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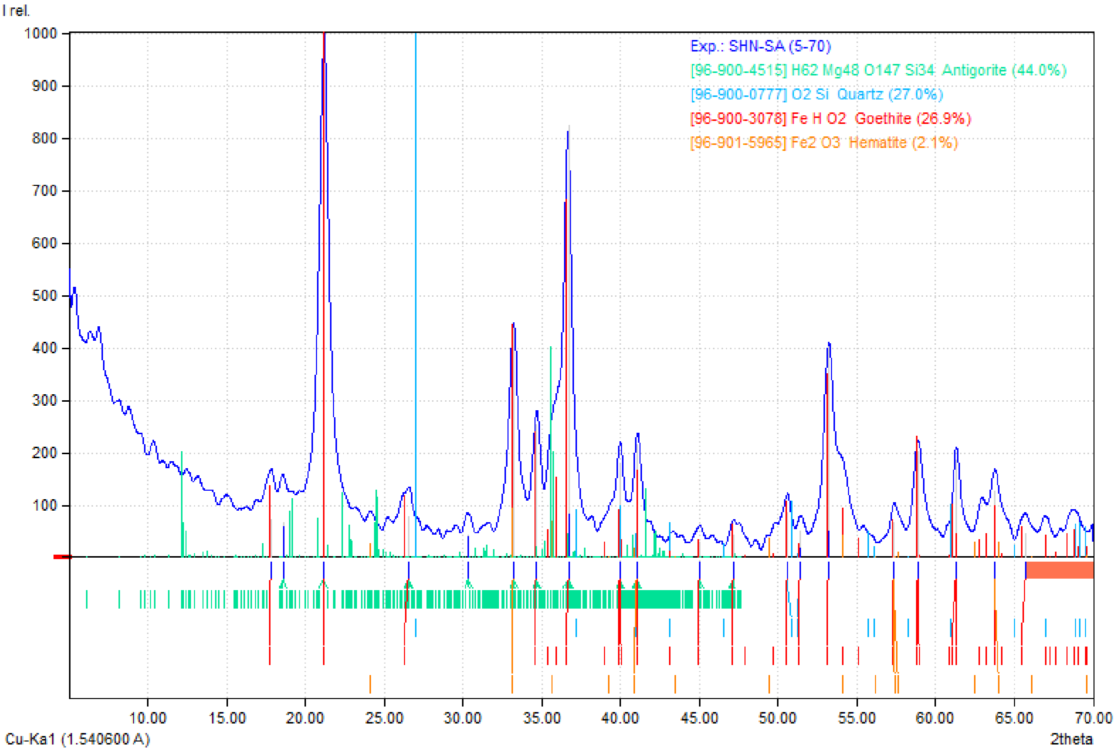
Lampiran 1 Hasil Analisi XRD

