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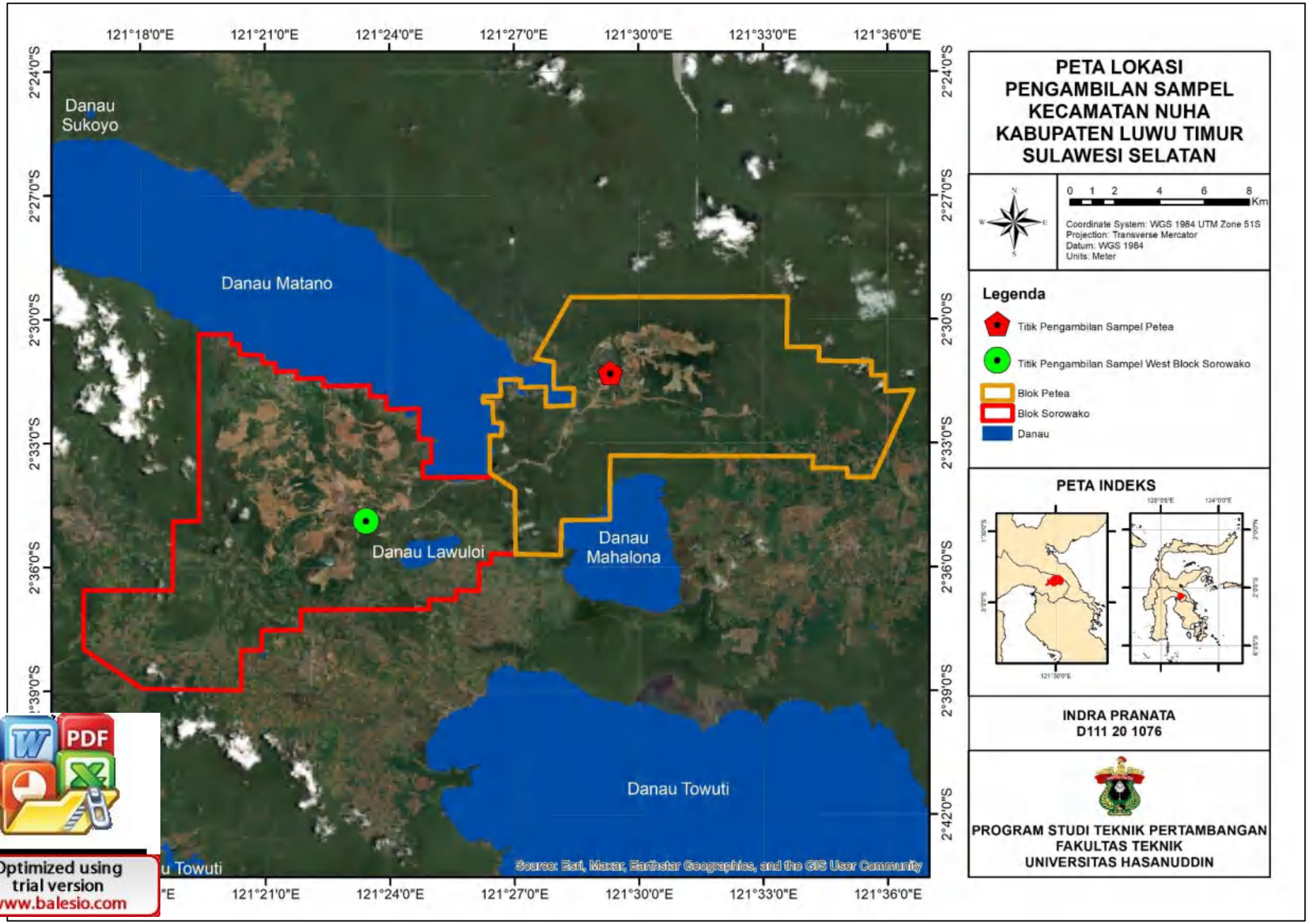
LAMPIRAN A
PETA LOKASI PENGAMBILAN SAMPEL



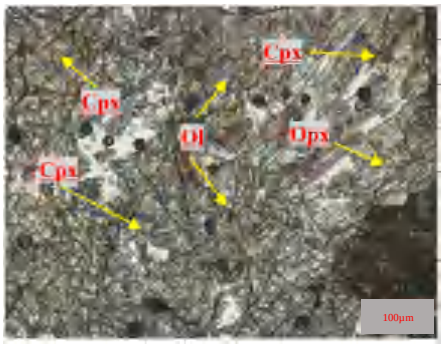
LAMPIRAN B

Hasil Analisis Petrografi

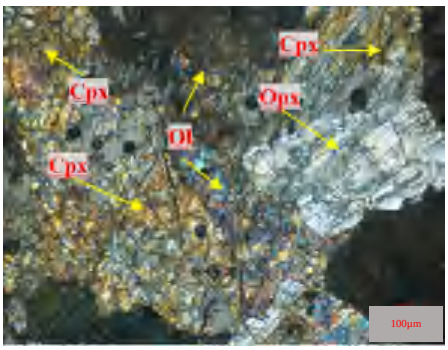
No. Urut : 1

Lokasi : Blok barat

FOTO:



//-Nikol



X-Nikol

Tipe Batuan : Batuan Beku Ultrabasa

Tipe Struktur : Masif

Klasifikasi : Streckeisen, 1974

Deskripsi Mikroskopis:

Kenampakan sayatan batuan pada warna absorbsi *colourless*, nikol silang abu-abu kehitaman, granularitas faneritik, kristanilitas holokristalin, bentuk mineral euhedral-subhedral, relasi equigranular, dengan komposisi mineral Olivin (40%), Ortopiroksin (25%) dan Clinopiroksin (35%).

Deskripsi Mineralogi

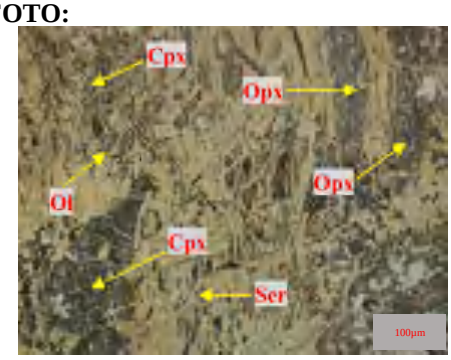
Komposisi Mineral	Jumlah (%)	Keterangan Optik Mineral
Olivin (Ol)	40	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk euhedral-subhedral, warna interferensi biru keunguan, kembaran tidak ada, sudut gelapan 25˚, jenis gelapan miring, dengan ukuran mineral 0,5 mm – 1 mm
Ortopiroksin (Opx)	25	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk euhedral-subhedral, warna interferensi putih keabuan, kembaran tidak ada, sudut gelapan 55˚, jenis gelapan paralel, dengan ukuran mineral 0,8 – 1,4 mm, dengan jenis piroksin adalah *orthopyroxene*.
iroksin (Cpx)	35	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias n_{min}

		> n_{cb}, pleokroisme lemah, pecahan *uneven*, bentuk euhedral-subhedral, warna interferensi putih kekuningan, kembaran tidak ada, sudut gelapan 23˚, jenis gelapan miring, dengan ukuran mineral 0,5 – 1,2 mm, dengan jenis piroksin adalah *clinopyroxene*.
Nama Batuan : *Olivine Webstrite* (Streckeisen, 1974)		

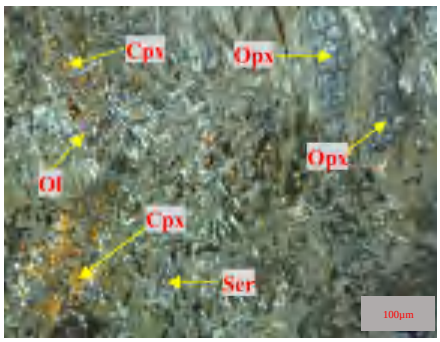
No. Urut : 2

Lokasi : Petea

FOTO:



//-Nikol



X-Nikol

Tipe Batuan : Batuan Beku Ultrabasa

Tipe Struktur : Masif

Klasifikasi : Streckeisen, 1974

Deskripsi Mikroskopis:

Kenampakan sayatan batuan pada warna absorbsi colorless, nikol silang abu-abu kehitaman, granularitas faneritik, kristanilitas holokristalin, bentuk mineral euhedral-subhedral, relasi equigranular, dengan komposisi mineral Olivin (2%), Serpentin (43%), Ortopiroksin (25%) dan Clinopiroksin (30%).

Deskripsi Mineralogi

Komposisi Mineral	Jumlah (%)	Keterangan Optik Mineral
Olivin (Ol)	2	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk subhedral-anhedral, warna interferensi biru keunguan, kembaran tidak ada, sudut gelapan 22˚, jenis gelapan miring, dengan ukuran mineral 0,1 mm – 0,2 mm
Serpentin (Ser)	43	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk subhedral-anhedral, warna interferensi putih keabuan, kembaran tidak ada, sudut gelapan 31˚, jenis gelapan miring, dengan ukuran mineral 0,3 mm – 0,5 mm
iroksin (Opx)	25	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*,

		bentuk euhedral-subhedral, warna interferensi putih keabuan, kembaran tidak ada, sudut gelapan 63˚, jenis gelapan paralel, dengan ukuran mineral 0,5 – 0,7 mm, dengan jenis piroksin adalah *orthopyroxene*.
Clinopiroksin (Cpx)	30	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk euhedral-subhedral, warna interferensi putih kekuningan, kembaran tidak ada, sudut gelapan 27˚, jenis gelapan miring, dengan ukuran mineral 0,8 – 1 mm, dengan jenis piroksin adalah *clinopyroxene*.
Nama Batuan : *Serpentinized Lherzolite* (Streckeisen, 1974)		

LAMPIRAN C

Hasil Analisis *X-Ray Diffraction* (XRD) blok Barat

Limonit

Match! Phase Analysis Report

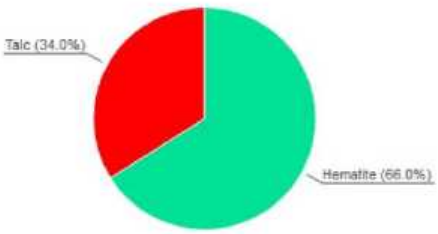
Sample: MEF1000018814

Sample Data

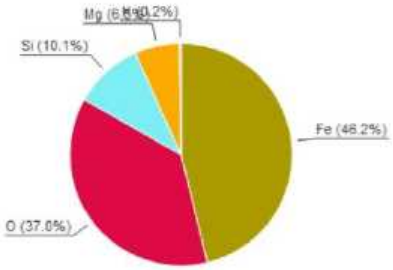
File name	SIL-MWF1000017341.xrdml
File path	D:/SEMESTER 8/SKRIPSI/XRD SOROWAKO 2
Data collected	2024-01-24T13:23:40+01:00
Data range	8.013° - 89.978°
Original data range	8.013° - 89.978°
Number of points	3773
Step size	0.022
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	Yes
Data smoothed	Yes
Radiation	X-rays
Wavelength	1.790300 Å

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	66.0	Hematite	Fe2 O3
B	34.0	Talc	H2 Mg3 O12 Si4
	17.4	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
Fe	46.2%
O	*37.0%(*)*
Si	10.1%
Mg	6.5%
**LE (sum)*	*37.2%*

Details of identified phases

A: Hematite (66.0 %)*

Formula sum	Fe2 O3
Entry number	96-901-5965
Figure-of-Merit (FoM)	0.722648*
Total number of peaks	94
Peaks in range	32
Peaks matched	16
Intensity scale factor	0.65
2theta correction	-0.048°
Space group	R -3 c
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 5.0346 Å c= 13.7473 Å
I/Ic	3.71
Calc. density	5.272 g/cm³
Reference	Finger L. W., Hazen R. M., "Crystal structure and isothermal compression of Fe2O3, Cr2O3, and V2O3 to 50 kbarsNote: P = 0.001 kbar", Journal of Applied Physics **51**, 5362-5367 (1980)

B: Talc (34.0 %)*

Formula sum	H2 Mg3 O12 Si4
Entry number	96-900-8298
Figure-of-Merit (FoM)	0.530778*
Total number of peaks	502
Peaks in range	406
Peaks matched	39
Intensity scale factor	0.09
2theta correction	0.151°
Space group	C -1
Crystal system	triclinic (anorthic)
Unit cell	a= 5.2900 Å b= 9.1730 Å c= 9.4600 Å α= 90.460° β= 98.680 ° γ= 90.090 °
I/Ic	1.03
Calc. density	2.776 g/cm³
Reference	Perdikatsis B., Burzlaff H., "Strukturverfeinerung am talk Mg3[(OH)2Si4O10]", Zeitschrift fur Kristallographie **156**, 177-186 (1981)

(*)2theta values have been shifted internally for the calculation of the amounts, the intensity scaling factors as well as the figure-of-merit (FoM), due to the active search-match option 'Automatic zero point adaption'.

