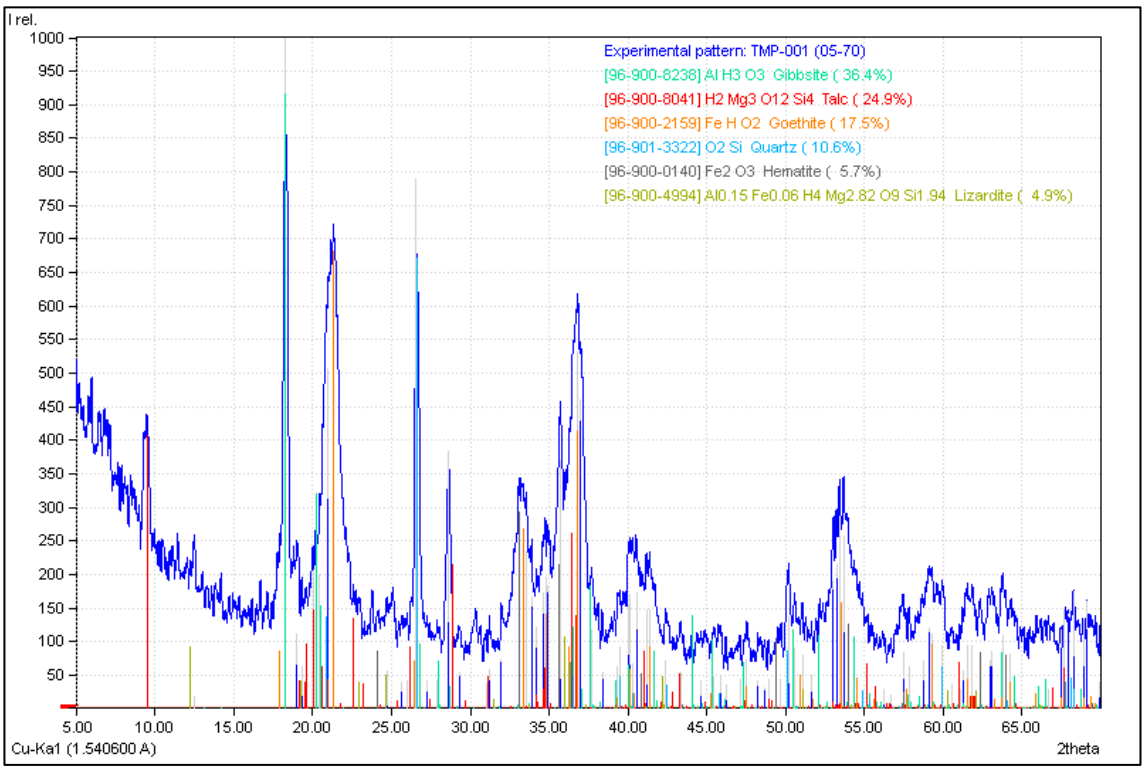
Sumber: Science Stuff, Inc.
http://www.sciencestuff.com/msds/C2169.html

Okt 2009 - From: www.itokindo.org (free pdf - **Manajemen Modern** dan **Kesehatan Masyarakat**)

LAMPIRAN B

HASIL ANALISIS XRD

1. Sampel awal TMP-001

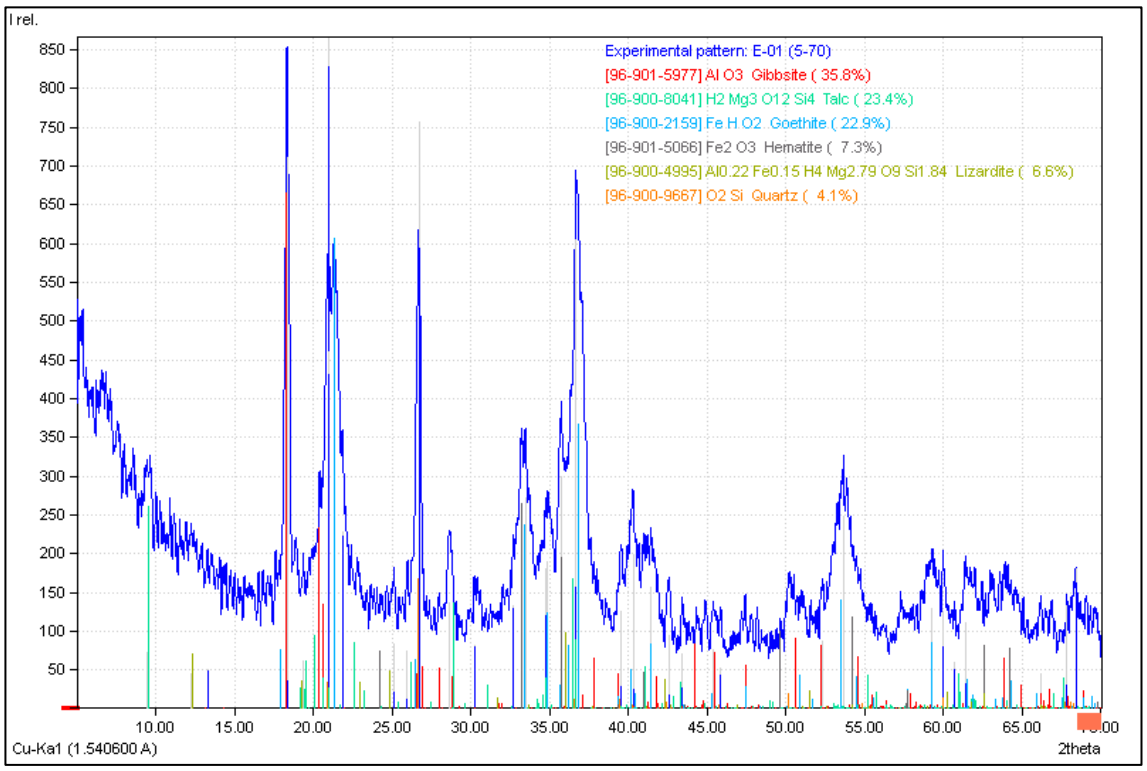


Index	*Amount (%)*	*Name*	*Formula sum*
A	36,4	*Gibbsite*	Al H3 O3
B	24,9	*Talc*	H2 Mg3 O12 Si4
C	17,5	*Goethite*	Fe H O2
D	10,6	*Quartz*	O2 Si
E	5,7	*Hematite*	Fe2 O3
F	4,9	*Lizardite*	Al0.15 Fe0.06 H4 Mg2.82 O9 Si1.94

No.	**2theta [°]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,51	9,2925	227,69	0,3644	B
2	12,49	7,0813	17,20	0,2000	F
3	18,25	4,8572	1000,00	0,3617	A
4	19,01	4,6647	110,04	0,1807	B
5	19,33	4,5882	62,72	0,4000	F
6	19,59	4,5279	64,41	0,4000	B
7	20,01	4,4338	205,90	0,4000	B
8	20,21	4,3904	152,49	0,6000	A
9	20,45	4,3394	199,45	0,6800	A,B
10	20,93	4,2409	507,34	0,7200	B,D
11	21,31	4,1662	602,77	0,8400	C
12	22,57	3,9363	69,00	0,4800	B
13	24,13	3,6853	39,05	0,3345	B,E
14	24,69	3,6029	55,66	0,2000	F
15	25,67	3,4676	38,60	0,3856	B

No.	2theta [°]	d [Å]	I/I0	FWHM	*Matched*
16	25,97	3,4282	42,19	0,2000	B
17	26,57	3,3521	788,98	0,3077	A,C,D
18	27,27	3,2676	41,48	0,3600	B
19	27,87	3,1986	41,17	0,3680	A
20	28,63	3,1154	383,65	0,2974	A,B
21	29,29	3,0467	53,24	0,1915	A
22	31,01	2,8815	37,01	0,0732	B
23	31,21	2,8635	58,51	0,2309	F
24	31,97	2,7972	73,63	0,1200	A
25	33,11	2,7034	254,79	0,6800	A,E
26	33,51	2,6721	232,93	0,9200	B,C
27	33,91	2,6414	165,84	0,3600	A,F
28	34,21	2,6190	121,48	0,2400	B
29	34,63	2,5882	171,62	1,0800	B
30	34,77	2,5781	195,72	0,8000	B,C
31	34,93	2,5666	183,01	1,1200	B
32	35,73	2,5110	369,92	0,6000	C,E,F
33	36,79	2,4410	531,57	0,8800	A,B,D
34	36,83	2,4384	530,58	0,8000	C
35	36,93	2,4321	459,82	0,7200	A
36	37,67	2,3860	117,23	0,4800	A
37	38,39	2,3429	54,56	0,1600	A
38	39,31	2,2901	63,09	0,1200	A,B,C,E,F
39	39,49	2,2801	91,12	0,4400	B,D
40	40,03	2,2506	154,50	0,2400	A,B
41	40,17	2,2431	170,86	0,5200	A,C
42	40,27	2,2377	66,73	0,2400	C,D
43	40,55	2,2229	173,11	1,2800	B,E
44	41,19	2,1898	147,88	1,2800	A,B,F
45	41,39	2,1797	147,57	0,8400	A,B,C
46	42,41	2,1296	71,13	0,2000	B,D,F
47	43,35	2,0856	53,18	0,2400	A,B,C,E
48	44,09	2,0523	70,83	0,0938	A
49	44,63	2,0287	40,45	0,2000	A,B
50	45,45	1,9940	48,08	0,3200	A,B,C
51	45,93	1,9743	48,07	0,5650	D
52	46,21	1,9630	34,84	0,1200	A,B
53	47,11	1,9275	43,64	0,2400	A
54	47,53	1,9115	73,25	0,3089	B,C