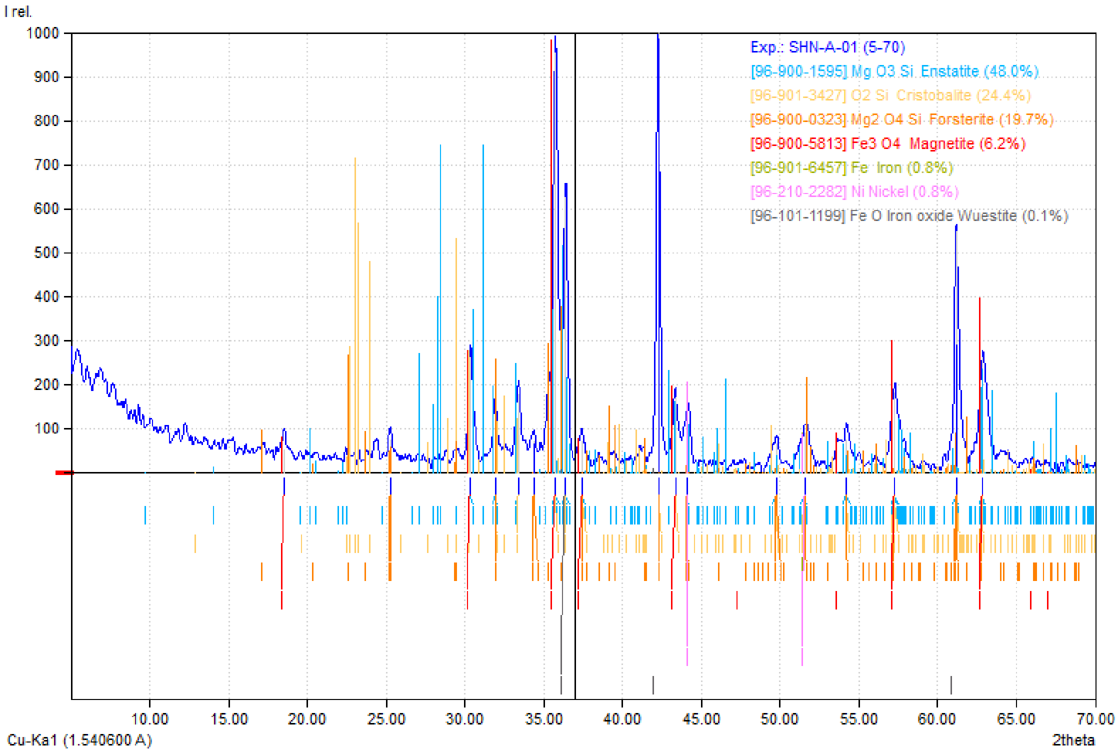
1. Sampel Awal



Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	17.86	4.9624	70.66	0.7701	A,C
2	18.60	4.7666	65.45	0.7317	A
3	21.20	4.1875	1000.00	0.6933	A,B,C
4	26.56	3.3534	77.77	0.8369	A,C
5	30.32	2.9455	42.72	0.3950	A
6	33.22	2.6947	436.67	0.6400	A,C,D
7	34.68	2.5845	252.45	0.6689	A,C
8	36.70	2.4468	823.03	0.6571	A,C
9	39.98	2.2533	178.68	0.7753	A,B,C
10	41.08	2.1955	214.82	0.7753	A,B,C,D
11	45.02	2.0120	29.21	0.3765	A,C
12	47.18	1.9248	42.95	0.5726	A,C
13	50.62	1.8018	85.26	0.9638	B,C
14	51.44	1.7750	50.90	0.8961	B,C
15	53.22	1.7197	401.22	0.8285	C
16	57.38	1.6046	65.49	0.8350	C,D
17	58.90	1.5667	201.19	0.8416	C
18	61.34	1.5101	185.52	0.9079	C
19	63.78	1.4581	126.20	1.0406	C,D
20	65.70	1.4201	44.04	1.0406	C

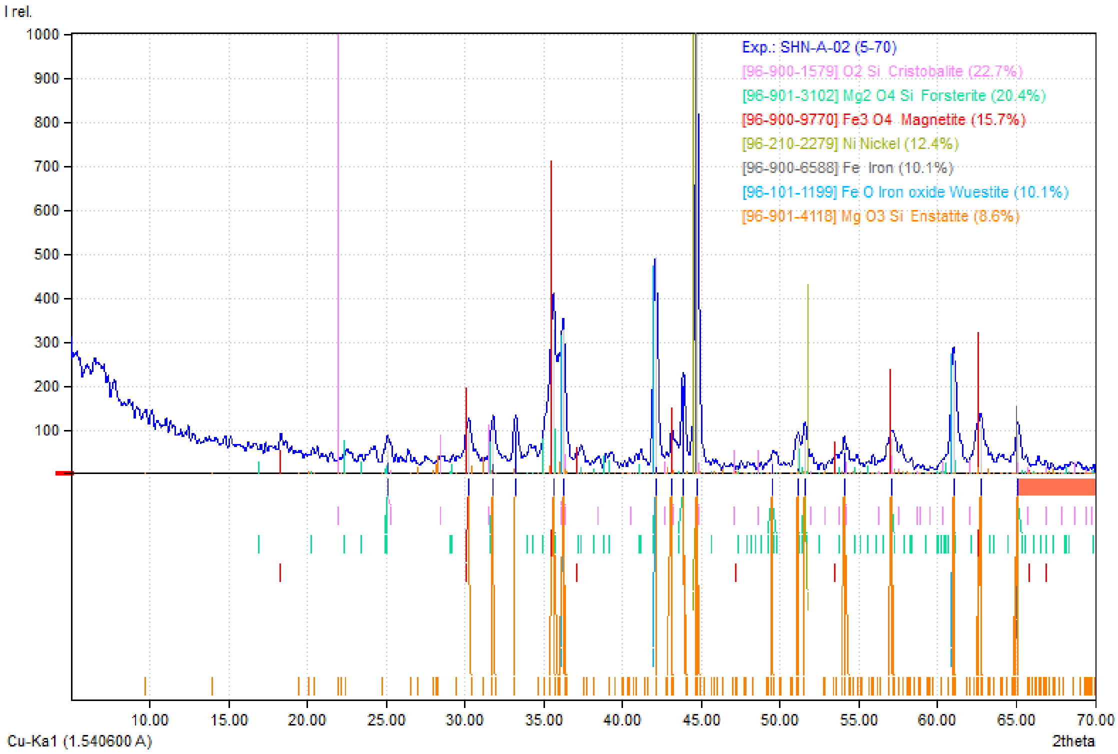
2. Sampel SA01



Peak List

No.	*2theta [º]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	18.52	4.7870	51.85	0.2854	D
2	25.28	3.5202	76.38	0.2861	C
3	30.36	2.9417	262.80	0.3423	A,B,D
4	31.94	2.7997	142.97	0.3205	A,B,C
5	33.42	2.6790	179.30	0.3809	A,B
6	34.36	2.6079	71.41	0.3809	C
7	35.76	2.5089	957.22	0.3793	A,B,D
8	36.40	2.4663	627.50	0.3200	A,B,G
9	37.42	2.4013	72.81	0.4700	A,B,C,D
10	42.28	2.1359	1000.00	0.2487	A,B,C
11	43.36	2.0851	171.77	0.3425	A,B,D
12	44.16	2.0492	140.79	0.4363	A,B,C,E,F
13	49.78	1.8302	64.67	0.4461	A,B,C
14	51.60	1.7699	91.63	0.7096	A,B,C,E,F
15	54.22	1.6904	76.38	0.9548	A,B,C
16	57.30	1.6066	183.61	0.5805	A,B,C,D
17	61.18	1.5137	548.78	0.3128	A,B,C
18	62.88	1.4768	261.71	0.5663	A,B,C,D