Candidates

Name	*Formula*	*Entry No.*	*FoM*
(Fe0.8 Ga0.2)	Fe0.8 Ga0.2	96-152-4161	0.5690
(Fe0.875 Mo0.125)	Fe0.875 Mo0.125	96-231-0291	0.5657
Iron-beta	Fe	96-900-8538	0.5652
Chromium	Cr	96-901-1599	0.5650
	Ni V	96-153-9069	0.5644
(Fe0.9 Ir0.1)	Fe0.9 Ir0.1	96-152-5525	0.5603
(Cr0.25 Fe0.5 V0.25)	Cr0.25 Fe0.5 V0.25	96-152-4743	0.5595
(Fe0.95 Sb0.05)	Fe0.95 Sb0.05	96-152-2566	0.5563
(Fe0.85 Ge0.15)	Fe0.85 Ge0.15	96-152-4163	0.5563
(Fe0.8 Mn0.2)	Fe0.8 Mn0.2	96-152-5356	0.5563
(Cr Fe)	Cr Fe	96-152-4008	0.5562
	Lu Pt2 Si2	96-153-8220	0.5491
(La Sm) S2	La S2 Sm	96-152-3894	0.5370
	Ca4 Fe0.82 Li1.18 N2	96-810-1637	0.5320
Neon	Ne	96-901-1723	0.5232
Berzelianite	Cu2 Se	96-900-8065	0.5180
Lithium titanium oxide (2.7/1.3/4)	Li2.666 O3.999 Ti1.333	96-101-0898	0.5172
Periclase	Mg O	96-901-3218	0.5122
Periclase	Mg O	96-901-3250	0.5121
	Ni Zn	96-152-3807	0.5091
	Fe V	96-152-2881	0.5055
	Os3 Sn7	96-152-1726	0.5031
(Mg (H2 O)6) (Te I6)	H12 I6 Mg O6 Te	96-153-4163	0.5019
Trimagnesium dihydroxide phyllo-tetrasilicate (Talc 2M)	H2 Mg3 O12 Si4	96-101-1153	0.0000
Zinc Aluminum Hydroxide Nitrate Hydrate (Hydrotalcite polytype_3R1)	Al0.84 N1.69 O35.24 Zn2.16	96-300-0049	0.0000
Talc	H2 Mg3 O12 Si4	96-900-8041	0.0000
Talc	H2 Mg3 O12 Si4	96-900-8298	0.0000
Tantalcarbide	C Ta	96-900-8732	0.0000
Talc 2M	Mg3 O12 Si4	96-901-4436	0.0000
Talc	H2 Mg3 O12 Si4	96-901-7404	0.0000

Search-Match

Settings

Reference database used	COD-Inorg 2024.06.03
Method	Peak-based search-match
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.50
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

Criteria for entries added by user

Reference:

Entry number: 96-101-1153;96-300-0049;96-900-8041;96-900-8298;96-900-8732;96-901-4436;96-901-7404

Peak List

No.	*2theta [°]*	*d [A]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	10.92	9.4037	75.29	521.01	0.8334	B
2	14.27	7.2063	47.45	641.35	1.6276	
3	21.77	4.7407	83.53	1718.49	2.4776	B
4	24.77	4.1741	501.65	5240.64	1.2581	B
5	28.11	3.6856	216.41	3076.48	1.7120	A

6	31.02	3.3470	193.01	1209.26	0.7545	
7	33.09	3.1435	46.72	603.96	1.5568	B
8	38.83	2.6932	771.46	15112.28	2.3591	A
9	41.74	2.5128	1000.00	12787.81	1.5400	A,B
10	47.89	2.2057	536.65	6945.41	1.5586	A,B
11	51.60	2.0566	71.10	614.72	1.0412	B
12	58.36	1.8360	148.29	3152.69	2.5603	A,B
13	63.47	1.7019	570.11	7363.34	1.5554	A,B
14	74.35	1.4813	151.21	2026.41	1.6139	A,B
15	76.14	1.4518	398.92	5018.43	1.5150	A,B
16	86.09	1.3115	65.95	1417.13	2.5876	A,B

Integrated Profile Areas

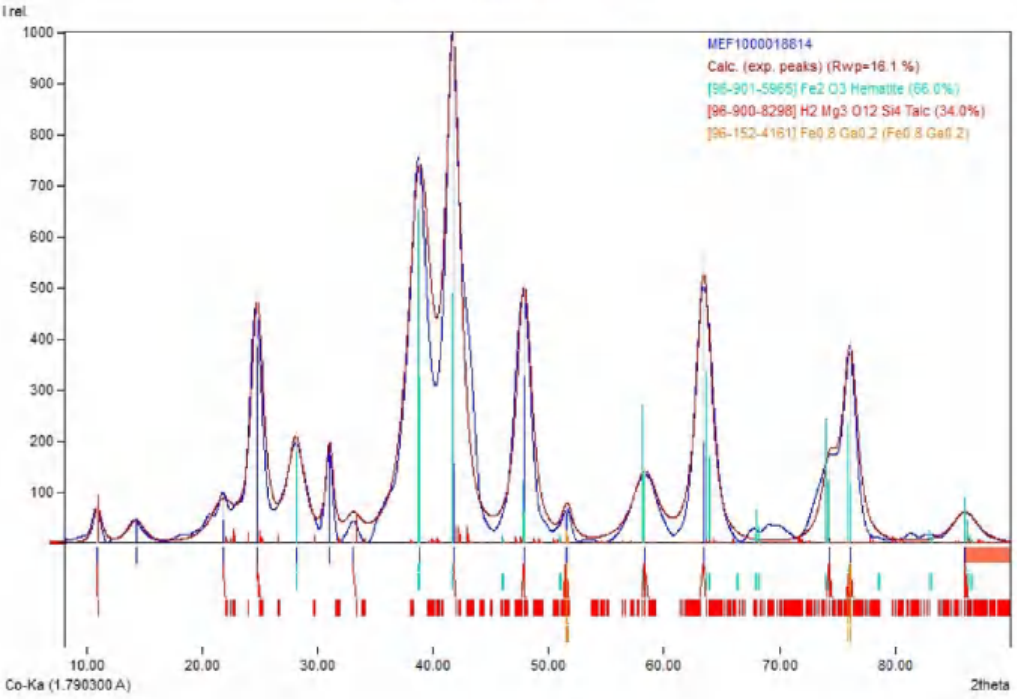
Based on calculated profile

Profile area	***Counts***	***Amount***
Overall diffraction profile	2931722	100.00%
Background radiation	218569	7.46%
Diffraction peaks	2713153	92.54%
Peak area belonging to selected phases	2202085	75.11%
Peak area of phase A (Hematite)	*1797646*	*61.32%*
Peak area of phase B (Talc)	*404439*	*13.80%*
Unidentified peak area	511067	17.43%

Peak Residuals

Peak data	***Counts***	***Amount***
Overall peak intensity	67449	100.00%
Peak intensity belonging to selected phases	40579	60.16%
Unidentified peak intensity	26870	39.84%

Diffraction Pattern Graphics



Saprolit

Match! Phase Analysis Report

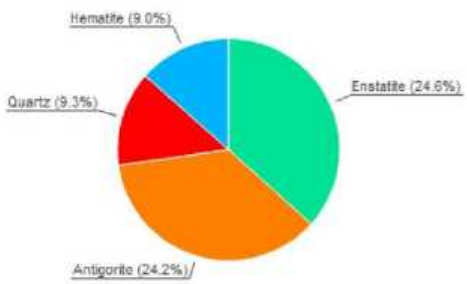
Sample: MEF1000018815

Sample Data

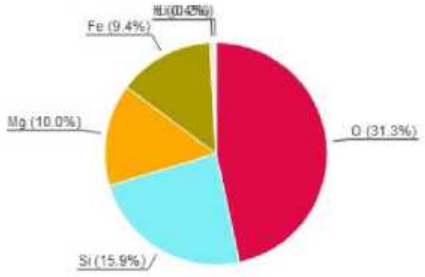
File name	SIL-MWF1000017342.xrdml
File path	D:/SEMESTER 8/SKRIPSI/XRD SOROWAKO 2
Data collected	2024-01-24T12:51:55+01:00
Data range	8.013° - 89.978°
Original data range	8.013° - 89.978°
Number of points	3773
Step size	0.022
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	Yes
Data smoothed	Yes
Radiation	X-rays
Wavelength	1.790300 Å

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	24.6	Enstatite	Fe0.47 Li0.2 Mg1.33 O6 Si2
B	24.2	Antigorite	H79 Mg48 O147 Si34
C	9.3	Quartz	O2 Si
D	9.0	Hematite	Fe2 O3
	32.8	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*31.3%(*)*
Si	15.9%
Mg	10.0%
Fe	9.4%
[illegible]	[illegible]
[illegible]	[illegible]
**LE (sum)*	*31.9%*

Details of identified phases

A: Enstatite (24.6 %)*

Formula sum	Fe0.47 Li0.2 Mg1.33 O6 Si2
Entry number	96-901-0874
Figure-of-Merit (FoM)	0.545932*
Total number of peaks	998
Peaks in range	998
Peaks matched	42
Intensity scale factor	0.08
2theta correction	0.078°
Space group	P b c a
Crystal system	orthorhombic
Unit cell	a= 18.2162 Å b= 8.8194 Å c= 5.2054 Å
I/Ic	0.61
Calc. density	3.370 g/cm³
Reference	Camara F., Iezzi G., Tiepolo M., Oberti R., "The crstal chemistry of lithium and Fe3+ in synthetic orthopyroxeneSample: LMFPX5", Physics and Chemistry of Minerals **33**, 475-483 (2006)

B: Antigorite (24.2 %)*

Formula sum	H79 Mg48 O147 Si34
Entry number	96-900-3104
Figure-of-Merit (FoM)	0.560733*
Total number of peaks	996
Peaks in range	996
Peaks matched	129
Intensity scale factor	0.10
2theta correction	-0.037°
Space group	P 1 m 1
Crystal system	monoclinic
Unit cell	a= 43.5050 Å b= 9.2510 Å c= 7.2630 Å β= 91.320 °
I/Ic	0.72
Calc. density	2.587 g/cm³
Reference	Capitani G., Mellini M., "The modulated crystal structure of antigorite: The m = 17 polysome", American Mineralogist **89**, 147-158 (2004)

C: Quartz (9.3 %)*

Formula sum	O2 Si
Entry number	96-900-0776
Figure-of-Merit (FoM)	0.668091*
Total number of peaks	98
Peaks in range	98
Peaks matched	7
Intensity scale factor	0.15
2theta correction	0.044°
Space group	P 32 2 1 S
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 4.9160 Å c= 5.4054 Å
I/Ic	2.95
Calc. density	2.646 g/cm³
Reference	Levien L., Prewitt C. T., Weidner D. J., "Structure and elastic properties of quartz at pressureP = 1 atm", American Mineralogist **65**, 920-930 (1980)

D: Hematite (9.0 %)*

Formula sum	Fe2 O3
Entry number	96-900-0140
Figure-of-Merit (FoM)	0.612422*
Total number of peaks	96
Peaks in range	96
Peaks matched	9
Intensity scale factor	0.18
2theta correction	0.058°
Space group	R -3 c
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 5.0380 Å c= 13.7720 Å
I/Ic	3.67 (Source: Unknown)
Calc. density	5.256 g/cm³
Reference	Blake R. L., Hessevick R. E., Zoltai T., Finger L. W., "Refinement of the hematite structure", American Mineralogist **51**, 123-129 (1966)

(*)2theta values have been shifted internally for the calculation of the amounts, the intensity scaling factors as well as the figure-of-merit (FoM), due to the active search-match option 'Automatic zero point adaption'.