2. Sampel E-01

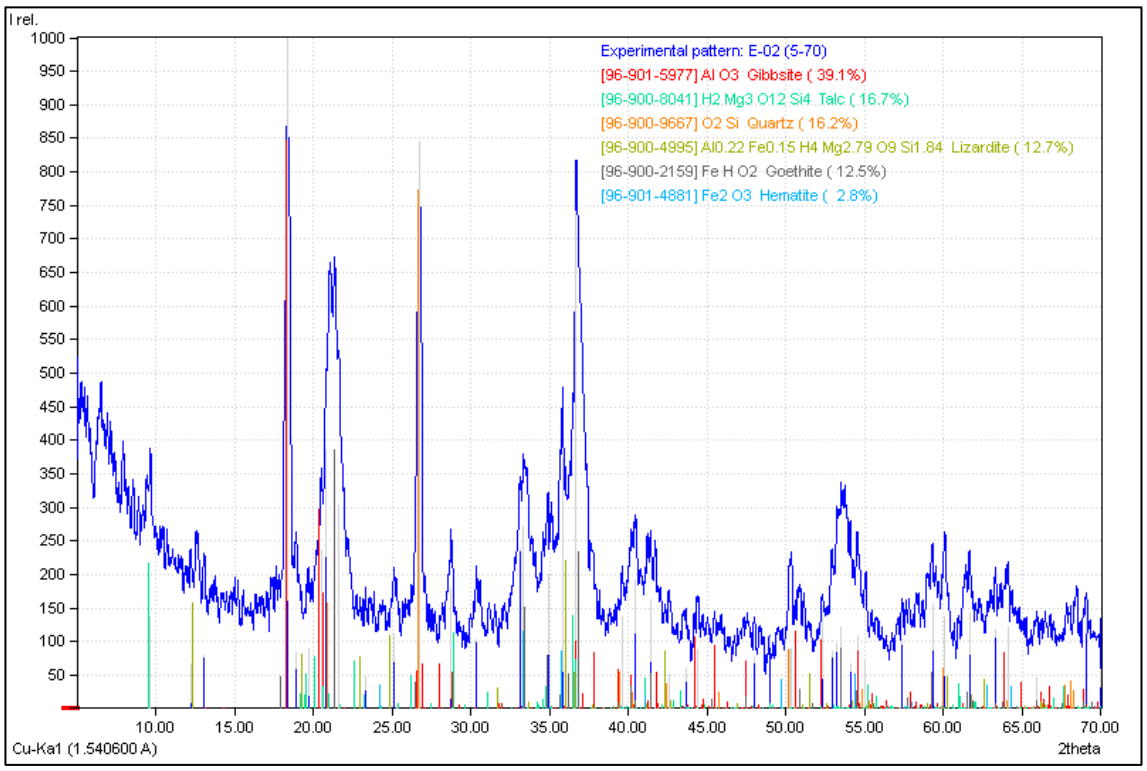


Index	*Amount (%)*	*Name*	*Formula sum*
A	35,8	*Gibbsite*	Al O3
B	23,4	*Talc*	H2 Mg3 O12 Si4
C	22,9	*Goethite*	Fe H O2
D	7,3	*Hematite*	Fe2 O3
E	6,6	*Lizardite*	Al0.22 Fe0.15 H4 Mg2.79 O9 Si1.84
F	4,1	*Quartz*	O2 Si

No.	**2theta [°]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,50	9,3022	72,11	0,3271	B
2	12,22	7,2371	45,11	0,2400	E
3	13,32	6,6418	50,93	0,1069	A
4	18,34	4,8336	711,21	0,2400	A
5	19,36	4,5812	62,17	0,1200	B,E
6	20,38	4,3541	170,66	0,2400	A,B
7	20,94	4,2389	865,44	0,4000	F
8	20,98	4,2309	460,42	0,5600	B
9	21,30	4,1681	470,08	0,8400	C
10	21,84	4,0662	228,60	0,4400	B
11	25,12	3,5422	83,69	0,2409	B,E
12	25,94	3,4321	74,79	0,3600	B
13	26,68	3,3385	6,20	0,3381	A,C,F
14	26,72	3,3336	757,18	0,3187	A

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
15	28,62	3,1165	136,64	0,32	A,B
16	30,24	2,9531	81,89	0,20	A
17	32,70	2,7364	132,57	0,44	B
18	33,26	2,6916	262,24	0,80	A,D
19	33,46	2,6759	271,20	0,76	B,C,E
20	34,76	2,5788	180,33	0,84	B
21	34,86	2,5716	189,61	0,88	B,C
22	35,74	2,5103	299,85	0,60	A,C,D,E
23	36,68	2,4481	605,02	0,76	A,B,C,F
24	39,54	2,2773	124,69	0,52	A,B,C,D,F
25	40,30	2,2361	199,04	0,88	A,B,C,F
26	41,44	2,1772	156,38	0,68	A,B,C,E
27	42,58	2,1215	94,88	0,32	B,E,F
28	43,42	2,0824	70,44	0,20	A,B,C,D
29	45,42	1,9952	75,46	0,372	A,B,C
30	45,86	1,9771	53,02	0,16	A,B,F
31	52,34	1,7466	87,72	0,44	A,B,E
32	53,64	1,7073	248,73	1,08	B,C
33	59,28	1,5576	129,30	1,00	A,B,C,E
34	59,98	1,5411	125,91	0,24	A,B,E,F
35	60,68	1,5250	59,71	0,12	A,B
36	61,36	1,5097	111,56	0,28	A,B,C
37	66,20	1,4105	44,99	0,12	A,D,E
38	67,82	1,3807	131,84	0,48	A,B,C,F
39	68,38	1,3708	180,64	1,32	B,C,E,F

3. Sampel E-02

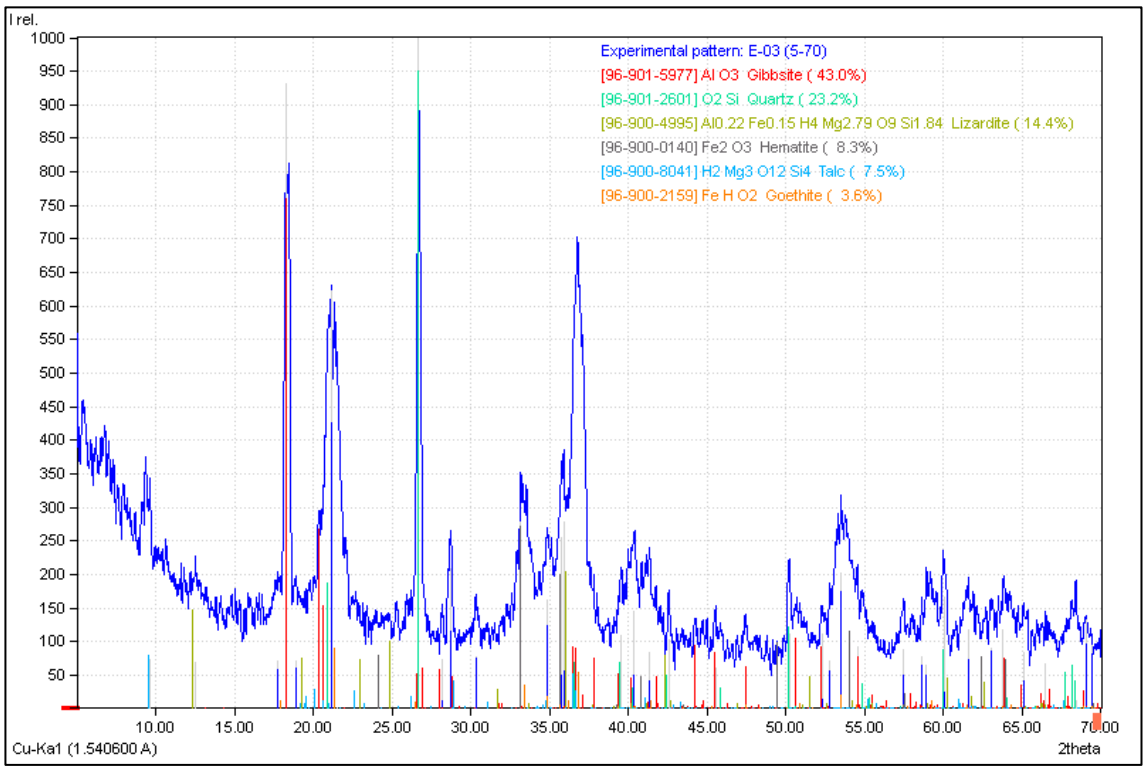


Index	*Amount (%)*	*Name*	*Formula sum*
A	39,1	*Gibbsite*	Al O3
B	16,7	*Talc*	H2 Mg3 O12 Si4
C	16,2	*Quartz*	O2 Si
D	12,7	*Lizardite*	Al0.22 Fe0.15 H4 Mg2.79 O9 Si1.84
E	12,5	*Goethite*	Fe H O2
F	2,8	*Hematite*	Fe2 O3

