DAFTAR PUSTAKA

Ahmad, W., (2001). Nickel Laterites-A Training Manual: Chemistry, Mineralogy, and Formation of Ni Laterites.Sorowako: PT INCO.

Ahmad, W., (2002). Mine Geology at PT. INCO. Sorowako: PT. INCO.

Ahmad, W., (2006). Fundamentals of Chemistry, Mineralogy, Weathering Processes, and Laterites Formations. Sorowako: PT INCO.

Ahmad, W., (2008). Nickel Laterite : A Short Course On The Chemistry, Mineralogy, and Formation of Nickel Laterite. :PT. INCO Indonesia.

Arifin, M., Widodo, S., dan Anshariah. (2015). Karakteristik Endapan Nikel Laterit pada Blok X PT. Bintangdelapan Mineral Kecamatan Bahodopi Kabupaten Morowali Provinsi Sulawesi Tengah. Jurnal Geomine, 1, pp. 37-45. https://dx.doi.org/10.33536/jg.v1i1.7.

Butt, C. R. M. dan Zeegers, H., (1992). Regolith Exploration Geochemistry in Tropical and Subtropical Terrains. Handbook of Exploration Geochemistry. Amsterdam: Elsevier.

Bowes, D. R., (1989). Ultrabasic Igneous Rocks In: Petrology. Encyclopedia of Earth Science, Springer. https://doi.org/10.1007 /0-387-30845-8 _ 247

Cahit, H., Selahattin, K., Necip, G., Tolga, Q., Ibrahim, G., Hasan, S., dan Osman, P. (2017). Mineralogy and genesis of the lateritic regolith related Ni-Co deposit of the Caldag area (Manisa, Western Anatolia), Turkey. Canadian Journal of Earth Science. Vol. 55, No. 3, pp: 252-271. https://dx.doi.org/10.1139/cjes-2017-0184

Downes, H. (2020). Ultramafic Rock.. London: Departement of Earth and Planetary Sciences, Birkbeck University of London.

Elias, M., (2002). Nickel Laterite Deposits-Geological Overview, Resources and Exploitation. Giant Ore Deposits: Characteristics, Genesis, and Exploration CODES Special Publication. 4, pp. 205-220.

Evans, A., (1993). Ore Geology and Industrial Minerals an Introduction. Third Edition penyunt. Australia: Blackwell Publishing.

Gill, R., (2010). Igneous Rocks and Processes: A Practical Guide. New Jersey: Willey-Blackwell Published.

Golightly, J. P., (1981). Nickeliferous Laterite Deposits. Economic Geology, 75th nniversary Volume.

an Wilson, M. E. J., (2000). Neogene sutures in eastern Indonesia. Journal Asian Earth Sciences, 18(6), pp. 781-808. https://doi.org/10.1016/S1367-120(00)00040-7

Hasria, H., Asfar, S., Ngkoimani, L, O., Okto, A., Jaya, R, I, M, C., dan Sepdiansar, R. (2021). Pengaruh Geomorfologi Terhadap Pola Distribusi Unsur Nikel Dan Besi Pada Endapan Nikel Laterit di Kabupaten Buton Tengah Sulawesi Tenggara. GEOSAPTA, Volume 7(2), 103. http://dx.doi.org/10.20527/jg.v7i2.10716.

Hasria, H., dan Septiana, S., (2024). Geologi Endapan Nikel Laterit. Yogyakarta: Deepublish.

Ito, A., Otake, T., Maulana, A., Sanematsu, K., Sufriadin, dan Sato, T. (2021). Geochemical constraints on the mobilization of Ni and critical metals in laterite deposits, Sulawesi, Indonesia: A mass-balance approach. Resource Geology, 71(3), pp. 1-28. https://doi.org/10.1111/rge.12266.

Kadarusman, A., Miyashita, S., Maruyama, S., Parkinson, C. D., dan Ishikawa, A. (2004). Petrology, geochemistry and paleogeographic reconstruction of the East Sulawesi Ophiolite, Indonesia. Tectonophysics, 392, pp. 55-83. https://doi.org/10.1016/j.tecto.2004.04.008.

Kamaruddin, H., Indrakusuma, R. A., Rosana, M. F., Sulaksana, N., dan Yuningsih, E. T. (2018). Profil Endapan Laterit Nikel Di Pomalaa, Kabupaten Kolaka, Provinsi Sulawesi Tenggara. Buletin Sumber Daya Geologi , 13(2), pp. 84-105.

Kurniadi, A., Rosana, M. F., Yuningsih, E. T., dan Pambudi, H. L. (2017). Karakteristik Batuan Asal Endapan Nikel Laterit di Daerah Madang dan Serakaman Tengah. Padjajaran Geoscience Journal. 1(2), pp. 149-163.

Lampropoulou, P., Petrounias, P., Giannakopoulou P. P., Rogkala, A., Koukouzas, N., Tsikouras, B., Hatzipanagiotou, K. (2020). The Effect of Chemical Composition of Ultramafic and Mafic Aggregates on Their Physicomechanical Properties as well as on the Produced Concrete Strength. Minerals. 10(406), 1-27 https://doi:10.3390/min10050406

Lintjewas, L., Setiawan, I., dan Al Kausar, A., (2019). Profil Endapan Nikel Laterit di Daerah Palangga, Provinsi Sulawesi Tenggara. RISET Geologi Dan Pertambangan, 29(1), 91-104.

McRae, M. E., (2023). Mineral Commodity Series, Virginia: U. S. Geological Survey.

Nockolds, S. R. (1954). Average Chemical Compositions of Some Igenous Rocks. Bulletin of The Geological Society of America. 65(10), 1007-1032. https://doi.org/10.1130/0016-7606(1954)65[1007:ACCOSI]2.0.CO;2

F. I., Rosana, M. F., dan Heriawan, M. N. (2018). Keterkaitan elimpahan Unsur Major dan Minoe dengan Zonasi Laterit Nikel Blok HZ Harzburgit) dan DN (Dunit) Daerah Pulau Pakal, Halmahera Timur.

Buletin Sumber Daya Geologi, 13(3), pp. 155-175. http://dx.doi.org/10.47599/bsdg.v13i3.230

Seifert, K., dan Brunotte, D. (1996). Geochemistry of Serpentinized Mantle Peridotite From Site 897 In The Iberia Abyssal Plain. Proceedings of The Ocean Drilling Program, Scientific Results. 149(1), 413-424.

Simandjuntak, T. O., Surono, dan Sukido, D., (1993). Peta Geologi Lembar Kolaka, Sulawesi, Bandung: Pusat Penelitian dan Pengembangan Geologi.

Surono, (2013). Geologi Lengan Tenggara Sulawesi. Bandung: Badan Geologi ESDM.

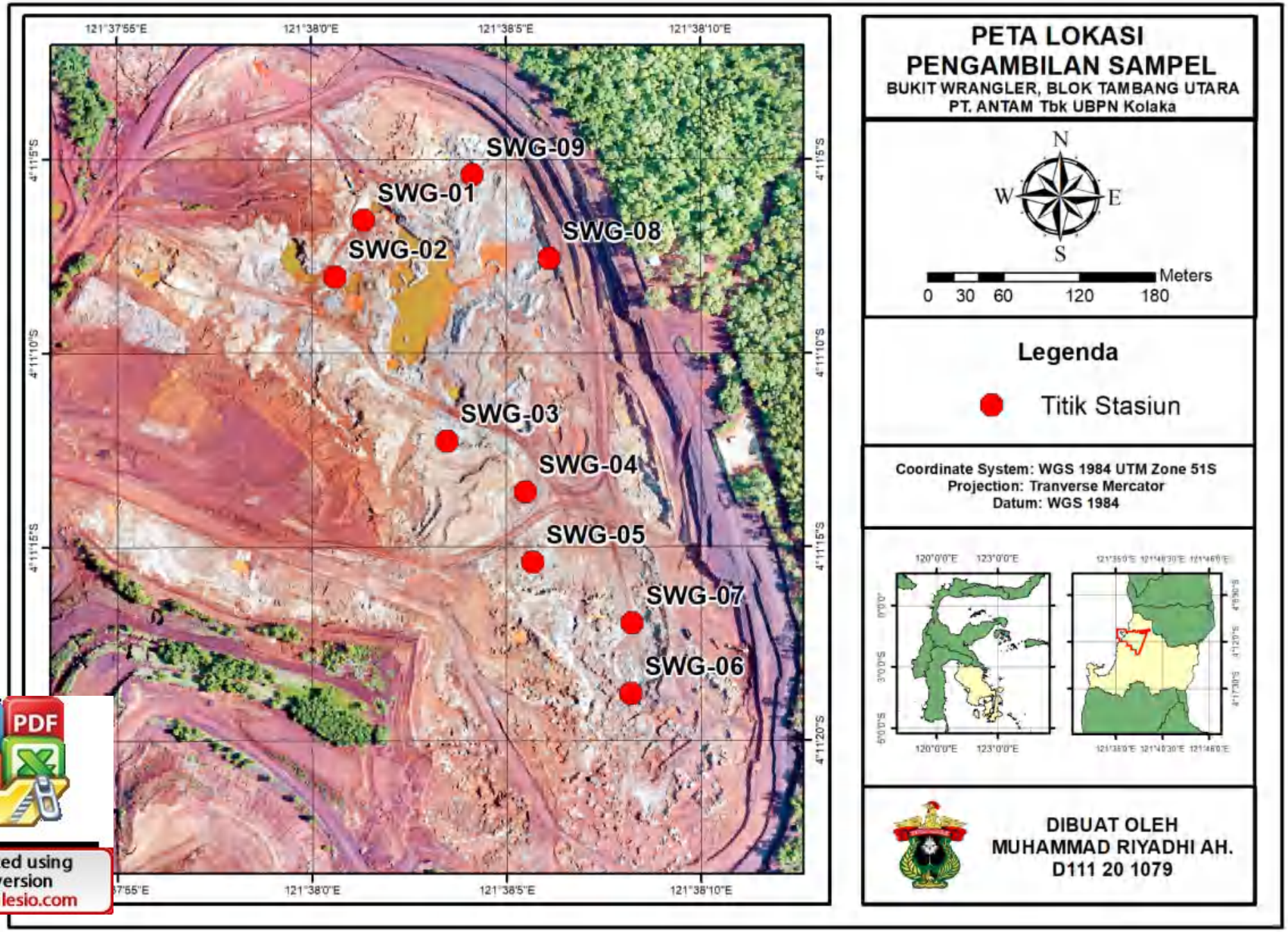
Streckeisen, A. 1974. Classification and Nomenclatur of Plutonic Rocks: recommendations of the IUGS subcomission on the systematics of igneous rocks. Geologische Rundschau. Vol. 63, pp: 773-786. https://doi.org/10.1007/BF01820841.

Thayer, T.P., (1989). Ultramafic Rocks. In: Petrology. Encyclopedia Of Earth Science. Springer, Boston, MA. https://doi.org/10.1007/0-387-30845-8_250.

Travis, R., B. 1955. Classification of Rocks: Volume 50. Colorado: Colorado School of Mines.

Van Leeuwen, T. M. dan Pieters, P. E., (2011). Minerals Deposits of Sulawesi. Manado, Proceedings of the Sulawesi Mineral.