Candidates

Name	*Formula*	*Entry No.*	*FoM*
Co1.67 Na0.21 (Al4 Si8 O24)	Al4 Co1.67 Na0.21 O24 Si8	96-152-9718	0.6594
	O2 Si	96-210-0189	0.6507
Quartz	O2 Si	96-900-0776	0.6487
Quartz	O2 Si	96-901-2601	0.6483
	O2 Si	96-710-3015	0.6477
Silicon oxide $-alpha (Quartz low)	O2 Si	96-101-1173	0.6475
Quartz	O2 Si	96-901-3322	0.6461
Quartz	O2 Si	96-900-5018	0.6450
Silicon oxide (Quartz)	O2 Si	96-500-0036	0.6442
Quartz	O2 Si	96-901-0145	0.6441
Silicon oxide $-alpha (Quartz low)	O2 Si	96-101-1098	0.6423
Quartz	O2 Si	96-900-9667	0.6410
Quartz	O2 Si	96-900-5019	0.6388
Quartz	O2 Si	96-901-0147	0.6383
Quartz	O2 Si	96-900-5020	0.6382
	H26 N4 O60 V20 Zn5	96-704-9489	0.6376
Quartz	O2 Si	96-901-1494	0.6351
	O2 Si	96-230-0371	0.6346
Retgersite	Ni O10 S	96-901-1290	0.6341
Quartz	O2 Si	96-901-0146	0.6328
	Al0.05 Li0.05 O2 Si0.95	96-900-2384	0.6316
Silicon oxide (Quartz low)	O2 Si	96-101-1160	0.6310

Quartz	O2 Si	96-900-5021	0.6307
Retgersite	H12 Ni O10 S	96-901-1289	0.6267
Aluminocoquimbite	Al Fe H18 O21 S3	96-901-5844	0.6262
	C2 H0 N0.83 O4 P Zn1.17	96-720-4960	0.6260
	C4 H28 I N2 O24 P8 Pt2 Rb2	96-433-0407	0.6245
Silicon oxide - $-alpha (Quartz low)	O2 Si	96-101-1177	0.6244
Si O2	O2 Si	96-152-6861	0.6235
Retgersite	H12 Ni O10 S	96-901-1266	0.6220
Indium hydrogenbis(sulfate) tetrahydrate	H9 In O12 S2	96-100-4046	0.6188
Ca1.78 (Al3.7 Si8.3 O24)	Al3.7 Ca1.78 O24 Si8.3	96-153-5773	0.6175
	In O12 S2	96-901-6319	0.6172
Si O2	O2 Si	96-153-2513	0.6152
Retgersite	H12 Ni O10 S	96-901-1079	0.6144
Retgersite	H12 Ni O10 S	96-901-1885	0.6143
Retgersite	H12 Ni O10 S	96-901-1367	0.6131
Retgersite (deuterated)	D12 Ni O10 S	96-901-1265	0.6130
Retgersite	H12 Ni O10 S	96-901-1244	0.6114
Berlinite	Al O4 P	96-900-6550	0.6056
Portlandite (deuterated)	Ca D2 O2	96-901-0908	0.5825
	C5 Li N O6 P2	96-723-5080	0.5673
Nd (O H)2 (N O3) (H2 O)	H4 N Nd O6	96-153-0315	0.5666
	Al F5 Fe H14 O7	96-157-1110	0.5653
((H2 O)6 Co) ((H2 O) F5 Al)	Al Co F5 H10 O7	96-154-0081	0.5621
K Eu2 F (Si4 O10)	Eu2 F K O10 Si4	96-810-4031	0.5556
Li2 (W O4)	Li2 O4 W	96-231-0516	0.5541
	Al12 Ce10 N36 O18 Si18 Sr3	96-600-0128	0.5520
tricalcium manganese bis(sulfate) hexahydroxide trihydrate	Ca3 H12 Mn O17 S2	96-223-0975	0.5483
Plumboselite	O5 Pb3 Se	96-901-5252	0.5457
Na6 (Si15.96 Al1.98 (Be (O H)0.4 F0.6)2 O39) (H2 O)1.56	Al1.98 Be2 F1.2 H3.92 Na6 O41.36 Si15.96	96-210-6666	0.5415
Ca (H F)6 (As F6)2	As2 Ca F18 H6	96-153-5548	0.5389
and 23 others...			

Search-Match

Settings

Reference database used	COD-Inorg 2024.06.03
Method	Peak-based search-match
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.50
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

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	10.88	9.4411	403.41	2960.76	0.8151	B
2	14.12	7.2836	125.67	731.59	0.6466	B
3	21.68	4.7595	147.43	865.76	0.6522	B
4	22.79	4.5309	432.71	3025.12	0.7765	A,B
5	24.25	4.2625	322.50	4416.82	1.5211	B,C
6	31.00	3.3493	1000.00	2029.34	0.2254	A,B,C
7	32.79	3.1719	854.17	2358.30	0.3066	A,B
8	36.22	2.8799	330.83	611.60	0.2053	A,B
9	38.65	2.7048	314.77	4187.76	1.4776	A,B,D
10	41.65	2.5178	653.22	9457.49	1.6080	A,B,D
11	47.76	2.2113	189.74	2450.14	1.4342	A,B,D
12	58.93	1.8199	79.07	316.39	0.4444	A,C
13	63.38	1.7040	205.32	398.94	0.2173	A,D
14	72.31	1.5172	160.02	1989.91	1.3907	A
15	75.88	1.4560	162.71	1770.51	1.2169	A,C,D

Integrated Profile Areas

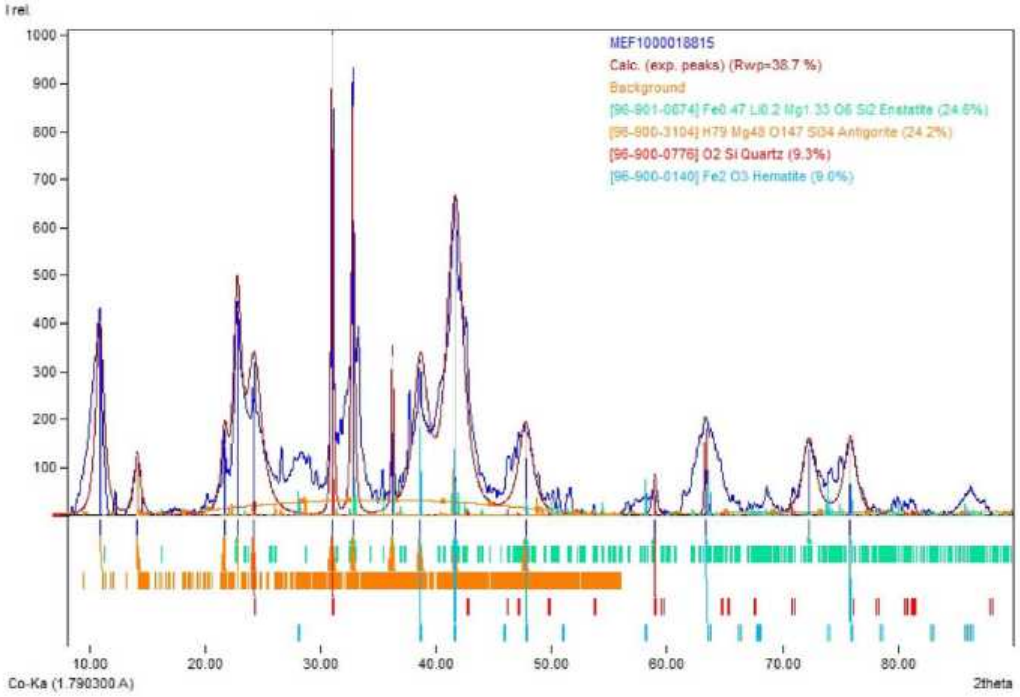
Based on calculated profile

Profile area	***Counts***	***Amount***
Overall diffraction profile	2306865	100.00%
Background radiation	304404	13.20%
Diffraction peaks	2002461	86.80%
Peak area belonging to selected phases	1245330	53.98%
Peak area of phase A (Enstatite)	*402846*	*17.46%*
Peak area of phase B (Antigorite)	*325444*	*14.11%*
Peak area of phase C (Quartz)	*151054*	*6.55%*
Peak area of phase D (Hematite)	*365985*	*15.87%*
Unidentified peak area	757131	32.82%

Peak Residuals

Peak data	*Counts*	*Amount*
Overall peak intensity	37570	100.00%
Peak intensity belonging to selected phases	14445	38.45%
Unidentified peak intensity	23125	61.55%

Diffraction Pattern Graphics



Bedrock

Match! Phase Analysis Report

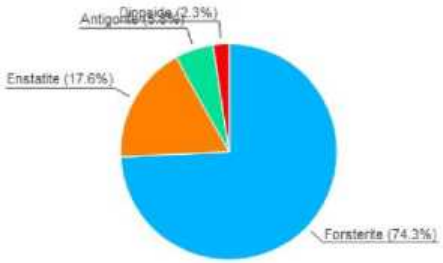
Sample: MEF1000018817

Sample Data

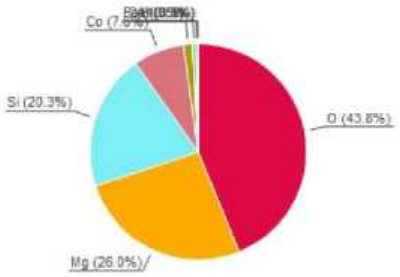
File name	SIL-MWF1000017344.xrdml
File path	D:/SEMESTER 8/SKRIPSI/XRD SOROWAKO 2
Data collected	2024-01-24T12:43:58+01:00
Data range	8.013° - 89.978°
Original data range	8.013° - 89.978°
Number of points	3773
Step size	0.022
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	Yes
Data smoothed	Yes
Radiation	X-rays
Wavelength	1.790300 Å

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	74.3	Forsterite	Co0.261 Mg1.739 O4 Si
B	17.6	Enstatite	Al0.14 Ca0.012 Fe0.24 Mg1.66 O6 Si1.94
C	5.8	Antigorite	H58 Mg45 O138 Si32
D	2.3	Diopside	Ca Fe0.26 Mg0.74 O6 Si2
	25.7	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	43.8%(*)
Mg	26.0%
Si	20.3%
Co	7.6%
Fe	1.3%
Ca	0.5%
Al	0.3%
*LE (sum)	43.9%

Details of identified phases

A: Forsterite (74.3 %)*

Formula sum	Co0.261 Mg1.739 O4 Si
Entry number	96-900-1065
Figure-of-Merit (FoM)	0.773535*
Total number of peaks	474
Peaks in range	160
Peaks matched	72
Intensity scale factor	0.85
2theta correction	0.060°
Space group	P b n m
Crystal system	orthorhombic
Unit cell	a= 4.7600 Å b= 10.2210 Å c= 5.9840 Å
I/Ic	0.96
Calc. density	3.416 g/cm³
Reference	Miyake M., Nakamura H., Kojima H., Marumo F., "Cation ordering in Co-Mg olivine solid-solution seriesSample: Co03", American Mineralogist **72**, 594-598 (1987)

