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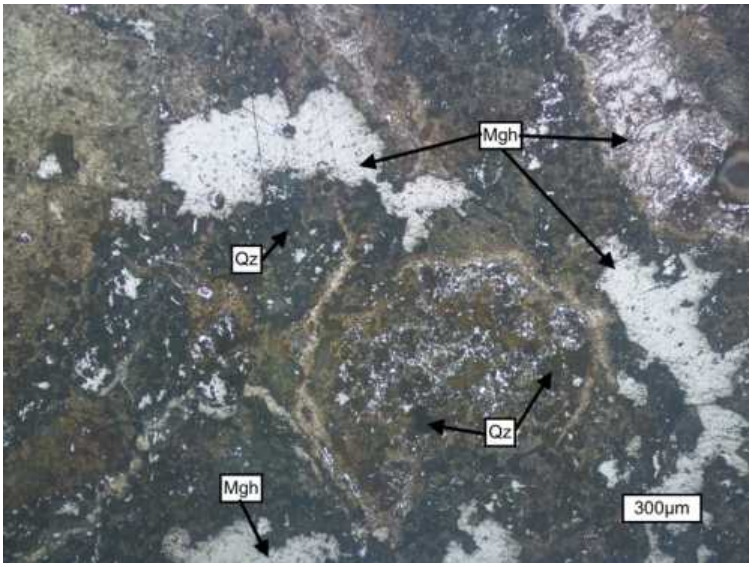
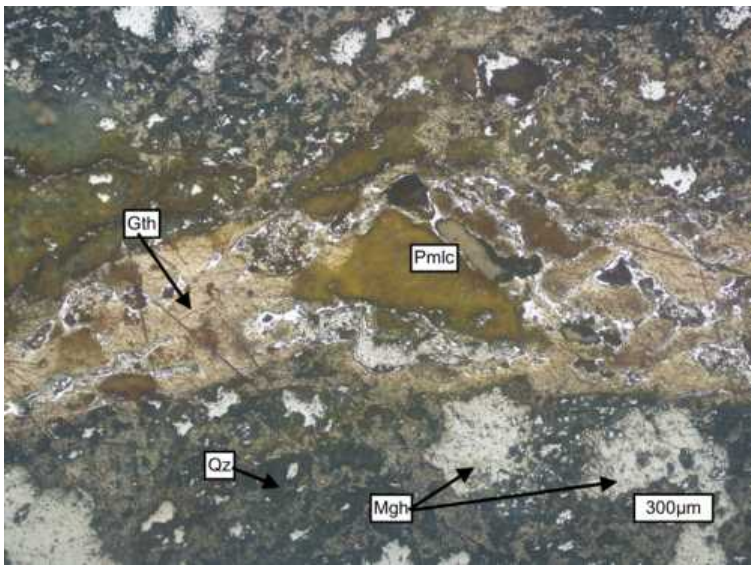
APPENDICES

APPENDICE 1

MICROSCOPIC ANALYSIS RESULT

Mineralogy		
Mineral	**Symbol**	**Mineral optical description**
Goetit	**(Gth)**	Triclin crystal system, pale red in shape (anhedral-subhedral), the visible mineral size is 50 µm-100 µm.
Maghemite	**(Mgh)**	Trigonal crystal system, white in shape (anhedral-subhedral), the visible mineral size is 10 µm-100 µm
Pseudomalachite	**(Pmlc)**	Monoclin crystal system, yellow-green with a shape (anhedral-subhedral), a visible mineral measurement of 10 µm-50 µm.
Quartz	**(Qz)**	has a crystal shape with imperfections up to anhedral-subhedral.
Photo		





APPENDICE 2

SULFURIC ACID (H_2SO_4) DILUTION CALCULATION

SULFURIC ACID (H_2SO_4) DILUTION

M1 = 6

*1 M Solution

$M_1V_1 = M_2V_2$

$6 \times V_1 = 1 \times 150\ mL$

$V_1 = \frac{1\ x\ 150mL}{6}$

$= 25\ mL$

*2 M Solution

$M_1V_1 = M_2V_2$

$6 \times V_1 = 2 \times 150\ mL$

$V_1 = \frac{2\ x\ 150\ mL}{6}$

$= 50\ mL$

*3 M Solution

$M_1V_1 = M_2V_2$

$6 \times V_1 = 3 \times 150\ mL$

$V_1 = \frac{3\ x\ 150\ mL}{6}$

$= 75\ mL$

*4 M Solution

$M_1V_1 = M_2V_2$

$6 \times V_1 = 4 \times 150\ mL$

$V_1 = \frac{4\ x\ 150\ mL}{6}$

$= 100\ mL$

APPENDICE 3

ATOMIC ABSORPTION SPECTROMETER (AAS) ANALYSIS RESULTS

LABORATORIUM PENELITIAN DAN PENGEMBANGAN SAINS
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS HASANUDDIN
Jl. Perintis Kemerdekaan Km. 10 Tamalanrea, Makassar 90245
Telp. 0411-586016 • Fax. 0411-588551 • Email : lpps.fmipa.unhas@gmail.com

KAN Komite Akreditasi Nasional Laboratorium Penguji LP-1484-IDN

LAPORAN HASIL PENGUJIAN

CERTIFICATE OF ANALYSIS

Nomor Pekerjaan : **LPPS.AJ-2310-13/8**

Job Number

Dipersembahkan Kepada
Presented To

Kepada Yth	**: Zalsa Vionatha**	**Jabatan**	**: Peneliti**
Attention		*Job Title*	
Nama Pelanggan	**: Zalsa Vionatha**	**Tujuan Pengujian**	**: Analisis Logam**
Customer Name		*Purpose of analysis*	
Alamat/Universitas	**: Perumahan Griya Rezki abadi Blok A01,**	**No. Faks/** *Fax No.*	**: -**
Address/University	**Mawang, Gowa**		
Tanggal Sampel Diterima	**: 16 Oktober 2023**	**No. Telp./** *Phone No.*	**: 0882022471463**
Date of Sample Receipt			
Email	**: -**	**Tanggal Sampel Dianalisis**	**: 10 – 20 Oktober 2023**
Email		*Date of Sample Analysed*	
Nama Pengujian	**: Analisis Tembaga (Cu) pada Larutan dan Padatan Menggunakan AAS**	**Total Halaman**	**: 2**
Name of analysis		*Total of pages*	

Hasil hanya berhubungan dengan contoh yang diuji dan laporan ini tidak boleh digandakan kecuali seluruhnya.
The result relate only to the samples tested and this report shall not be reproduced except in full

LABORATORIUM PENELITIAN DAN PENGEMBANGAN SAINS
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS HASANUDDIN
Jl. Perintis Kemerdekaan Km. 10 Tamalanrea, Makassar 90245
Telp. 0411-586016 • Fax. 0411-588551 • Email : lpps.fmipa.unhas@gmail.com

LAPORAN HASIL PENGUJIAN
CERTIFICATE OF ANALYSIS

Nomor Pekerjaan : LPPS.AJ-2310-13/8

I. Pelanggan / *Principal*

1.1 Nama / *Name*	: Zalsa Vionatha
1.2 Alamat / *Address*	: Perumahan Griya Rezki abadi Blok A01, Mawang, Gowa
1.3 Telepon / *Phone*	: 0882022471463
1.4 Personil Penghubung / *Contact Person*	: -
1.5 Email / *Email*	: -

II. Contoh Uji / *Sample*

2.1 Kode Sampel / *Sampel Code*	: LPPS.A-2310-13/8a – 8h
2.2 Kemasan / *Packaging*	: Botol Plastik dan Plastik Sampel
2.3 Nama Sampel / *Sample Name*	: Larutan (7) dan Padatan (1)
2.4 Jumlah Sampel / *Number of Sample*	: 8
2.5 Tanggal Sampling / *Date of Sampling*	: -
2.6 Diterima / *Date of Received*	: 16 Oktober 2023
2.7 Tanggal Uji / *Date of Analysis*	: 17 - 23 Oktober 2023
2.8 Jenis Uji / *Type of Analysis*	: Logam Cu AAS