Lampiran 1 Peta pengambilan sampel



Lampiran 2 Hasil Analisis XRF

LABORATORIUM INSTRUMEN
PT ANTAM Tbk
UBPN KOLAKA

Kepada Yth :
1. Quality Control Bureau Head
2. Sample Preparation Dept Head
3. Ore Quality Assurance Dept Head
4. Arsip

STASIUN		Ni	Co	Fe	SiO_2	CaO	MgO	Al_2O_3
STD 12	SWG-01	0.24	0.00	5.51	43.10	0.72	38.86	1.72
STD 13	SWG-02	0.26	0.00	5.97	38.86	0.92	41.58	1.50
STD 15	SWG-03	0.34	0.00	6.23	43.11	0.84	38.50	1.56
STD 16	SWG-04	0.27	0.00	6.01	40.83	0.94	39.78	1.59
STD 17	SWG-05	0.26	0.00	5.93	41.79	1.21	36.76	1.82
STD 18	SWG-06	0.48	0.00	6.34	42.33	1.25	35.36	1.88
STD 19	SWG-07	0.27	0.00	5.85	40.87	1.12	39.18	1.63
STD 21	SWG-08	0.26	0.00	6.08	41.05	0.72	41.47	1.52
STD 22	SWG-09	0.41	0.00	6.62	39.76	1.28	38.53	1.71

Mengetahui
Quality Control Manager
TTD

ıvan Taryana. ST
6 7373

Pomalaa, 22 Februari 2024
Instrument Laboratory Ass.Manager
TTD

Nikma Fitri Athifah
NPP.101994 8684

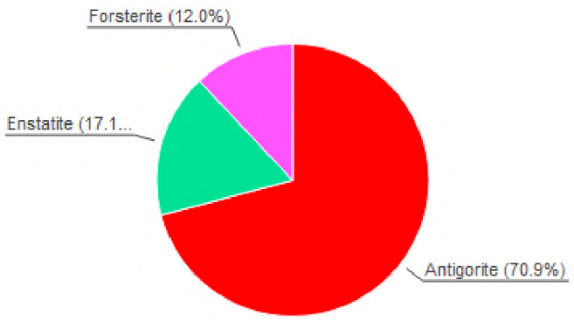
Lampiran 3 Hasil Analisis XRD

Match! Phase Analysis Report

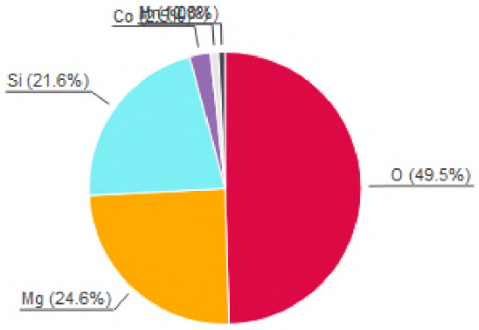
Sample: DIDI-STD-12 (5-70)

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	70.9	Antigorite	H62 Mg48 O147 Si34
B	17.1	Enstatite	Co0.132 Mg0.781 Mn0.087 O3 Si
C	12.0	Forsterite	Co0.261 Mg1.739 O4 Si
	16.2	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*49.5%(*)*
Mg	24.6%
Si	21.6%
Co	2.5%
H	*1.0%(*)*
Mn	0.8%
**LE (sum)*	*50.5%*

Details of identified phases

A: Antigorite (70.9 %)*

Formula sum	H62 Mg48 O147 Si34
Entry number	96-900-4515
Figure-of-Merit (FoM)	0.658408*
Total number of peaks	493
Peaks in range	493
Peaks matched	106
Intensity scale factor	0.72
2theta correction	-0.039°
Space group	P 1 m 1
Crystal system	monoclinic
Unit cell	a= 43.3000 Å b= 9.2300 Å c= 7.2700 Å β= 91.600 °
I/Ic	0.76
Calc. density	2.593 g/cm³
Reference	Uehara S., "TEM and XRD study of antigorite superstructures", The Canadian Mineralogist **36**, 1595-1605 (1998)

B: Enstatite (17.1 %)*

Formula sum	Co0.132 Mg0.781 Mn0.087 O3 Si
Entry number	96-900-4119
Figure-of-Merit (FoM)	0.582043*
Total number of peaks	500
	181
	37
	0.13
	-0.082°
	P b c a
	orthorhombic
	a= 18.2460 Å b= 8.8390 Å c= 5.1960 Å
	0.55
	3.412 g/cm³

Reference	Hawthorne F. C., Ito J., "Synthesis and crystal-structure refinement of transition-metalorthopyroxenes I: Orthoenstatite and (Mg, Mn, Co) orthopyroxene", The Canadian Mineralogist **15**, 321-338 (1977)

C: Forsterite (12.0 %)*

Formula sum	Co0.261 Mg1.739 O4 Si
Entry number	96-900-1065
Figure-of-Merit (FoM)	0.683704*
Total number of peaks	363
Peaks in range	75
Peaks matched	21
Intensity scale factor	0.15
2theta correction	-0.009°
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)

(*)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	12.12	7.2966	1000.00	154.83	0.4488	A
2	17.44	5.0809	58.60	6.18	0.3057	A,C
3	19.40	4.5718	205.80	56.12	0.7904	A,B
4	22.94	3.8737	113.18	30.29	0.7758	A,C
5	24.40	3.6451	879.99	129.71	0.4272	A,B
6	28.22	3.1598	436.26	44.26	0.2941	A,B
7	31.16	2.8680	448.79	39.94	0.2579	A,B
8	32.32	2.7677	135.82	11.87	0.2534	A,C
9	35.78	2.5076	506.00	248.52	1.4235	A,B,C
10	36.50	2.4597	274.35	35.11	0.3709	A,B,C
11	39.68	2.2696	54.02	4.87	0.2615	A,B,C
12	40.08	2.2479	106.06	33.08	0.9039	A,B,C
13	41.84	2.1573	147.11	40.79	0.8036	A,B,C
14	51.08	1.7867	77.93	26.80	0.9967	B,C
15	52.26	1.7491	219.07	29.95	0.3963	C
16	52.96	1.7276	206.61	25.47	0.3572	B,C
17	60.22	1.5355	226.95	129.38	1.6523	B,C
18	60.92	1.5195	62.67	29.46	1.3622	B,C
19	62.66	1.4814	124.32	21.65	0.5048	B,C
20	67.06	1.3945	80.17	11.80	0.4000	B,C
21	69.98	1.3433	35.35	5.20	0.4000	B,C

Integrated Profile Areas

Based on calculated profile

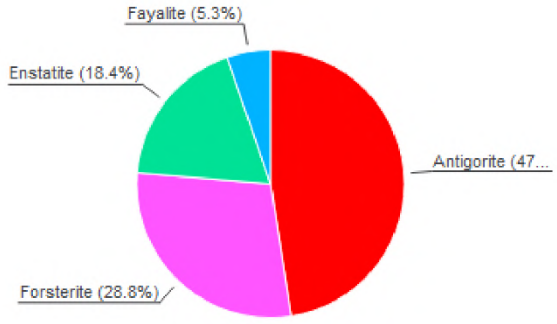
Profile area	*Counts*	*Amount*
Overall diffraction profile	123086	100.00%
	61314	49.81%
	61772	50.19%
ed phases	41830	33.98%
ite)	*25016*	*20.32%*
e)	*9607*	*7.81%*
ite)	*7206*	*5.85%*
	19942	16.20%

Match! Phase Analysis Report

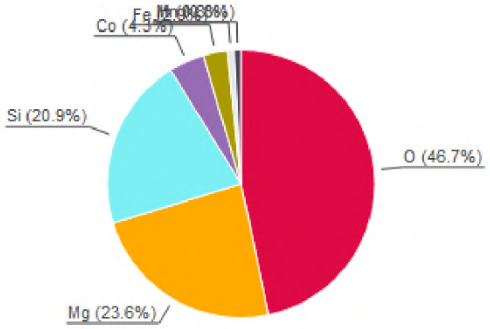
Sample: DIDI-STD-13 (5-70)

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	47.5	Antigorite	H79 Mg48 O147 Si34
B	28.8	Forsterite	Co0.261 Mg1.739 O4 Si
C	18.4	Enstatite	Co0.132 Mg0.781 Mn0.087 O3 Si
D	5.3	Fayalite	Fe2 O4 Si
	19.7	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*46.7%(*)*
Mg	23.6%
Si	20.9%
Co	4.3%
Fe	2.9%
H	*0.8%(*)*
Mn	0.8%
**LE (sum)*	*47.6%*

Details of identified phases

A: Antigorite (47.5 %)*

Formula sum	H79 Mg48 O147 Si34
Entry number	96-900-3104
Figure-of-Merit (FoM)	0.694343*
Total number of peaks	498
Peaks in range	498
Peaks matched	179
Intensity scale factor	0.61
2theta correction	-0.021°
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)

B: Forsterite (28.8 %)*

Formula sum	Co0.261 Mg1.739 O4 Si
Entry number	96-900-1065
Figure-of-Merit (FoM)	0.763026*
	363
	75
	32
	0.49
	0.002°
	P b n m
	orthorhombic
	a= 4.7600 Å b= 10.2210 Å c= 5.9840 Å
	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)

C: Enstatite (18.4 %)*

Formula sum	Co0.132 Mg0.781 Mn0.087 O3 Si
Entry number	96-900-4119
Figure-of-Merit (FoM)	0.579731*
Total number of peaks	500
Peaks in range	179
Peaks matched	50
Intensity scale factor	0.18
2theta correction	-0.054°
Space group	P b c a
Crystal system	orthorhombic
Unit cell	a= 18.2460 Å b= 8.8390 Å c= 5.1960 Å
I/Ic	0.55
Calc. density	3.412 g/cm³
Reference	Hawthorne F. C., Ito J., "Synthesis and crystal-structure refinement of transition-metalorthopyroxenes I: Orthoenstatite and (Mg, Mn, Co) orthopyroxene", The Canadian Mineralogist **15**, 321-338 (1977)

D: Fayalite (5.3 %)*

Formula sum	Fe2 O4 Si
Entry number	96-901-1592
Figure-of-Merit (FoM)	0.681235*
Total number of peaks	359
Peaks in range	73
Peaks matched	31
Intensity scale factor	0.16
2theta correction	0.061°
Space group	P b n m
Crystal system	orthorhombic
Unit cell	a= 4.7570 Å b= 10.1530 Å c= 5.9850 Å
I/Ic	1.70
Calc. density	4.682 g/cm³
Reference	Kudoh Y., Takeda H., "Single crystal X-ray diffraction study on the bond compressibilityof fayalite, Fe~2~SiO~4~ and rutile, TiO~2~ under high pressureSample: P = 93 kbar", Physica B+C **140**, 333-336 (1986)

(*)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	12.06	7.3328	1000.00	168.23	0.4202	A
2	17.28	5.1276	103.04	13.88	0.3364	A,B,D
3	19.36	4.5812	121.11	43.76	0.9025	A,C
4	20.10	4.4141	50.97	16.18	0.7929	A,C
5	22.78	3.9005	357.65	28.64	0.2000	A
6	22.94	3.8737	206.72	14.17	0.1711	A,B,D
7	24.36	3.6510	899.60	122.70	0.3407	A
8	25.54	3.4849	124.10	16.08	0.3236	A,B,D
9	28.20	3.1620	393.11	41.31	0.2624	A,C
10	29.88	2.9879	112.66	12.29	0.2725	A,B,D
11	31.14	2.8698	391.28	30.59	0.1952	A,C
12	32.28	2.7710	414.75	33.21	0.2000	A,B,D
13	35.74	2.5103	990.39	117.15	0.2954	A,B,C,D
		.4597	884.05	97.55	0.2756	A,B,C,D
		.3482	109.04	24.70	0.5658	A,B,C,D
		.3168	60.32	6.49	0.2689	A,B,C,D
		.2674	246.42	29.34	0.2974	A,B,C,D
		.2490	363.60	24.45	0.1680	A,B,C,D
		.1583	131.72	38.79	0.7355	A,B,D
		.1456	1.19	0.42	0.8894	A,C
		.9562	76.56	6.72	0.2192	A,B,C,D
		.7509	313.17	25.08	0.2000	B,D
		.6721	83.57	6.69	0.2000	B,C,D

24	56.10	1.6381	120.96	11.62	0.2400	B,C,D
25	56.80	1.6196	103.97	8.82	0.2118	B,C,D
26	60.24	1.5350	185.44	98.00	1.3200	B,C,D
27	61.92	1.4974	225.22	31.99	0.3547	B,C,D
28	62.68	1.4810	214.02	27.71	0.3234	B,C
29	67.22	1.3916	93.19	21.37	0.5729	B,C,D
30	69.44	1.3524	80.41	7.05	0.2000	B,C,D