No.	**2theta [°]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,68	9,1296	137,21	0,6061	B
2	12,24	7,2253	67,35	0,1207	D
3	13,10	6,7529	78,51	0,1240	A
4	18,36	4,8284	1000	0,3726	A
5	18,92	4,6867	82,94	0,4000	B
6	19,68	4,5074	90,00	0,2400	B
7	20,52	4,3247	235,54	0,5600	A,B
8	20,82	4,2631	386,28	1,7099	B,C
9	21,64	4,1034	304,23	0,4950	B,E
10	23,30	3,8146	48,04	0,0761	B
11	25,14	3,5395	111,37	0,4373	D
12	25,30	3,5174	4,93	0,1618	B
13	26,78	3,3263	844,37	0,3308	A,C
14	28,76	3,1016	179,08	0,4132	A,B

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
15	30,34	2,9436	101,57	0,5645	A
16	33,12	2,7026	238,46	0,4400	A
17	33,34	2,6853	271,43	0,8000	B,E,F
18	34,92	2,5673	200,01	0,9200	B,E
19	35,82	2,5049	374,13	0,5200	A,D,E,F
20	36,68	2,4481	740,42	0,7987	A,B,C,E
21	39,60	2,2740	135,49	0,6800	A,B,C,E,F
22	40,44	2,2287	190,93	0,4000	A,B,C,E
23	41,42	2,1782	162,33	1,5336	A,B,D,E
24	41,70	2,1642	2,11	0,4455	A
25	42,56	2,1225	52,67	0,2289	B,C,D
26	43,64	2,0724	59,95	0,3964	A,B,E,F
27	44,38	2,0396	88,27	0,1600	A,B
28	47,98	1,8946	76,67	0,1600	A,B
29	48,94	1,8597	107,59	1,9600	A,B
30	50,22	1,8152	88,74	1,9600	B,C,E
31	50,32	1,8118	89,39	0,1732	A,B,C
32	52,32	1,7472	153,5	1,9600	A,B,D
33	52,92	1,7288	86,44	1,9600	A,B
34	53,24	1,7191	96,28	0,8206	B
35	53,50	1,7114	121,70	0,5327	B,E
36	54,08	1,6944	67,28	1,2888	A,B,D
37	54,54	1,6812	108,13	0,6500	A,B,E,F
38	55,02	1,6677	70,99	0,1579	B,C,D
39	57,36	1,6051	103,21	0,7600	A,B,C
40	59,30	1,5571	155,36	1,7490	A,B,E
41	60,08	1,5387	136,10	0,1696	A,B,C,D
42	61,64	1,5035	142,63	0,4400	A,B,D,E
43	63,30	1,4680	116,39	0,2000	A,E
44	64,10	1,4516	121,31	0,1600	A,B,C,E,F
45	65,94	1,4155	45,86	0,4588	A,B,C,D,E
46	69,02	1,3596	162,33	0,0400	A,B,E
47	69,96	1,3436	55,44	0,0400	A,B,E,F

4. Sampel E-03

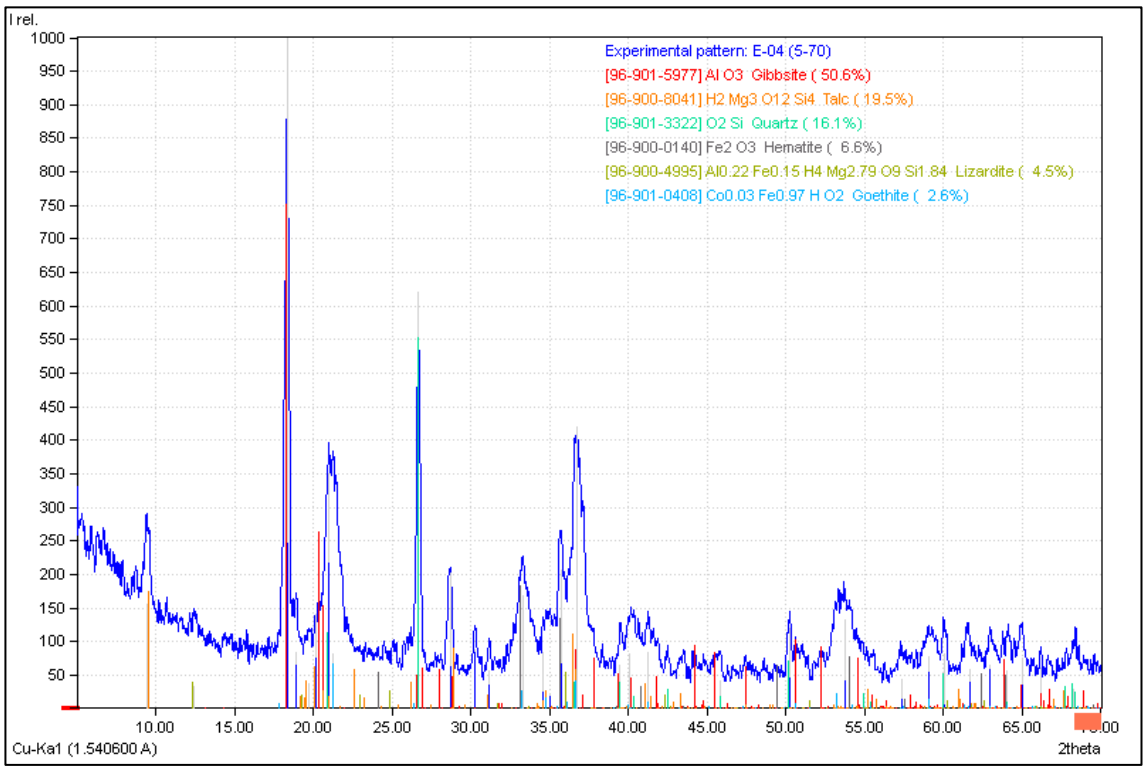


Index	*Amount (%)*	*Name*	*Formula sum*
A	43	*Gibbsite*	Al O3
B	23,2	*Quartz*	O2 Si
C	14,4	*Lizardite*	Al0.22 Fe0.15 H4 Mg2.79 O9 Si1.84
D	8,3	*Hematite*	Fe2 O3
E	7,5	*Talc*	H2 Mg3 O12 Si4
F	3,6	*Goethite*	Fe H O2

No.	**2theta [°]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,66	9,1485	72,62	0,0838	E
2	12,52	7,0644	69,17	0,2400	C
3	17,78	4,9845	71,57	0,6400	F
4	18,32	4,8388	930,27	0,3715	A
5	18,88	4,6965	69,99	0,3200	E
6	20,36	4,3584	160,40	0,2400	A,E
7	21,14	4,1993	622,74	1,0436	B,E
8	21,50	4,1298	1,74	0,4301	E,F
9	26,68	3,3385	1000,00	0,2700	A,B,F
10	28,18	3,1642	72,77	0,1589	A
11	28,74	3,1038	207,57	0,2701	A,E

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
12	30,34	2,9436	77,46	0,2872	A
13	33,16	2,6995	278,61	0,9600	A,D,F
14	34,88	2,5702	162,21	0,7200	E,F
15	35,74	2,5103	255,77	0,4800	D,F
16	35,92	2,4981	277,74	0,9600	A,C,F
17	39,56	2,2762	108,68	0,4400	A,B,E,F
18	40,36	2,2329	143,98	1,8368	A,B,E,F
19	41,34	2,1822	82,79	0,5177	A,C,E,F
20	42,56	2,1225	102,95	0,1482	B,C,E
21	45,56	1,9894	61,14	0,6266	A,B,E
22	47,42	1,9157	55,89	0,2400	A,E,F
23	50,20	1,8159	110,95	1,6000	B,E,F
24	52,30	1,7478	110,95	1,6000	A,E
25	52,78	1,7330	69,87	1,6000	A,C,E
26	53,50	1,7114	202,54	0,7561	E,F
27	54,52	1,6818	92,06	1,1305	A,E,F
28	57,48	1,6020	86,89	0,6400	A,B,D,E,F
29	58,60	1,5740	77,17	1,4105	A,E
30	58,92	1,5662	64,03	0,3324	A,C,E
31	60,02	1,5401	165,13	0,6400	A,B,C,E
32	61,56	1,5052	117,12	0,6800	A,C,E,F
33	62,98	1,4747	89,29	0,2000	E,F
34	63,78	1,4581	117,59	0,4000	A,B,D,E,F
35	65,10	1,4317	83,32	0,6000	A,C,E
36	66,42	1,4064	66,25	1,0207	A,C,E
37	68,38	1,3708	12,12	0,0400	B,C,E,F
38	69,04	1,3593	131,87	0,0400	A,E,F
39	69,40	1,3531	94,10	0,0400	D,E,F