III. Hasil Uji / *Result*

Kode Sampel	Nama Sampel	Satuan	Konsentrasi Logam Cu
LPPS.A-2310-13/8a	ZV 01	mg/L	512.25
LPPS.A-2310-13/8b	ZV 02	mg/L	507.70
LPPS.A-2310-13/8c	ZV 03	mg/L	522.76
LPPS.A-2310-13/8d	ZV 04	mg/L	516.46
LPPS.A-2310-13/8e	ZV 05	mg/L	481.79
LPPS.A-2310-13/8f	ZV 06	mg/L	506.30
LPPS.A-2310-13/8g	ZV 07	mg/L	563.03
LPPS.A-2310-13/8h	ZV 08	mg/kg	3223.13

Makassar, 1 November 2023
Penanggung Jawab Mutu

Prof. Dr. Nunuk Hariani Soekamto, MS
NIP. 19601215 198702 2 001

Catatan:
- Hasil Uji hanya berlaku untuk contoh tersebut di atas
- Dilarang mengutip/menyalin sebagian isi hasil uji ini

LAB. PPS FMIPA UNHAS	FORMULIR NO: FSOP-7.8-LPPS-FMIPAUH-01.4	Tanggal Berlaku : 1 April 2019
	REKAMAN HASIL ANALISIS	Edisi/Revisi Ke : 1/0
		Halaman : 1/3

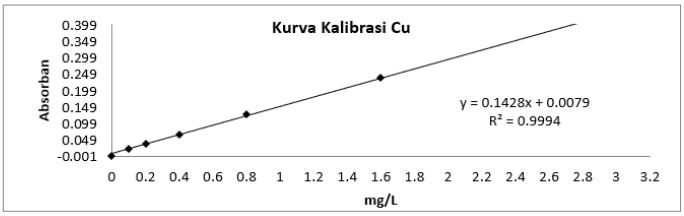
REKAMAN HASIL ANALISIS

Nomor Pekerjaan : LPPS.A-2310-13/8a-h
Tanggal Penerimaan : 16 Oktober 2023
Tanggal Analisis : 17 – 23 Oktober 2023
Suhu Ruangan : 26,1 °C
Kelembapan Ruangan : 56% RH

1. Analisis Logam Tembaga (Cu)

Optimasi Analisa Tembaga (Cu)					
Type Alat: AA 7000 Shimadzu		Slit width	: 0.7 nm	Fuel Gas Flow Rate (0.8-4.0)	: 1.8 L/min
: ASC-7000		Flame type	: Air-C_2H_2	Support gas flow rate (13.5-17.50)	: 15 L/min
HCL Cu Hamamatsu		Burner Height	: 7,0 nm	P. Gelombang Max	: 324,62 nm
P. gelombang	: 324,8 nm	Burner angle	: 0 degree		
Lamp Current Low (Peak) (mA) : 8		Lamp Mode	: BGC-D2		

Cu (mg/L)	Absorban
0	0.0007
0.1	0.0220
0.2	0.0378
0.4	0.0652
0.8	0.1278
1.6	0.2396
3.2	0.4618



Persyaratan		Hasil	Keterangan keberterimaan hasil analisis		
				R^2=	0.9994
Linearitas (r)	≥ 0.995	0.9997	Memenuhi	r=	0.9997
MDL (mg/L)		0.0076			
%R	75%-120%	78.87	Memenuhi		

Kontrol sampel	Absorban	[Cu] mg/L
Cu 0,4 mg/L	0.0531	0.32
	0.0528	0.31
Rata-rata	0.0530	0.32

Kadar Air Kode Sampel	B. Cawan Kosong (G)	Berat Sebelum Pemanasan (G)	B. Sampel (B. Basah) (G)	Berat setelah Pemanasan (G)	B. Sampel (B. Kering) (G)	Kadar Air (%)
LPPS.A-2310-13/8h	30.0142	30.5150	0.5008	30.3676	0.3534	29.43

Berat sampel peleburan Kode Sampel	B. Cawan Kosong (G)	B. Cawan+sampel sblm di+pelebur (G)	B. Sampel (B. kering) (G)	B.cawan+sampel +pelebur sblm dilebur (G)	B.cawan+sampel +pelebur setelah dilebur (G)	Berat sampel setelah dilebur (G)
LPPS.A-2310-13/8h	30.0142	30.3676	0.3534	31.8726	30.7684	0.7542

LAB. PPS FMIPA UNHAS	FORMULIR NO: FSOP-7.8-LPPS-FMIPAUH-01.4	Tanggal Berlaku : 1 April 2019
	REKAMAN HASIL ANALISIS	Edisi/Revisi Ke : 1/0
		Halaman : 2/3

Kode Sampel	Absorban	[Cu] (mg/L)	fp (kali)	[Cu] x fp (mg/L)	B. Sampel (G)	V. Sampel (mL)	Konsentrasi Cu (mg/kg= ppm)
LPPS.A-2310-13/8h	0.0539	0.32					
	0.0541	0.32	100	32.28	0.5008	50	3223.13
Rata-Rata	**= 0.0540**	**0.3228**					

Kode Sampel	Absorban	[Cu] (mg/L)	fp (kali)	[Cu] (mg/L)	Kesimpulan Hasil
LPPS.A-2310-13/8a	0.0812	0.51			
	0.0809	0.51	1000	512.25	
Rata-Rata	**= 0.0811**	**0.512**			
LPPS.A-2310-13/8b	0.0801	0.51			
	0.0807	0.51	1000	507.70	
Rata-Rata	**= 0.0804**	**0.508**			
LPPS.A-2310-13/8c	0.0824	0.52			
	0.0827	0.52	1000	522.76	
Rata-Rata	**= 0.0826**	**0.523**			
LPPS.A-2310-13/8d	0.0816	0.52			
	0.0817	0.52	1000	516.46	
Rata-Rata	**= 0.0817**	**0.516**			
LPPS.A-2310-13/8e	0.0779	0.49			
	0.0755	0.47	1000	481.79	
Rata-Rata	**= 0.0767**	**0.482**			
LPPS.A-2310-13/8f	0.0799	0.50			
	0.0805	0.51	1000	506.30	
Rata-Rata	**= 0.0802**	**0.506**			
LPPS.A-2310-13/8g	0.0874	0.56			
	0.0892	0.57	1000	563.03	
Rata-Rata	**= 0.0883**	**0.563**			

Perhitungan

$$\text{mg/kg (ppm)} = \frac{\text{konsentrasi (mg/L) x Volume (mL)}}{\text{berat sampel (g)}}$$

$$\text{\% Kadar Air} = \frac{\text{(berat cawan kosong + sampel setelah pemanasan - berat cawan kosong + sampel sebelum pemanasan) g}}{\text{berat sampel (g)}} \times 100\%$$

Perhitungan

$$\text{mg/L} = \frac{\text{Volume Akhir (mL)}}{\text{Volume Awal (mL)}} \times \text{konsentrasi (mg/L) x fp}$$

LAB. PPS FMIPA UNHAS	FORMULIR NO: FSOP-7.8-LPPS-FMIPAUH-01.4	Tanggal Berlaku : 1 April 2019
	REKAMAN HASIL ANALISIS	Edisi/Revisi Ke : 1/0
		Halaman : 3/3

Makassar, 25 Oktober 2023

Wakil Penanggung Jawab Teknis

Mahdalia, S.Si, M.Si
NIP. 197508261996012001

Analis

Fibiyanthy, S.Si
NIP. 19810202 200604 2 001

APPENDICE 4

EXTRACTION RATE CALCULATION

The copper extraction rate was calculated using the leaching efficiency formula in Dong et al. (2023) in equation 4 below:

$$\eta = \frac{C_i \, x \, V}{m \, x \, W_i} \, x \, 100$$

Where:

η = Extraction rate (%)

C_i = Metal consentration (mg/L) in pregnant leach solution (PLS)

V = PLS volume (L)

m = Mass (Kg)

W_i = Metal content (mg/Kg)

PLS volume (V) = 0,05 L

Mass sampel (m) = 0,015 Kg

Cu Contentration (W_i)= 3223,13 mg/Kg

1. Extraction rate at 60 mins extraction time and 1 M acid concentration (C_i= 512,25 mg/L)

$$\text{Extraction rate (\%)} = \frac{C_i \times V}{m \times W_i} \text{ x } 100\% = \frac{512{,}25 \times 0{,}05}{0{,}015 \times 3223{,}13} \text{ x } 100\% = 52{,}98\%$$