B: Enstatite (17.6 %)*

Formula sum	Al0.14 Ca0.012 Fe0.24 Mg1.66 O6 Si1.94
Entry number	96-900-6437
Figure-of-Merit (FoM)	0.568163*
Total number of peaks	1000
Peaks in range	394
Peaks matched	102
Intensity scale factor	0.11
2theta correction	0.016°
Space group	P b c a
Crystal system	orthorhombic
Unit cell	a= 18.2310 Å b= 8.8095 Å c= 5.1873 Å
I/Ic	0.52
Calc. density	3.324 g/cm³
Reference	Hugh-Jones D A, Chopelas A., Angel R. J., "Tetrahedral compression in (Mg,Fe)SiO3 orthopyroxenesSample: P = 0.00 GPa, natural orthopyroxene", Physics and Chemistry of Minerals **24**, 301-310 (1997)

C: Antigorite (5.8 %)*

Formula sum	H58 Mg45 O138 Si32
Entry number	96-900-4000
Figure-of-Merit (FoM)	0.612766*
Total number of peaks	654
Peaks in range	654
Peaks matched	227
Intensity scale factor	0.05
2theta correction	-0.032°
Space group	C 1 2/m 1
Crystal system	monoclinic
Unit cell	a= 81.6640 Å b= 9.2550 Å c= 7.2610 Å β= 91.409 °
I/Ic	0.70
Calc. density	2.578 g/cm³
Reference	Capitani G. C., Mellini M., "The crystal structure of a second antigorite polysome (m = 16),by single-crystal synchrotron diffraction", American Mineralogist **91**, 394-399 (2006)

D: Diopside (2.3 %)*

Formula sum	Ca Fe0.26 Mg0.74 O6 Si2
Entry number	96-900-4212
Figure-of-Merit (FoM)	0.583702*
Total number of peaks	572
Peaks in range	207
Peaks matched	60
Intensity scale factor	0.04
2theta correction	-0.074°
Space group	C 1 2/c 1
Crystal system	monoclinic
Unit cell	a= 9.7730 Å b= 8.9523 Å c= 5.2524 Å β= 105.676 °
I/Ic	1.31
Calc. density	3.374 g/cm³
Reference	Raudsepp M., Hawthorne F. C., Turnock A. C., "Evaluation of the Rietveld method for the characterization of fine-grainedproducts of the mineral synthesis: the diopside-hedenbergite joinSample: D3", The Canadian Mineralogist **28**, 93-109 (1990)

(*)2theta values have been shifted internally for the calculation of the amounts, the intensity scaling factors as well as the figure-of-merit (FoM), due to the active search-match option 'Automatic zero point adaption'.

Candidates

Name	*Formula*	*Entry No.*	*FoM*
	Ga O4 P	96-151-8036	0.5607
	Ga O4 P	96-151-8035	0.5591
Al P O4	Al O4 P	96-231-0665	0.5531
Si O2	O2 Si	96-153-6390	0.5421
	Cl3 Cs In0.07 Sn0.9	96-400-3023	0.5343
Sr2 Fe Mo O6	Fe Mo O6 Sr2	96-152-8328	0.5157
	Cl3 Cs In0.07 Sn0.9	96-400-3024	0.5153
Cs2 (Ce (N O3)5 (H2 O)2)	Ce Cs2 H4 N5 O17	96-153-6041	0.5134
	B Ba3 S6 Sb	96-434-2935	0.5127
	Cl3 Cs Mn0.1 Sn0.9	96-400-3021	0.5110
Bavenite	Al1.867 Be2.15 Ca4 H2 Na0.006 O28 Si8.983	96-901-7567	0.5093
Bavenite	Al1.816 Be2.22 Ca4 H2 Na0.003 O28 Si8.964	96-901-7563	0.5081
Bavenite	Al1.882 Be2.178 Ca4 H2 Na0.009 O28 Si8.94	96-901-7561	0.5066
Bavenite	Al1.801 Be2.13 Ca3.919 H2 Na0.012 O28 Si9.069	96-901-7566	0.5056
	H14 Mg6 O16 S	96-210-1504	0.5053
Sn Cl F	Cl F Sn	96-210-7071	0.5050
Ronneburgite	K2 Mn O12 V4	96-900-2584	0.5043
Sr1.9 Nd0.1 Fe Mo O6	Fe Mo Nd0.1 O6 Sr1.9	96-152-8329	0.5041
Uranium trihydride - \b	H3 U	96-100-8631	0.5024
Iron silicate - \a (Fayalite)	Fe2 O4 Si	96-100-0065	0.0000
Fayalite	Ca0.004 Fe1.844 Mg0.078 Mn0.074 O4 Si	96-900-0169	0.0000
Fayalite	Ca0.02 Fe0.98 Mg0.98 Mn0.02 O4 Si	96-900-0170	0.0000
Fayalite	Fe2.001 O4 Si0.999	96-900-0396	0.0000
Fayalite	Fe2 O4 Si	96-900-0470	0.0000
Fayalite	Fe2 O4 Si	96-900-0471	0.0000

Fayalite	Fe2 O4 Si	96-900-0472	0.0000
Fayalite	Fe2 O4 Si	96-900-0473	0.0000
Fayalite	Fe2 O4 Si	96-900-0555	0.0000
Fayalite	Fe2 O4 Si	96-900-0556	0.0000
Fayalite	Fe2 O4 Si	96-900-0557	0.0000
Fayalite	Fe2 O4 Si	96-900-0558	0.0000
Fayalite	Fe2 O4 Si	96-900-0559	0.0000
Fayalite	Fe2 O4 Si	96-900-0560	0.0000
Fayalite	Fe2 O4 Si	96-900-0561	0.0000
Fayalite	Fe2 O4 Si	96-900-0562	0.0000
Fayalite	Fe2 O4 Si	96-900-0563	0.0000
Fayalite	Fe2 O4 Si	96-900-7047	0.0000
Fayalite	Fe2 O4 Si	96-901-1589	0.0000
Fayalite	Fe2 O4 Si	96-901-1590	0.0000
Fayalite	Fe2 O4 Si	96-901-1591	0.0000
Fayalite	Fe2 O4 Si	96-901-1592	0.0000
Fayalite	Fe2 O4 Si	96-901-1593	0.0000
Fayalite	Fe2 O4 Si	96-901-1594	0.0000
Fayalite	Fe1.1 Mg0.75 Mn0.15 O4 Si	96-901-4821	0.0000
Fayalite	Fe1.4 Mn0.6 O4 Si	96-901-5038	0.0000
Fayalite	Fe1.1 Mg0.75 Mn0.15 O4 Si	96-901-5274	0.0000
Fayalite	Fe Mn O4 Si	96-901-5641	0.0000
Fayalite	Fe1.1 Mg0.75 Mn0.15 O4 Si	96-901-6213	0.0000
Fayalite	Fe1.1 Mg0.75 Mn0.15 O4 Si	96-901-6290	0.0000

Search-Match

Settings

Reference database used	COD-Inorg 2024.06.03
Method	Peak-based search-match
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.50
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

Criteria for entries added by user

Reference:

Entry number: 96-100-0065;96-900-0169;96-900-0170;96-900-0396;96-900-0470;96-900-0471;96-900-0472;96-900-0473;96-900-0555;96-900-0556;96-900-0557;96-900-0558;96-900-0559;96-900-0560;96-900-0561;96-900-0562;96-900-0563;96-900-7047;96-901-1589;96-901-1590;96-901-1591;96-901-1592;96-901-1593;96-901-1594;96-901-4821;96-901-5038;96-901-5274;96-901-5641;96-901-6213;96-901-6290

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	10.90	9.4224	41.74	281.29	0.2693	C
2	12.21	8.4192	51.53	220.14	0.1707	
3	14.08	7.3059	88.24	1187.43	0.5377	C
4	20.16	5.1145	477.42	1984.25	0.1661	A,C
5	24.29	4.2550	83.41	594.98	0.2850	C
6	26.57	3.8954	651.45	3035.08	0.1862	A,C
7	27.79	3.7279	202.95	896.52	0.1765	A,C
8	29.61	3.5028	214.54	1772.96	0.3302	A,C
9	31.02	3.3470	544.86	3387.96	0.2484	B,C,D
10	32.81	3.1698	300.87	1532.84	0.2036	B,C
11	34.74	2.9984	245.67	1156.49	0.1881	A,C,D
12	36.26	2.8765	348.38	1398.37	0.1604	B,C,D
13	37.67	2.7724	907.16	3694.95	0.1627	A,B,C
14	41.67	2.5166	953.38	4517.98	0.1893	A,B,C,D
15	42.61	2.4639	1000.00	5223.39	0.2087	A,B,C
16	44.71	2.3533	160.03	798.56	0.1994	A,B,C,D
17	45.39	2.3202	115.59	479.52	0.1658	A,C,D
18	46.47	2.2688	285.83	2935.53	0.4103	A,B,C
19	46.87	2.2509	370.86	1407.21	0.1516	A,B,C,D
20	48.89	2.1633	193.55	881.11	0.1819	A,B,D
21	52.17	2.0359	49.89	260.14	0.2083	A,B,D
22	56.86	1.8802	77.73	394.42	0.2027	A,B
23	61.45	1.7521	556.21	3138.36	0.2254	A,D
24	64.66	1.6738	132.35	777.40	0.2347	A,B,D
25	66.18	1.6395	133.29	896.84	0.2688	A,B,D
26	67.03	1.6212	121.26	778.95	0.2567	A,B,D
27	73.33	1.4990	264.01	1786.56	0.2704	A,B,D
28	74.33	1.4817	382.55	2681.50	0.2801	A,B,D
29	79.68	1.3973	111.95	1085.15	0.3873	A,B,D
30	82.85	1.3529	82.66	1058.85	0.5118	A,B
31	85.70	1.3163	52.72	785.87	0.5956	A,B,D
32	87.28	1.2970	38.80	614.94	0.6333	A,B,D

Integrated Profile Areas

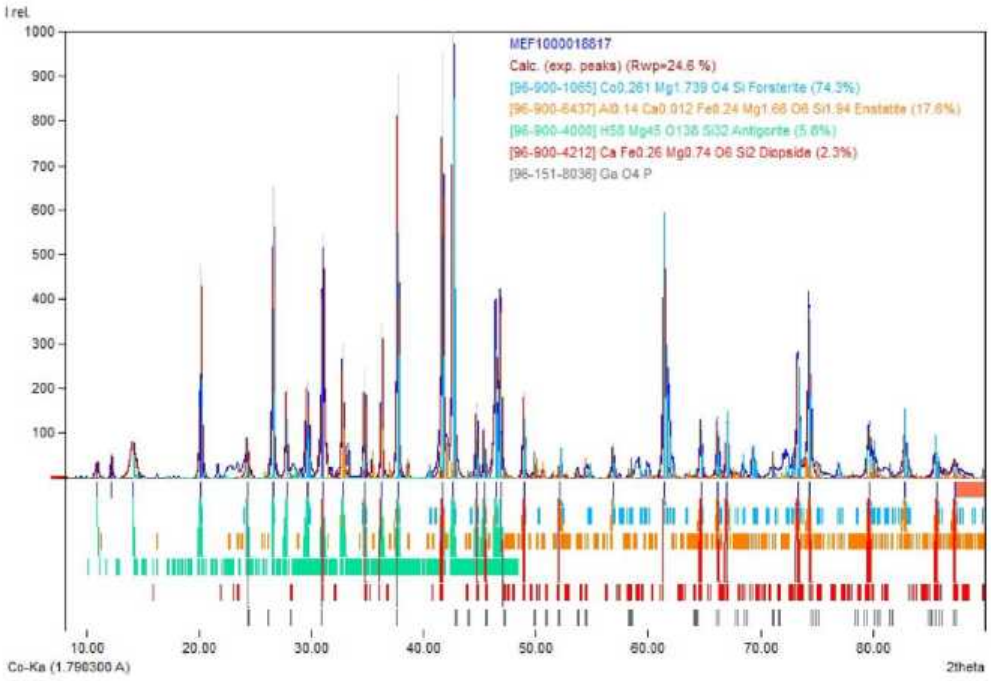
Based on calculated profile

Profile area	*Counts*	*Amount*
Overall diffraction profile	2718300	100.00%
Background radiation	0	0.00%
Diffraction peaks	2728869	100.39%
Peak area belonging to selected phases	2031264	74.73%
Peak area of phase A (Forsterite)	*1627164*	*59.86%*
Peak area of phase B (Enstatite)	*300052*	*11.04%*
Peak area of phase C (Antigorite)	*63530*	*2.34%*
Peak area of phase D (Diopside)	*40518*	*1.49%*
Unidentified peak area	697605	25.66%