Integrated Profile Areas

Based on calculated profile

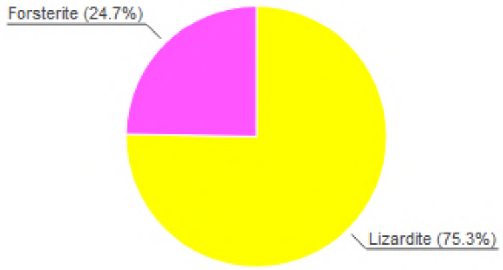
Profile area	***Counts***	***Amount***
Overall diffraction profile	120729	100.00%
Background radiation	54018	44.74%
Diffraction peaks	66710	55.26%
Peak area belonging to selected phases	42890	35.53%
Peak area of phase A (Antigorite)	*15081*	*12.49%*
Peak area of phase B (Forsterite)	*14855*	*12.30%*
Peak area of phase C (Enstatite)	*8334*	*6.90%*
Peak area of phase D (Fayalite)	*4620*	*3.83%*
Unidentified peak area	23820	19.73%

Match! Phase Analysis Report

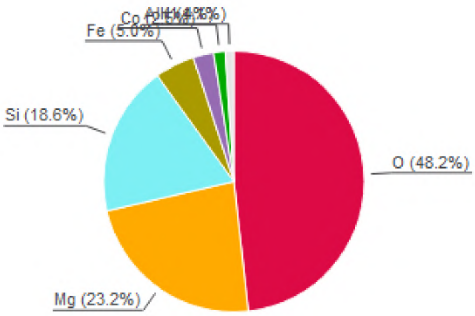
Sample: DIDI-STD-15 (5-70)

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	75.3	Lizardite	Al0.201 Fe0.339 H4 Mg2.544 O9 Si1.904
B	24.7	Forsterite	Co0.261 Mg1.739 O4 Si
	15.9	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*48.2%(*)*
Mg	23.2%
Si	18.6%
Fe	5.0%
Co	2.5%
Al	1.4%
H	*1.1%(*)*
**LE (sum)*	*49.3%*

Details of identified phases

A: Lizardite (75.3 %)*

Formula sum	Al0.201 Fe0.339 H4 Mg2.544 O9 Si1.904
Entry number	96-901-6051
Figure-of-Merit (FoM)	0.671814*
Total number of peaks	114
Peaks in range	28
Peaks matched	11
Intensity scale factor	0.91
2theta correction	0.038°
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
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)

B: Forsterite (24.7 %)*

Formula sum	Co0.261 Mg1.739 O4 Si
Entry number	96-900-1065
Figure-of-Merit (FoM)	0.707185*
Total number of peaks	363
Peaks in range	75
Peaks matched	22
Intensity scale factor	0.19
2theta correction	-0.021°
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)

(*)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

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

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	9.46	9.3415	81.82	12.56	0.3812	
2	10.50	8.4184	69.31	9.37	0.3357	
3	12.14	7.2846	1000.00	173.11	0.4298	A
4	17.42	5.0867	72.26	10.91	0.3749	B
5	19.38	4.5765	153.49	67.14	1.0860	A
6	22.86	3.8871	154.75	33.27	0.5337	A,B
7	24.42	3.6422	795.87	139.04	0.4337	A
8	25.52	3.4876	109.23	15.80	0.3591	B
9	28.22	3.1598	163.35	26.32	0.4000	
10	28.64	3.1144	161.61	19.05	0.2926	
11	32.34	2.7660	192.70	21.65	0.2790	B
12	35.74	2.5103	545.73	147.99	0.6732	A,B
13	36.52	2.4584	375.33	76.27	0.5045	B
14	40.08	2.2479	173.81	35.70	0.5099	B
15	41.84	2.1573	117.92	37.58	0.7912	A,B
16	52.30	1.7478	143.35	33.75	0.5845	A,B
17	60.20	1.5360	172.95	97.14	1.3944	A,B
18	61.58	1.5048	89.79	50.23	1.3887	A,B
19	62.70	1.4806	119.01	23.01	0.4800	B
20	67.00	1.3956	78.65	12.00	0.3789	B
21	69.54	1.3507	54.44	9.12	0.4161	B

Integrated Profile Areas

Based on calculated profile

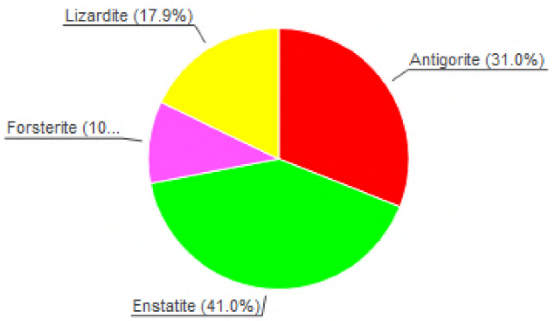
Profile area	*Counts*	*Amount*
Overall diffraction profile	119426	100.00%
Background radiation	57258	47.94%
Diffraction peaks	62169	52.06%
Peak area belonging to selected phases	43156	36.14%
Peak area of phase A (Lizardite)	*32373*	*27.11%*
Peak area of phase B (Forsterite)	*10783*	*9.03%*
	19012	15.92%

Match! Phase Analysis Report

Sample: DIDI-STD-16 (5-70)

Analysis Results

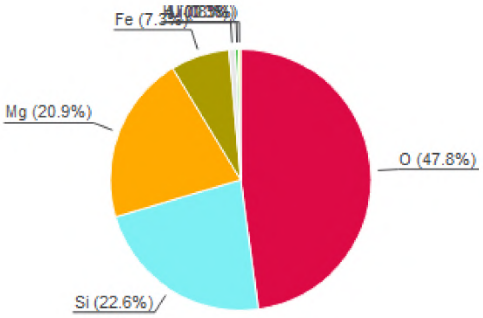
Phase composition (Weight %) calc. by RIR method



Index	Amount (%)	Name	Formula sum
A	31.0	Antigorite	H79 Mg48 O147 Si34
B	41.0	Enstatite	Fe0.47 Li0.2 Mg1.33 O6 Si2
C	10.1	Forsterite	Fe0.278 Mg1.722 O4 Si
D	17.9	Lizardite	Al0.201 Fe0.339 H4 Mg2.544 O9 Si1.904
	18.7	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Elemental composition (Weight %) calc. by RIR method



Element	Amount (weight %)
O	*47.8%(*)*
Si	22.6%
Mg	20.9%
Fe	7.3%
H	*0.8%(*)*
Al	0.3%
Li	*0.3%(*)*
**LE (sum)*	*48.9%*

Details of identified phases

A: Antigorite (31.0 %)*

Formula sum	H79 Mg48 O147 Si34
Entry number	96-900-3104
Figure-of-Merit (FoM)	0.710554*
Total number of peaks	498
Peaks in range	498
Peaks matched	152
Intensity scale factor	0.33
2theta correction	0.055°
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)

B: Enstatite (41.0 %)*

Formula sum	Fe0.47 Li0.2 Mg1.33 O6 Si2
Entry number	96-901-0873
Figure-of-Merit (FoM)	0.618711*
Total number of peaks	500
Peaks in range	166
	54
	0.37
	-0.013°
	P b c a
	orthorhombic
	a= 18.2369 Å b= 8.8246 Å c= 5.2076 Å
	0.61
	3.362 g/cm³
	Camara F., Iezzi G., Tiepolo M., Oberti R., "The crstal chemistry of lithium and Fe3+ in synthetic

orthopyroxeneSample: LMFPX4", Physics and Chemistry of Minerals **33**, 475-483 (2006)

C: Forsterite (10.1 %)*

Formula sum	Fe0.278 Mg1.722 O4 Si
Entry number	96-900-4325
Figure-of-Merit (FoM)	0.683028*
Total number of peaks	363
Peaks in range	68
Peaks matched	27
Intensity scale factor	0.17
2theta correction	-0.127°
Space group	P b n m
Crystal system	orthorhombic
Unit cell	a= 4.7673 Å b= 10.2490 Å c= 5.9996 Å
I/Ic	1.15
Calc. density	3.387 g/cm³
Reference	Liang J., Hawthorne F. C., "Characterization of fine-grained mixtures of rock-forming minerals byRietveld structure refinement: olivine + pyroxene Sample: P1 Rietveld, 9.9%olivine", The Canadian Mineralogist **32**, 541-552 (1994)

D: Lizardite (17.9 %)*

Formula sum	Al0.201 Fe0.339 H4 Mg2.544 O9 Si1.904
Entry number	96-901-6051
Figure-of-Merit (FoM)	0.670042*
Total number of peaks	114
Peaks in range	28
Peaks matched	14
Intensity scale factor	0.39
2theta correction	-0.009°
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
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)

(*)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

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

Peak List

d [Å]	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
3.2924	50.17	2.23	0.0593	A
2.3207	445.28	119.94	0.3600	A,D
2.1335	84.10	6.68	0.1061	A,C
2.0637	55.41	7.84	0.1890	A
1.6671	43.86	2.63	0.0800	A
1.6047	70.13	18.89	0.3600	A,D

7	19.44	4.5625	5.93	1.29	0.2914	A,B
8	19.44	4.5625	1.67	0.10	0.0800	
9	19.82	4.4759	75.97	9.10	0.1600	
10	20.06	4.4228	60.39	7.20	0.1594	A,B
11	21.66	4.0996	40.00	9.61	0.3212	A,B
12	22.74	3.9073	121.08	18.12	0.2000	A,C,D
13	22.98	3.8670	103.58	16.39	0.2115	A
14	24.40	3.6451	398.35	119.22	0.4000	A,D
15	24.48	3.6334	364.12	87.18	0.3200	A,B
16	27.68	3.2202	73.83	6.63	0.1200	A,B
17	28.20	3.1620	1000.00	89.79	0.1200	A,B
18	31.14	2.8698	335.80	43.20	0.1719	A,B,D
19	32.36	2.7643	13.72	3.36	0.3271	A,C
20	32.44	2.7577	141.26	25.25	0.2388	A
21	35.40	2.5336	125.88	75.35	0.8000	A,B
22	35.78	2.5076	371.97	133.60	0.4800	A,B,C,D
23	36.60	2.4532	304.04	86.95	0.3822	A,B,C
24	39.68	2.2696	80.26	16.21	0.2699	A,B,C
25	40.12	2.2457	111.32	19.06	0.2288	A,B,C
26	41.84	2.1573	73.46	24.19	0.4400	A,B,C,D
27	42.80	2.1111	73.75	17.66	0.3200	A,B,C
28	46.40	1.9554	55.99	14.81	0.3535	A,B,C,D
29	51.10	1.7860	64.06	20.76	0.3600	B,D
30	52.24	1.7497	126.21	24.61	0.2606	C
31	52.52	1.7410	87.70	16.79	0.2558	B,C,D
32	60.18	1.5364	104.58	59.47	0.7600	B,C,D
33	60.90	1.5200	121.91	29.19	0.3200	B,C
34	61.92	1.4974	135.65	17.53	0.1727	B,C,D
35	62.50	1.4848	116.48	14.34	0.1645	B,C
36	62.68	1.4810	127.33	14.54	0.1526	B
37	66.98	1.3960	60.86	10.93	0.2400	B,C
38	67.20	1.3920	58.79	24.63	0.5600	B,C
39	67.40	1.3883	46.57	5.58	0.1600	B,C,D