2. Extraction rate at 30 mins extraction time and 2 M acid concentration (C_i= 507,7 mg/L)

$$\text{Extraction rate (\%)} = \frac{C_i \times V}{m \times W_i} \text{ x } 100\% = \frac{507{,}70 \times 0{,}05}{0{,}015 \times 3223{,}13} \text{ x } 100\% = 52{,}51\%$$

3. Extraction rate at 60 mins extraction time and 2 M acid concentration (C_i= 522,76 mg/L)

$$\text{raction rate (\%)} = \frac{C_i \times V}{m \times W_i} \text{ x } 100\% = \frac{522{,}76 \times 0{,}05}{0{,}015 \times 3223{,}13} \text{ x } 100\%$$

$= 54{,}06\%$

4. Extraction rate at 90 mins extraction time and 2 M acid concentration (C_i= 516,46 mg/L)

$$\text{Extraction rate (\%)} = \frac{C_i \times V}{m \times W_i} \text{ x } 100\%$$

$$= \frac{516{,}46 \times 0{,}05}{0{,}015 \times 3223{,}13} \text{ x } 100\%$$

$$= 53{,}41\%$$

5. Extraction rate at 120 mins extraction time and 2 M acid concentration (C_i= 481,79 mg/L)

$$\text{Extraction rate (\%)} = \frac{C_i \times V}{m \times W_i} \text{ x } 100\%$$

$$= \frac{481{,}79 \times 0{,}05}{0{,}015 \times 3223{,}13} \text{ x } 100\%$$

$$= 49{,}83\%$$

6. Extraction rate at 60 mins extraction time and 3 M acid concentration (C_i= 506,30 mg/L)

$$\text{Extraction rate (\%)} = \frac{C_i \times V}{m \times W_i} \text{ x } 100\%$$

$$= \frac{506{,}30 \times 0{,}05}{0{,}015 \times 3223{,}13} \text{ x } 100\%$$

$$= 52{,}36\%$$

7. Extraction rate at 60 mins extraction time and 4 M acid concentration (C_i= 563,03 mg/L)

$$\text{Extraction rate (\%)} = \frac{C_i \times V}{m \times W_i} \text{ x } 100\%$$

$$= \frac{563{,}03 \times 0{,}05}{0{,}015 \times 3223{,}13} \text{ x } 100\%$$

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

APPENDICE 5

X-RAY DIFFRACTION (XRD) ANALYSIS RESULTS

OXIDE ORE FROM TONRA X-RAY DIFFRACTION (XRD) ANAYSIS RESULTS

Match! Phase Analysis Report

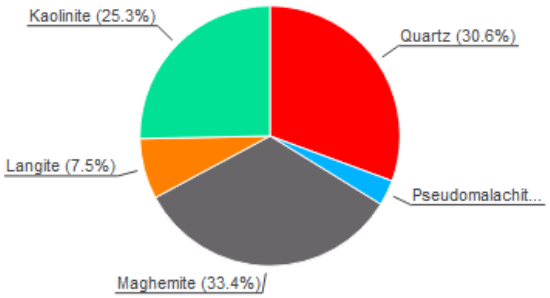
Sample: ZV-01

Sample Data

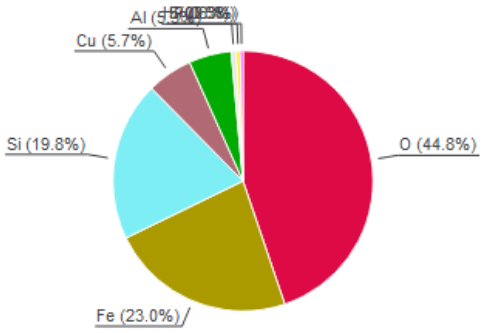
File name	ZV-01.txt
File path	C:/Users/ACER/Documents/MATCH3/ZV-01
Data collected	Nov 2, 2023 12:21:59
Data range	5.000° - 70.000°
Original data range	5.000° - 70.000°
Number of points	3251
Step size	0.020
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	No
Data smoothed	Yes
Radiation	X-rays
Wavelength	1.541874 Å

Analysis Results

Phase composition (Weight %)



Elemental composition (Weight %)



Index	*Amount (%)*	*Name*	*Formula sum*
A	30.6	Quartz	O2 Si
B	3.2	Pseudomalachite	Cu5 H4 O12 P2
C	33.4	Maghemite	Fe21 H O33
D	7.5	Langite	Cu4 H10 O12 S
E	25.3	Kaolinite	Al2 H4 O9 Si2
	11.9	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*44.8%(*)*
Fe	23.0%
Si	19.8%
Cu	5.7%
Al	5.3%
H	*0.6%(*)*
S	0.5%
P	0.3%
**LE (sum)*	*45.4%*

Details of identified phases

A: Quartz (30.6 %)*

Formula sum	O2 Si
Entry number	96-900-5019
Figure-of-Merit (FoM)	0.798095*
Total number of peaks	140
Peaks in range	36
	23
	0.65*
	P 32 2 1 S
	trigonal (hexagonal axes)
	a= 4.9209 Å c= 5.4091 Å
	2.93
	2.639 g/cm³

Kihara K., "An X-ray study of the temperature dependence of the quartz structureSample: at T = 398 K", European Journal of Mineralogy **2**, 63-77 (1990)

B: Pseudomalachite (3.2 %)

Formula sum	Cu5 H4 O12 P2
Entry number	96-900-0590
Figure-of-Merit (FoM)	0.000000
Total number of peaks	1000
Peaks in range	355
Peaks matched	56
Intensity scale factor	0.04
Space group	P 1 21/c 1
Crystal system	monoclinic
Unit cell	a= 4.4728 Å b= 5.7469 Å c= 17.0320 Å β= 91.043 °
I/Ic	1.92
Calc. density	4.368 g/cm³
Reference	Shoemaker G. L., Anderson J. B., Kostiner E., "Refinement of the crystal structure of pseudomalachite", American Mineralogist **62**, 1042-1048 (1977)

C: Maghemite (33.4 %)

Formula sum	Fe21 H O33
Entry number	96-901-7846
Figure-of-Merit (FoM)	0.000000
Total number of peaks	196
Peaks in range	64
Peaks matched	11
Intensity scale factor	1.00
Space group	P -4 3 m
Crystal system	cubic
Unit cell	a= 8.3500 Å
I/Ic	4.16
Calc. density	4.854 g/cm³
Reference	Sinha K. P., Sinha A. P. B., "Ein Fehlstellenuberstruktur - Modell fur gamma-Fe2O3", Zeitschrift fur Anorganische und Allgemeine Chemie **293**, 228-232 (1957)

D: Langite (7.5 %)

Formula sum	Cu4 H10 O12 S
Entry number	96-901-3896
Figure-of-Merit (FoM)	0.000000
Total number of peaks	590
Peaks in range	251
Peaks matched	45
Intensity scale factor	0.28
Space group	P 1 c 1
Crystal system	monoclinic
Unit cell	a= 7.1370 Å b= 6.0310 Å c= 11.2170 Å γ= 90.000 °
I/Ic	5.11
Calc. density	3.359 g/cm³
Reference	Gentsch M., Weber K., "Structure of langite, Cu4[(OH)6|SO4]*2H2O", Acta Crystallographica, Section C **40**, 1309-1311 (1984)

E: Kaolinite (25.3 %)*

Formula sum	Al2 H4 O9 Si2
Entry number	96-155-0599
Figure-of-Merit (FoM)	0.588432*
Total number of peaks	508
Peaks in range	268
Peaks matched	61
Intensity scale factor	0.14*
Space group	P 1
Crystal system	triclinic (anorthic)
Unit cell	a= 5.1737 Å b= 8.9850 Å c= 7.3522 Å α= 91.684° β= 105.128 ° γ= 89.755 °
I/Ic	0.74
Calc. density	2.599 g/cm³
Reference	Richard D., Rendtorff N. M., "First principles study of structural properties and electric fieldgradients in kaolinite", Applied Clay Science **169**, 67-73 (2019)