Peak Residuals

Peak data	*Counts*	*Amount*
Overall peak intensity	51646	100.00%
Peak intensity belonging to selected phases	49934	96.69%
Unidentified peak intensity	1712	3.31%

Diffraction Pattern Graphics



LAMPIRAN D

Hasil Analisis *X-Ray Diffraction* (XRD) Blok Petea

Limonit

Match! Phase Analysis Report

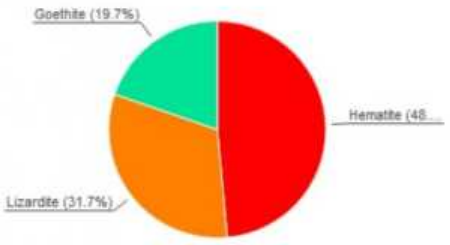
Sample: MEF1000018815

Sample Data

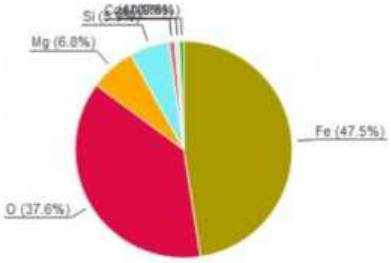
File name	SIL-MWF1000017338.xrdml
File path	D:/SEMESTER 8/SKRIPSI/XRD PETEA 2
Data collected	2024-01-24T13:07:18+01:00
Data range	8.013° - 89.978°
Original data range	8.013° - 89.978°
Number of points	3773
Step size	0.022
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	Yes
Data smoothed	Yes
Radiation	X-rays
Wavelength	1.790300 Å

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	48.5	Hematite	Fe2 O3
B	31.7	Lizardite	Al0.201 Fe0.339 H4 Mg2.544 O9 Si1.904
C	19.7	Goethite	Co0.07 Fe0.93 H O2
	10.8	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
Fe	47.5%
O	*37.6%(*)*
Mg	6.8%
Si	5.9%
Co	0.9%
[illegible]	[illegible]
Al	0.6%
**LE (sum)*	*38.2%*

Details of identified phases

A: Hematite (48.5 %)*

Formula sum	Fe2 O3
Entry number	96-901-5066
Figure-of-Merit (FoM)	0.783628*
Total number of peaks	94
Peaks in range	94
Peaks matched	18
Intensity scale factor	0.61
2theta correction	-0.015°
Space group	R -3 c
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 5.0249 Å c= 13.7163 Å
I/Ic	3.72 (Source: Unknown)
Calc. density	5.305 g/cm³
Reference	Finger L. W., Hazen R. M., "Crystal structure and isothermal compression of Fe2O3, Cr2O3, and V2O3 to 50 kbarsNote: P = 15.4 kbar", Journal of Applied Physics **51**, 5362-5367 (1980)

B: Lizardite (31.7 %)*

Formula sum	Al0.201 Fe0.339 H4 Mg2.544 O9 Si1.904
Entry number	96-901-6051
Figure-of-Merit (FoM)	0.595958*
Total number of peaks	152
Peaks in range	152
Peaks matched	16
Intensity scale factor	0.16
2theta correction	0.143°
Space group	P 3 1 m
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 5.3263 Å c= 7.2885 Å
I/Ic	1.48 (Source: Unknown)
Calc. density	2.668 g/cm³
Reference	Laurora A., Brigatti M. F., Malferrari D., Galli E., "The crystal chemistry of lizardite-1T from northApennines ophiolites near Modena, ItalyNote: sample Santa Scolastica, polytype 1T", The Canadian Mineralogist **49**, 1045-1054 (2011)

C: Goethite (19.7 %)*

Formula sum	Co0.07 Fe0.93 H O2
Entry number	96-901-0410
Figure-of-Merit (FoM)	0.569530*
Total number of peaks	244
Peaks in range	244
Peaks matched	14
Intensity scale factor	0.21
2theta correction	0.010°
Space group	P b n m
Crystal system	orthorhombic
Unit cell	a= 4.5901 Å b= 9.9309 Å c= 3.0148 Å
I/Ic	3.09
Calc. density	4.305 g/cm³
Reference	Alvarez M., Sileo E. E., Rueda E. H., "Structure and reactivity of synthetic Co-substituted goethitesSample: G7, 7 mol% Co", American Mineralogist **93**, 584-590 (2008)

(*)2theta values have been shifted internally for the calculation of the amounts, the intensity scaling factors as well as the figure-of-merit (FoM), due to the active search-match option 'Automatic zero point adaption'.

Candidates

Name	*Formula*	*Entry No.*	*FoM*
	H8 Ni6 O18 Si4	96-230-0710	0.5455
	As2 Li4 O9 V	96-434-5025	0.5349
	H8 Mg2 Ni4 O18 Si4	96-230-0709	0.5340
Cu6 (Si6 O18) (H2 O)6	Cu6 H12 O24 Si6	96-153-5106	0.5240
Mg3Si2O5(OH)4 (chrysotile)	H4 Mg3 O9 Si2	96-155-2116	0.5177
Zippeite	H27 Na5 O52 S4 U8	96-900-4756	0.5166
	D4 O7 P V	96-151-7988	0.5164
Lizardite	Al0.209 Fe0.105 H4 Mg2.787 O9 Si1.896	96-901-5581	0.5118
Lizardite	Al0.201 Fe0.339 H4 Mg2.544 O9 Si1.904	96-901-6051	0.5116
	H8 Mg4 Ni2 O18 Si4	96-230-0707	0.5068
Lizardite	Al0.223 Fe0.141 H4 Mg2.742 O9 Si1.888	96-901-5164	0.5050
	Cs0.12 H1.02 Mo O0.51 S2	96-156-1665	0.5042
Lizardite	Al0.235 Fe0.147 H4 Mg2.733 O9 Si1.882	96-901-6148	0.5040
Lizardite-2H1	Mg3 O9 Si2	96-900-4513	0.5035
	C22 B8.08 O194.64 Si87.92	96-434-9515	0.5031
	F4 Li O2 Re	96-432-1983	0.5016
Lizardite	Al0.151 Fe0.174 H4 Mg2.745 O9 Si1.924	96-901-5487	0.5014
Lizardite	Al0.162 Fe0.18 H4 Mg2.694 O9 Si1.886	96-901-4665	0.5008

Search-Match

Settings

Reference database used	COD-Inorg 2024.06.03
Method	Peak-based search-match
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.50
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

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	10.86	9.4600	94.36	375.87	0.4418	
2	14.01	7.3398	537.61	2610.17	0.5384	B
3	21.72	4.7501	89.37	596.30	0.7399	
4	23.14	4.4637	131.12	1566.18	1.3246	
5	24.74	4.1777	419.36	3238.67	0.8564	C
6	28.31	3.6606	428.80	4477.27	1.1579	A,B
7	30.96	3.3539	140.59	592.78	0.4676	C

8	33.20	3.1335	56.50	263.67	0.5176	
9	38.83	2.6932	675.25	10865.40	1.7844	A,C
10	41.69	2.5153	1000.00	10783.86	1.1959	A,B,C
11	43.04	2.4402	249.24	2462.07	1.0955	B,C
12	48.00	2.2010	466.19	5750.11	1.3678	A,B
13	58.40	1.8347	156.55	3119.30	2.2097	A
14	63.92	1.6910	487.49	6650.43	1.5129	A,B,C
15	70.99	1.5418	69.04	1590.52	2.5546	B
16	74.22	1.4836	178.16	4235.82	2.6366	A
17	76.35	1.4482	308.78	3040.61	1.0920	A,C
18	86.28	1.3091	66.57	1166.17	1.9427	A,B,C

Integrated Profile Areas

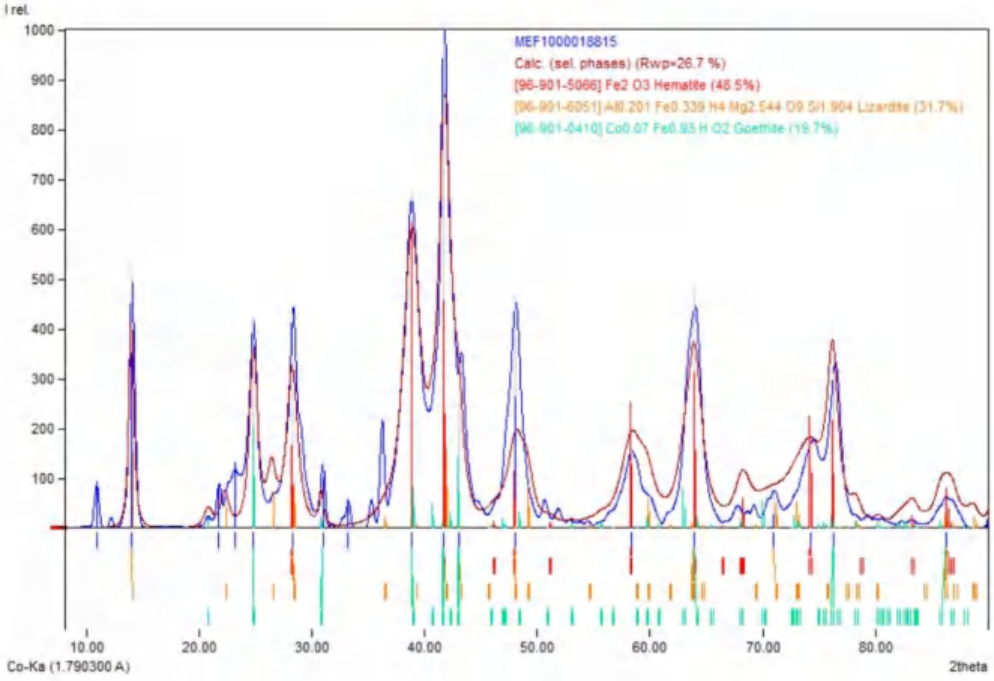
Based on calculated profile

Profile area	*Counts*	*Amount*
Overall diffraction profile	2789624	100.00%
Background radiation	313416	11.24%
Diffraction peaks	2476208	88.76%
Peak area belonging to selected phases	2175619	77.99%
Peak area of phase A (Hematite)	*1272077*	*45.60%*
Peak area of phase B (Lizardite)	*426949*	*15.30%*
Peak area of phase C (Goethite)	*476593*	*17.08%*
Unidentified peak area	300589	10.78%

Peak Residuals

Peak data	*Counts*	*Amount*
Overall peak intensity	63385	100.00%
Peak intensity belonging to selected phases	50037	78.94%
Unidentified peak intensity	13348	21.06%