Integrated Profile Areas

Based on calculated profile

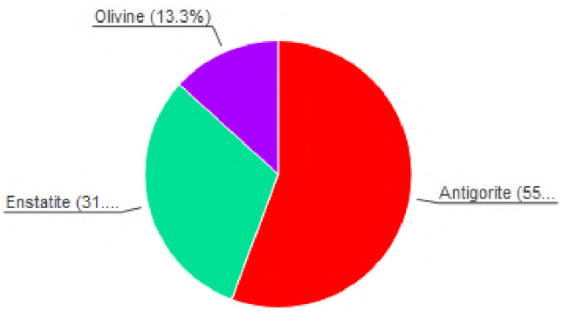
Profile area	***Counts***	***Amount***
Overall diffraction profile	135775	100.00%
Background radiation	58692	43.23%
Diffraction peaks	77083	56.77%
Peak area belonging to selected phases	51628	38.02%
Peak area of phase A (Antigorite)	*12623*	*9.30%*
Peak area of phase B (Enstatite)	*21325*	*15.71%*
Peak area of phase C (Forsterite)	*6462*	*4.76%*
Peak area of phase D (Lizardite)	*11218*	*8.26%*
Unidentified peak area	25454	18.75%

Match! Phase Analysis Report

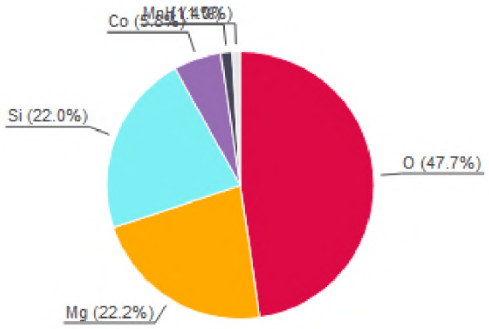
Sample: DIDI-STD-17 (5-70)

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	55.7	Antigorite	H79 Mg48 O147 Si34
B	31.0	Enstatite	Co0.132 Mg0.781 Mn0.087 O3 Si
C	13.3	Olivine	Co0.75 Mg1.25 O4 Si
	16.7	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*47.7%(*)*
Mg	22.2%
Si	22.0%
Co	5.8%
Mn	1.4%
H	*1.0%(*)*
**LE (sum)*	*48.7%*

Details of identified phases

A: Antigorite (55.7 %)*

Formula sum	H79 Mg48 O147 Si34
Entry number	96-900-3104
Figure-of-Merit (FoM)	0.709796*
Total number of peaks	498
Peaks in range	498
Peaks matched	221
Intensity scale factor	0.55
2theta correction	-0.040°
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: Enstatite (31.0 %)*

Formula sum	Co0.132 Mg0.781 Mn0.087 O3 Si
Entry number	96-900-4119
Figure-of-Merit (FoM)	0.638577*
Total number of peaks	500
[illegible]	179
	71
	0.23
	-0.071°
	P b c a
	orthorhombic
	a= 18.2460 Å b= 8.8390 Å c= 5.1960 Å
	0.55 (Source: Unknown)
	3.412 g/cm³

Reference	Hawthorne F. C., Ito J., "Synthesis and crystal-structure refinement of transition-metalorthopyroxenes I: Orthoenstatite and (Mg, Mn, Co) orthopyroxene", The Canadian Mineralogist **15**, 321-338 (1977)

C: Olivine (13.3 %)*

Formula sum	Co0.75 Mg1.25 O4 Si
Entry number	96-900-6396
Figure-of-Merit (FoM)	0.766441*
Total number of peaks	364
Peaks in range	75
Peaks matched	40
Intensity scale factor	0.24
2theta correction	-0.063°
Space group	P b n m
Crystal system	orthorhombic
Unit cell	a= 4.7679 Å b= 10.2400 Å c= 5.9884 Å
I/Ic	1.31 (Source: Unknown)
Calc. density	3.786 g/cm³
Reference	Muller-Sommer M, Hock R., Kirfel A., "Rietveld refinement study of the cation distribution in (Co, Mg)-olivinesolid solutionSample: M62", Physics and Chemistry of Minerals **24**, 17-23 (1997)

(*)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	12.16	7.2727	762.62	115.88	0.4400	A
2	17.46	5.0752	77.16	9.65	0.3622	A,C
3	19.40	4.5718	166.52	36.95	0.6425	A,B
4	22.90	3.8804	215.96	25.90	0.3473	A,C
5	23.94	3.7141	207.93	20.11	0.2800	A,C
6	24.40	3.6451	739.39	89.00	0.3486	A,B
7	25.46	3.4957	119.62	12.54	0.3035	A,C
8	26.64	3.3435	57.39	9.62	0.4855	A,B
9	27.14	3.2830	48.47	5.29	0.3159	A,B
10	28.22	3.1598	508.22	56.16	0.3200	A,B
11	29.86	2.9898	157.60	9.92	0.1822	A,C
12	30.42	2.9361	151.11	9.98	0.1913	A,B
13	31.16	2.8680	1000.00	73.99	0.2142	A,B
14	32.36	2.7643	295.64	20.42	0.2000	A,C
15	33.20	2.6963	83.82	6.95	0.2400	A,B
16	35.72	2.5116	541.68	157.60	0.8425	A,B,C
17	36.48	2.4610	540.18	67.67	0.3627	A,B,C
18	39.70	2.2685	121.71	8.77	0.2087	A,B,C
19	40.06	2.2490	144.96	21.46	0.4288	A,B,C
20	41.88	2.1553	135.63	35.87	0.7659	A,B,C
21	42.86	2.1083	95.40	22.05	0.6693	A,B,C
22	44.06	2.0536	75.78	12.70	0.4853	A,B
23	44.54	2.0326	50.37	11.09	0.6374	A,B,C
24	45.76	1.9812	73.04	7.76	0.3076	A,B
25	46.40	1.9554	118.04	9.35	0.2294	A,B,C
26	51.10	1.7860	162.06	16.70	0.2984	B,C
27	52.22	1.7503	247.76	25.16	0.2941	C
28	56.10	1.6381	115.75	8.89	0.2223	B,C
29	56.84	1.6185	85.63	7.20	0.2435	B,C
30	60.72	1.5240	250.31	56.59	0.6547	B
31	60.90	1.5200	237.41	62.31	0.7600	B,C
32	61.92	1.4974	173.36	21.55	0.3600	B,C
		1.4806	152.18	17.77	0.3381	B,C
		1.3956	152.84	12.67	0.2400	B,C
		1.3916	120.80	7.31	0.1753	B,C
		1.3524	78.65	3.12	0.1150	B,C
		1.3484	73.07	3.50	0.1389	B,C

Integrated Profile Areas

ofile

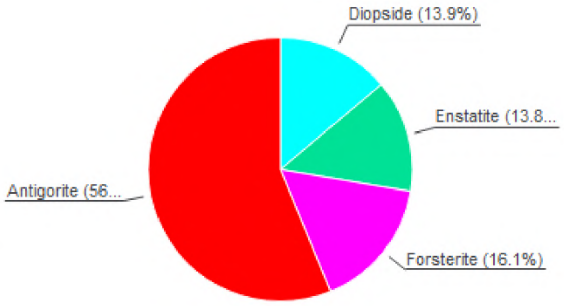
Profile area	*Counts*	*Amount*
Overall diffraction profile	123754	100.00%
Background radiation	60227	48.67%
Diffraction peaks	63527	51.33%
Peak area belonging to selected phases	42851	34.63%
Peak area of phase A (Antigorite)	*18727*	*15.13%*
Peak area of phase B (Enstatite)	*15009*	*12.13%*
Peak area of phase C (Olivine)	*9115*	*7.37%*
Unidentified peak area	20676	16.71%

Match! Phase Analysis Report

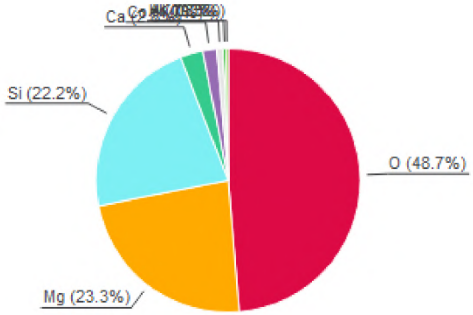
Sample: DIDI-STD-18 (5-70)

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	13.9	Diopside	Al0.19 Ca0.88 K0.12 Mg0.83 O6 Si1.98
B	13.8	Enstatite	Ca0.2 Mg1.8 O6 Si2
C	16.1	Forsterite	Co0.261 Mg1.739 O4 Si
D	56.2	Antigorite	H62 Mg48 O147 Si34
	17.1	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*48.7%(*)*
Mg	23.3%
Si	22.2%
Ca	2.8%
Co	1.7%
H	*0.8%(*)*
Al	0.3%
K	0.3%
**LE (sum)*	*49.4%*

Details of identified phases

A: Diopside (13.9 %)*

Formula sum	Al0.19 Ca0.88 K0.12 Mg0.83 O6 Si1.98
Entry number	96-900-4028
Figure-of-Merit (FoM)	0.647510*
Total number of peaks	286
Peaks in range	83
Peaks matched	30
Intensity scale factor	0.18
2theta correction	0.002°
Space group	C 1 2/c 1
Crystal system	monoclinic
Unit cell	a= 9.5089 Å b= 8.6937 Å c= 5.1545 Å β= 105.344 °
I/Ic	1.10
Calc. density	3.505 g/cm³
Reference	Bindi L., Downs R. T., Harlow G. E., Safonov O. G., Litvin Y. A., Perchuk L. L., Uchida H., Menchetti S., "Compressibility of synthetic potassium-rich clinopyroxene:In situ high-pressure single-crystal X-ray studySample: 939-1, P = 8.11 GPa", American Mineralogist **91**, 802-808 (2006)

B: Enstatite (13.8 %)*

Formula sum	Ca0.2 Mg1.8 O6 Si2
Entry number	96-900-4958
Figure-of-Merit (FoM)	0.603970*
Total number of peaks	499
Peaks in range	165
Peaks matched	46
Intensity scale factor	0.15
2theta correction	-0.074°
Space group	P 1 21/c 1
Crystal system	monoclinic
Unit cell	a= 9.6655 Å b= 8.8534 Å c= 5.2138 Å β= 108.349 °
I/Ic	0.91

Calc. density	3.199 g/cm³
Reference	Tribaudino M., Nestola F., Meneghini C., "Rietveld refinement of clinopyroxenes with intermediateCa-content along the join diopside-enstatiteSample: Di20En80", The Canadian Mineralogist **43**, 1411-1421 (2005)

C: Forsterite (16.1 %)*

Formula sum	Co0.261 Mg1.739 O4 Si
Entry number	96-900-1065
Figure-of-Merit (FoM)	0.662609*
Total number of peaks	363
Peaks in range	68
Peaks matched	27
Intensity scale factor	0.18
2theta correction	0.022°
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)

D: Antigorite (56.2 %)*

Formula sum	H62 Mg48 O147 Si34
Entry number	96-900-4515
Figure-of-Merit (FoM)	0.653517*
Total number of peaks	493
Peaks in range	493
Peaks matched	143
Intensity scale factor	0.50
2theta correction	-0.029°
Space group	P 1 m 1
Crystal system	monoclinic
Unit cell	a= 43.3000 Å b= 9.2300 Å c= 7.2700 Å β= 91.600 °
I/Ic	0.76
Calc. density	2.593 g/cm³
Reference	Uehara S., "TEM and XRD study of antigorite superstructures", The Canadian Mineralogist **36**, 1595-1605 (1998)

(*)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

Criteria for entries added by user

Reference:

Entry number: 96-101-0498;96-154-4624;96-154-4625;96-154-4890;96-154-4891;96-900-0393;96-900-0394;96-900-0395;96-900-0397;96-900-0867;96-900-0868;96-900-1066;96-900-1067;96-900-1068;96-900-1069;96-900-1070;96-900-1097;96-900-1098;96-900-1099;96-900-1100;96-900-1101;96-900-1102;96-900-1103;96-900-1194;96-900-1195;96-900-1196;96-900-1197;96-900-1198;96-900-1199;96-900-1200;96-900-1201;96-900-1202;96-900-1203;96-900-1204;96-900-1205;96-900-1206;96-900-2512;96-900-2513;96-900-2514;96-900-2515;96-900-2516;96-900-2586;96-900-2587;96-900-2588;96-900-2589;96-900-2590;96-900-2591;96-900-2592;96-900-2593;96-900-2594;96-900-2595;96-900-2596;96-900-2597;96-900-2598;96-900-2599;96-900-2600;96-900-2601;96-900-2602;96-900-2603;96-900-2604;96-900-2605;96-900-2606;96-900-2607;96-900-2608;96-900-2609;96-900-2610;96-900-2611;96-900-2612;96-900-2613;96-900-2614;96-900-2615;96-900-2616;96-900-2617;96-900-2618;96-900-2619;96-900-2620;96-900-2621;96-900-2622;96-900-2623;96-900-2624;96-900-2625;96-900-2626;96-900-2627;96-900-2628;96-900-2629;96-900-2630;96-900-2631;96-900-2632;96-900-2633;96-900-2634;96-900-5857;96-900-5909;96-900-5910;96-900-5911;96-900-5912;96-900-5913;96-900-5914;96-900-5915;96-900-5916;96-900-5917;96-900-5918;96-900-5919;96-900-5920;96-900-5921;96-900-6391;96-900-6392;96-900-6393;96-900-6394;96-900-6395;96-900-6396;96-900-6397;96-900-6398;96-900-6399;96-900-6400;96-900-6401;96-900-6402;96-900-6403;96-900-6404;96-900-6876;96-900-6877;96-900-6878;96-900-6879;96-900-6880;96-900-6881;96-900-6882;96-900-6883;96-900-6884;96-900-6885;96-900-6886;96-900-6887;96-900-6888;96-900-6889;96-900-6890;96-900-6891;96-900-6892;96-900-6893;96-901-2682;96-901-4596;96-901-6130

Peak List

d [Å]	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
7.3207	1000.00	143.90	0.4790	D

2	19.34	4.5858	201.22	43.56	0.7206	A,B,D
3	22.86	3.8871	118.05	24.36	0.6869	C,D
4	24.38	3.6480	798.28	111.07	0.4632	B,D
5	26.64	3.3435	116.87	17.92	0.5105	B,D
6	28.18	3.1642	519.98	57.11	0.3656	A,B,D
7	29.86	2.9898	59.98	6.49	0.3600	B,C,D
8	30.38	2.9398	118.65	7.97	0.2235	A,B,D
9	31.12	2.8716	573.44	50.24	0.2917	A,B,D
10	32.30	2.7693	120.91	10.55	0.2904	A,B,C,D
11	33.12	2.7026	77.87	5.94	0.2538	D
12	35.82	2.5049	238.36	36.58	0.5108	A,B,C,D
13	36.40	2.4663	540.46	232.65	1.4330	A,B,C,D
14	39.68	2.2696	88.21	28.76	1.0852	A,C,D
15	41.90	2.1544	152.28	48.36	1.0572	A,B,C,D
16	42.74	2.1139	79.49	21.90	0.9172	B,C,D
17	43.18	2.0934	68.36	6.18	0.3011	A,B,D
18	51.14	1.7847	124.44	24.49	0.6552	A,B,C
19	52.32	1.7472	118.41	15.65	0.4400	A,B,C
20	52.88	1.7300	84.87	10.76	0.4220	B,C
21	60.26	1.5346	228.43	103.37	1.5064	A,B,C
22	61.78	1.5004	101.51	63.34	2.0772	A,B,C
23	62.70	1.4806	219.32	31.62	0.4800	A,B,C
24	63.30	1.4680	141.56	13.24	0.3114	A,B,C
25	65.80	1.4181	52.74	5.50	0.3472	A,B,C
26	67.28	1.3905	79.33	12.84	0.5389	A,B,C

Integrated Profile Areas

Based on calculated profile

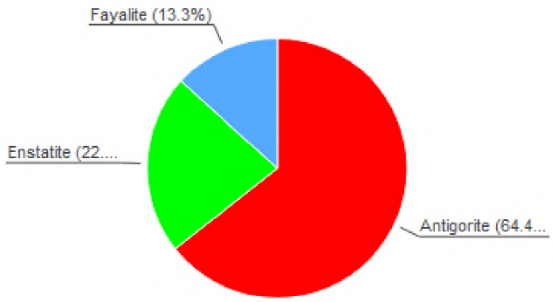
Profile area	***Counts***	***Amount***
Overall diffraction profile	119397	100.00%
Background radiation	62906	52.69%
Diffraction peaks	56491	47.31%
Peak area belonging to selected phases	36123	30.25%
Peak area of phase A (Diopside)	*5681*	*4.76%*
Peak area of phase B (Enstatite)	*5397*	*4.52%*
Peak area of phase C (Forsterite)	*7495*	*6.28%*
Peak area of phase D (Antigorite)	*17549*	*14.70%*
Unidentified peak area	20369	17.06%

Match! Phase Analysis Report

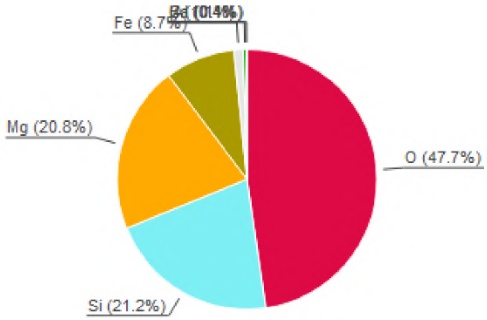
Sample: DIDI-STD-19 (5-70)

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	64.4	Antigorite	H79 Mg48 O147 Si34
B	22.4	Enstatite	Al0.14 Ca0.012 Fe0.24 Mg1.66 O6 Si1.94
C	13.3	Fayalite	Fe2 O4 Si
	18.1	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*47.7%(*)*
Si	21.2%
Mg	20.8%
Fe	8.7%
H	*1.1%(*)*
Al	0.4%
Ca	0.1%
**LE (sum)*	*48.8%*

Details of identified phases

A: Antigorite (64.4 %)*

Formula sum	H79 Mg48 O147 Si34
Entry number	96-900-3104
Figure-of-Merit (FoM)	0.691010*
Total number of peaks	498
Peaks in range	498
Peaks matched	147
Intensity scale factor	0.57
2theta correction	-0.041°
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)

B: Enstatite (22.4 %)*

Formula sum	Al0.14 Ca0.012 Fe0.24 Mg1.66 O6 Si1.94
Entry number	96-900-6437
Figure-of-Merit (FoM)	0.604523*
Total number of peaks	500
Peaks in range	178
Peaks matched	63
	0.14
	-0.042°
	P b c a
	orthorhombic
	a= 18.2310 Å b= 8.8095 Å c= 5.1873 Å
	0.52
	3.324 g/cm³
	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: Fayalite (13.3 %)*

Formula sum	Fe2 O4 Si
Entry number	96-901-1592
Figure-of-Merit (FoM)	0.690882*
Total number of peaks	359
Peaks in range	73
Peaks matched	35
Intensity scale factor	0.28
2theta correction	0.037°
Space group	P b n m
Crystal system	orthorhombic
Unit cell	a= 4.7570 Å b= 10.1530 Å c= 5.9850 Å
I/Ic	1.70
Calc. density	4.682 g/cm³
Reference	Kudoh Y., Takeda H., "Single crystal X-ray diffraction study on the bond compressibilityof fayalite, Fe~2~SiO~4~ and rutile, TiO~2~ under high pressureSample: P = 93 kbar", Physica B+C **140**, 333-336 (1986)

(*) 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	12.12	7.2966	1000.00	147.28	0.4394	A
2	17.26	5.1335	103.10	12.27	0.3551	A,C
3	19.40	4.5718	179.27	53.24	0.8860	A,B
4	22.86	3.8871	258.99	36.37	0.4189	A,C
5	24.40	3.6451	815.57	119.45	0.4369	A
6	25.50	3.4903	103.59	12.88	0.3710	A,C
7	28.22	3.1598	301.20	37.55	0.3719	A,B
8	29.82	2.9938	111.90	14.18	0.3780	A,C
9	30.42	2.9361	89.69	7.35	0.2446	A,B
10	31.16	2.8680	383.13	38.44	0.2993	A,B
11	32.40	2.7610	376.93	35.52	0.2811	A,C
12	35.76	2.5089	708.61	169.32	0.7128	A,B,C
13	36.48	2.4610	442.68	64.81	0.4367	A,B,C
14	38.30	2.3482	95.13	28.71	0.9004	A,B,C
15	39.74	2.2663	185.90	44.73	0.7179	A,B,C
16	41.86	2.1563	135.75	51.15	1.1240	A,B,C
17	45.82	1.9788	84.97	8.82	0.3097	A,B
18	51.06	1.7873	88.71	23.17	0.7791	B,C
19	52.26	1.7491	317.86	34.10	0.3200	C
20	54.90	1.6710	97.71	11.08	0.3383	B,C
21	56.14	1.6370	106.73	11.10	0.3102	B,C
22	58.64	1.5730	137.88	19.25	0.4164	B,C
23	60.28	1.5341	215.20	74.04	1.0263	B,C
24	60.92	1.5195	99.79	55.65	1.6634	B,C
25	61.92	1.4974	224.61	36.14	0.4800	B,C
26	62.66	1.4814	165.85	21.78	0.3918	B
27	63.26	1.4688	251.58	26.84	0.3182	B,C
28	67.32	1.3898	354.55	42.42	0.3569	B,C
29	69.56	1.3504	60.44	6.55	0.3234	B,C

Integrated Profile Areas

Based on calculated profile

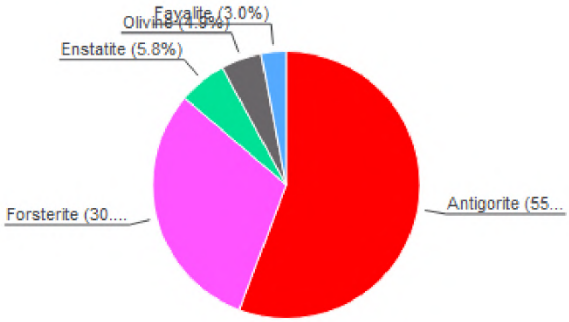
Profile area	Counts	Amount
Overall diffraction profile	114204	100.00%
	47621	41.70%
	66584	58.30%
elected phases	45862	40.16%
ntigorite)	*21898*	*19.17%*
nstatite)	*11148*	*9.76%*
ayalite)	*12816*	*11.22%*
	20722	18.14%

Match! Phase Analysis Report

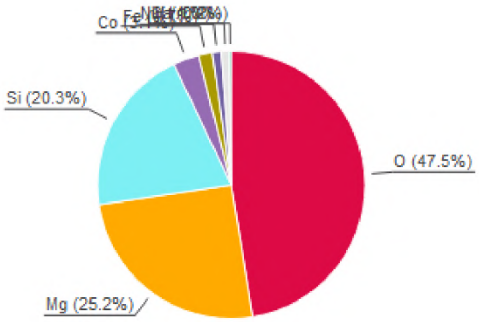
Sample: DIDI-STD-21 (5-70)

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	55.8	Antigorite	H79 Mg48 O147 Si34
B	30.5	Forsterite	Co0.261 Mg1.739 O4 Si
C	5.8	Enstatite	Ca0.2 Mg1.8 O6 Si2
D	4.9	Olivine	Mg1.4 Ni0.6 O4 Si
E	3.0	Fayalite	Fe2 O4 Si
	18.0	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*47.5%(*)*
Mg	25.2%
Si	20.3%
Co	3.1%
Fe	1.7%
Ni	1.1%
H	*1.0%(*)*
Ca	0.2%
**LE (sum)*	*48.4%*

Details of identified phases

A: Antigorite (55.8 %)*

Formula sum	H79 Mg48 O147 Si34
Entry number	96-900-3104
Figure-of-Merit (FoM)	0.690439*
Total number of peaks	498
Peaks in range	498
Peaks matched	153
Intensity scale factor	0.44
2theta correction	-0.036°
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)