(*)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*
	Be F2	96-153-1932	0.6302
Si O2	O2 Si	96-153-8065	0.6290
Tantalcarbide	C Ta	96-900-8732	0.3440
Aluminium silicate hydroxide * (Kaolinite 2M)	Al2 H4 O9 Si2	96-101-1046	0.0000
Trimagnesium dihydroxide phyllo-tetrasilicate (Talc 2M)	H2 Mg3 O12 Si4	96-101-1153	0.0000
(Fe2 O3)10.6667 (Maghemite)	Fe21.3334 O32.0001	96-152-8612	0.0000
	Al2 H4 O9 Si2	96-155-0599	0.0000
	Al2 H4 O9 Si2	96-156-6358	0.0000
	Al2 H4 O9 Si2	96-156-6359	0.0000
	Al2 H4 O9 Si2	96-156-6360	0.0000

Zinc Aluminum Hydroxide Nitrate Hydrate (Hydrotalcite polytype_3R1)	Al0.84 N1.69 O35.24 Zn2.16	96-300-0049	0.0000
Pseudomalachite	Cu5 H4 O12 P2	96-900-0590	0.0000
Titanomaghemite	Fe2.18 O4 Ti0.42	96-900-1115	0.0000
Maghemite	Fe2 O3	96-900-6317	0.0000
Maghemite	Fe2 O3	96-900-6318	0.0000
Maghemite	Fe3 O4	96-900-6319	0.0000
Talc	H2 Mg3 O12 Si4	96-900-8041	0.0000
Talc	H2 Mg3 O12 Si4	96-900-8298	0.0000
Kaolinite	Al2 H4 O9 Si2	96-900-9231	0.0000
Kaolinite	Al2 H4 O9 Si2	96-900-9235	0.0000
Langite	Cu4 H10 O12 S	96-900-9716	0.0000
Maghemite	Fe2 O3	96-901-2693	0.0000
Langite	Cu4 H10 O12 S	96-901-3896	0.0000
Talc 2M	Mg3 O12 Si4	96-901-4436	0.0000
Kaolinite	Al2 O9 Si2	96-901-5000	0.0000
Talc	H2 Mg3 O12 Si4	96-901-7404	0.0000
Maghemite	Fe2.668 O4	96-901-7490	0.0000
Maghemite	Fe2.645 O3.99	96-901-7494	0.0000
Maghemite	Fe2.645 O3.99	96-901-7520	0.0000
Maghemite	Fe1.966 O2.962	96-901-7521	0.0000
Kaolinite	Al1.992 Ca0.012 Fe0.016 H4 Mg0.008 O9 Si1.956 Ti0.018	96-901-7767	0.0000
Kaolinite	Al1.992 Ca0.012 Fe0.016 H4 Mg0.008 O9 Si1.956 Ti0.018	96-901-7768	0.0000
Maghemite	Fe21 H O33	96-901-7846	0.0000

Search-Match

Settings

Reference database used	COD-Inorg 2023.06.06
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.60
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;96-101-1046;96-155-0599;96-156-6358;96-156-6359;96-156-6360;96-900-9231;96-900-9235;96-901-5000;96-901-7767;96-901-7768;96-900-9716;96-901-3896;96-900-0590;96-152-8612;96-900-1115;96-900-6317;96-900-6318;96-900-6319;96-901-2693;96-901-7490;96-901-7494;96-901-7520;96-901-7521;96-901-7846

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	12.32	7.1845	335.52	173.84	0.8757	D,E
2	18.94	4.6857	94.04	38.35	0.6894	B
3	20.10	4.4178	116.42	46.42	0.6739	B,D,E
4	20.96	4.2384	330.05	75.86	0.3885	A,B,D,E
5	25.22	3.5313	409.11	115.67	0.4779	B,D,E
6	26.62	3.3487	1000.00	183.75	0.3106	A,E
7	26.68	3.3413	0.53	0.10	0.3200	A
8	31.56	2.8349	41.23	9.13	0.3744	B,E
9	33.34	2.6875	40.62	25.08	1.0437	B,D
10	33.68	2.6612	19.08	3.64	0.3221	C,D
11	35.02	2.5623	110.47	29.01	0.4438	B,D,E
12	36.60	2.4553	237.61	58.35	0.4151	A,B,E
13	39.50	2.2814	113.96	29.87	0.4431	A,E
14	40.32	2.2369	64.49	20.19	0.5292	A,B,C,D,E
15	42.52	2.1261	103.00	14.37	0.2357	A,B,D,E
16	45.04	2.0129	104.56	3.96	0.0640	B,C,D
17	50.12	1.8201	152.66	19.72	0.2184	A,B,C,D,E
18	55.06	1.6679	74.85	27.99	0.6321	A,B,C,D,E
19	59.96	1.5428	168.79	31.24	0.3129	A,B,C,D,E
20	68.34	1.3726	106.91	26.94	0.4259	A,B,C,D,E

Integrated Profile Areas

Based on calculated profile

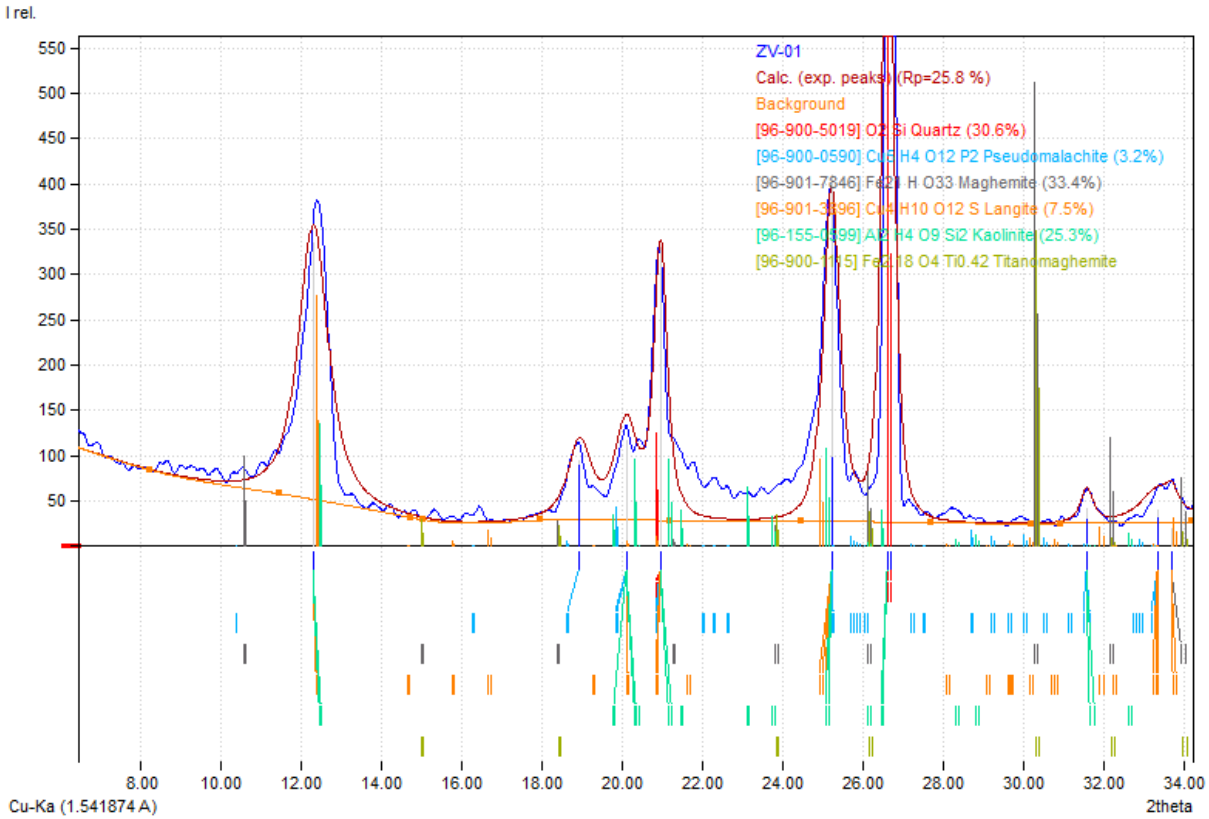
	Counts	*Amount*
ile	114022	100.00%
	56886	49.89%

Diffraction peaks	57136	50.11%
Peak area belonging to selected phases	43525	38.17%
Peak area of phase A (Quartz)	*13206*	*11.58%*
Peak area of phase B (Pseudomalachite)	*2826*	*2.48%*
Peak area of phase C (Maghemite)	*7290*	*6.39%*
Peak area of phase D (Langite)	*8277*	*7.26%*
Peak area of phase E (Kaolinite)	*11927*	*10.46%*
Unidentified peak area	13610	11.94%