5. Sampel E-04

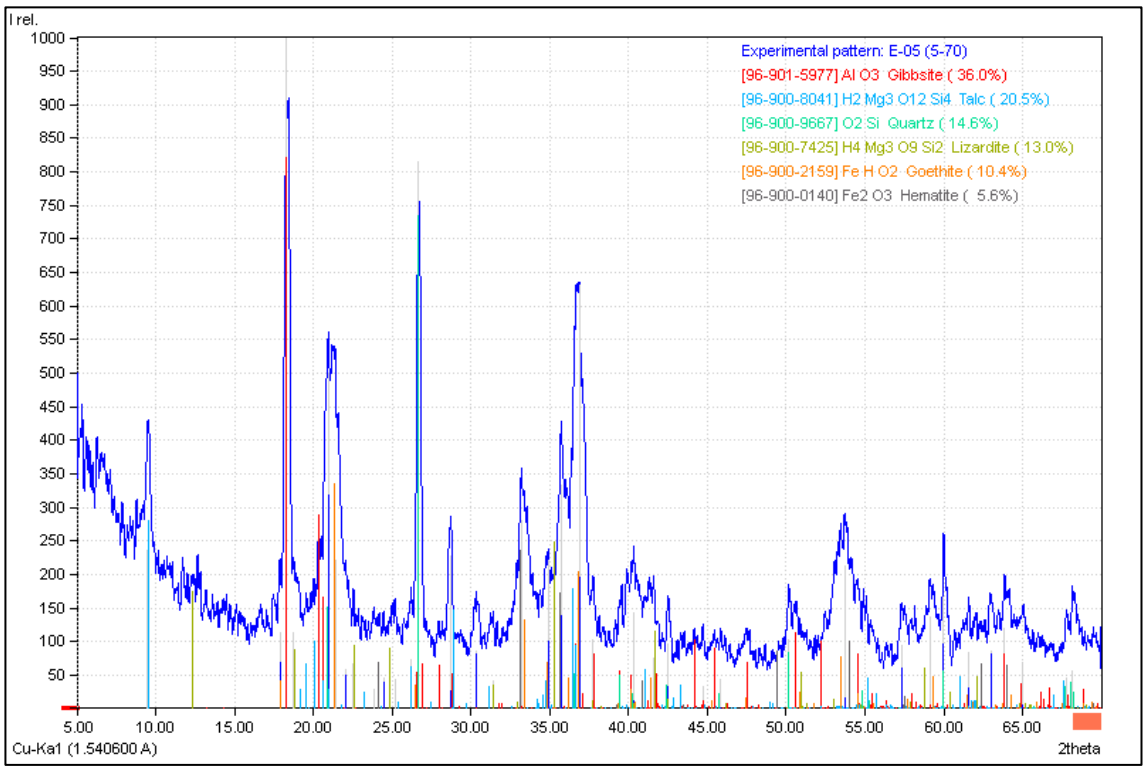


Index	*Amount (%)*	*Name*	*Formula sum*
A	50,6	*Gibbsite*	Al O3
B	19,5	*Talc*	H2 Mg3 O12 Si4
C	16,1	*Quartz*	O2 Si
D	6,6	*Hematite*	Fe2 O3
E	4,5	*Lizardite*	Al0.22 Fe0.15 H4 Mg2.79 O9 Si1.84
F	2,6	*Goethite*	Co0.03 Fe0.97 H O2

No.	**2theta [°]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,42	9,3810	155,68	0,4685	B
2	12,42	7,1210	33,43	0,5071	E
3	18,34	4,8336	1000,00	0,3100	A
4	18,94	4,6818	84,34	0,1225	B
5	19,68	4,5074	36,84	0,4800	B
6	20,14	4,4055	140,35	0,7600	B
7	20,32	4,3668	39,69	0,7600	A,B
8	20,98	4,2309	349,49	0,7086	B,C
9	21,26	4,1758	82,42	0,7756	F
10	26,68	3,3385	620,79	0,2556	A,C
11	28,68	3,1101	202,90	0,3138	A,B
12	30,24	2,9531	87,30	0,3823	A

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
13	33,16	2,6995	278,61	0,9600	A,D,F
14	33,30	2,6884	168,09	0,8800	A,B,D,F
16	35,04	2,5588	22,92	0,6105	B
17	35,70	2,5130	207,17	0,4400	A,D,F
18	36,74	2,4442	419,43	0,9135	A,B,C,F
19	37,08	2,4226	4,96	0,4266	A
20	39,48	2,2807	63,62	0,3200	A,B,C,D
21	40,08	2,2479	81,27	0,6000	A,B,C,F
22	41,26	2,1863	84,05	0,4800	A,B,E,F
23	45,84	1,9779	41,26	0,2000	A,B,C
24	47,46	1,9141	29,93	0,8531	A,B,F
25	50,28	1,8132	118,82	0,3200	B,C
26	52,22	1,7503	44,23	0,3200	A,B
27	53,74	1,7043	132,20	1,2000	A,B,D
28	57,38	1,6046	44,28	0,6000	A,B,C,D,F
29	59,06	1,5629	77,57	0,9600	A,B,E,F
30	60,04	1,5397	80,68	0,4000	A,B,C,E
31	61,64	1,5035	58,10	0,2400	A,B,E,F
32	62,96	1,4751	63,90	0,2800	B,F
33	64,00	1,4536	55,18	0,2400	A,B,C,D,F
34	65,02	1,4333	74,89	0,2400	A,B,E
35	66,16	1,4113	60,10	0,3200	A,B,D,E
36	68,22	1,3736	28,53	0,3200	A,B,C,F

6. Sampel E-05

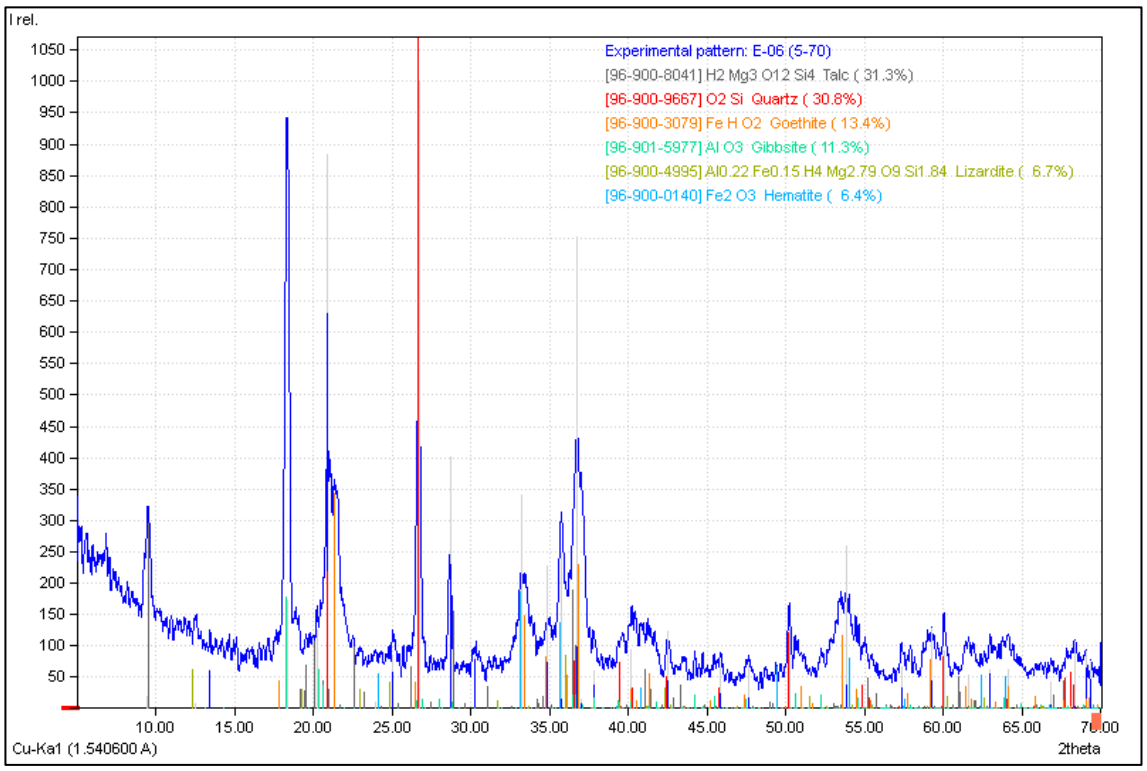


Index	***Amount (%)***	***Name***	***Formula sum***
A	36	*Gibbsite*	Al O3
B	20,5	*Talc*	H2 Mg3 O12 Si4
C	14,6	*Quartz*	O2 Si
D	13	*Lizardite*	H4 Mg3 O9 Si2
E	10,4	*Goethite*	Fe H O2
F	5,6	*Hematite*	Fe2 O3

No.	**2theta [º]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,47	9,3316	234,69	0,4330	B
2	17,89	4,9541	112,82	0,2400	E
3	18,31	4,8414	1000,00	0,3757	A
4	18,75	4,7288	113,43	0,8000	D
5	19,57	4,5325	23,92	0,1726	B
6	20,03	4,4294	82,27	0,2400	B
7	20,33	4,3647	156,81	0,2000	A,B
8	20,95	4,2369	499,05	0,9266	B,C
9	21,39	4,1508	220,57	0,4074	E
10	22,03	4,0316	57,82	0,5317	B
11	22,53	3,9432	66,37	0,1200	B,D
12	23,83	3,7310	28,09	0,9219	F