Diffraction Pattern Graphics



Saprolit

Match! Phase Analysis Report

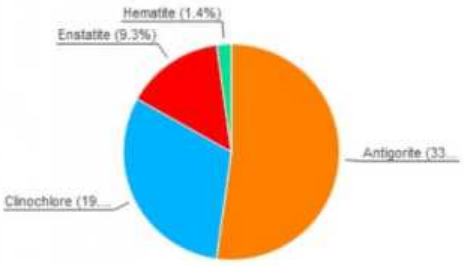
Sample: MEF1000018815

Sample Data

File name	SIL-MWF1000017339.xrdml
File path	D:/SEMESTER 8/SKRIPSI/XRD PETEA 2
Data collected	2024-01-24T12:59:33+01:00
Data range	8.013° - 89.978°
Original data range	8.013° - 89.978°
Number of points	3773
Step size	0.022
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	Yes
Data smoothed	Yes
Radiation	X-rays
Wavelength	1.790300 Å

Analysis Results

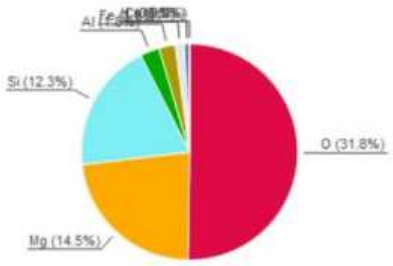
Phase composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	33.0	Antigorite	H79 Mg48 O147 Si34
B	19.6	Clinochlore	Al1.75 Cr0.25 H8 Mg5 O18 Si3
C	9.3	Enstatite	Al0.14 Ca0.012 Fe0.24 Mg1.66 O6 Si1.94
D	1.4	Hematite	Fe2 O3
	36.8	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Elemental composition (Weight %) calc. by RIR method



Element	*Amount (weight %)*
O	*31.8%(*)*
Mg	14.5%
Si	12.3%
Al	1.8%
Fe	1.6%
Ca	0.8%(*)
Cr	0.5%
Ca	0.0%
**LE (sum)*	32.6%

Details of identified phases

A: Antigorite (33.0 %)*

Formula sum	H79 Mg48 O147 Si34
Entry number	96-900-3104
Figure-of-Merit (FoM)	0.590275*
Total number of peaks	996
Peaks in range	996
Peaks matched	126
Intensity scale factor	0.33
2theta correction	-0.131°
Space group	P 1 m 1
Crystal system	monoclinic
Unit cell	a= 43.5050 Å b= 9.2510 Å c= 7.2630 Å β= 91.320 °
I/Ic	0.72 (Source: Unknown)
Calc. density	2.587 g/cm³
Reference	Capitani G., Mellini M., "The modulated crystal structure of antigorite: The m = 17 polysome", American Mineralogist **89**, 147-158 (2004)

B: Clinochlore (19.6 %)*

Formula sum	Al1.75 Cr0.25 H8 Mg5 O18 Si3
Entry number	96-900-0759
Figure-of-Merit (FoM)	0.572872*
Total number of peaks	506
Peaks in range	506
Peaks matched	51
Intensity scale factor	0.15
2theta correction	0.060°
Space group	C -1
Crystal system	triclinic (anorthic)
Unit cell	a= 5.3340 Å b= 9.2280 Å c= 14.3710 Å α= 90.530° β= 97.430 ° γ= 89.900 °
I/Ic	0.55 (Source: Unknown)
Calc. density	2.661 g/cm³
Reference	Phillips T. L., Loveless J. K., Bailey S. W., "Cr3+ coordination in chlorites: a structural study of ten chromian chloritesSiskiyou Co., Calif.", American Mineralogist **65**, 112-122 (1980)

C: Enstatite (9.3 %)*

Formula sum	Al0.14 Ca0.012 Fe0.24 Mg1.66 O6 Si1.94
Entry number	96-900-6439
Figure-of-Merit (FoM)	0.526603*
Total number of peaks	996
Peaks in range	373
Peaks matched	36
Intensity scale factor	0.07
2theta correction	0.036°
Space group	P b c a
Crystal system	orthorhombic
Unit cell	a= 18.1600 Å b= 8.7503 Å c= 5.1606 Å
I/Ic	0.51 (Source: Unknown)
Calc. density	3.377 g/cm³
Reference	Hugh-Jones D A, Chopelas A., Angel R. J., "Tetrahedral compression in (Mg,Fe)SiO3 orthopyroxenesSample: P = 1.90 GPa, natural orthopyroxene", Physics and Chemistry of Minerals **24**, 301-310 (1997)

D: Hematite (1.4 %)*

Formula sum	Fe2 O3
Entry number	96-900-0140
Figure-of-Merit (FoM)	0.551009*
Total number of peaks	96
Peaks in range	34
Peaks matched	10
Intensity scale factor	0.07
2theta correction	0.041°
Space group	R -3 c
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 5.0380 Å c= 13.7720 Å
I/Ic	3.67 (Source: Unknown)
Calc. density	5.256 g/cm³
Reference	Blake R. L., Hessevick R. E., Zoltai T., Finger L. W., "Refinement of the hematite structure", American Mineralogist **51**, 123-129 (1966)

(*)2theta values have been shifted internally for the calculation of the amounts, the intensity scaling factors as well as the figure-of-merit (FoM), due to the active search-match option 'Automatic zero point adaption'.

Candidates

Name	*Formula*	*Entry No.*	*FoM*
	C16 N4 O23 Se5 U4	96-721-7153	0.6133
	C9 H41 B17 Mg N4.5 O31.5	96-771-5889	0.6123
Os10 C (C O)24 I2	C25 I2 O24 Os10	96-711-7492	0.6011
	B Br6 Cl12 H38 O17 Zr6	96-430-0115	0.5935
Bis[cis-cyclohexane tris(methylamine)zinc bis(trifluoromethyl-sulfonate)][(C6H9(NH2)3] Zn(CF3SO3)2	C14 H30 F6 N6 O6 S2 Zn	96-210-3190	0.5838
	Er2 O10.5 P3	96-711-0109	0.5788
	H29.2 Mo12 Na5.8 O55.5 U	96-724-8370	0.5779
Cd5 (O H)8 (N O3)2 (H2 O)2	Cd5 H12 N2 O16	96-153-9680	0.5763
As3 S4 Sb F6	As3 F6 S4 Sb	96-434-4210	0.5753
	As2 H16 O20 Sr U2	96-900-4912	0.5660
Sr (As U O6)2 (H2 O)8	As2 H16 O20 Sr U2	96-153-8512	0.5639
Uramarsite	As1.22 H12.72 N1.15 Na0.09 O18 P0.78 U2	96-901-2685	0.5625
N,N'-bis(2-hydroxybenzyl)piperazine copper(II) acetate	C22 H26 Cu2 N2 O6	96-155-7326	0.5615
	C3 H6 Er2 O10.5 P3	96-711-0106	0.5615
Cs3 (Au O2) (Cs1.72 Rb2.28 Au4)	Au5 Cs4.72 O2 Rb2.28	96-151-0553	0.5571
Belendorffite	Cu7 Hg6	96-901-2536	0.5563
	C35 H31.5 Mn N2.5 O9 P	96-712-3812	0.5529
	C3 H8 Er2 O11.5 P3	96-711-0108	0.5512
Lead bismuth oxide (.3/.7/1.3)	Bi0.67 O1.33 Pb0.33	96-101-0021	0.5506
(N H4)4 (Pt12 O8 (S O4)12)	H16 N4 O56 Pt12 S12	96-153-6519	0.5495
As3 S4 As F6	As4 F6 S4	96-434-4209	0.5483
Monolanthanum tripotassium tetrahydrogen decamolybdodicobaltate(III)tridecahydrate	Co2 H30 K3 La Mo10 O51	96-222-4854	0.5418
	C12 Cl3 Cs7 Mo4 N12 Na4 Se4	96-431-0718	0.5417
(N H4)6 (Mo7 O22.5 (O2)1.5) (H2 O)6	H36 Mo7 N6 O31.5	96-810-4083	0.5393

Rb8 (Ta6 O19) (H2 O)14	C I3 K2 N O Pb	96-770-1773	0.5390
(HNEt3)2[Re2(Cl4C6O2)4](C4H8O)	H28 O33 Rb8 Ta6	96-153-5081	0.5366
biammonium trisodium nonadecaoxo(tritungsto)trivanadate dodecahydrate	C40 H40 Cl16 N2 O9 Re2	96-431-5078	0.5318
Cu5 O (Se O3) Cl5	H32 N2 Na3 O31 V3 W3	96-200-7290	0.5295
Hexaaquadodeca-\m-bromo-octahedro-hexatantalum bromide chloride octahydrate	C42 H100 Ba Nb2 O14	96-403-0525	0.5256
Hexahydride tetrapotassium hexadecasodium(germanodecatungstato) (phosphononatungstato)tetrazirconateheptatriacontahydrate	Cl5 Cu5 O4 Se	96-153-7554	0.5247
beryllium bis(hypophosphite)	Ca Li2	96-152-7865	0.5239
Sr5 Sn3	Br12.4 Cl1.6 H28 O14 Ta6	96-201-2745	0.5217
Tremolite	Ge2 H80 K4 Na16 O181 P2 W38 Zr4	96-202-1257	0.5215
Tremolite	Be H4 O4 P2	96-201-4099	0.5213
Pentabarium aluminium iridium(IV) iridium(V) undecaoxide	Sn3 Sr5	96-722-1340	0.5212
Ag2 (Pb P2 O7)	Al0.01 Ca1.94 Cl0.01 F0.03 Fe0.12 H1.96 K0.01 Mg4.85 Mn0.02 Na0.05 O23.96 Si8	96-901-0498	0.5203
2C70, 3CS2 solvate	Al0.144 B0.008 Ca1.85 F0.33 Fe0.18 H1.67 K0.1 Mg4.75 Mn0.01 Na0.31 O23.67Si7.928 Ti0.01 Zn0.01	96-900-3674	0.5134
Pb3.5 V4.51 O14.75	Al Ba5 Ir2 O11	96-200-2454	0.5133
(N H4)6 (Sb4 F12 (S O4)3)	C42 H32 S4 Sn2	96-210-0062	0.5116
Tremolite	Ag2 O7 P2 Pb	96-150-9703	0.5114
Actinolite	C143 S6	96-450-8337	0.5104
Tremolite	O14.75 Pb3.5 V4.51	96-152-7054	0.5094
Tremolite	F12 H24 N6 O12 S3 Sb4	96-202-0219	0.5051
Na0.51 K0.06 Ca1.86 Mg2.87 Fe1.33 Al0.96 (Al2.04 Si5.96 O22) (O H)2	Ca2 H2 Mg5 O24 Si8	96-900-0360	0.5051
Pargasite	O5 Pb3 Se	96-400-1078	0.5050
Hornblende	Al0.252 Ca1.904 F0.726 Fe0.905 H1.566 K0.096 Mg4.083 Mn0.02 Na0.232 O23.274Si7.788 Ti0.014	96-900-1923	0.5032
Actinolite	Ca2 H2 Mg5 O24 Si8	96-900-1781	0.5019
	Ca2 H2 Mg5 O24 Si8	96-900-1780	0.5018
	Al3 Ca1.86 Fe1.33 H2 K0.06 Mg2.87 Na0.51 O24 Si5.96	96-153-0340	0.5012
	Al1.85 Ca0.98 Fe0.76 H2 K0.018 Mg3.41 Na1.69 O24 Si7.08 Ti0.02	96-901-0541	0.5012
	Al1.08 Ca1.7 Fe1.718 H2 Mg3.442 Na0.46 O24 Si6.92	96-900-1245	0.5001
	Al0.204 Ca1.954 F0.276 Fe0.947 H1.696 K0.096 Mg4.031 Mn0.014 Na0.152 O23.724Si7.82 Ti0.004	96-900-1924	0.5001

and 132 others...