Peak Residuals

Peak data	***Counts***	***Amount***
Overall peak intensity	933	100.00%
Peak intensity belonging to selected phases	852	91.22%
Unidentified peak intensity	82	8.78%

Diffraction Pattern Graphics



EXTRACTED X-RAY DIFFRACTION (XRD) ANALYSIS RESULTS

CONCENTRATION

Match! Phase Analysis Report

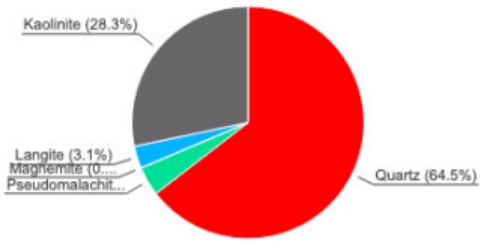
Sample: ZV-R-4K

Sample Data

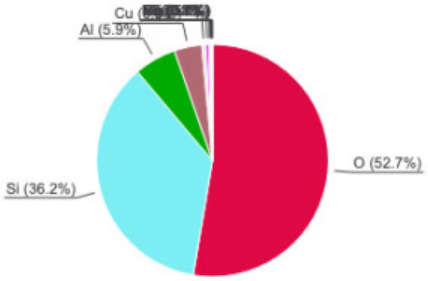
File name	ZV-R-4K.txt
File path	/Users/ZalsaVionatha/Downloads/ZV-R-4K dan ZV-R-60-W/ZV-R-4K
Data collected	Nov 15, 2023 14:39:24
Data range	5.000° - 70.000°
Original data range	5.000° - 70.000°
Number of points	3251
Step size	0.020
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	No
Data smoothed	No
Radiation	X-rays
Wavelength	1.541874 Å

Analysis Results

Phase composition (Weight %)



Elemental composition (Weight %)



Index	*Amount (%)*	*Name*	*Formula sum*
A	64.5	Quartz	O2 Si
B	4.1	Pseudomalachite	Cu5 H4 O12 P2
C	0.0	Maghemite	Fe21 H O33
D	3.1	Langite	Cu4 H10 O12 S
E	28.3	Kaolinite	Al1.992 Ca0.012 Fe0.016 H4 Mg0.008 O9 Si1.956 Ti0.018
	14.0	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*52.7%(*)*
Si	36.2%
Al	5.9%
Cu	3.9%
H	*0.5%(*)*
P	0.4%
S	0.2%
Fe	0.1%
Ti	0.1%
Ca	0.1%
Mg	0.0%
**LE (sum)*	*53.2%*

Details of identified phases

A: Quartz (64.5 %)*

Formula sum	O2 Si
Entry number	96-901-0146
Figure-of-Merit (FoM)	0.831642*
Total number of peaks	140
Peaks in range	36
Peaks matched	28
Intensity scale factor	0.78*
Space group	P 32 2 1 S
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 4.9180 Å c= 5.4070 Å
I/Ic	2.95
Calc. density	2.643 g/cm³

Ikuta D., Kawame N., Banno S., Hirajima T., Ito K., Rakovan J. F., Downs R. T., Tamada O., "First in situ X-ray diffraction identification of coesite and retrogradequartz on a glass thin section of an ultrahigh-pressure metamorphic rock andtheir crystal structure details Locality: Oomine granite, Tenkawa-mura, Nara,Southwest Japan Sample: in air", American Mineralogist **92**, 57-63 (2007)

1 %)

	Cu5 H4 O12 P2
	96-900-0590
	0.000000
	1000

Peaks in range	355
Peaks matched	89
Intensity scale factor	0.03
Space group	P 1 21/c 1
Crystal system	monoclinic
Unit cell	a= 4.4728 Å b= 5.7469 Å c= 17.0320 Å β= 91.043 °
I/Ic	1.92
Calc. density	4.368 g/cm³
Reference	Shoemaker G. L., Anderson J. B., Kostiner E., "Refinement of the crystal structure of pseudomalachite", American Mineralogist **62**, 1042-1048 (1977)

C: Maghemite (0.0 %)

Formula sum	Fe21 H O33
Entry number	96-901-7846
Figure-of-Merit (FoM)	0.000000
Total number of peaks	196
Peaks in range	64
Peaks matched	14
Intensity scale factor	0.00
Space group	P -4 3 m
Crystal system	cubic
Unit cell	a= 8.3500 Å
I/Ic	4.16
Calc. density	4.854 g/cm³
Reference	Sinha K. P., Sinha A. P. B., "Ein Fehlstellenuberstruktur - Modell fur gamma-Fe2O3", Zeitschrift fur Anorganische und Allgemeine Chemie **293**, 228-232 (1957)

D: Langite (3.1 %)*

Formula sum	Cu4 H10 O12 S
Entry number	96-900-9716
Figure-of-Merit (FoM)	0.636447*
Total number of peaks	998
Peaks in range	401
Peaks matched	127
Intensity scale factor	0.07*
Space group	P 1 c 1
Crystal system	monoclinic
Unit cell	a= 7.1180 Å b= 6.0340 Å c= 11.2090 Å β= 90.020 °
I/Ic	5.37
Calc. density	3.369 g/cm³
Reference	Galy J., Jaud J., Pulou R., Sempere R., "Structure cristalline de la langite, Cu4[SO4(OH)6H2O]*H2OLocality: Mazega, Aveyrone, France", Bulletin de Mineralogie **107**, 641-648 (1984)

E: Kaolinite (28.3 %)

Formula sum	Al1.992 Ca0.012 Fe0.016 H4 Mg0.008 O9 Si1.956 Ti0.018
Entry number	96-901-7768
Figure-of-Merit (FoM)	0.000000
Total number of peaks	510
Peaks in range	271
Peaks matched	104
Intensity scale factor	0.12
Space group	C 1
Crystal system	triclinic (anorthic)
Unit cell	a= 5.1528 Å b= 8.9415 Å c= 7.3985 Å α= 91.715° β= 104.756 ° γ= 89.866 °
I/Ic	1.04
Calc. density	2.612 g/cm³
Reference	Lee S., Xu H., "Using complementary methods of synchrotron radiation powder diffraction andpair distribution functions to refine crystal structures with high qualityparameters - A reviewNote: Neutron data, chemistry data provided by author", Minerals **10**, -124 (2020)

(*)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*
Aluminium silicate hydroxide * (Kaolinite 2M)	Al2 H4 O9 Si2	96-101-1046	0.0000
Silicon oxide $-alpha (Quartz low)	O2 Si	96-101-1098	0.0000
Silicon oxide (Quartz low)	O2 Si	96-101-1160	0.0000
Silicon oxide $-alpha (Quartz low)	O2 Si	96-101-1173	0.0000
Silicon oxide - $-alpha (Quartz low)	O2 Si	96-101-1177	0.0000
Silicon oxide - \b (Quartz high)	O2 Si	96-101-1201	0.0000
Silicon oxide (Quartz high)	O2 Si	96-110-0020	0.0000
(Fe2 O3)10.6667 (Maghemite)	Fe21.3334 O32.0001	96-152-8612	0.0000
Kaolinite	Al2 H4 O9 Si2	96-155-0599	0.0000
Kaolinite K-I	Al2 H4 O9 Si2	96-156-6358	0.0000
Kaolinite K-II	Al2 H4 O9 Si2	96-156-6359	0.0000
Kaolinite K-III	Al2 H4 O9 Si2	96-156-6360	0.0000
Silicon oxide (Quartz)	O2 Si	96-500-0036	0.0000
Pseudomalachite	Cu5 H4 O12 P2	96-900-0590	0.0000
Quartz	O2 Si	96-900-0776	0.0000
Quartz	O2 Si	96-900-0777	0.0000
	O2 Si	96-900-0778	0.0000
	O2 Si	96-900-0779	0.0000
	O2 Si	96-900-0780	0.0000
	O2 Si	96-900-0781	0.0000
	Fe2.18 O4 Ti0.42	96-900-1115	0.0000
	O2 Si	96-900-5018	0.0000
	O2 Si	96-900-5019	0.0000
	O2 Si	96-900-5020	0.0000
	O2 Si	96-900-5021	0.0000
	O2 Si	96-900-5022	0.0000