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
13	24,45	3,6378	45,91	0,0901	B
14	25,17	3,5353	43,17	0,7516	B,D
15	26,19	3,3999	72,43	0,2400	B
16	26,67	3,3398	816,02	0,2631	A,C,E
17	28,69	3,1091	226,75	0,2547	A,B
18	30,37	2,9408	85,75	0,3464	A
19	31,43	2,8440	41,31	0,7237	D
20	33,21	2,6955	280,35	0,9200	A,D,E,F
21	34,93	2,5666	219,96	0,9200	B,E
22	35,75	2,5096	332,23	0,5600	A,E,F
23	36,87	2,4359	630,71	0,7417	A,B,E
24	37,75	2,3811	103,56	0,2800	A,B,D
25	40,31	2,2356	142,22	1,0400	A,B,C,D,E
26	41,63	2,1677	74,83	1,0082	A,B,D,E
27	42,51	2,1249	96,39	0,2167	B,C,D
28	44,71	2,0253	33,17	0,3600	A,B
29	45,85	1,9775	42,80	0,3600	A,B,C,D
30	47,49	1,9130	50,44	0,5807	A,B,E
31	50,15	1,8176	102,18	0,8400	B,C,E
32	53,77	1,7034	212,87	1,1200	A,B,E,F
33	57,31	1,6063	93,05	0,7200	A,B,C,F
34	59,11	1,5617	136,93	0,7200	A,B,D,E
35	59,99	1,5408	165,75	0,3218	A,B,C
36	61,57	1,5050	83,69	0,2000	A,B,E
37	62,97	1,4749	85,45	0,2800	B
38	63,85	1,4567	119,30	0,2000	A,B,C,E,F
39	65,03	1,4331	69,16	0,3200	A,B,D
40	67,75	1,3820	45,39	0,3529	A,B,C,E
41	68,13	1,3752	56,07	0,5347	A,B,C,E

7. Sampel E-06

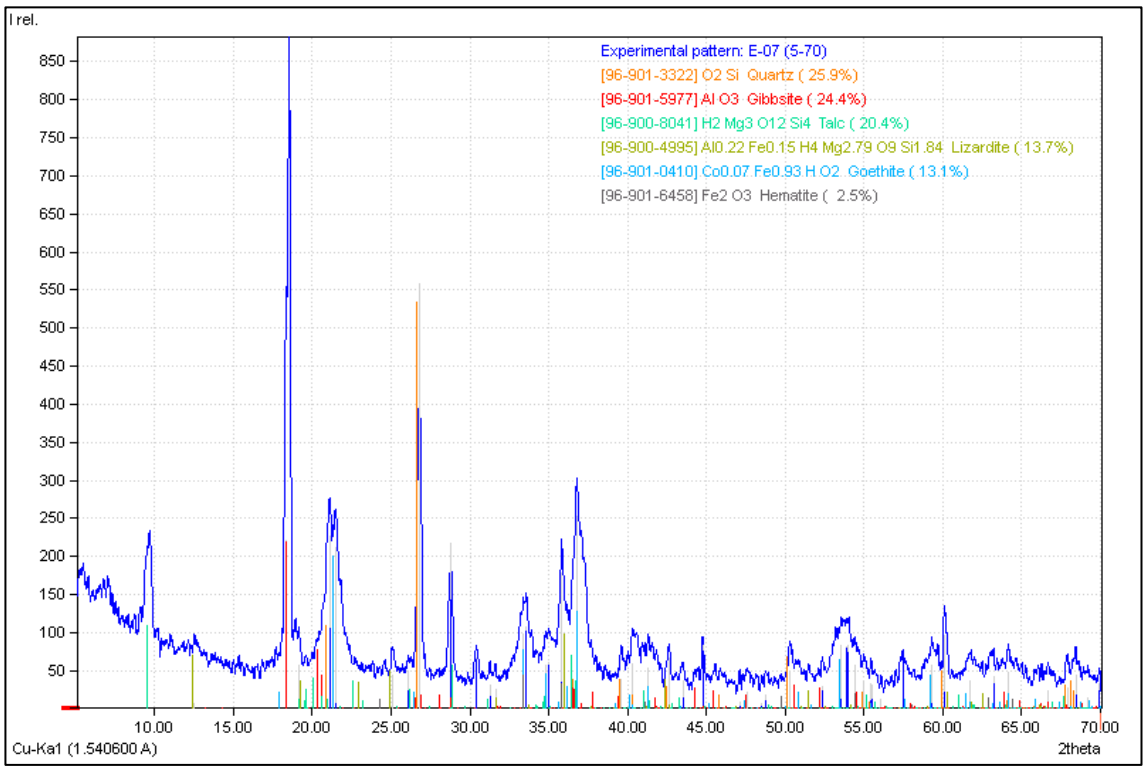


Index	*Amount (%)*	*Name*	*Formula sum*
A	31,3	*Talc*	H2 Mg3 O12 Si4
B	30,8	*Quartz*	O2 Si
C	13,4	*Goethite*	Fe H O2
D	11,3	*Gibbsite*	Al O3
E	6,7	*Lizardite*	Al0.22 Fe0.15 H4 Mg2.79 O9 Si1.84
F	6,4	*Hematite*	Fe2 O3

No.	**2theta [º]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,50	9,3022	19,90	0,4400	A
2	12,48	7,0869	7,52	0,1600	E
3	13,44	6,5828	62,44	0,0769	D
4	18,34	4,8336	173,37	0,3200	D
5	20,24	4,3839	126,25	0,3600	A,D
6	20,92	4,2429	882,99	0,3600	A,B
7	21,36	4,1565	250,71	0,6400	C
8	22,58	3,9346	35,89	0,3600	A
9	23,92	3,7171	9,18	0,2400	F
10	25,04	3,5534	83,00	0,3616	E
11	26,72	3,3336	1000,00	0,2865	B,C,D
12	28,70	3,1080	401,19	0,2278	A,D
13	30,28	2,9493	81,59	0,5743	D

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
14	33,20	2,6963	341,03	0,8400	C,D,F
15	34,80	2,5759	226,25	0,8400	A,C
16	35,76	2,5089	247,53	0,4400	C,D,E,F
17	36,74	2,4442	751,58	0,8443	A,B,C,D
18	37,02	2,4264	13,98	0,3256	D
19	37,78	2,3793	60,15	0,2000	A,D,E
20	40,20	2,2415	93,25	0,5600	A,B,C,D
21	42,52	2,1244	123,61	0,2725	A,B,E
22	45,86	1,9771	65,09	0,9975	A,B,D
23	47,64	1,9073	69,64	0,4662	A,C,D
24	50,22	1,8152	125,8	1,4994	A,B,C
25	53,80	1,7026	258,07	1,7768	A,C,D,F
26	57,34	1,6056	66,26	1,7956	A,B,D,F
27	59,22	1,5590	128,54	1,3958	A,C,D,E
28	60,04	1,5397	91,85	0,2400	A,B,D,E
29	61,62	1,5039	54,03	0,8000	A,C,D,E
30	62,92	1,4759	61,33	0,2000	A,D
31	64,06	1,4524	61,95	0,4800	A,B,C,D,F
32	66,80	1,3993	42,95	0,4059	A,D
33	68,34	1,3715	108,39	0,0400	A,B,C
34	69,02	1,3596	91,57	0,0400	A,C,D
35	69,34	1,3541	76,07	0,0400	A,C,F

8. Sampel E-07

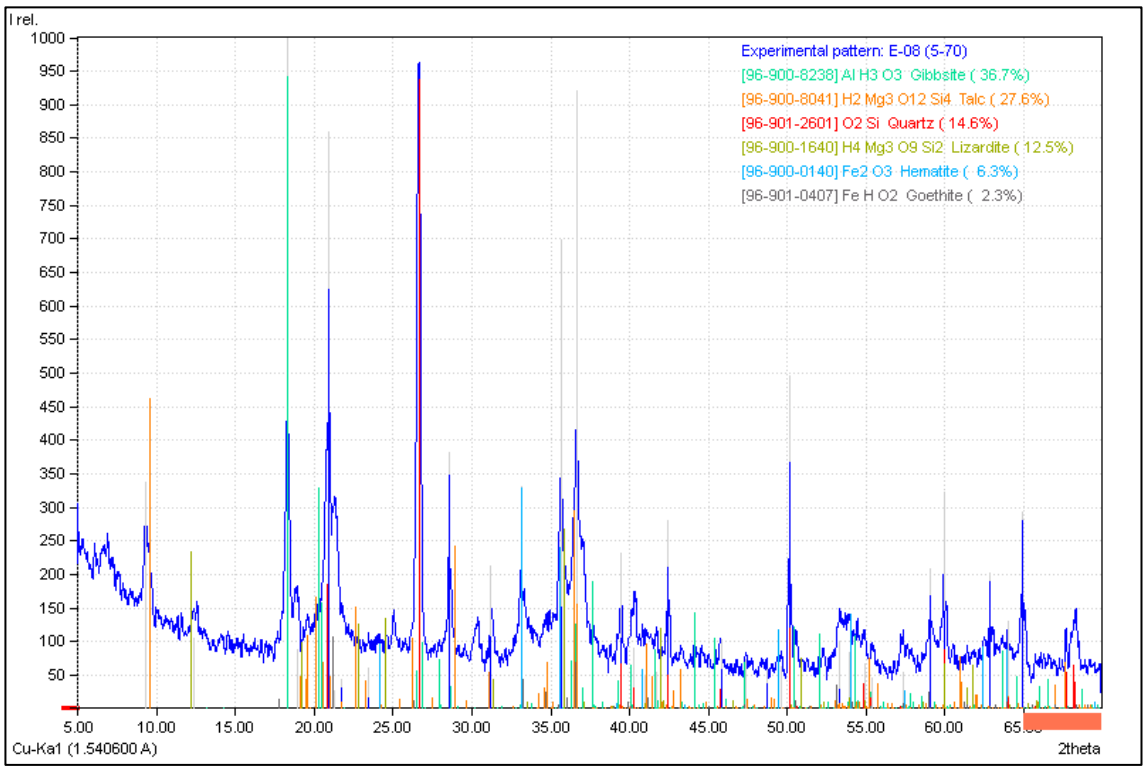


Index	*Amount (%)*	*Name*	*Formula sum*
A	25,9	*Quartz*	O2 Si
B	24,4	*Gibbsite*	Al O3
C	20,4	*Talc*	H2 Mg3 O12 Si4
D	13,7	*Lizardite*	Al0.22 Fe0.15 H4 Mg2.79 O9 Si1.84
E	13,1	*Goethite*	Co0.07 Fe0.93 H O2
F	2,5	*Hematite*	Fe2 O3