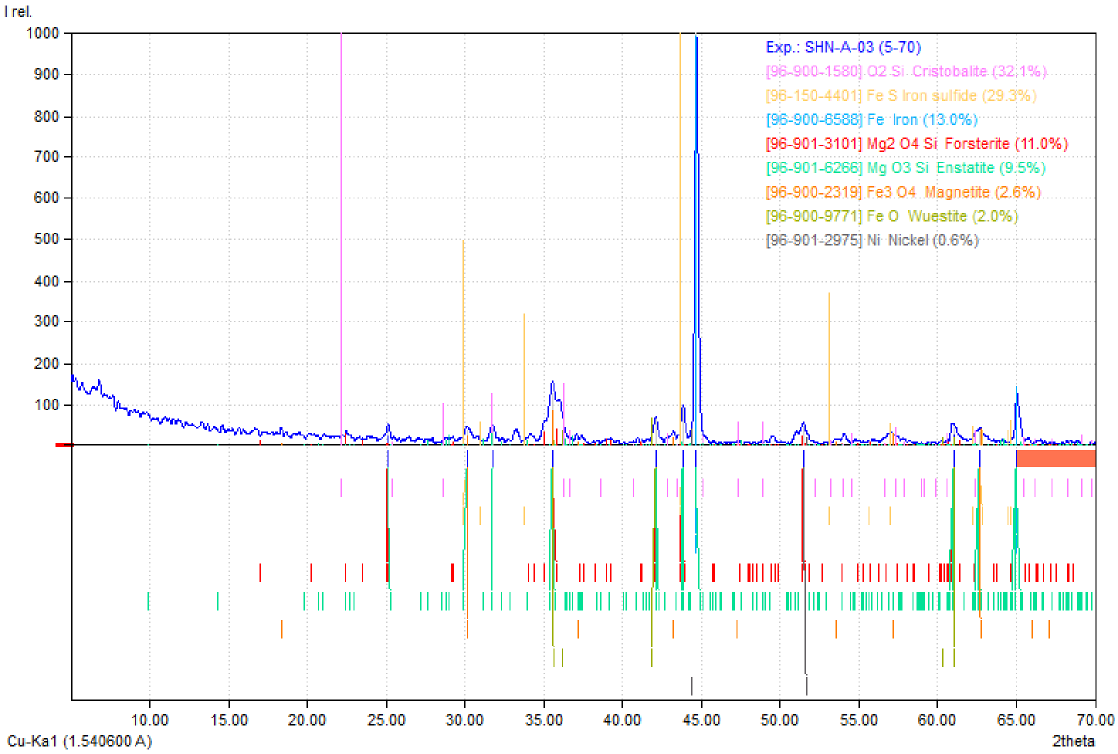
3. Sampel SA02



Peak List

No.	*2theta [º]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	25.10	3.5450	54.66	0.4897	A,C
2	30.26	2.9512	94.04	0.4823	D,H
3	31.80	2.8117	107.78	0.3563	C,H
4	33.24	2.6931	110.76	0.3157	H
5	35.62	2.5185	328.81	0.8983	C,D,H
6	36.24	2.4768	325.81	0.3600	A,G,H
7	42.12	2.1436	490.44	0.2992	C,G,H
8	43.12	2.0962	82.34	0.2989	A,D,H
9	43.86	2.0625	215.90	0.2985	B,C,H
10	44.72	2.0248	1000.00	0.2592	A,E,F,H
11	49.54	1.8385	31.38	0.5954	C,H
12	51.14	1.7847	74.22	0.3751	C,H
13	51.60	1.7699	91.03	0.4509	C,E,H
14	54.08	1.6944	55.29	0.4801	A,H
15	57.08	1.6123	78.42	0.6867	A,B,C,D,H
16	61.02	1.5173	271.99	0.3917	C,G,H
17	62.72	1.4802	111.00	0.6576	B,D,H
18	65.08	1.4321	96.22	0.3950	A,C,F,H