Quartz	O2 Si	96-900-5023	0.0000
Quartz	O2 Si	96-900-5024	0.0000
Quartz	O2 Si	96-900-5025	0.0000
Quartz	O2 Si	96-900-5026	0.0000
Quartz	O2 Si	96-900-5027	0.0000
Quartz	O2 Si	96-900-5028	0.0000
Quartz	O2 Si	96-900-5029	0.0000
Quartz	O2 Si	96-900-5030	0.0000
Quartz	O2 Si	96-900-5031	0.0000
Quartz	O2 Si	96-900-5032	0.0000
Quartz	O2 Si	96-900-5033	0.0000
Quartz	O2 Si	96-900-5034	0.0000
Maghemite	Fe2 O3	96-900-6317	0.0000
Maghemite	Fe2 O3	96-900-6318	0.0000
Maghemite	Fe3 O4	96-900-6319	0.0000
Quartz	O2 Si	96-900-7379	0.0000
Quartz	O2 Si	96-900-8093	0.0000
Quartz	O2 Si	96-900-8094	0.0000
Kaolinite	Al2 H4 O9 Si2	96-900-9231	0.0000
Kaolinite	Al2 H4 O9 Si2	96-900-9235	0.0000
Quartz	O2 Si	96-900-9667	0.0000
Langite	Cu4 H10 O12 S	96-900-9716	0.0000
Quartz	O2 Si	96-901-0145	0.0000
Quartz	O2 Si	96-901-0146	0.0000
Quartz	O2 Si	96-901-0147	0.0000
Quartz	O2 Si	96-901-1494	0.0000

and 23 others...

Search-Match

Settings

Reference database used	COD-Inorg 2023.06.06
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.60
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: 96-101-1098;96-101-1160;96-101-1173;96-101-1177;96-101-1201;96-110-0020;96-500-0036;96-900-0776;96-900-0777;96-900-0778;96-900-0779;96-900-0780;96-900-0781;96-900-5018;96-900-5019;96-900-5020;96-900-5021;96-900-5022;96-900-5023;96-900-5024;96-900-5025;96-900-5026;96-900-5027;96-900-5028;96-900-5029;96-900-5030;96-900-5031;96-900-5032;96-900-5033;96-900-5034;96-900-7379;96-900-8093;96-900-8094;96-900-9667;96-901-0145;96-901-0146;96-901-0147;96-901-1494;96-901-1495;96-901-1496;96-901-1497;96-901-2601;96-901-2602;96-901-2603;96-901-2604;96-901-2605;96-901-2606;96-901-3322;96-901-5023;96-900-0590;96-152-8612;96-900-1115;96-900-6317;96-900-6318;96-900-6319;96-901-2693;96-901-7490;96-901-7494;96-901-7520;96-901-7521;96-901-7846;96-900-9716;96-901-3896;96-101-1046;96-155-0599;96-156-6358;96-156-6359;96-156-6360;96-900-9231;96-900-9235;96-901-5000;96-901-7767;96-901-7768

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	12.32	7.1845	89.40	91.38	0.7288	D,E
2	20.00	4.4396	77.97	118.03	1.0792	B,D,E
3	20.88	4.2545	244.23	151.92	0.4435	A,B,D
4	24.68	3.6074	94.63	116.80	0.8800	E
5	25.24	3.5286	87.94	73.79	0.5983	B,D
6	26.72	3.3364	1000.00	399.24	0.2846	A,E
7	35.00	2.5638	31.42	29.12	0.6607	B,D,E
8	35.94	2.4988	39.30	32.73	0.5938	C,D,E
9	36.58	2.4566	125.30	41.86	0.2382	A,B
10	37.82	2.3788	47.12	30.33	0.4589	B,D,E
11	38.20	2.3560	27.45	39.56	1.0277	D
12	38.50	2.3384	29.16	13.25	0.3240	B,D,E
13	39.42	2.2859	78.92	45.86	0.4143	A,D,E
14	40.30	2.2380	51.44	20.21	0.2801	A,B,C,D,E
15	42.44	2.1300	65.23	26.33	0.2877	A,B,D,E
16	45.76	1.9829	46.86	33.76	0.5137	A,B,D,E
17	48.06	1.8932	22.28	9.11	0.2916	B,D,E
18	50.16	1.8187	163.85	56.85	0.2473	A,B,C,D,E
19	53.76	1.7051	21.81	7.57	0.2473	B,C,D,E
20	54.86	1.6735	65.39	45.91	0.5005	A,B,C,D,E
21	59.98	1.5423	149.22	46.98	0.2245	A,B,C,D,E
22	62.36	1.4891	45.94	5.15	0.0800	B,D,E
23	62.48	1.4865	47.14	10.96	0.1658	B,D,E
24	64.02	1.4544	24.80	6.37	0.1830	A,B,C,D,E
		.3837	66.95	26.38	0.2810	A,B,D,E
		.3762	89.99	52.76	0.4180	A,B,D,E
		.3730	54.03	11.31	0.1492	A,B,C,D,E

Integrated Profile Areas

›file

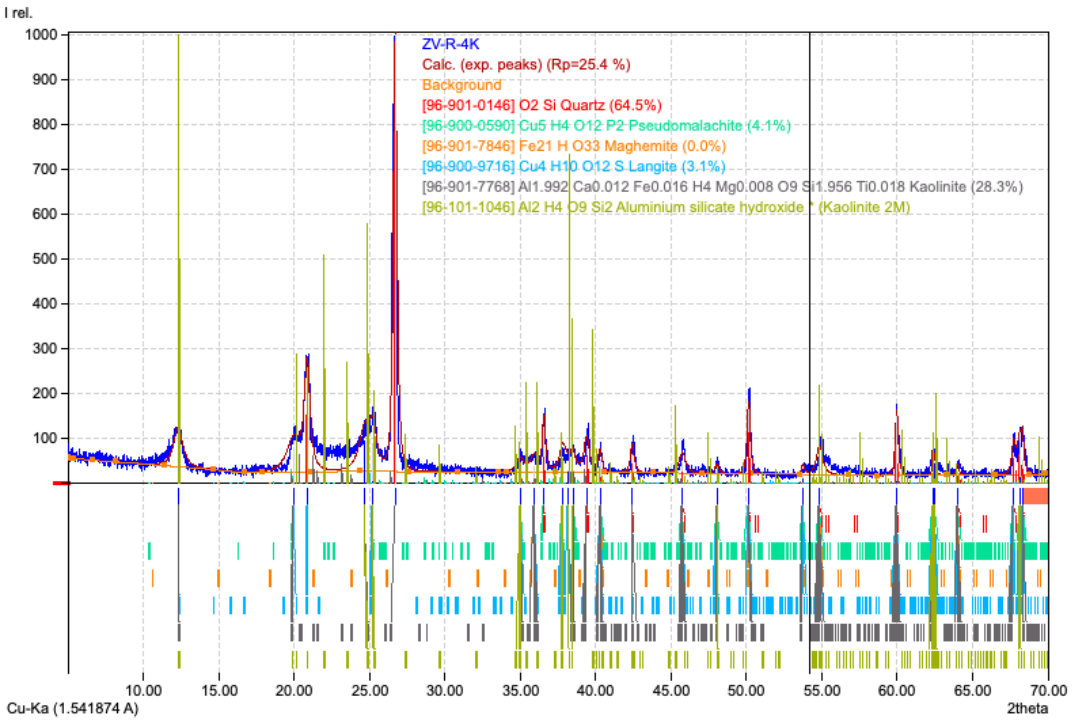
Counts	*Amount*
180530	100.00%

Background radiation	94042	52.09%
Diffraction peaks	86488	47.91%
Peak area belonging to selected phases	61292	33.95%
Peak area of phase A (Quartz)	*33604*	*18.61%*
Peak area of phase B (Pseudomalachite)	*4707*	*2.61%*
Peak area of phase C (Maghemite)	*20*	*0.01%*
Peak area of phase D (Langite)	*4268*	*2.36%*
Peak area of phase E (Kaolinite)	*18694*	*10.35%*
Unidentified peak area	25196	13.96%

Peak Residuals

Peak data	***Counts***	***Amount***
Overall peak intensity	1544	100.00%
Peak intensity belonging to selected phases	1468	95.09%
Unidentified peak intensity	76	4.91%