No.	**2theta [º]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,54	9,2633	25,04	0,4400	C
2	12,52	7,0644	5,66	0,1600	D
3	18,38	4,8232	220	0,2973	B
4	19,14	4,6333	56,24	0,3200	C,D
5	21,10	4,2071	226,41	0,5600	A,C
6	21,46	4,1374	211,96	0,8000	C,E
7	25,06	3,5506	44,36	0,2679	D
8	26,06	3,4166	49,15	0,3600	C
9	26,80	3,3239	558,59	0,2603	A,B
10	28,82	3,0953	216,35	0,2995	B,C
11	30,40	2,9380	65,63	0,2869	B

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
12	31,28	2,8573	30,30	0,1600	C
13	31,62	2,8273	25,57	0,1224	B,D
14	33,36	2,6837	97,95	0,6400	B,E,F
15	33,56	2,6682	107,88	0,4800	B,C,D
16	34,80	2,5759	57,64	0,4400	C,E
17	35,00	2,5616	60,61	0,8400	C
18	35,82	2,5049	177,38	0,3600	B,D,E,F
19	36,78	2,4416	252,56	0,6000	A,B,C,E
20	39,62	2,2729	38,12	0,1600	A,B,C,F
21	40,34	2,234	59,50	0,3200	A,B,C,E
22	41,34	2,1822	53,69	0,2800	B,C,D,E,F
23	42,62	2,1196	65,65	0,2188	A,C,D
24	43,52	2,0779	35,47	0,2280	B,C,E,F
25	44,80	2,0214	83,82	0,1747	B,C
26	47,14	1,9264	9,05	0,2122	D
27	47,60	1,9088	21,95	0,2367	B,C,E
28	48,52	1,8748	6,57	0,0430	B,C
29	48,78	1,8654	16,85	0,0900	B,C
30	50,32	1,8118	49,81	0,2400	A,B,C
31	52,36	1,7459	29,53	0,1200	B,C
32	52,38	1,7453	28,56	0,1600	D
33	53,58	1,7090	82,79	1,2000	C,E
34	53,90	1,6996	81,47	1,3200	C
35	54,00	1,6967	82,54	1,1200	B,C,D
36	54,46	1,6835	56,08	0,7200	B,C,E,F
37	55,00	1,6682	36,45	0,5200	A,C,D
38	55,46	1,6555	32,34	0,1600	A,B,C,D
39	55,48	1,6549	31,23	0,1200	C,E
40	56,10	1,6381	11,60	0,1200	B,C
41	57,48	1,6020	65,23	0,3600	A,B,C,E
42	59,30	1,5571	56,51	0,4800	B,C,E
43	60,14	1,5373	96,42	0,2000	A,B,C,D
44	61,76	1,5009	36,29	0,6000	B,C,D,E
45	63,22	1,4697	41,48	0,2000	B,E
46	64,20	1,4496	47,04	0,4000	A,C,E,F
47	66,66	1,4019	23,04	0,2000	B,C,D,F
48	67,90	1,3793	26,91	0,2400	A,B,C,E
49	68,44	1,3697	43,91	0,3227	A,C,D
50	69,24	1,3558	13,36	0,1600	B,C,E
51	69,94	1,3440	32,09	0,2492	B,C,E,F

9. Sampel E-08

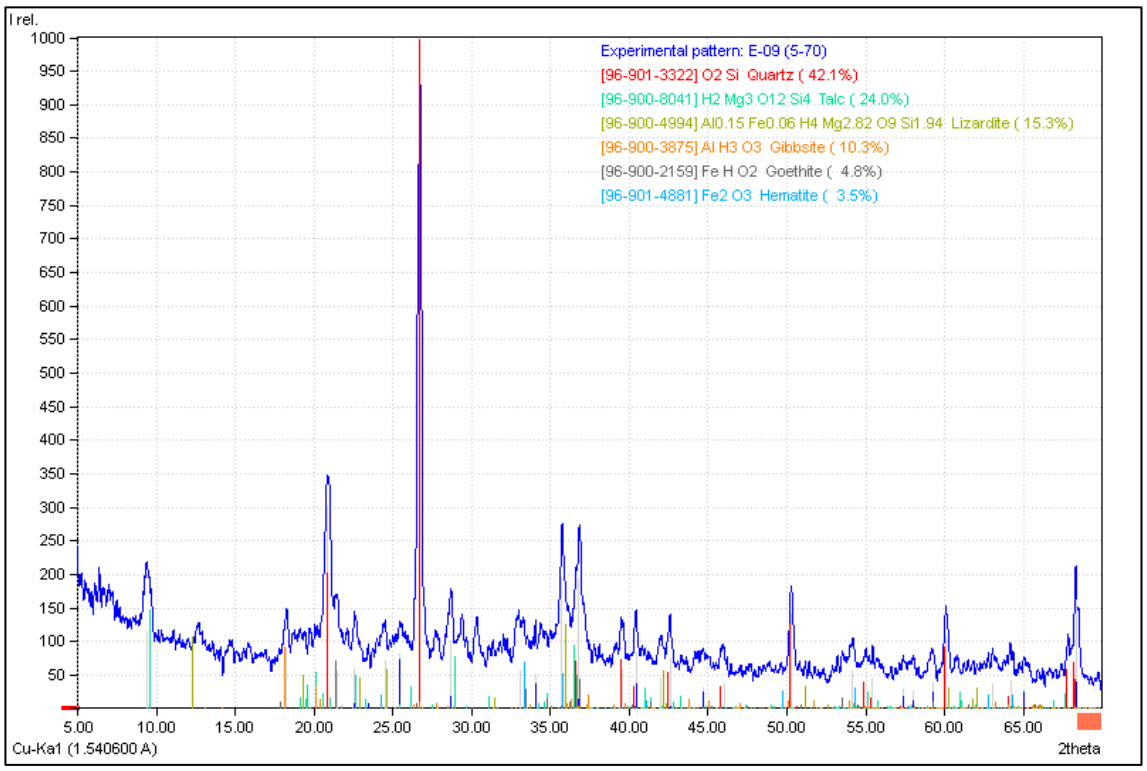


Index	***Amount (%)***	***Name***	***Formula sum***
A	36,7	*Gibbsite*	Al H3 O3
B	27,6	*Talc*	H2 Mg3 O12 Si4
C	14,6	*Quartz*	O2 Si
D	12,5	*Lizardite*	H4 Mg3 O9 Si2
E	6,3	*Hematite*	Fe2 O3
F	2,3	*Goethite*	Fe H O2

No.	**2theta [º]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,29	9,5120	336,84	0,4625	B
2	12,35	7,1612	104,45	0,6279	D
3	18,31	4,8414	1000,00	0,3248	A
4	18,91	4,6891	88,53	0,2800	B,D
5	19,59	4,5279	46,69	0,2800	B
6	20,95	4,2369	860,03	0,8231	B,C
7	21,31	4,1662	25,47	0,3505	F
8	21,73	4,0866	42,83	0,5420	B
9	23,45	3,7906	59,39	0,0915	B
10	24,53	3,6261	63,92	0,2012	B,D
11	26,63	3,3447	879,60	0,3200	A,C

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
12	28,53	3,1261	382,42	0,3645	A
13	31,21	2,8635	211,64	0,2906	B,D
14	33,11	2,7034	330,23	0,7200	A,E,F
15	35,67	2,5150	699,47	0,3687	A,D,E,F
16	36,63	2,4513	921,22	0,7200	A,B,C,F
17	37,67	2,3860	59,18	0,6601	A,B
18	39,49	2,2801	231,75	0,3010	A,B,C,E
19	40,27	2,2377	89,76	0,4400	A,B,C,F
20	41,01	2,1990	50,46	0,1600	A,B,D,E,F
21	41,75	2,1618	53,26	0,1600	A,D
22	42,41	2,1296	280,44	0,2800	B,C,D
23	44,17	2,0488	92,25	0,2810	A,B
24	45,81	1,9792	102,20	0,3932	A,B,C
25	47,37	1,9176	72,27	0,2800	A,B,F
26	48,71	1,8679	58,44	0,2800	B
27	49,65	1,8347	62,09	0,6443	B,E,F
28	50,15	1,8176	495,61	0,2619	B,C,D
29	53,35	1,7159	99,55	0,4800	B,F
30	53,97	1,6976	84,22	1,3600	A,B,D,E,F
31	54,91	1,6707	66,03	0,2400	B,C,D
32	55,37	1,6579	45,96	0,2000	A,B,C,F
33	57,33	1,6058	54,01	0,2800	A,B,C,E,F
34	59,07	1,5626	208,59	0,4101	A,B,F
35	59,95	1,5418	321,66	0,6000	A,B,C,D
36	62,89	1,4766	201,44	0,6400	A,B,F
37	64,01	1,4534	131,03	0,4793	B,C,D,E,F
38	64,91	1,4354	293,61	0,6400	A,B