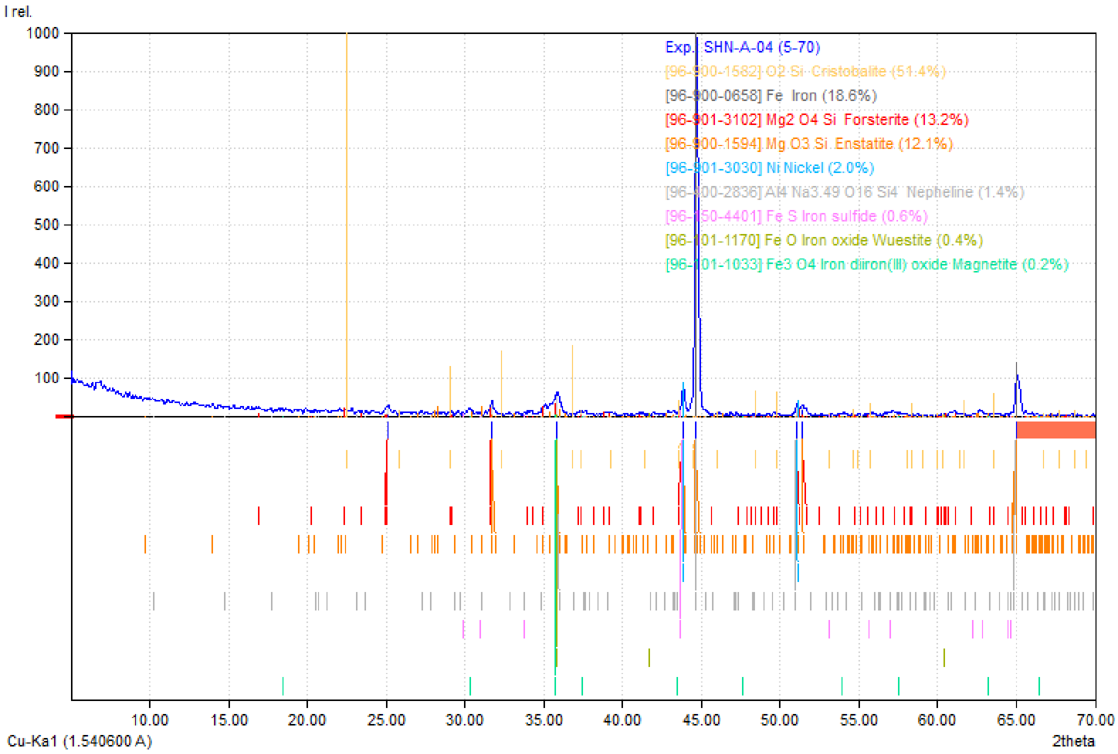
4. Sampel SA03



Peak List

No.	2theta [º]	d [Å]	I/I0	FWHM	Matched
1	25.12	3.5422	38.58	0.2685	A,B
2	30.20	2.9570	35.98	0.5285	B,E,H
3	31.78	2.8135	40.91	0.3826	A,B
4	35.58	2.5212	127.39	0.9834	A,B,E,G
5	42.12	2.1436	62.46	0.6417	A,B,G,I
6	43.86	2.0625	90.72	0.3001	A,B,C,H
7	44.70	2.0257	1000.00	0.2366	B,C,D,F,I
8	51.48	1.7737	46.71	0.4536	A
9	61.04	1.5168	46.40	0.5005	A,B,G,I
10	62.70	1.4806	33.60	0.8078	B,E,H,I
11	65.04	1.4329	121.37	0.2895	B,F,I

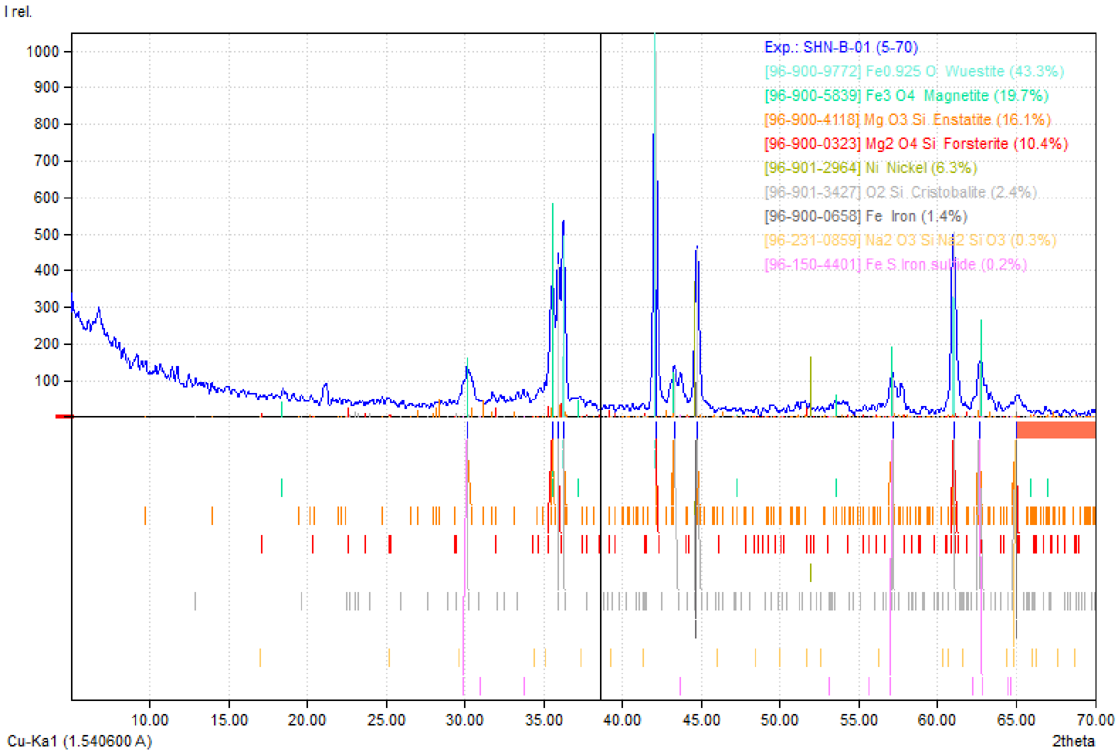
5. Sampel SA04



Peak List

No.	***2theta [º]***	***d [Å]***	***I/I0***	***FWHM***	***Matched***
1	25.14	3.5395	18.83	0.2757	C
2	31.68	2.8221	29.64	0.2951	C,D
3	35.86	2.5022	54.49	0.5278	C,D,F,H,I
4	43.86	2.0625	71.29	0.2371	A,C,D,E,G
5	44.70	2.0257	1000.00	0.2205	A,B,D,F
6	51.08	1.7867	25.89	0.4168	C,D,E,F
7	51.44	1.7750	28.42	0.3731	C,D
8	65.02	1.4333	102.54	0.3295	B,D,F