Diffraction Pattern Graphics



EXTRACTED X-RAY DIFFRACTION (XRD) ANALYSIS RESULTS

TIME

Match! Phase Analysis Report

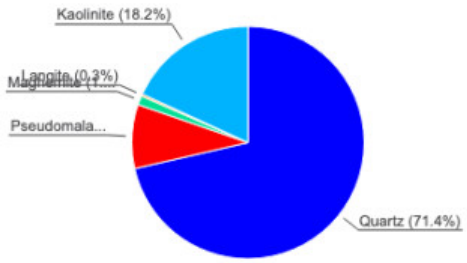
Sample: ZV-R-60-W

Sample Data

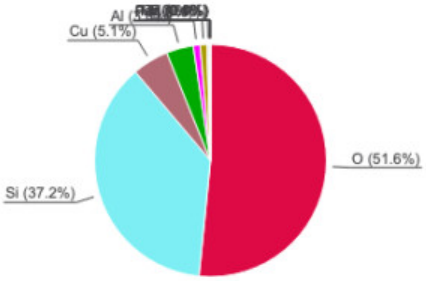
File name	ZV-R-60-W.txt
File path	/Users/ZalsaVionatha/Downloads/ZV-R-4K dan ZV-R-60-W/ZV-R-60-W
Data collected	Nov 15, 2023 14:39:42
Data range	5.000° - 70.000°
Original data range	5.000° - 70.000°
Number of points	3251
Step size	0.020
Rietveld refinement converged	No
Alpha2 subtracted	No
Background subtr.	No
Data smoothed	No
Radiation	X-rays
Wavelength	1.541874 Å

Analysis Results

Phase composition (Weight %)



Elemental composition (Weight %)



Index	*Amount (%)*	*Name*	*Formula sum*
A	71.4	Quartz	O2 Si
B	8.9	Pseudomalachite	Cu5 H4 O12 P2
C	1.3	Maghemite	Fe21 H O33
D	0.3	Langite	Cu4 H10 O12 S
E	18.2	Kaolinite	Al1.992 Ca0.012 Fe0.016 H4 Mg0.008 O9 Si1.956 Ti0.018
	17.7	*Unidentified peak area*	

Amounts calculated by RIR (Reference Intensity Ratio) method

Element	*Amount (weight %)*
O	*51.6%(*)*
Si	37.2%
Cu	5.1%
Al	3.8%
P	1.0%
Fe	0.9%
H	*0.4%(*)*
Ti	0.1%
Ca	0.0%
S	0.0%
Mg	0.0%
**LE (sum)*	*51.9%*

Details of identified phases

A: Quartz (71.4 %)*

Formula sum	O2 Si
Entry number	96-900-0776
Figure-of-Merit (FoM)	0.856757*
Total number of peaks	140
Peaks in range	36
Peaks matched	30
Intensity scale factor	0.66*
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

Levien L., Prewitt C. T., Weidner D. J., "Structure and elastic properties of quartz at pressureP = 1 atm", American Mineralogist **65**, 920-930 (1980)

) %)

	Cu5 H4 O12 P2
	96-900-0590
	0.000000
	1000
	354
	89

Intensity scale factor	0.05
Space group	P 1 21/c 1
Crystal system	monoclinic
Unit cell	a= 4.4728 Å b= 5.7469 Å c= 17.0320 Å β= 91.043 °
I/Ic	1.92
Calc. density	4.368 g/cm³
Reference	Shoemaker G. L., Anderson J. B., Kostiner E., "Refinement of the crystal structure of pseudomalachite", American Mineralogist **62**, 1042-1048 (1977)

C: Maghemite (1.3 %)

Formula sum	Fe21 H O33
Entry number	96-901-7846
Figure-of-Merit (FoM)	0.000000
Total number of peaks	196
Peaks in range	64
Peaks matched	14
Intensity scale factor	0.02
Space group	P -4 3 m
Crystal system	cubic
Unit cell	a= 8.3500 Å
I/Ic	4.16
Calc. density	4.854 g/cm³
Reference	Sinha K. P., Sinha A. P. B., "Ein Fehlstellenuberstruktur - Modell fur gamma-Fe2O3", Zeitschrift fur Anorganische und Allgemeine Chemie **293**, 228-232 (1957)

D: Langite (0.3 %)

Formula sum	Cu4 H10 O12 S
Entry number	96-901-3896
Figure-of-Merit (FoM)	0.000000
Total number of peaks	590
Peaks in range	251
Peaks matched	75
Intensity scale factor	0.00
Space group	P 1 c 1
Crystal system	monoclinic
Unit cell	a= 7.1370 Å b= 6.0310 Å c= 11.2170 Å γ= 90.000 °
I/Ic	5.11
Calc. density	3.359 g/cm³
Reference	Gentsch M., Weber K., "Structure of langite, Cu4[(OH)6|SO4]*2H2O", Acta Crystallographica, Section C **40**, 1309-1311 (1984)

E: Kaolinite (18.2 %)

Formula sum	Al1.992 Ca0.012 Fe0.016 H4 Mg0.008 O9 Si1.956 Ti0.018
Entry number	96-901-7768
Figure-of-Merit (FoM)	0.000000
Total number of peaks	510
Peaks in range	270
Peaks matched	100
Intensity scale factor	0.06
Space group	C 1
Crystal system	triclinic (anorthic)
Unit cell	a= 5.1528 Å b= 8.9415 Å c= 7.3985 Å α= 91.715° β= 104.756 ° γ= 89.866 °
I/Ic	1.04
Calc. density	2.612 g/cm³
Reference	Lee S., Xu H., "Using complementary methods of synchrotron radiation powder diffraction andpair distribution functions to refine crystal structures with high qualityparameters - A reviewNote: Neutron data, chemistry data provided by author", Minerals **10**, -124 (2020)

(*)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***
Aluminium silicate hydroxide * (Kaolinite 2M)	Al2 H4 O9 Si2	96-101-1046	0.0000
Silicon oxide $-alpha (Quartz low)	O2 Si	96-101-1098	0.0000
Silicon oxide (Quartz low)	O2 Si	96-101-1160	0.0000
Silicon oxide $-alpha (Quartz low)	O2 Si	96-101-1173	0.0000
Silicon oxide - $-alpha (Quartz low)	O2 Si	96-101-1177	0.0000
Silicon oxide - \b (Quartz high)	O2 Si	96-101-1201	0.0000
Silicon oxide (Quartz high)	O2 Si	96-110-0020	0.0000
(Fe2 O3)10.6667 (Maghemite)	Fe21.3334 O32.0001	96-152-8612	0.0000
Kaolinite	Al2 H4 O9 Si2	96-155-0599	0.0000
Kaolinite K-I	Al2 H4 O9 Si2	96-156-6358	0.0000
Kaolinite K-II	Al2 H4 O9 Si2	96-156-6359	0.0000
Kaolinite K-III	Al2 H4 O9 Si2	96-156-6360	0.0000
Silicon oxide (Quartz)	O2 Si	96-500-0036	0.0000
Pseudomalachite	Cu5 H4 O12 P2	96-900-0590	0.0000
Quartz	O2 Si	96-900-0776	0.0000
Quartz	O2 Si	96-900-0777	0.0000
Quartz	O2 Si	96-900-0778	0.0000
Quartz	O2 Si	96-900-0779	0.0000
Quartz	O2 Si	96-900-0780	0.0000
	O2 Si	96-900-0781	0.0000
	Fe2.18 O4 Ti0.42	96-900-1115	0.0000
	O2 Si	96-900-5018	0.0000
	O2 Si	96-900-5019	0.0000
	O2 Si	96-900-5020	0.0000
	O2 Si	96-900-5021	0.0000
	O2 Si	96-900-5022	0.0000
	O2 Si	96-900-5023	0.0000
	O2 Si	96-900-5024	0.0000
	O2 Si	96-900-5025	0.0000
	O2 Si	96-900-5026	0.0000

Quartz	O2 Si	96-900-5027	0.0000
Quartz	O2 Si	96-900-5028	0.0000
Quartz	O2 Si	96-900-5029	0.0000
Quartz	O2 Si	96-900-5030	0.0000
Quartz	O2 Si	96-900-5031	0.0000
Quartz	O2 Si	96-900-5032	0.0000
Quartz	O2 Si	96-900-5033	0.0000
Quartz	O2 Si	96-900-5034	0.0000
Maghemite	Fe2 O3	96-900-6317	0.0000
Maghemite	Fe2 O3	96-900-6318	0.0000
Maghemite	Fe3 O4	96-900-6319	0.0000
Quartz	O2 Si	96-900-7379	0.0000
Quartz	O2 Si	96-900-8093	0.0000
Quartz	O2 Si	96-900-8094	0.0000
Kaolinite	Al2 H4 O9 Si2	96-900-9231	0.0000
Kaolinite	Al2 H4 O9 Si2	96-900-9235	0.0000
Quartz	O2 Si	96-900-9667	0.0000
Langite	Cu4 H10 O12 S	96-900-9716	0.0000
Quartz	O2 Si	96-901-0145	0.0000
Quartz	O2 Si	96-901-0146	0.0000
Quartz	O2 Si	96-901-0147	0.0000
Quartz	O2 Si	96-901-1494	0.0000

and 23 others...