10. Sampel E-09



Index	*Amount (%)*	*Name*	*Formula sum*
A	42,1	*Quartz*	O2 Si
B	24	*Talc*	H2 Mg3 O12 Si4
C	15,3	*Lizardite*	Al0.15 Fe0.06 H4 Mg2.82 O9 Si1.94
D	10,3	*Gibbsite*	Al H3 O3
E	4,8	*Goethite*	Fe H O2
F	3,5	*Hematite*	Fe2 O3

No.	**2theta [°]**	**d [Å]**	**I/I0**	**FWHM**	***Matched***
1	9,36	9,4410	115,56	0,5091	B
2	18,20	4,8704	90,57	0,6000	D
3	20,86	4,2550	300,73	0,6000	A,B
4	21,50	4,1298	56,56	0,3570	B,E
5	22,54	3,9415	58,68	0,2631	B
6	23,44	3,7922	6,98	0,1200	B
7	24,52	3,6275	71,56	0,3200	B,C,F
8	25,44	3,4984	80,54	0,3200	B
9	26,72	3,3336	1000,00	0,2613	A,D,E
10	28,68	3,1101	100,78	0,2800	B,D
11	33,04	2,7090	56,83	0,6800	D,F

No.	2theta [º]	d [Å]	I/I0	FWHM	*Matched*
12	34,06	2,6302	49,71	0,1200	B
13	35,72	2,5116	194,63	0,2800	C,D,E,F
14	36,80	2,4404	192,89	0,4000	A,B,D,E
15	39,52	2,2784	58,21	0,2800	A,B,D,E,F
16	40,44	2,2287	80,71	0,3003	A,B,E
17	41,98	2,1504	45,71	0,3649	B,C
18	42,58	2,1215	76,04	0,2400	A,B,C
19	44,70	2,0257	30,99	0,2000	B,D
20	46,00	1,9714	37,69	0,2000	A,B,D
21	50,26	1,8139	141,2	0,3218	A,B,C,D,E
22	54,18	1,6915	57,08	0,2800	B,C,D,F
23	55,44	1,6560	45,27	0,1600	A,B,C,D,E
24	57,38	1,6046	28,47	0,2000	A,B,D
25	58,04	1,5879	27,43	0,1600	B,D,F
26	59,26	1,5581	39,10	0,3208	B,E
27	60,12	1,5378	109,31	0,2830	A,B,C,D
28	63,04	1,4734	37,69	0,2000	D,E,F
29	64,18	1,4500	40,63	0,1200	A,B,C,D,E,F
30	65,02	1,4333	27,94	0,1200	B,D
31	67,76	1,3818	43,12	0,2734	A,B,C,E
32	68,36	1,3711	161,20	0,4309	A,B,D,E

LAMPIRAN C

HASIL ANALISIS AAS

Hasil Analisis AAS Sampel Awal

Kode Sampel	Kadar (%)			
	Ni	Fe	Al	Co
TMP-001	1,40	37,30	14,10	0,14

Hasil Analisis AAS Sampel *Pregnant Leach Solution*

Kode Sampel	Hasil Analisis Sampel PLS (ppm)			
	Ni	Fe	Al	Co
E01	162	4468	1030	21,2
E02	460	9378	1560	37,9
E03	606	11172	1815	58,9
E04	576	11450	1795	55,1
E05	626	12476	1960	53,9
E06	738	12600	2155	54,9
E07	884	14441	2325	40,4
E08	1203	15183	2359	57,9
E09	1394	8415	2576	60,2

LAMPIRAN D

PERHITUNGAN PENGENCERAN ASAM NITRAT (HNO_3)

Kepekatan konsentrasi induk asam nitrat (HNO_3) = 68%

Massa jenis asam nitrat (HNO_3) = 1,408 g/mL

Massa molekul relatif asam nitrat (HNO_3) = 63 g/mol

Rumus yang digunakan untuk mencari konsentrasi induk asam nitrat (HNO_3) adalah:

$$M = \frac{10}{\text{Massa Molekul Relatif HNO3}} \text{ x Massa Jenis } HNO_3 \text{ x Kepekatan } HNO_3$$

$$M = \frac{10}{63} \text{ x } 1{,}408 \text{ g/mL x } 68$$

$$M = 15{,}197 \text{ M}$$

Volume asam nitrat (HNO_3) yang dibutuhkan untuk setiap molarnya

2 M = 1.500 mL

3 M = 250 mL

4 M = 250 mL

6 M = 250 Ml

Rumus yang digunakan dalam pengenceran larutan asam nitrat (HNO_3) adalah:

$$M_1 V_1 = M_2 V_2$$

1. Konsentrasi 2 M

   15,197 M x V = 2 M x 250 mL

   $$V = \frac{2 \text{ x } 250}{15{,}197}$$

   V = 32,90 mL

   Tambahan volume aquades = 250 mL- 32,90 mL =217,10 mL

2. Konsentrasi 3 M

   15,197 M x V = 3 M x 250 mL

   $$V = \frac{3 \text{ x } 250}{15{,}197}$$

   V = 49,35 mL

   Tambahan volume aquades = 250 mL- 49,35 mL =200,65 mL

3. Konsentrasi 4 M

   15,197 M x V = 4 M x 250 mL

   $$V = \frac{4 \text{ x } 250}{15{,}197}$$

   V = 65,80 mL

   Tambahan volume aquades = 250 mL- 65,80 mL = 184,2 mL

4. Konsentrasi 6 M

   15,197 M x V = 6 M x 250 mL

   $$V = \frac{6 \text{ x } 250}{15{,}197}$$

   V = 98,70 mL

   Tambahan volume aquades = 250 mL - 98,70 mL = 151,3 mL

LAMPIRAN E

PERHITUNGAN KADAR Ni, Fe, Al DAN Co DARI DATA AAS

A. Perhitungan Kadar Nikel

Kadar Ni akhir setelah pelindian dihitung menggunakan rumus berikut:

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

1. Kadar Ni Hasil Pelindian Sampel E01

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{162 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,16%

2. Kadar Ni Hasil Pelindian Sampel E02

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{460 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,46%

3. Kadar Ni Hasil Pelindian Sampel E03

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{606 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,61%

4. Kadar Ni Hasil Pelindian Sampel E04

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{576 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,58%

5. Kadar Ni Hasil Pelindian Sampel E05

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{626 \text{ (mg/L) x } 10\text{x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,63%

6. Kadar Ni Hasil Pelindian Sampel E06

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{738 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,74%

7. Kadar Ni Hasil Pelindian Sampel E07

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{884 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,88%

8. Kadar Ni Hasil Pelindian Sampel E08

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{1.203 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 1,20%

9. Kadar Ni Hasil Pelindian Sampel E09

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{1.394 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 1,39%

B. Perhitungan Kadar Besi (Fe)

Kadar Fe akhir setelah pelindian dihitung menggunakan rumus berikut:

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ X } 100\%$$

1. Kadar Fe Hasil Pelindian Sampel E01

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{4.468 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 4,47%

2. Kadar Fe Hasil Pelindian Sampel E02

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{9.378 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 9,38%

3. Kadar Fe Hasil Pelindian Sampel E03

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{11172 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 11,17%

4. Kadar Fe Hasil Pelindian Sampel E04

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{11450 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 11,45%

5. Kadar Fe Hasil Pelindian Sampel E05

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{12476 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 12,48%

6. Kadar Fe Hasil Pelindian Sampel E06

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{12600 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 12,60%

7. Kadar Fe Hasil Pelindian Sampel E07

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{14441 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 14,44%

8. Kadar Fe Hasil Pelindian Sampel E08

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{15183 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 15,18%

9. Kadar Fe Hasil Pelindian Sampel E09

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{8415 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 8,42%

C. Perhitungan Kadar Aluminium (Al)

Kadar Al akhir setelah pelindian dihitung menggunakan rumus berikut:

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

1. Kadar Al Hasil Pelindian Sampel E01

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{1030 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 1,03%

2. Kadar Al Hasil Pelindian Sampel E02

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{1560 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 1,56%

3. Kadar Al Hasil Pelindian Sampel E03

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{1815 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 1,82%

4. Kadar Al Hasil Pelindian Sampel E04

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{1795 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 1,80%

5. Kadar Al Hasil Pelindian Sampel E05

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{1960 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 1,96%

6. Kadar Al Hasil Pelindian Sampel E06

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{2155 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 2,16%

7. Kadar Al Hasil Pelindian Sampel E07

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{2325 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 2,33%

8. Kadar Al Hasil Pelindian Sampel E08

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{2359 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 2,36%

9. Kadar Al Hasil Pelindian Sampel E09

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{2576 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 2,58%

D. Perhitungan Kadar Kobalt

Kadar Co akhir setelah pelindian dihitung menggunakan rumus berikut:

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

1. Kadar Co Hasil Pelindian Sampel E01

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{21{,}2 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,02%

2. Kadar Co Hasil Pelindian Sampel E02

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{37{,}9 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,04%

3. Kadar Co Hasil Pelindian Sampel E03

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{58{,}9 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,06%

4. Kadar Co Hasil Pelindian Sampel E04

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{55{,}1 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,06%

5. Kadar Co Hasil Pelindian Sampel E05

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{53{,}9 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,05%

6. Kadar Co Hasil Pelindian Sampel E06

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{54{,}9 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,05%