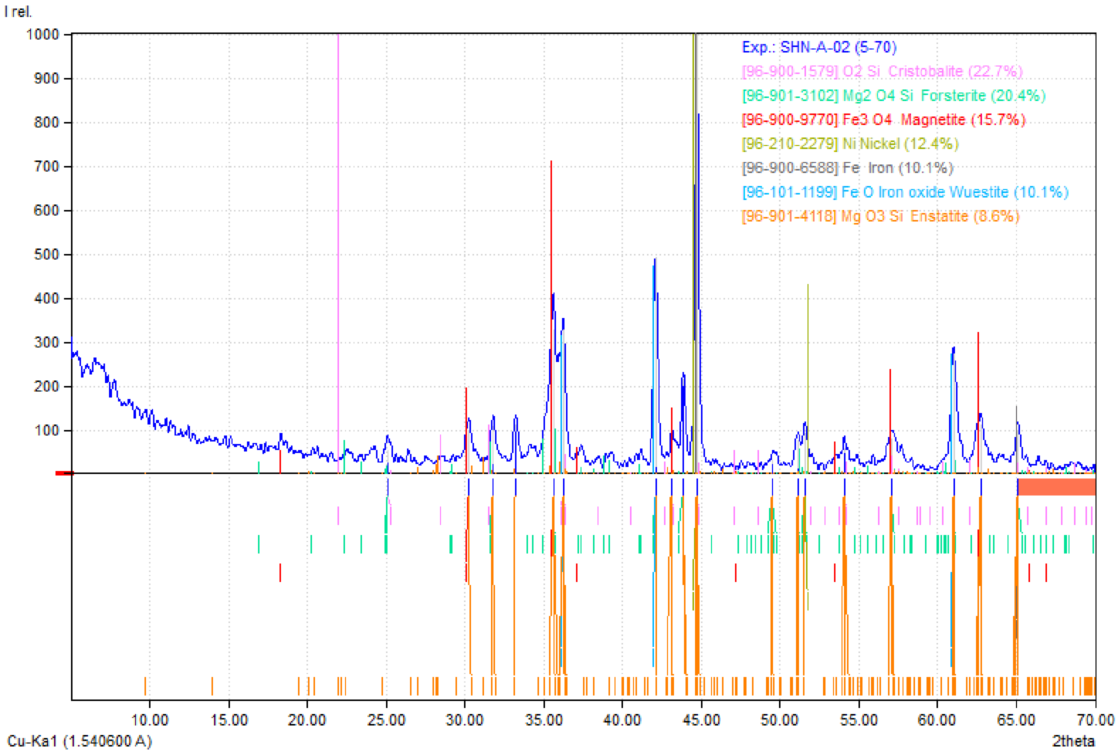
6. Sampel SB01



Peak List

No.	*2theta [º]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	30.16	2.9608	104.16	0.7373	B,C,F,I
2	35.54	2.5239	336.28	0.4000	B,C,D
3	35.94	2.4968	416.48	0.9600	C,D,F
4	36.26	2.4755	482.80	0.3836	A,C,F
5	42.10	2.1446	1000.00	0.2409	A,C,D
6	43.28	2.0888	117.95	0.5143	B,C,F
7	44.74	2.0240	460.06	0.3030	C,E,F,G
8	57.14	1.6107	106.17	0.5576	B,C,D,F,I
9	61.02	1.5173	506.63	0.3237	A,C,D,F
10	62.68	1.4810	142.02	0.5382	B,C,D,F,I
11	65.02	1.4333	44.96	0.7769	C,D,F,G,H