B: Forsterite (30.5 %)*

Formula sum	Co0.261 Mg1.739 O4 Si
Entry number	96-900-1065
Figure-of-Merit (FoM)	0.798561*
	363
	75
	33
	0.32
	-0.027°
	P b n m
	orthorhombic
	a= 4.7600 Å b= 10.2210 Å c= 5.9840 Å

I/Ic	0.96 (Source: Unknown)
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)

C: Enstatite (5.8 %)*

Formula sum	Ca0.2 Mg1.8 O6 Si2
Entry number	96-900-4958
Figure-of-Merit (FoM)	0.616012*
Total number of peaks	499
Peaks in range	177
Peaks matched	47
Intensity scale factor	0.06
2theta correction	-0.024°
Space group	P 1 21/c 1
Crystal system	monoclinic
Unit cell	a= 9.6655 Å b= 8.8534 Å c= 5.2138 Å β= 108.349 °
I/Ic	0.91
Calc. density	3.199 g/cm³
Reference	Tribaudino M., Nestola F., Meneghini C., "Rietveld refinement of clinopyroxenes with intermediateCa-content along the join diopside-enstatiteSample: Di20En80", The Canadian Mineralogist **43**, 1411-1421 (2005)

D: Olivine (4.9 %)*

Formula sum	Mg1.4 Ni0.6 O4 Si
Entry number	96-900-1098
Figure-of-Merit (FoM)	0.761245*
Total number of peaks	362
Peaks in range	74
Peaks matched	31
Intensity scale factor	0.05
2theta correction	0.054°
Space group	P b n m
Crystal system	orthorhombic
Unit cell	a= 4.7447 Å b= 10.1993 Å c= 5.9567 Å
I/Ic	0.94 (Source: Unknown)
Calc. density	3.717 g/cm³
Reference	Bostrom D., "Single-crystal X-ray diffraction studies of synthetic Ni-Mg olivine solidsolutionsSample: XNi2+ = .30", American Mineralogist **72**, 965-972 (1987)

E: Fayalite (3.0 %)*

Formula sum	Fe2 O4 Si
Entry number	96-901-1592
Figure-of-Merit (FoM)	0.720818*
Total number of peaks	359
Peaks in range	73
Peaks matched	32
Intensity scale factor	0.06
2theta correction	0.040°
Space group	P b n m
Crystal system	orthorhombic
Unit cell	a= 4.7570 Å b= 10.1530 Å c= 5.9850 Å
I/Ic	1.70
Calc. density	4.682 g/cm³
Reference	Kudoh Y., Takeda H., "Single crystal X-ray diffraction study on the bond compressibilityof fayalite, Fe~2~SiO~4~ and rutile, TiO~2~ under high pressureSample: P = 93 kbar", Physica B+C **140**, 333-336 (1986)

(*)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

d [Å]	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
7.3086	1000.00	150.66	0.4371	A
5.0867	179.51	17.67	0.2856	A,B,D,E
4.5671	148.06	51.78	1.0148	A,C
3.8737	313.48	40.05	0.3707	A,B,D,E

5	24.40	3.6451	781.93	109.95	0.4080	A
6	25.52	3.4876	128.84	14.32	0.3224	A,B,D,E
7	28.22	3.1598	295.52	29.28	0.2874	A,C
8	29.86	2.9898	159.51	15.10	0.2747	A,B,C,D,E
9	31.14	2.8698	264.02	25.12	0.2761	A,C
10	32.34	2.7660	451.64	36.68	0.2356	A,B,C,D,E
11	35.74	2.5103	673.28	136.01	0.5862	A,B,C,D,E
12	36.54	2.4571	688.91	97.46	0.4105	A,B,C,D,E
13	38.32	2.3470	126.10	23.21	0.5340	A,B,C,D,E
14	38.88	2.3145	97.69	9.08	0.2698	A,B,C,D,E
15	39.70	2.2685	252.35	31.36	0.3605	A,B,D,E
16	40.06	2.2490	212.68	17.11	0.2335	A,B,C,D,E
17	41.84	2.1573	149.88	39.28	0.7605	A,B,C,D,E
18	51.10	1.7860	98.38	18.40	0.5426	B,C,D,E
19	52.28	1.7484	405.42	50.30	0.3600	B,D,E
20	54.92	1.6705	85.55	9.41	0.3193	B,C,D,E
21	56.18	1.6359	129.22	11.85	0.2660	B,C,D,E
22	56.84	1.6185	114.31	10.68	0.2711	B,C,D,E
23	60.28	1.5341	191.12	94.66	1.4370	B,C,D,E
24	61.92	1.4974	208.30	46.66	0.6499	B,C,D,E
25	62.74	1.4797	249.69	27.70	0.3219	B,C,D
26	67.34	1.3894	125.99	20.25	0.4400	B,C,D,E
27	69.52	1.3511	76.73	10.09	0.3600	B,C,D,E

Integrated Profile Areas

Based on calculated profile

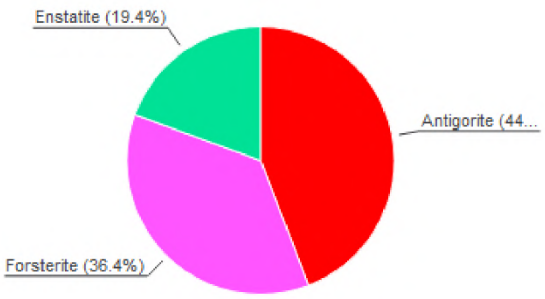
Profile area	***Counts***	***Amount***
Overall diffraction profile	118606	100.00%
Background radiation	54698	46.12%
Diffraction peaks	63908	53.88%
Peak area belonging to selected phases	42553	35.88%
Peak area of phase A (Antigorite)	*18138*	*15.29%*
Peak area of phase B (Forsterite)	*16957*	*14.30%*
Peak area of phase C (Enstatite)	*2562*	*2.16%*
Peak area of phase D (Olivine)	*1977*	*1.67%*
Peak area of phase E (Fayalite)	*2920*	*2.46%*
Unidentified peak area	21355	18.01%

Match! Phase Analysis Report

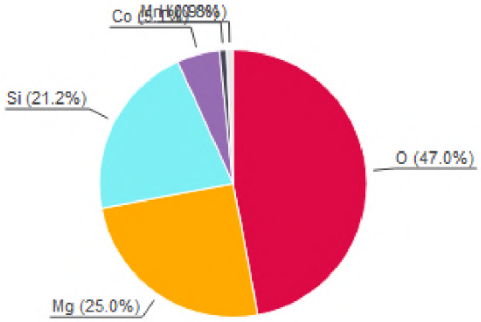
Sample: DIDI-STD-22 (5-70)

Analysis Results

Phase composition (Weight %) calc. by RIR method



Elemental composition (Weight %) calc. by RIR method



Index	*Amount (%)*	*Name*	*Formula sum*
A	44.2	Antigorite	H79 Mg48 O147 Si34
B	36.4	Forsterite	Co0.261 Mg1.739 O4 Si
C	19.4	Enstatite	Co0.132 Mg0.781 Mn0.087 O3 Si
	16.7	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*47.0%(*)*
Mg	25.0%
Si	21.2%
Co	5.1%
Mn	0.9%
H	*0.8%(*)*
**LE (sum)*	*47.8%*

Details of identified phases

A: Antigorite (44.2 %)*

Formula sum	H79 Mg48 O147 Si34
Entry number	96-900-3104
Figure-of-Merit (FoM)	0.687014*
Total number of peaks	498
Peaks in range	498
Peaks matched	150
Intensity scale factor	0.72
2theta correction	-0.024°
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)

B: Forsterite (36.4 %)*

Formula sum	Co0.261 Mg1.739 O4 Si
Entry number	96-900-1065
Figure-of-Merit (FoM)	0.771203*
Total number of peaks	363
	75
	27
	0.79
	0.012°
	P b n m
	orthorhombic
	a= 4.7600 Å b= 10.2210 Å c= 5.9840 Å
	0.96
	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)

C: Enstatite (19.4 %)*

Formula sum	Co0.132 Mg0.781 Mn0.087 O3 Si
Entry number	96-900-4119
Figure-of-Merit (FoM)	0.614866*
Total number of peaks	500
Peaks in range	179
Peaks matched	40
Intensity scale factor	0.24
2theta correction	-0.076°
Space group	P b c a
Crystal system	orthorhombic
Unit cell	a= 18.2460 Å b= 8.8390 Å c= 5.1960 Å
I/Ic	0.55
Calc. density	3.412 g/cm³
Reference	Hawthorne F. C., Ito J., "Synthesis and crystal-structure refinement of transition-metalorthopyroxenes I: Orthoenstatite and (Mg, Mn, Co) orthopyroxene", The Canadian Mineralogist **15**, 321-338 (1977)

(*)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	12.06	7.3328	955.17	147.68	0.4590	A
2	17.40	5.0925	115.20	14.10	0.3634	A,B
3	19.36	4.5812	145.75	32.83	0.6688	A,C
4	22.86	3.8871	294.83	30.74	0.3095	A,B
5	24.38	3.6480	843.58	103.17	0.3631	A,C
6	25.50	3.4903	149.34	16.10	0.3200	A,B
7	28.20	3.1620	628.21	47.27	0.2234	A,C
8	29.86	2.9898	172.83	15.79	0.2713	A,B
9	30.40	2.9380	167.83	11.52	0.2037	A,C
10	31.14	2.8698	553.68	43.66	0.2341	A,C
11	32.30	2.7693	584.61	39.47	0.2004	A,B
12	33.08	2.7058	96.86	7.29	0.2235	A,C
13	35.74	2.5103	1000.00	126.96	0.3769	A,B,C
14	36.50	2.4597	820.79	85.90	0.3107	A,B,C
15	38.28	2.3494	118.79	12.05	0.3010	A,B,C
16	39.70	2.2685	316.05	29.81	0.2800	A,B,C
17	40.06	2.2490	240.64	15.14	0.1868	A,B,C
18	41.82	2.1583	225.37	24.98	0.3290	A,B,C
19	52.22	1.7503	431.85	29.09	0.2000	B
20	61.94	1.4969	255.92	35.78	0.4150	B,C
21	62.66	1.4814	553.73	47.34	0.2538	B,C
22	66.96	1.3964	98.11	23.84	0.7214	B,C
23	67.24	1.3912	23.51	1.98	0.2502	B,C
24	69.42	1.3528	91.48	6.78	0.2199	B,C
25	69.66	1.3487	92.52	6.04	0.1937	B,C

Integrated Profile Areas

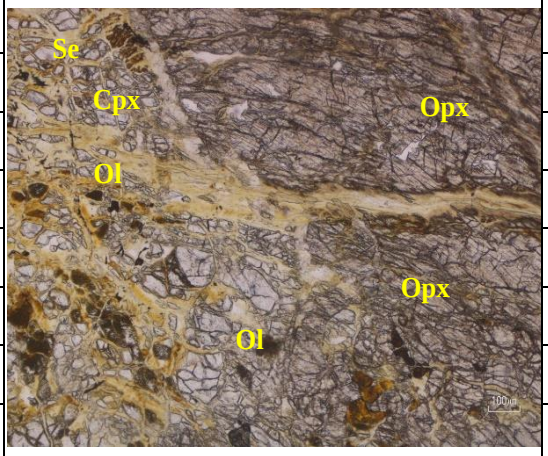
Based on calculated profile

Profile area	*Counts*	*Amount*
Overall diffraction profile	134060	100.00%
[illegible]	68043	50.76%
[illegible]	66017	49.24%
selected phases	43656	32.56%
ntigorite)	*14554*	*10.86%*
orsterite)	*19582*	*14.61%*
nstatite)	*9521*	*7.10%*
	22361	16.68%

Lampiran 4 Hasil Analisis Petrografi

No. Urut : 1
No. Sampel : STD 12 / SWG-01

Foto



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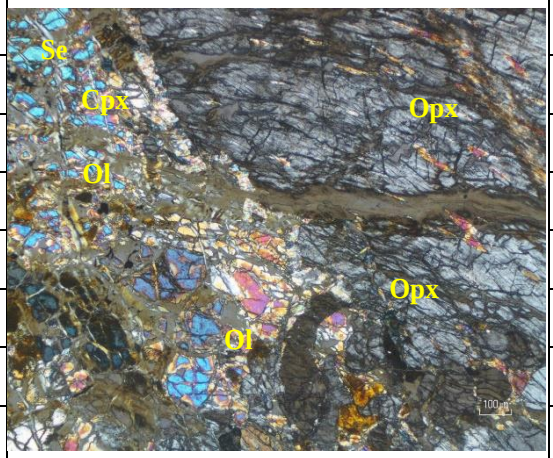


X-NIKOL

Lensa Okuler : 10x Lensa Objektif : 4x Perbesaran Total : 40x

Tipe Batuan : Batuan Beku

Tipe Struktur : Masif

Klasifikasi : Klasifikasi Streckeinsen, 1974

Deskripsi Mikroskopis :
Kenampakan sayatan batuan pada warna absorbsi *colorless*, nikol silang abu-abu kehitaman, granularitas porfiritik, kristanilitas hipokristalin, bentuk mineral euhedral-subhedral, relasi inequigranular, dengan komposisi mineral Olivin (25%), Serpentin (10%), Ortopiroksin (45%) dan Clinopiroksin (20%).