7. Kadar Co Hasil Pelindian Sampel E07

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{40{,}4 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,04%

8. Kadar Co Hasil Pelindian Sampel E08

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{57{,}9 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,06%

9. Kadar Co Hasil Pelindian Sampel E09

$$\text{Kadar (\%)} = \frac{\text{Hasil AAS (mg/L) x FP x Volume (L)}}{\text{Massa Sampel (mg)}} \text{ x } 100\%$$

$$\text{Kadar (\%)} = \frac{60{,}2 \text{ (mg/L) x } 10 \text{ x } 0{,}025 \text{ (L)}}{25.000 \text{ (mg)}} \text{ x } 100\%$$

Kadar (%) = 0,06%

LAMPIRAN F

PERHITUNGAN LAJU PELINDIAN Ni, Fe, Al, dan Co

A. Laju Pelindian Nikel

Laju pelindian Nikel hasil analisis AAS dapat dihitung dengan menggunakan rumus:

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

1. Laju Pelindian Ni Hasil Pelindian Sampel E01

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{0,16}{1,4} \times 100\%$$

$$\text{Laju Pelindian} = 11,57\%$$

2. Laju Pelindian Ni Hasil Pelindian Sampel E02

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} X\ 100\%$$

$$\text{Laju Pelindian} = \frac{0,46}{1,4} X\ 100\%$$

$$\text{Laju Pelindian} = 32,86\%$$

3. Laju Pelindian Ni Hasil Pelindian Sampel E03

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} X\ 100\%$$

$$\text{Laju Pelindian} = \frac{0,61}{1,4} X\ 100\%$$

$$\text{Laju Pelindian} = 43,29\%$$

4. Laju Pelindian Ni Hasil Pelindian Sampel E04

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} X\ 100\%$$

$$\text{Laju Pelindian} = \frac{0,58}{1,4} X\ 100\%$$

$$\text{Laju Pelindian} = 41,14\%$$

5. Laju Pelindian Ni Hasil Pelindian Sampel E05

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{0,63}{1,4} \text{ X } 100\%$$

$$\text{Laju Pelindian} = 44,71\%$$

6. Laju Pelindian Ni Hasil Pelindian Sampel E06

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{0,74}{1,4} \text{ X } 100\%$$

$$\text{Laju Pelindian} = 52,71\%$$

7. Laju Pelindian Ni Hasil Pelindian Sampel E07

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{0,88}{1,4} \text{ X } 100\%$$

$$\text{Laju Pelindian} = 63,14\%$$

8. Laju Pelindian Ni Hasil Pelindian Sampel E08

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{1,20}{1,4} \text{ X } 100\%$$

$$\text{Laju Pelindian} = 85,93\%$$

9. Laju Pelindian Ni Hasil Pelindian Sampel E09

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{1,39}{1,4} \text{ X } 100\%$$

$$\text{Laju Pelindian} = 99,57\%$$

B. Laju Pelindian Besi

Laju pelindian besi hasil analisis AAS dapat dihitung dengan menggunakan rumus:

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

1. Laju Pelindian Fe Hasil Pelindian Sampel E01

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ x } 100\%$$

$$\text{Laju Pelindian} = \frac{4{,}47}{37{,}3} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 11{,}98\%$$

2. Laju Pelindian Fe Hasil Pelindian Sampel E02

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ x } 100\%$$

$$\text{Laju Pelindian} = \frac{9{,}38}{37{,}3} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 25{,}14\%$$

3. Laju Pelindian Fe Hasil Pelindian Sampel E03

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ x } 100\%$$

$$\text{Laju Pelindian} = \frac{11{,}17}{37{,}3} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 29{,}95\%$$

4. Laju Pelindian Fe Hasil Pelindian Sampel E04

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{x } 100\%$$

$$\text{Laju Pelindian} = \frac{11{,}45}{37{,}3} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 30{,}70\%$$

5. Laju Pelindian Fe Hasil Pelindian Sampel E05

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{12,48}{37,3} \times 100\%$$

$$\text{Laju Pelindian} = 33,45\%$$

6. Laju Pelindian Fe Hasil Pelindian Sampel E06

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{12,60}{37,3} \times 100\%$$

$$\text{Laju Pelindian} = 33,78\%$$

7. Laju Pelindian Fe Hasil Pelindian Sampel E07

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{14,44}{37,3} \times 100\%$$

$$\text{Laju Pelindian} = 38,72\%$$

8. Laju Pelindian Fe Hasil Pelindian Sampel E08

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{15,18}{37,3} \times 100\%$$

$$\text{Laju Pelindian} = 40,71\%$$

9. Laju Pelindian Fe Hasil Pelindian Sampel E09

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{8,42}{37,3} \times 100\%$$

Laju Pelindian Laju Pelindian = 22,56%

C. Laju Pelindian Aluminium

Laju pelindian aluminium hasil analisis AAS dapat dihitung dengan menggunakan rumus:

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

1. Laju Pelindian Al Hasil Pelindian Sampel E01

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{1,03}{14,1} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 7,30\%$$

2. Laju Pelindian Al Hasil Pelindian Sampel E02

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{1,56}{14,1} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 11,06\%$$

3. Laju Pelindian Al Hasil Pelindian Sampel E03

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{X } 100\%$$

$$\text{Laju Pelindian} = \frac{1,82}{14,1} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 12,87\%$$

4. Laju Pelindian Al Hasil Pelindian Sampel E04

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{1,80}{14,1} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 12,73\%$$

5. Laju Pelindian Al Hasil Pelindian Sampel E05

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{1,96}{14,1} \times 100\%$$

$$\text{Laju Pelindian} = 13,90\%$$

6. Laju Pelindian Al Hasil Pelindian Sampel E06

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{2,16}{14,1} \times 100\%$$

$$\text{Laju Pelindian} = 15,28\%$$

7. Laju Pelindian Al Hasil Pelindian Sampel E07

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{2,33}{14,1} \times 100\%$$

$$\text{Laju Pelindian} = 16,49\%$$

8. Laju Pelindian Al Hasil Pelindian Sampel E08

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{2,36}{14,1} \times 100\%$$

$$\text{Laju Pelindian} = 16,73\%$$

9. Laju Pelindian Al Hasil Pelindian Sampel E09

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{2,58}{14,1} \times 100\%$$

$$\text{Laju Pelindian} = 18,27\%$$

D. Laju Pelindian Kobalt

Laju pelindian kobalt hasil analisis AAS dapat dihitung dengan menggunakan rumus:

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ x } 100\%$$

1. Laju Pelindian Co Hasil Pelindian Sampel E01

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ x } 100\%$$

$$\text{Laju Pelindian} = \frac{0,02}{0,14} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 15,14\%$$

2. Laju Pelindian Co Hasil Pelindian Sampel E02

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ x } 100\%$$

$$\text{Laju Pelindian} = \frac{0,04}{0,14} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 27,07\%$$

3. Laju Pelindian Co Hasil Pelindian Sampel E03

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ x } 100\%$$

$$\text{Laju Pelindian} = \frac{0,06}{0,14} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 42,07\%$$

4. Laju Pelindian Co Hasil Pelindian Sampel E04

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \text{ X } 100\%$$

$$\text{Laju Pelindian} = \frac{0,06}{0,14} \text{ x } 100\%$$

$$\text{Laju Pelindian} = 39,36\%$$

5. Laju Pelindian Co Hasil Pelindian Sampel E05

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{0,05}{0,14} \times 100\%$$

$$\text{Laju Pelindian} = 38,50\%$$

6. Laju Pelindian Co Hasil Pelindian Sampel E06

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{0,05}{0,14} \times 100\%$$

$$\text{Laju Pelindian} = 39,21\%$$

7. Laju Pelindian Co Hasil Pelindian Sampel E07

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{0,04}{0,14} \times 100\%$$

$$\text{Laju Pelindian} = 28,86\%$$

8. Laju Pelindian Co Hasil Pelindian Sampel E08

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{0,06}{0,14} \times 100\%$$

$$\text{Laju Pelindian} = 41,36\%$$

9. Laju Pelindian Co Hasil Pelindian Sampel E09

$$\text{Laju Pelindian} = \frac{\text{Kadar logam larutan kaya}}{\text{Kadar logam bijih}} \times 100\%$$

$$\text{Laju Pelindian} = \frac{0,06}{0,14} \times 100\%$$

$$\text{Laju Pelindian} = 43,00\%$$

LAMPIRAN G

KARTU KONSULTASI TUGAS AKHIR

Lampiran B 10

Kartu Konsultasi Tugas Akhir

JUDUL: Analisis Laju Pelindian Logam dari Bijih Limonit Lapaopao Kabupaten Kolaka dengan Metode Atmospheric Leaching Menggunakan Pelarut Asam Nitrat

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
06/02/2023	Perbaikan Bab I dan Bab IV	
13/02/2023	Perbaikan Bab IV dan Lampiran	
17/02/2023	Perbaikan Bab V	
24/02/2023	Perbaikan Abstrak, Bab IV, Bab V	
03/03/2023	Perbaikan Laporan Lengkap	

17/03/2023

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TANGGAL	MATERI KONSULTASI	PARAF DOSEN
06/03/2023	Perbaikan Bab I	
10/03/2023	Perbaikan Bab IV	
13/03/2023	Perbaikan Bab IV dan Bab V	
16/03/2023	Perbaikan Laporan Lengkap (ACC Dari Pembimbing II)	

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