Search-Match

Settings

Reference database used	COD-Inorg 2024.06.03
Method	Peak-based search-match
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.50
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

Criteria for entries added by user

Reference:

Entry number: 96-100-0048;96-101-1019;96-154-5543;96-154-8550;96-154-8551;96-154-8552;96-156-6758;96-900-1179;96-900-1221;96-900-1594;96-900-1595;96-900-1596;96-900-1597;96-900-1598;96-900-1599;96-900-1600;96-900-1601;96-900-1602;96-900-1642;96-900-1643;96-900-1644;96-900-1645;96-900-1646;96-900-1700;96-900-1701;96-900-2711;96-900-2712;96-900-2713;96-900-2714;96-900-2715;96-900-2716;96-900-2717;96-900-4030;96-900-4031;96-900-4032;96-900-4033;96-900-4034;96-900-4118;96-900-4119;96-900-4957;96-900-4958;96-900-5542;96-900-5543;96-900-5544;96-900-5545;96-900-5589;96-900-5590;96-900-5776;96-900-5777;96-900-6338;96-900-6339;96-900-6340;96-900-6341;96-900-6342;96-900-6343;96-900-6428;96-900-6429;96-900-6430;96-900-6431;96-900-6432;96-900-6433;96-900-6434;96-900-6435;96-900-6436;96-900-6437;96-900-6438;96-900-6439;96-900-6440;96-900-6441;96-900-6442;96-900-6443;96-900-8078;96-900-8165;96-901-0242;96-901-0872;96-901-0873;96-901-0874;96-901-0888;96-901-0889;96-901-0890;96-901-0891;96-901-0892;96-901-0893;96-901-0894;96-901-0895;96-901-0896;96-901-0897;96-901-0898;96-901-0899;96-901-1582;96-901-3659;96-901-4118;96-901-4448;96-901-4536;96-901-4861;96-901-4978;96-901-4984;96-901-5810;96-901-6053;96-901-6154;96-901-6258;96-901-6266;96-901-6573;96-901-6943;96-901-6944;96-901-6945;96-901-6946;96-900-0849;96-900-1092;96-900-1093;96-900-1639;96-900-1640;96-900-1779;96-900-1883;96-900-4509;96-900-4510;96-900-4511;96-900-4512;96-900-4513;96-900-4514;96-900-4994;96-900-4995;96-900-7425;96-901-4665;96-901-5164;96-901-5487;96-901-5581;96-901-6051;96-901-6148;96-901-7502

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	10.88	9.4411	271.50	2849.68	1.0937	A
2	12.19	8.4341	278.45	470.05	0.1759	A
3	14.34	7.1737	1000.00	4591.48	0.4784	A,B
4	21.64	4.7690	651.15	1554.17	0.2487	A,B

5	22.81	4.5266	404.31	3374.91	0.8698	A,B,C
6	29.03	3.5721	641.21	2034.84	0.3307	A,B,C
7	33.28	3.1255	603.57	1548.33	0.2673	A,B,C
8	35.37	2.9466	201.12	407.59	0.2112	A,B,C
9	36.26	2.8765	491.56	822.46	0.1743	A,C
10	38.61	2.7078	199.39	725.75	0.3793	A,C,D
11	41.67	2.5166	603.46	6313.29	1.0901	A,C,D
12	48.00	2.2010	78.56	883.08	1.1300	A,B,C,D
13	63.51	1.7008	98.41	1744.35	1.7819	B,C,D
14	72.23	1.5188	138.96	2463.05	1.7819	B,C
15	86.41	1.3075	42.18	291.75	0.6954	C,D

Integrated Profile Areas

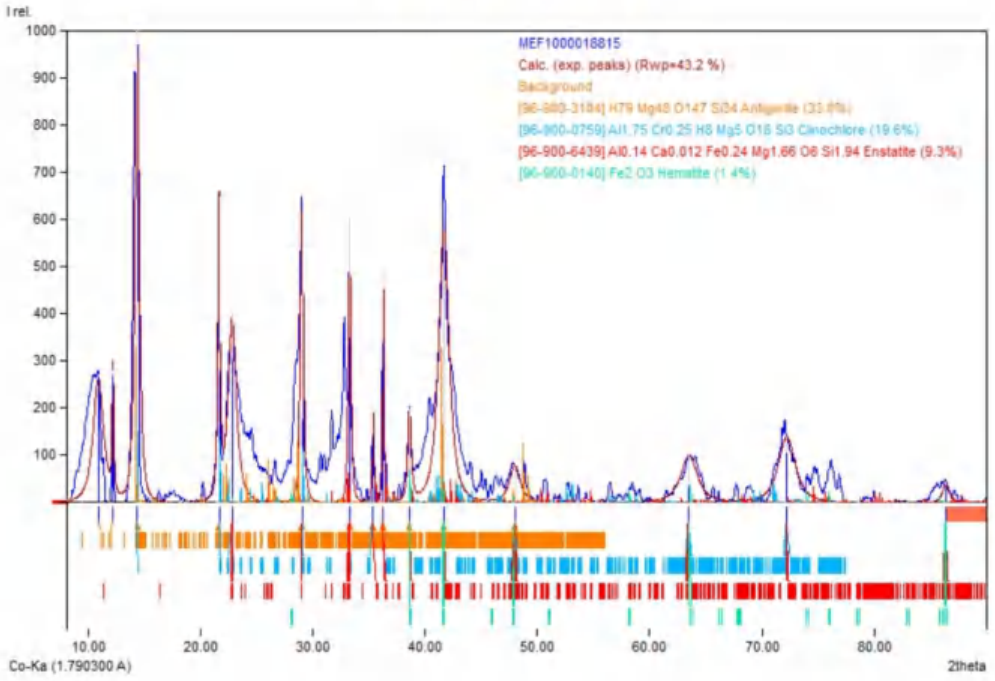
Based on calculated profile

Profile area	***Counts***	***Amount***
Overall diffraction profile	2002465	100.00%
Background radiation	14765	0.74%
Diffraction peaks	1987700	99.26%
Peak area belonging to selected phases	1250508	62.45%
Peak area of phase A (Antigorite)	*560980*	*28.01%*
Peak area of phase B (Clinochlore)	*418882*	*20.92%*
Peak area of phase C (Enstatite)	*195385*	*9.76%*
Peak area of phase D (Hematite)	*75262*	*3.76%*
Unidentified peak area	737191	36.81%

Peak Residuals

Peak data	***Counts***	***Amount***
Overall peak intensity	30075	100.00%
Peak intensity belonging to selected phases	22859	76.01%
Unidentified peak intensity	7216	23.99%

Diffraction Pattern Graphics



Bedrock

Match! Phase Analysis Report

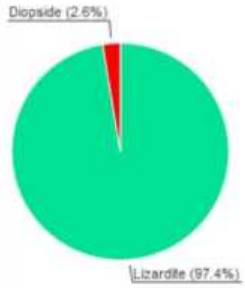
Sample: BR-PETEA (5-70)

Sample Data

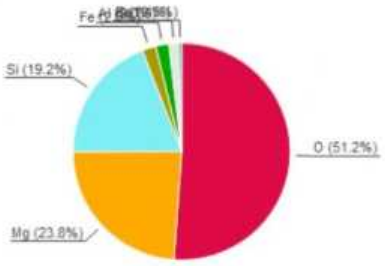
File name	BR-PETEA.RAW
File path	D:/SEMESTER 8/SKRIPSI/XRD PETEA/XRD BR/BR-PETEA
Data collected	Jul 12, 2024 21:38:51
Data range	5.000° - 70.000°
Original data range	5.000° - 70.000°
Number of points	3251
Step size	0.020
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	Yes
Data smoothed	Yes
Radiation	X-rays
Wavelength	1.540600 Å

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	97.4	Lizardite	Al0.209 Fe0.105 H4 Mg2.787 O9 Si1.896
B	2.6	Diopside	Ca Mg O6 Si2
	19.9	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*51.2%(*)*
Mg	23.8%
Si	19.2%
Fe	2.0%
Al	2.0%
H	(4.4%)*
Ca	0.5%
**LE (sum)*	*52.5%*

Details of identified phases

A: Lizardite (97.4 %)*

Formula sum	Al0.209 Fe0.105 H4 Mg2.787 O9 Si1.896
Entry number	96-901-5581
Figure-of-Merit (FoM)	0.793505*
Total number of peaks	114
Peaks in range	23
Peaks matched	10
Intensity scale factor	1.16
2theta correction	0.009°
Space group	P 3 1 m
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 5.3234 Å c= 7.2721 Å
I/Ic	1.34
Calc. density	2.610 g/cm³
Reference	Laurora A., Brigatti M. F., Malferrari D., Galli E., Rossi A., "The crystal chemistry of lizardite-1T from northernApennines ophiolites near Modena, ItalyNote: Pompeano 3, polytype 1T", The Canadian Mineralogist **49**, 1045-1054 (2011)

B: Diopside (2.6 %)*

Formula sum	Ca Mg O6 Si2
Entry number	96-900-0799
Figure-of-Merit (FoM)	0.598439*
Total number of peaks	286
Peaks in range	68
Peaks matched	12
Intensity scale factor	0.03
2theta correction	-0.111°
Space group	C 1 2/c 1
Crystal system	monoclinic
Unit cell	a= 9.6809 Å b= 8.8470 Å c= 5.2169 Å β= 105.570 °
I/Ic	1.15
Calc. density	3.342 g/cm³
Reference	Levien L., Prewitt C. T., "High-pressure structural study of diopsideP = 23.6 kbarpyroxene", American Mineralogist **66**, 315-323 (1981)

(*)2theta values have been shifted internally for the calculation of the amounts, the intensity scaling factors as well as the figure-of-merit (FoM), due to the active search-match option 'Automatic zero point adaption'.

Search-Match

Settings

Reference database used	COD-Inorg 2024.06.03
Method	Peak-based search-match
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.50
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

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	12.08	7.3207	956.23	160.88	0.4556	A
2	19.36	4.5812	194.13	75.43	1.0521	A
3	24.36	3.6510	1000.00	160.70	0.4351	A,B
4	30.30	2.9474	79.45	9.70	0.3304	B
5	35.94	2.4968	469.74	230.79	1.3304	A,B
6	42.06	2.1465	146.07	75.00	1.3903	A,B
7	50.94	1.7912	63.88	21.59	0.9152	A,B
8	60.16	1.5369	272.53	106.48	1.0580	A,B
9	61.66	1.5030	121.49	46.12	1.0279	A,B