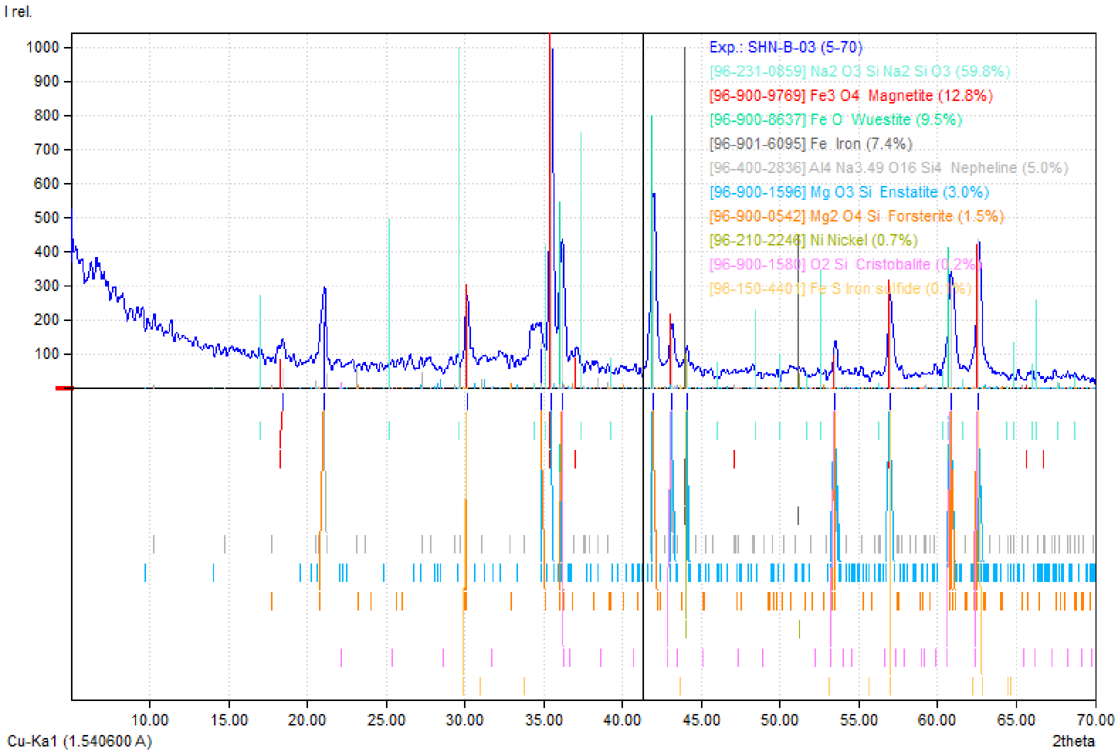
7. Sampel SB02



Peak List

No.	*2theta [º]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	25.10	3.5450	54.66	0.4897	A,C
2	30.26	2.9512	94.04	0.4823	D,H
3	31.80	2.8117	107.78	0.3563	C,H
4	33.24	2.6931	110.76	0.3157	H
5	35.62	2.5185	328.81	0.8983	C,D,H
6	36.24	2.4768	325.81	0.3600	A,G,H
7	42.12	2.1436	490.44	0.2992	C,G,H
8	43.12	2.0962	82.34	0.2989	A,D,H
9	43.86	2.0625	215.90	0.2985	B,C,H
10	44.72	2.0248	1000.00	0.2592	A,E,F,H
11	49.54	1.8385	31.38	0.5954	C,H
12	51.14	1.7847	74.22	0.3751	C,H
13	51.60	1.7699	91.03	0.4509	C,E,H
14	54.08	1.6944	55.29	0.4801	A,H
15	57.08	1.6123	78.42	0.6867	A,B,C,D,H
16	61.02	1.5173	271.99	0.3917	C,G,H
17	62.72	1.4802	111.00	0.6576	B,D,H
18	65.08	1.4321	96.22	0.3950	A,C,F,H

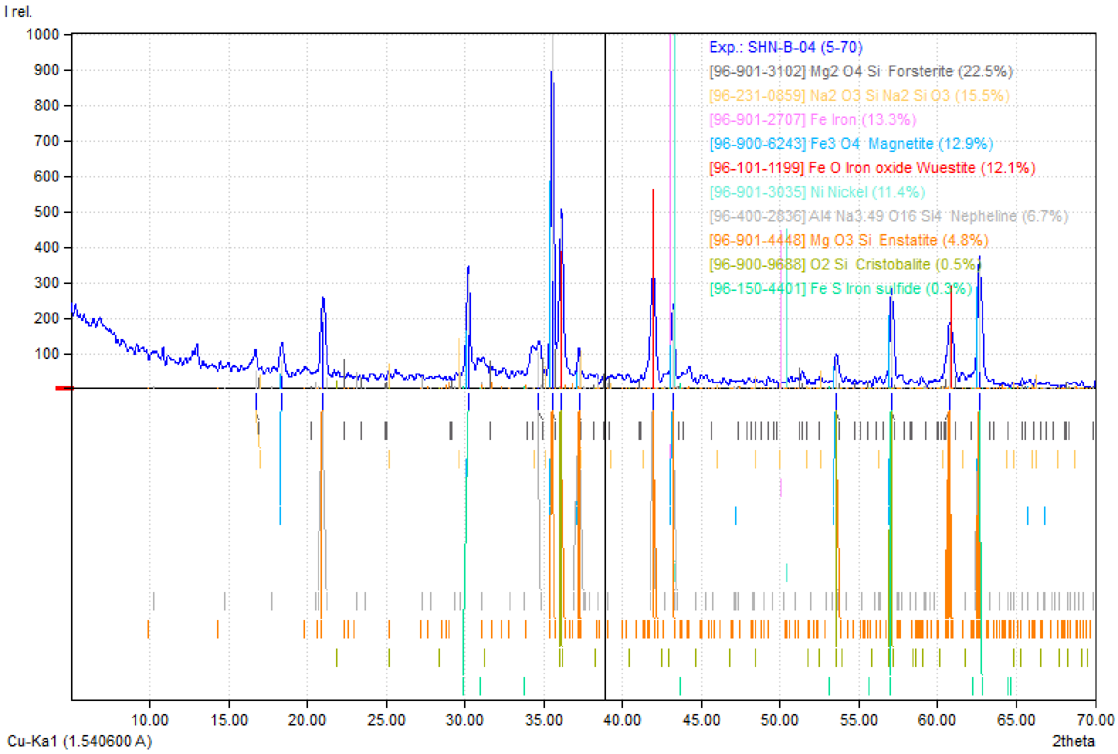
8. Sampel SB03



Peak List

No.	*2theta [º]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	18.42	4.8128	58.86	0.3814	B
2	21.10	4.2071	239.24	0.3120	E,G
3	30.16	2.9608	237.37	0.3097	B,G,J
4	34.80	2.5759	134.08	0.9114	E,F,G
5	35.50	2.5267	1000.00	0.2800	B,F
6	36.20	2.4794	407.09	0.3600	C,E,F,G,I
7	42.00	2.1495	560.05	0.3440	C,E,F,G
8	43.14	2.0953	147.53	0.3527	B,E,F,I
9	44.10	2.0519	84.03	0.3527	D,F,H
10	53.52	1.7108	112.79	0.2813	B,E,F,G,I
11	56.96	1.6154	252.83	0.3302	B,E,F,G,J
12	60.84	1.5213	324.03	0.5039	A,C,E,F,G,I
13	62.60	1.4827	438.50	0.3454	B,E,F,G,I,J