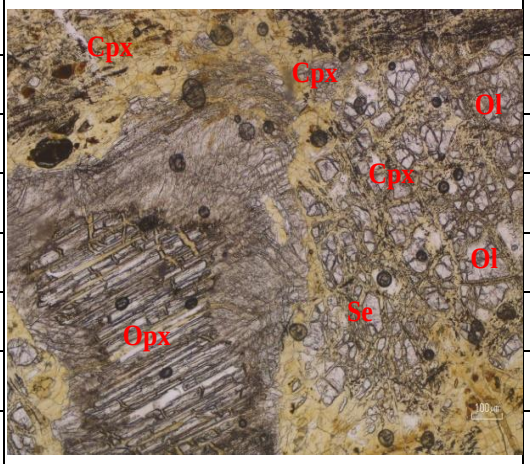
Deskripsi Mineralogi

Komposisi Mineral	Jumlah (%)	Keterangan Optik Mineral
Olivin (Ol)	27,7%	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 0,3 mm – 0,5 mm
Serpentin (Se)	10%	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief sedang, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan tidak ada, bentuk subhedral-anhedral, warna interferensi putih keabuan, kembaran tidak ada, sudut gelapan 31˚, jenis gelapan miring, dengan ukuran mineral 0,05 mm – 0,1 mm
Ortopiroksin (Opx)	50%	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 1,2 – 1,8 mm, dengan jenis piroksin adalah *orthopyroxene*.
Clinopiroksin (Cpx)	22,2%	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk subhedral-anhedral, warna interferensi putih kekuningan, kembaran tidak ada, sudut gelapan 23˚, jenis gelapan miring, dengan ukuran mineral 0,2 – 0,4 mm, dengan jenis piroksin adalah *clinopyroxene*.

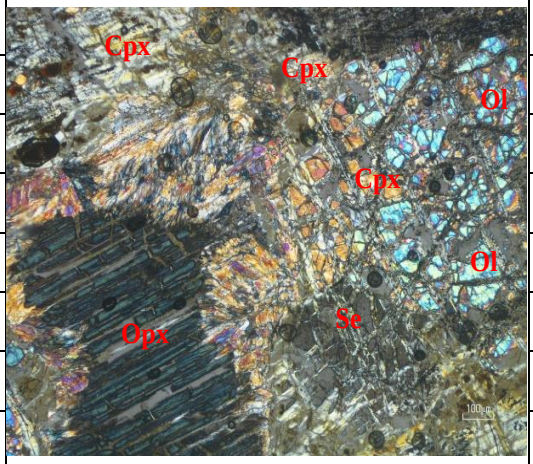
a Batuan : *Olivine Websterite* terserpentinisasi (Streckeinsen, 1974)

No. Urut : 2
No. Sampel : STD 15 / SWG-03 (1)

Foto



//-NIKOL



X-NIKOL

Lensa Okuler : 10x Lensa Objektif : 4x Perbesaran Total : 40x

Tipe Batuan : Batuan Beku

Tipe Struktur : Masif

Klasifikasi : Klasifikasi Streckeinsen, 1974

Deskripsi Mikroskopis :
Kenampakan sayatan batuan pada warna absorbsi *colorless*, nikol silang abu-abu kehitaman, granularitas porfiritik, kristanilitas hipokristalin, bentuk mineral euhedral-subhedral, relasi inequigranular, dengan komposisi mineral Olivin (25%), Serpentin (10%), Ortopiroksin (35%) dan Clinopiroksin (30%).

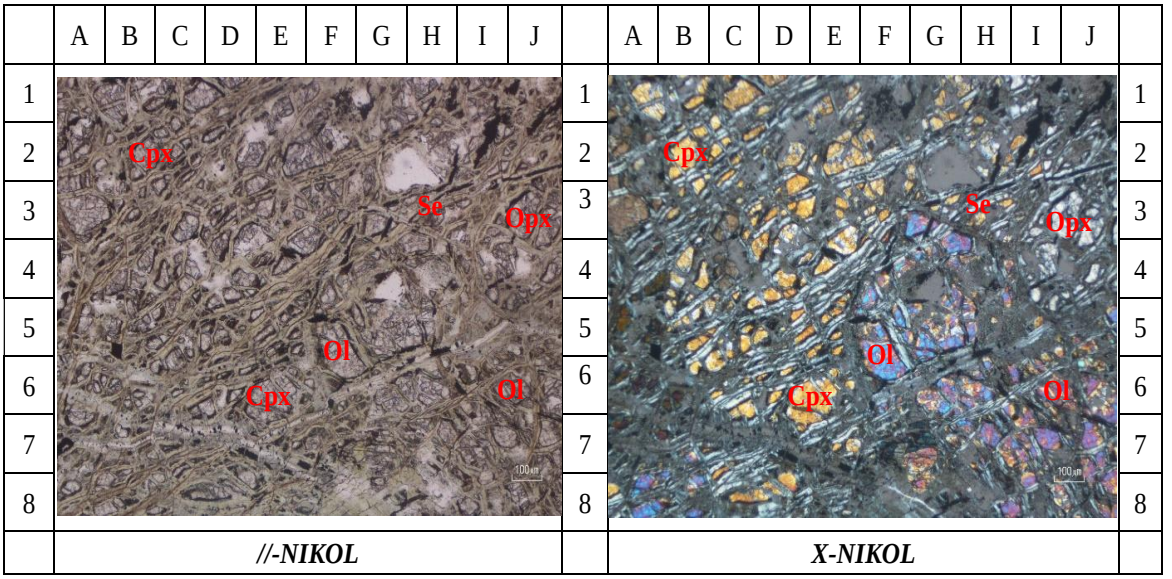
Deskripsi Mineralogi

Komposisi Mineral	Jumlah (%)	Keterangan Optik Mineral
Olivin (Ol)	27,7%	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 30˚, jenis gelapan miring, dengan ukuran mineral 0,3 mm – 0,8 mm
Serpentin (Se)	10%	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief sedang, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan tidak ada, bentuk subhedral-anhedral, warna interferensi putih keabuan, kembaran tidak ada, sudut gelapan 23˚, jenis gelapan miring, dengan ukuran mineral 0,05 mm – 0,08 mm
Ortopiroksin (Opx)	38,8%	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 52˚, jenis gelapan paralel, dengan ukuran mineral 1 – 1,3 mm, dengan jenis piroksin adalah *orthopyroxene*.
Clinopiroksin (Cpx)	33,3%	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk subhedral-anhedral, warna interferensi putih kekuningan, kembaran tidak ada, sudut gelapan 28˚, jenis gelapan miring, dengan ukuran mineral 0,3 – 0,5 mm, dengan jenis piroksin adalah *clinopyroxene*.

na Batuan : *Olivine Websterite* terserpentinisasi (Streckeinsen, 1974)

No. Urut : 3
No. Sampel : STD 16 / SWG-04 (1)

Foto



//-NIKOL *X-NIKOL*

Lensa Okuler : 10x Lensa Objektif : 4x Perbesaran Total : 40x

Tipe Batuan : Batuan Beku

Tipe Struktur : Masif

Klasifikasi : Klasifikasi Streckeinsen, 1974

Deskripsi Mikroskopis :
Kenampakan sayatan batuan pada warna absorbsi *colorless*, nikol silang abu-abu kehitaman, granularitas porfiritik, kristanilitas hipokristalin, bentuk mineral subhedral-anhedral, relasi inequigranular, dengan komposisi mineral Olivin (20%), Serpentin (40%), Ortopiroksin (25%) dan Clinopiroksin (15%).

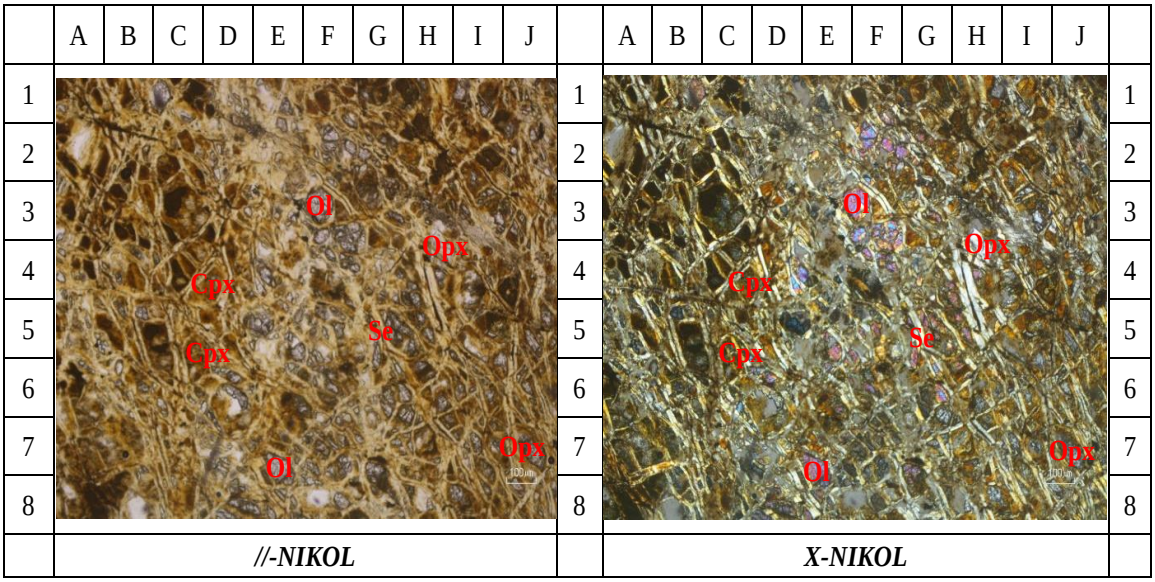
Deskripsi Mineralogi

Komposisi Mineral	Jumlah (%)	Keterangan Optik Mineral
Olivin (Ol)	33,3%	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 25˚, jenis gelapan miring, dengan ukuran mineral 0,3 mm – 0,5 mm
Serpentin (Se)	40%	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief sedang, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan tidak ada, bentuk subhedral-anhedral, warna interferensi putih keabuan, kembaran tidak ada, sudut gelapan 22˚, jenis gelapan miring, dengan ukuran mineral 0,1 mm – 0,15 mm
Ortopiroksin (Opx)	41,6%	Warna absorbsi *colorless*, belahan satu arah, 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 49˚, jenis gelapan paralel, dengan ukuran mineral 0,2 – 0,6 mm, dengan jenis piroksin adalah *orthopyroxene*.
Clinopiroksin (Cpx)	25%	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk subhedral-anhedral, warna interferensi putih kekuningan, kembaran tidak ada, sudut gelapan 35˚, jenis gelapan miring, dengan ukuran mineral 0,2 – 0,5 mm, dengan jenis piroksin adalah *clinopyroxene*.

ama Batuan : *Olivine websterite* (Streckeinsen, 1974)

No. Urut : 4
No. Sampel : STD 18 / SWG-06 (1)

Foto



//-NIKOL *X-NIKOL*

Lensa Okuler : 10x Lensa Objektif : 4x Perbesaran Total : 40x

Tipe Batuan : Batuan Beku

Tipe Struktur : Masif

Klasifikasi : Klasifikasi Streckeinsen, 1974

Deskripsi Mikroskopis :
Kenampakan sayatan batuan pada warna absorbsi *colorless*, nikol silang abu-abu kecoklatan, granularitas porfiritik, kristanilitas hipokristalin, bentuk mineral subhedral-anhedral, relasi inequigranular, dengan komposisi mineral Olivin (10%), Serpentin (45%), Ortopiroksin (15%) dan Clinopiroksin (30%).