Search-Match

Settings

Reference database used	COD-Inorg 2023.06.06
Automatic zeropoint adaptation	Yes
Downgrade entries with low scaling factors	Yes
Minimum figure-of-merit (FoM)	0.60
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: 96-101-1098;96-101-1160;96-101-1173;96-101-1177;96-101-1201;96-110-0020;96-500-0036;96-900-0776;96-900-0777;96-900-0778;96-900-0779;96-900-0780;96-900-0781;96-900-5018;96-900-5019;96-900-5020;96-900-5021;96-900-5022;96-900-5023;96-900-5024;96-900-5025;96-900-5026;96-900-5027;96-900-5028;96-900-5029;96-900-5030;96-900-5031;96-900-5032;96-900-5033;96-900-5034;96-900-7379;96-900-8093;96-900-8094;96-900-9667;96-901-0145;96-901-0146;96-901-0147;96-901-1494;96-901-1495;96-901-1496;96-901-1497;96-901-2601;96-901-2602;96-901-2603;96-901-2604;96-901-2605;96-901-2606;96-901-3322;96-901-5023;96-900-0590;96-152-8612;96-900-1115;96-900-6317;96-900-6318;96-900-6319;96-901-2693;96-901-7490;96-901-7494;96-901-7520;96-901-7521;96-901-7846;96-900-9716;96-901-3896;96-101-1046;96-155-0599;96-156-6358;96-156-6359;96-156-6360;96-900-9231;96-900-9235;96-901-5000;96-901-7767;96-901-7768

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0 (peak height)*	*Counts (peak area)*	*FWHM*	*Matched*
1	12.30	7.1962	70.73	80.09	0.7639	D,E
2	20.04	4.4309	92.53	120.10	0.8756	B,D,E
3	20.82	4.2666	242.51	142.67	0.3969	A,B,D
4	25.00	3.5619	100.14	160.32	1.0800	D,E
5	25.24	3.5286	120.82	93.12	0.5200	B
6	26.68	3.3413	1000.00	394.78	0.2663	A,E
7	35.06	2.5595	53.50	41.90	0.5284	B,D,E
8	36.54	2.4592	142.12	67.63	0.3210	A,B
9	37.80	2.3800	48.49	67.61	0.9407	B,D,E
10	38.62	2.3314	55.35	65.22	0.7949	B,C,D,E
11	39.46	2.2837	99.63	47.26	0.3200	A,D,E
12	40.20	2.2433	40.58	7.22	0.1200	A,B,C,D,E
13	42.46	2.1290	88.21	30.39	0.2324	A,B,D,E
14	45.78	1.9820	50.72	24.76	0.3294	A,B,D,E
15	50.14	1.8194	160.74	57.59	0.2417	A,B,C,D,E
16	53.90	1.7010	20.57	9.42	0.3089	B,C,D,E
17	54.84	1.6741	55.99	35.29	0.4253	A,B,C,D,E
18	55.38	1.6590	32.81	25.89	0.5323	A,B,D,E
19	59.96	1.5428	137.02	50.51	0.2487	A,B,C,D,E
20	62.40	1.4882	47.90	41.46	0.5839	B,D,E
21	64.00	1.4548	30.88	11.93	0.2606	A,B,C,D,E
22	67.74	1.3833	74.32	39.65	0.3599	A,B,D,E
23	68.16	1.3758	93.10	53.37	0.3867	A,B,D,E
24	68.30	1.3733	39.72	8.03	0.1363	A,B,C,D,E

Integrated Profile Areas

Based on calculated profile

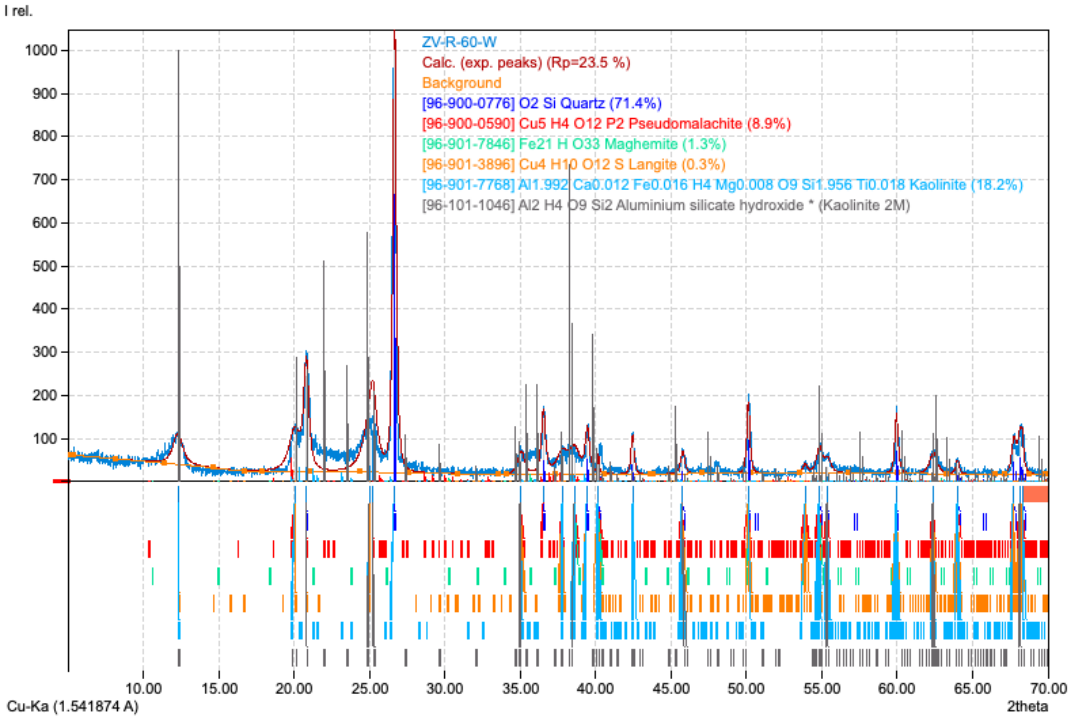
	Counts	*Amount*
	174232	100.00%
	83640	48.00%
	90592	52.00%
elected phases	59676	34.25%
uartz)	*36359*	*20.87%*
eudomalachite)	*9337*	*5.36%*
aghemite)	*1319*	*0.76%*
ngite)	*434*	*0.25%*

Peak area of phase E (Kaolinite)	*12226*	*7.02%*
Unidentified peak area	30917	17.74%

Peak Residuals

Peak data	***Counts***	***Amount***
Overall peak intensity	1676	100.00%
Peak intensity belonging to selected phases	1556	92.82%
Unidentified peak intensity	120	7.18%

Diffraction Pattern Graphics



APPENDICE 6

CONCULTATION CARD

Lampiran B 10

Kartu Konsultasi Tugas Akhir

JUDUL: STUDY OF COPPER EXTRACTION FROM OXIDE ORE USING SULFURIC ACID SOLVENT

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
06/12/2023	1. Kesalahan penulisan 2. Diagram alir 3. Grammar	
08/12/2023	1. Hasil analisis mikroskopis 2. Hasil XRD 3. Grafik PLS (Extraction Rate)	
13/02/2024	1. Grammar 2. Pembahasan difusi mineral 3. Kesimpulan	
14/02/2024	1. Hasil mikroskopis 2. Pembahasan extraction rate 3. Kesimpulan	

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
6/02/2024	Kesimpulan Lampiran Abstrak	
6/02/2024	Poster Artikel Ilmiah	
19/02/2024	Artikel Ilmiah	
19/02/2024		