9. Sampel SB04



Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	16.72	5.2981	51.25	0.2337	A,B
2	18.40	4.8180	79.91	0.2771	D
3	21.02	4.2230	225.57	0.2943	G,H
4	30.22	2.9550	322.83	0.2560	D,J
5	34.70	2.5831	102.13	0.7702	A,G
6	35.56	2.5226	1000.00	0.2140	A,D,H
7	36.12	2.4847	476.06	0.2800	E,G,H,I
8	37.24	2.4125	89.75	0.2684	A,B,D,G,H
9	41.96	2.1514	314.39	0.3279	A,E,G,H
10	43.22	2.0916	223.12	0.2279	C,D,F,G,H
11	53.58	1.7090	81.62	0.2732	A,D,G,H,I
12	57.08	1.6123	260.33	0.2809	A,D,G,H,I,J
13	60.78	1.5227	169.67	0.4748	A,B,E,G,H
14	62.64	1.4819	336.72	0.3194	D,G,H,J

Lampiran 2 Hasil Analisi XRF

Hasil Analisis XRF Sampel

No	Ident	NiO	Fe2O3	SiO2	Al2O3	CaO	MgO	P2O5	TiO2	Cr2O3	MnO
		%	%	%	%	%	%	%	%	%	%
1	Shany XRF SB01	2,104	24,797	28,647	5,786	0,048	16,661	0,034	0,092	1,926	0,376
	Shany XRF SB01	2,110	24,788	28,582	5,819	0,055	16,546	0,036	0,095	1,919	0,38
2	Shany XRF SB02	2,006	23,127	28,385	5,575	0,074	16,466	0,029	0,093	1,933	0,305
	Shany XRF SB02	2,009	23,089	28,274	5,078	0,074	16,436	0,018	0,096	1,93	0,298
3	Shany XRF SB03	1,811	22,316	27,571	4,735	0,054	16,119	0,011	0,068	1,967	0,148
	Shany XRF SB03	1,808	22,315	27,585	4,761	0,046	16,101	0,012	0,078	1,968	0,148
4	Shany XRF SB04	1,769	22,046	27,265	4.466	0,06	15,955	0,08	0,074	1,938	0,15
	Shany XRF SB04	1,766	22,045	27,253	4,551	0,054	16,902	0,04	0,08	1,936	0,148
5	Shany XRF SA01	2,339	20,989	26,927	4,948	0,07	16,202	0,029	0,09	1,921	0,198
	Shany XRF SA01	2,349	20,982	26,787	4,885	0,065	16,207	0,032	0,09	1,922	0,202
6	Shany XRF SA02	2,396	20,344	25,146	4,865	0,043	16,735	0,033	0,089	1,876	0,515
	Shany XRF SA02	2,394	20,324	25,281	4,867	0,048	16,725	0,03	0,094	1,879	0,519

7	Shany XRF SA03	2,326	19,428	25,044	4,697	0,044	17,335	0,031	0,087	1,889	0,601
	Shany XRF SA03	2,324	19,429	25,034	4,677	0,049	17,331	0,038	0,09	1,889	0,605
8	Shany XRF SA04	2,065	18,828	24,907	4,132	0,062	17,686	0,043	0,119	1,901	0,585
	Shany XRF SA04	2,067	18,879	24,943	4,09	0,065	17,684	0,044	0,121	1,9	0,588
9	Shany XRF	1,933	26,929	36,543	5,986	0,026	14,884	0,012	0,072	1,889	0,167
	Shany XRF	1,941	26,943	36,539	5,998	0,028	14,883	0,014	0,067	1,89	0,168

Lampiran 3 Perhitungan *Recovery*

A. Nikel

Kadar awal (%)	Berat Awal (gr)		Berat setelah Kalsinasi (gr)		Kadar Akhir (%)		*Recovery (%)*	
	Reduktor	Reduktor dan Aditif	Reduktor	Reduktor dan Aditif	Reduktor	Reduktor dan Aditif	Reduktor	Reduktor dan Aditif
1,53	21	23	1,85	1,66	1,85	1,66	92,94	76,34
1,53	22	24	1,88	1,58	1,88	1,58	84,31	74,19
1,53	23	25	1,83	1,42	1,83	1,42	74,32	67,78
1,53	24	26	1,62	1,39	1,62	1,39	61,65	66,37

Recovery Ni dihitung menggunakan rumus sebagai berikut:

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni})} \text{ x } 100\%$$

1. *Recovery* Ni hasil kalsinasi menggunakan 5% reduktor arang tongkol jagung selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(16{,}18(gr) \times 1{,}85(\%))}{(21(gr) \times 1{,}53(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 93{,}16\ \%$$

2. *Recovery* Ni hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(15{,}09(gr) \times 1{,}88(\%))}{22(gr) \times 1{,}53(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 84{,}28\ \%$$

3. *Recovery* Ni hasil kalsinasi menggunakan 15% reduktor arang tongkol jagung selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(14{,}32(gr) \times 1{,}83(\%))}{23(gr) \times 1{,}53(\%))} \times 100\%$$

Recovery (%) $= 74{,}47$ %

4. *Recovery* Ni hasil kalsinasi menggunakan 20% reduktor arang tongkol jagung selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(13{,}49(gr) \times 1{,}62(\%))}{24(gr) \times 1{,}53(\%))} \times 100\%$$

Recovery (%) $= 61{,}50$ %

5. *Recovery* Ni hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung dan 5% aditif Na_2SO_4 selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(16{,}20(gr) \times 1{,}66(\%))}{23(gr) \times 1{,}53(\%))} \times 100\%$$

Recovery (%) $= 76{,}42$ %

6. *Recovery* Ni hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung dan 10% aditif Na_2SO_4 selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(17{,}26(gr) \times 1{,}58(\%))}{24(gr) \times 1{,}53(\%))} \times 100\%$$