Deskripsi Mineralogi

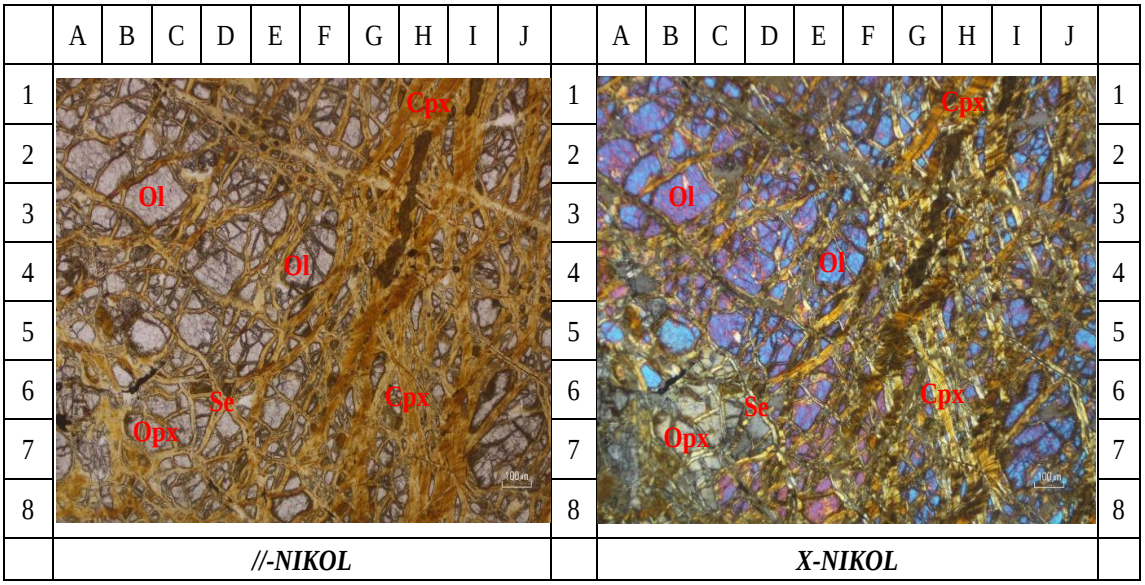
Komposisi Mineral	Jumlah (%)	Keterangan Optik Mineral
Olivin (Ol)	18,8%	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk subhedral-anhedral, warna interferensi biru keunguan, kembaran tidak ada, sudut gelapan 30˚, jenis gelapan miring, dengan ukuran mineral 0,1 mm – 0,3 mm
Serpentin (Se)	45%	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief sedang, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan tidak ada, bentuk subhedral-anhedral, warna interferensi putih keabuan, kembaran tidak ada, sudut gelapan 24˚, jenis gelapan miring, dengan ukuran mineral 0,1 mm – 0,15 mm
Ortopiroksin (Opx)	27,2%	Warna absorbsi *colorless*, belahan satu arah, 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 59˚, jenis gelapan paralel, dengan ukuran mineral 0,2 – 0,3 mm, dengan jenis piroksin adalah *orthopyroxene*.
Clinopiroksin (Cpx)	54,5%	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk subhedral-anhedral, warna interferensi putih kekuningan, kembaran tidak ada, sudut gelapan 27˚, jenis gelapan miring, dengan ukuran mineral 0,1 – 0,3 mm, dengan jenis piroksin adalah *clinopyroxene*.

Nama Batuan : *Olivine websterite* (Streckeinsen, 1974)

No. Urut : 5

No. Sampel : STD 21 / SWG-08 (1)

Foto



Lensa Okuler : 10x Lensa Objektif : 4x Perbesaran Total : 40x

Tipe Batuan : Batuan Beku

Tipe Struktur : Masif

Klasifikasi : Klasifikasi Streckeinsen, 1974

Deskripsi Mikroskopis :

Kenampakan sayatan batuan pada warna absorbsi *colorless*, nikol silang abu-abu kecoklatan, granularitas porfiritik, kristanilitas hipokristalin, bentuk mineral euhedral-subhedral, relasi inequigranular, dengan komposisi mineral Olivin (60%), Serpentin (15%), Ortopiroksin (5%) dan Clinopiroksin (20%).

Deskripsi Mineralogi

Komposisi Mineral	Jumlah (%)	Keterangan Optik Mineral
Olivin (Ol)	70,5%	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 29˚, jenis gelapan miring, dengan ukuran mineral 0,8 mm – 1 mm
Serpentin (Se)	15%	Warna absorbsi *colorless*, belahan tidak ada, intensitas tinggi, relief sedang, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan tidak ada, bentuk subhedral-anhedral, warna interferensi putih keabuan, kembaran tidak ada, sudut gelapan 27˚, jenis gelapan miring, dengan ukuran mineral 0,05 mm – 0,06 mm
Ortopiroksin (Opx)	5,8%	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 48˚, jenis gelapan paralel, dengan ukuran mineral 0,3 – 0,7 mm, dengan jenis piroksin adalah *orthopyroxene*.
(Cpx)	23,5%	Warna absorbsi *colorless*, belahan satu arah, intensitas tinggi, relief tinggi, indeks bias $n_{min} > n_{cb}$, pleokroisme lemah, pecahan *uneven*, bentuk subhedral-anhedral, warna interferensi putih kekuningan, kembaran tidak ada, sudut gelapan 31˚, jenis gelapan miring, dengan ukuran mineral 0,2 – 0,3 mm, dengan jenis piroksin adalah *clinopyroxene*.

Nama Batuan : *Lherzolite* (Streckeinsen, 1974)

KLASIFIKASI BATUAN BEKU MENURUT RUSSELL B. TRAVIS (1955)

		K. Felspar > 2/3 Seluruh Feldspar			K. Felspar 1/3 – 2/3 seluruh Feldspar			Felspar Plagioklas > 2/3 seluruh Feldspar						Sedikit/Tidakada Feldspar		Tipe Khusus
	MINERAL UTAMA	KWARSA >10%	KWARSA <10% FELSPATOID <10%	FELSPATOID >10%	KWARSA >10%	KWARSA <10% FELSPATOID <10%	FELSPATOID >10%	K.Feldspar >10% seluruh Felspar	K. Felspar <10% Seluruh Felspar					Terutama : Piroksin Dan atau Olivin	Terutama : Mineral Fe/Mg Dan Felspatoid	
									Na - Plagioklas		Ca - Plagioklas					
									KWARSA >10%	Kwarsa <10% Felspatoid <10%	Kwarsa <10% Felspatoid <10%	Felspatoid >10% Pyroksin >10%				
	MINERAL TAMBAHAN KHAS	Terutama : Hornblende, Biotit, Piroksin, Muskovit Juga : Na-Amphibol,Eigirin, Kankrinit, Turmalin, Sodalit			Terutama : Hornblende, Biotit, Piroksin Juga : Na-Amfibol, Eigirin			Terutama : Hornblende, Biotit, Piroksin (dalam Andesit) Juga : Felspatoid, Na-Amphibol			Terutama : Prioksin, Uralit,Olovin Juga : Hornblende,Biotit, Kwarsa, Eigirin, Na-Amphibol			Terutama : Serpentin Bijih besi Juga : Biotit, Hronblende	Hornblende Biotit Bijih besi	PEGMATIT APLIT LAMPROPIR
	INDEKS WARNA	10	15	20	20	25	30	20	20	25	30		60	95	55	
PLUTONIK	EKWIGRANULAR Batolit Lapolit "Stock" Lakolit luas Retas tebal Sill	GRANIT	SIANIT	SIANIT NEFELIN	MONSONIT KWARSA (ADAMELIT)	MONSONIT	MONSONIT NEFELIN	GRANO DIORIT	DIORIT KWARSA (TONALIT)	DIORIT	GABRO Norit Olivin saluo Traktolit Anortorit Gabro kwarsa	DIABAS (Dolerit)	TERALIT	PERIDOTIT Harzburgit Pikrit Dunit Piroksen Serpentinit	IJOLIT Messorite Dsb	
PORFIRITIK	MASA DASAR FANERITIK Lakolit Retas Sill "mug" "Stock" kecil Tepi masa luas	PORFIRI GRANIT	PORFIRI SIANIT	PORFIRI SIANIT NEFELIN	PORFIRI MONZONIT KWARSA	PORFIRI MONZONIT	PORFIRI MONZONIT NEFELIN	PORFIRI GRANO DIORIT	PORFIRI DIORIT KWARSA	PORFIRI DIORIT	PORFIRI GABRO		PORFIRI TERALIT	PORFIRI PERIDOTIT		
	MASA DASAR AFANITIK Retas Sill Lakolit Aliran Pemrukaan	PORFIRI RIOLIT	PORFIRI TRAKIT	PORFIRI FONOLIT	PORFIRI LATIT KWARSA	PORFIRI LATIT	PORFIRI LATIT NEFELIN	PORFIRI DASIT		PORFIRI ANDESIT	PORFIRI BASAL		PORFIRI TEFRIT	PORFIRI LIMBURGIT		
	MIKROKRISTALIN Retas Sill Aliran	RIOLIT	TRAKIT	FONOLIT	LATIT KWARSA (DELENIT)	LATIT (TRAKIT-ANDESIT	LATIT NEFELIN	DASIT		ANDESIT	BASAL		TEFRIT	LIMBURGIT	Nefelit Lesitit Melilitit Olivin Nepelinit Dsb.	TRAP FELSIT
	OBSIDIAN "PITCHSTONE" VITROFIR" PERLIT BATUAPUNG SKOREA															

Lampiran 5 Kartu Konsultasi

Lampiran B 10

Kartu Konsultasi Tugas Akhir

JUDUL: STUDI KARAKTERISTIK MINERALOGI DAN KIMIA BATUAN DASAR ENDAPAN NIKEL LATERIT PADA BUKIT WRANGLER PT ANTAM TBK UBPN KOLAKA

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
17-07-2024	• Penulisan abstrak, tujuan penelian diganti • Penulisan rumus kimia diperbaiki • Rujukan gambar dimasukkan kedalam tubuh teks	
19-07-2024	• Tujuan penelitian diperbaiki • Kata pengantar diperbaiki • Penggunaan kata asing dibenarkan	
22-07-2024	• Kesalahan penyusunan kata (typo) • Bahasa asing (italic) • Peta lokasi, peta geologi regional diperbaiki	
26-07-2024	• Pengolahan data XRD diperbaiki grafik • Daftar Pustaka	
29-07-2024	• Bab II diperbaiki penyusunan kalimat • Kesalahan typo	

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
07-08-2024	· Hasil dan Pembahasan · Metode dan Alur Penelitian · Daftar Pustaka	
08-08-2024	· Koordinat Peta diperselas · Kesalahan Typo	
09-08-2024	· Penulisan Jurnal dan Poster	
12-08-2024	· Penulisan Artikel Ilmiah dan Poster	
12/8-24	Acc Seminar	
06-09-2024	· Revisi Tujuan Penelitian Batuan berdasarkan komposisi kimia · Hasil persentase di normalisasikan · Satuan nilai pada Tabel (%) · Keterangan gambar diperlengkap · Skala pada gambar Singkapan	