Integrated Profile Areas

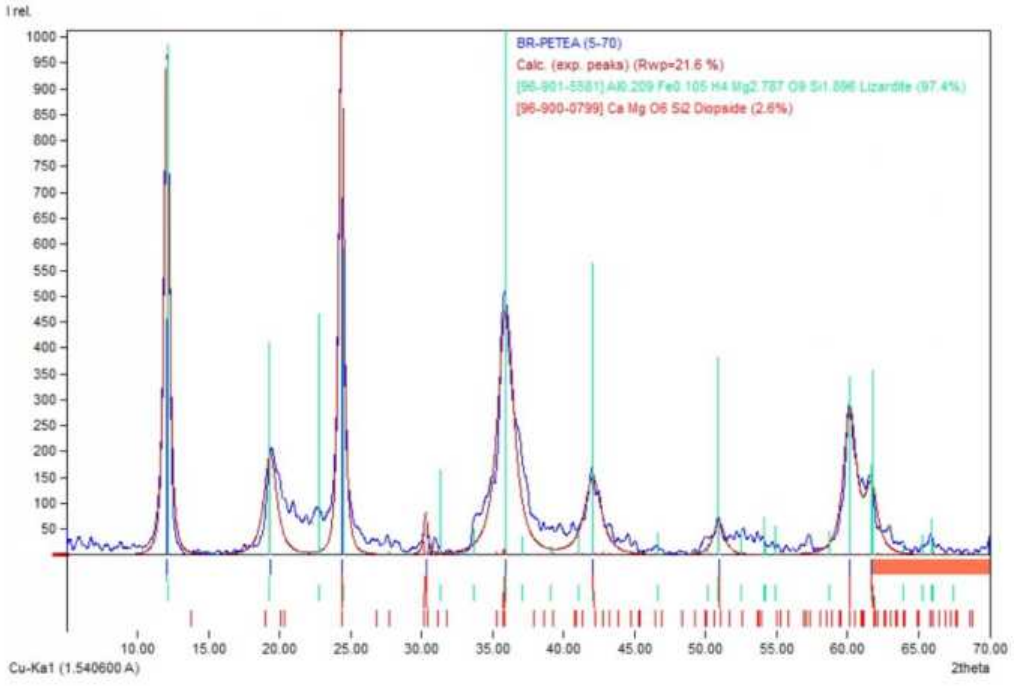
Based on calculated profile

Profile area	*Counts*	*Amount*
Overall diffraction profile	58291	100.00%
Background radiation	5640	9.67%
Diffraction peaks	52652	90.33%
Peak area belonging to selected phases	41051	70.42%
Peak area of phase A (Lizardite)	*39980*	*68.59%*
Peak area of phase B (Diopside)	*1071*	*1.84%*
Unidentified peak area	11601	19.90%

Peak Residuals

Peak data	*Counts*	*Amount*
Overall peak intensity	887	100.00%
Peak intensity belonging to selected phases	753	84.95%
Unidentified peak intensity	133	15.05%

Diffraction Pattern Graphics



LAMPIRAN E

Hasil Analisis *X-Ray Flourescence* (XRF)

Hasil analisis XRF sampel daerah blok Barat Sorowako

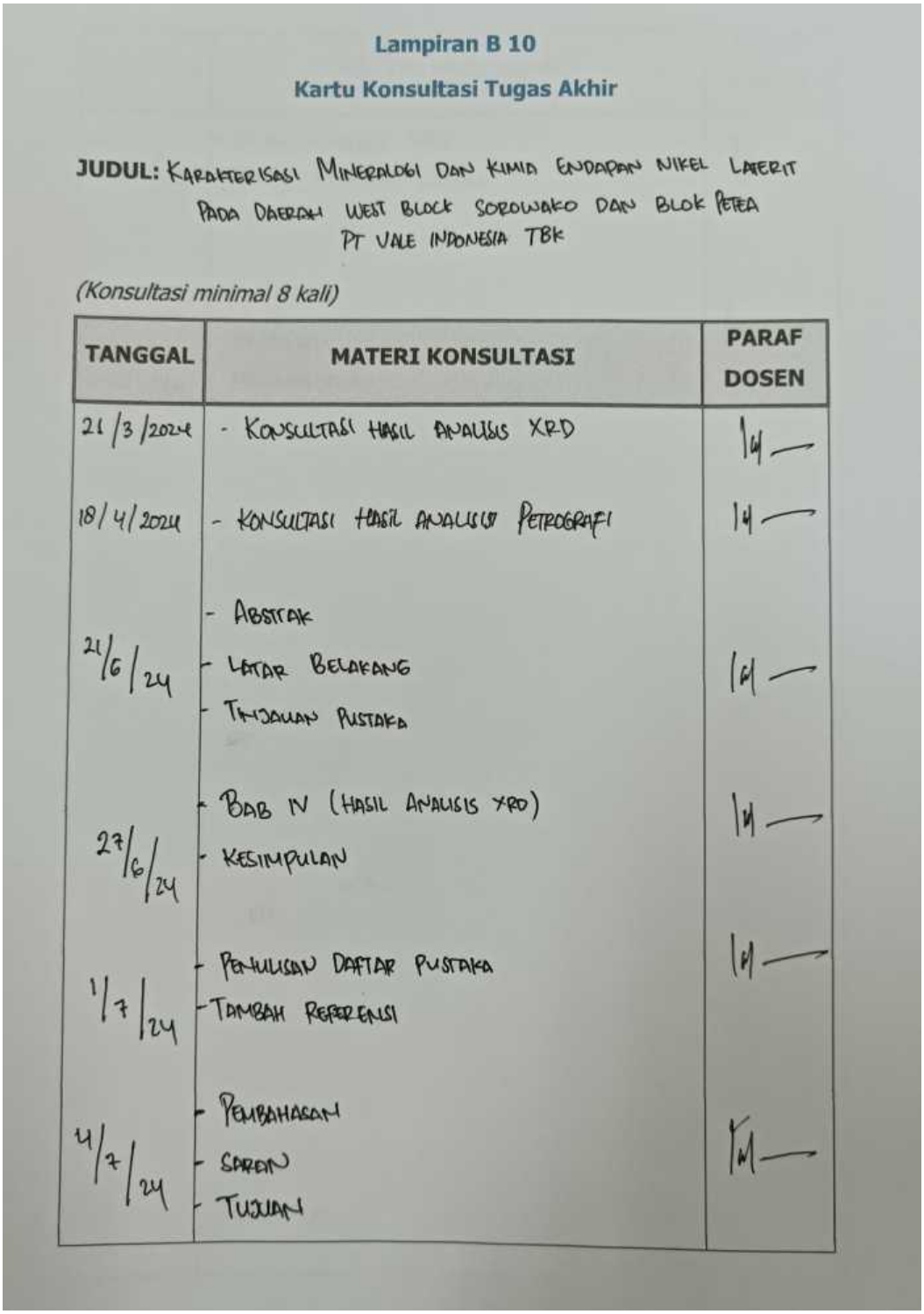
Lapisan	Ni (%)	Fe (%)	Co (%)	SiO_2 (%)	MgO (%)	Al_2O_3 (%)	Cr (%)	Mn (%)	Ca (%)
Limonit	1,28	47,84	0,10	11,05	3,42	4,92	2,02	1,29	0,06
Saprolit	1,32	10,63	0,02	45,48	32,08	1,72	0,55	0,18	0,76
Bedrock	0,44	8,07	0,01	42,67	42,52	0,87	0,36	0,13	0,37

Hasil analisis XRF sampel daerah blok Petea

Lapisan	Ni (%)	Fe (%)	Co (%)	SiO_2 (%)	MgO (%)	Al_2O_3 (%)	Cr (%)	Mn (%)	Ca (%)
Limonit	0,84	35,26	0,05	18,39	8,62	9,94	1,48	0,42	0,17
Saprolit	1,31	14,11	0,02	42,08	19,28	4,31	1,23	0,24	0,99
Bedrock	0,43	7,14	0,01	41,56	34,05	1,1	0,34	0,11	0,51

LAMPIRAN F

Kartu Konsultasi Tugas Akhir



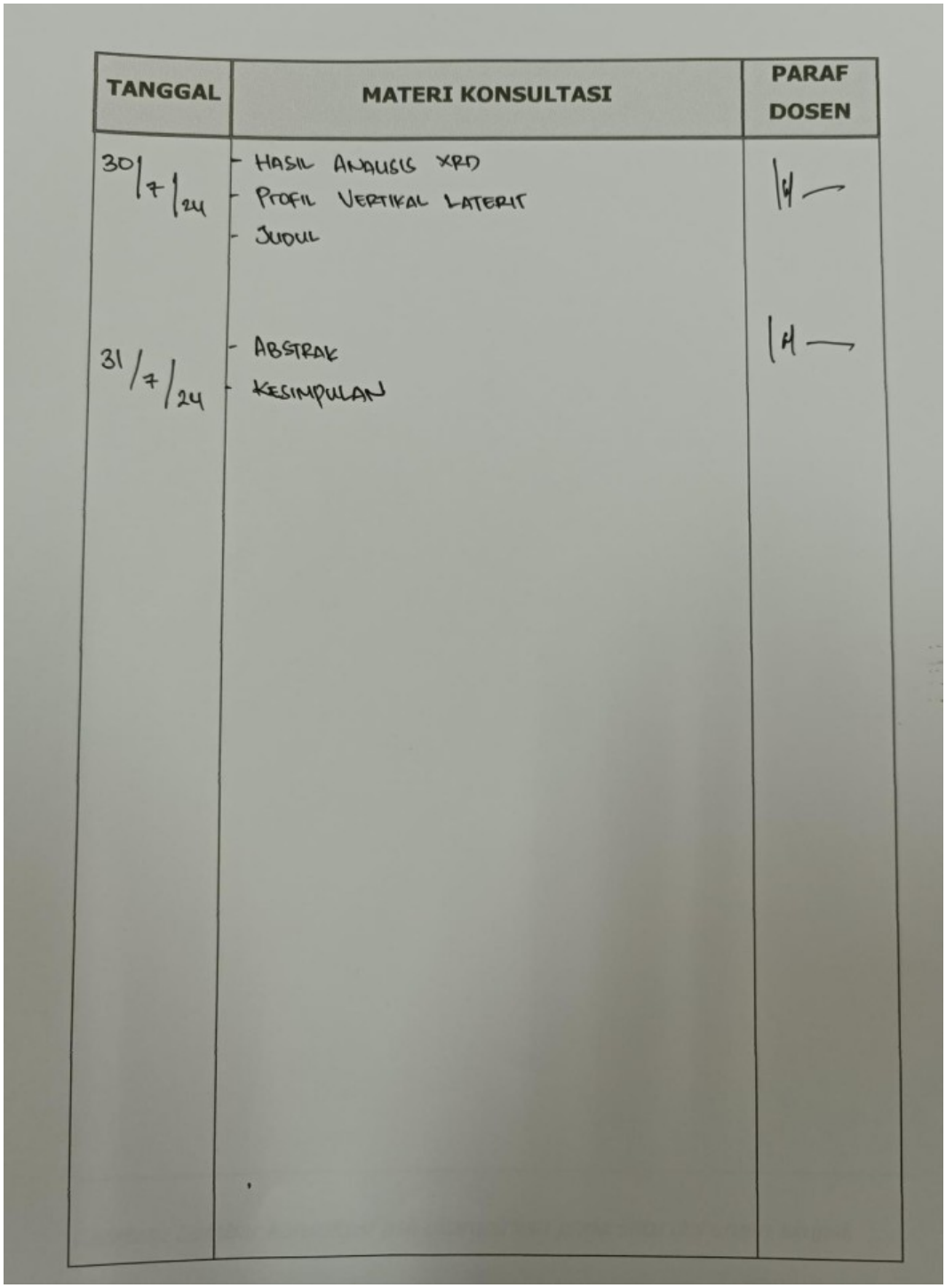
Lampiran B 10

Kartu Konsultasi Tugas Akhir

JUDUL: KARAKTERISASI MINERALOGI DAN KIMIA ENDAPAN NIKEL LATERIT PADA DAERAH WEST BLOCK SOROWAKO DAN BLOK PETEA PT VALE INDONESIA TBK

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
21/3/2024	- KONSULTASI HASIL ANALISIS XRD	
18/4/2024	- KONSULTASI HASIL ANALISIS PETROGRAFI	
21/6/24	- ABSTRAK - LATAR BELAKANG - TINJAUAN PUSTAKA	
27/6/24	- BAB IV (HASIL ANALISIS XRD) - KESIMPULAN	
1/7/24	- PENULISAN DAFTAR PUSTAKA - TAMBAH REFERENSI	
4/7/24	- PEMBAHASAN - SARAN - TUJUAN	



TANGGAL	MATERI KONSULTASI	PARAF DOSEN
30/7/24	- HASIL ANALISIS XRD - PROFIL VERTIKAL LATERIT - JUDUL	
31/7/24	- ABSTRAK - KESIMPULAN	