Recovery (%) $= 74{,}27$ %

7. *Recovery* Ni hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung dan 15% aditif Na_2SO_4 selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(18{,}25(gr) \times 1{,}42(\%))}{25(gr) \times 1{,}53(\%))} \times 100\%$$

Recovery (%) $= 67{,}75$ %

8. *Recovery* Ni hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung dan 20% aditif Na_2SO_4 selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Ni x Kadar Produk Ni})}{(\text{M Awal Ni} \times \text{Kadar Awal Ni })} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(19{,}02(gr) \times 1{,}39(\%))}{26(gr) \times 1{,}53(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 66{,}46\ \%$$

B. Besi

Kadar awal (%)	Berat Awal (gr)		Berat setelah Kalsinasi (gr)		Kadar Akhir (%)		*Recovery (%)*	
	Reduktor	Reduktor dan Aditif	Reduktor	Reduktor dan Aditif	Reduktor	Reduktor dan Aditif	Reduktor	Reduktor dan Aditif
18,84	21	23	16,18	16,20	14,68	17,34	60,03	64,83
18,84	22	24	15,09	17,26	14,22	16,15	51,77	61,65
18,84	23	25	14,32	18,25	13,59	15,61	44,91	60,48
18,84	24	26	13,94	19,02	13,20	15,42	40,70	59,87

Recovery Fe dihitung menggunakan rumus sebagai berikut:

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk FE})}{(\text{M Awal Fe } \times \text{Kadar Awal Fe })} \text{ x } 100\%$$

1. *Recovery* Fe hasil kalsinasi menggunakan 5% reduktor arang tongkol jagung selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk Fe})}{(\text{M Awal Fe} \times \text{Kadar Awal Fe })} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(16{,}18(gr) \times 14{,}68(\%))}{21(gr) \times 18{,}84(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 60{,}03\ \%$$

2. *Recovery* Fe hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk Fe})}{(\text{M Awal Fe} \times \text{Kadar Awal Fe })} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(15{,}09\ (gr) \times 14{,}22(\%))}{22(gr) \times 18{,}84(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 51{,}77\ \%$$

3. *Recovery* Fe hasil kalsinasi menggunakan 15% reduktor arang tongkol jagung selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk Fe})}{(\text{M Awal Fe} \times \text{Kadar Awal Fe})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(14{,}32\ (gr) \times 13{,}59(\%))}{23(gr) \times 18{,}84(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 44{,}91\ \%$$

4. *Recovery* Fe hasil kalsinasi menggunakan 20% reduktor arang tongkol jagung selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk Fe})}{(\text{M Awal Fe} \times \text{Kadar Awal Fe})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(13{,}94\ (gr) \times 13{,}20(\%))}{24(gr) \times 18{,}84(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 40{,}70\ \%$$

5. *Recovery* Fe hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung dan 5% aditif Na_2SO_4 selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk Fe})}{(\text{M Awal Fe} \times \text{Kadar Awal Fe})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(16{,}20\ (gr) \times 1{,}66(\%))}{23\ (gr) \times 18{,}84(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 64{,}83\ \%$$

6. *Recovery* Fe hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung dan 10% aditif Na_2SO_4 selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk Fe})}{(\text{M Awal Fe} \times \text{Kadar Awal Fe})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(17{,}26\ (gr) \times 1{,}58(\%))}{24\ (gr) \times 18{,}84(\%))} \times 100\%$$

$$\text{Recovery (\%)} = 61{,}65\ \%$$

7. *Recovery* Fe hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung dan 15% aditif Na_2SO_4 selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk Fe})}{(\text{M Awal Fe} \times \text{Kadar Awal Fe})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(18{,}26\ (gr) \times 1{,}42(\%))}{25\ (gr) \times 18{,}84(\%))} \times 100\%$$

Recovery (%) = 60,48 %

8. *Recovery* Fe hasil kalsinasi menggunakan 10% reduktor arang tongkol jagung dan 20% aditif Na_2SO_4 selama 1 jam pada suhu 1.000°C

$$\text{Recovery (\%)} = \frac{(\text{M produk Fe x Kadar Produk Fe})}{(\text{M Awal Fe} \times \text{Kadar Awal Fe})} \text{ x } 100\%$$

$$\text{Recovery (\%)} = \frac{(19{,}02\ (gr) \times 1{,}39(\%))}{26\ (gr) \times 18{,}84(\%))} \times 100\%$$

Recovery (%) = 59,87%

Lampiran 4 Kartu Konsultasi Tugas Akhir

Lampiran B 10

Kartu Konsultasi Tugas Akhir

JUDUL: STUDI PENINGKATAN KADAR BIJIH NIKEL LATERIT DENGAN METODE KALSINASI MENGGUNAKAN REDUKTOR ARANG TONGKOL JAGUNG DAN ADITIF NATRIUM SULFAT

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
26/01/2023	Perbaikan BAB I dan BAB III	
30/01/2023	Perbaikan dan penambahan BAB II	
01/02/2023	Perbaikan BAB IV	
10/02/2023	Perbaikan Abstrak, BAB IV	
17/02/2023	Perbaikan BAB V	
21/02/2023	Perbaikan Laporan Lengkap	
28/02/2023	Perbaikan abstrak dan kesimpulan	
03/03/2023	Perbaikan kelengkapan laporan lengkap, artikel, dan poster	