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LAMPIRAN

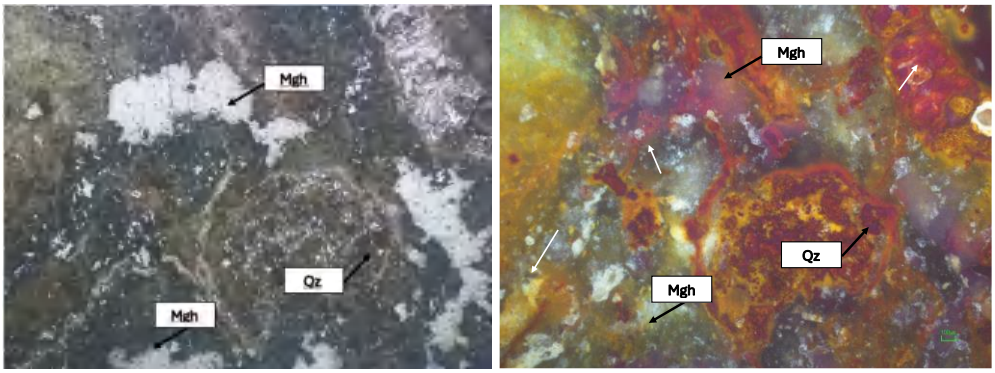
LAMPIRAN 1

HASIL ANALISIS MIKROSKOPIS

Lampiran 1 Hasil Analisis Mikroskopis

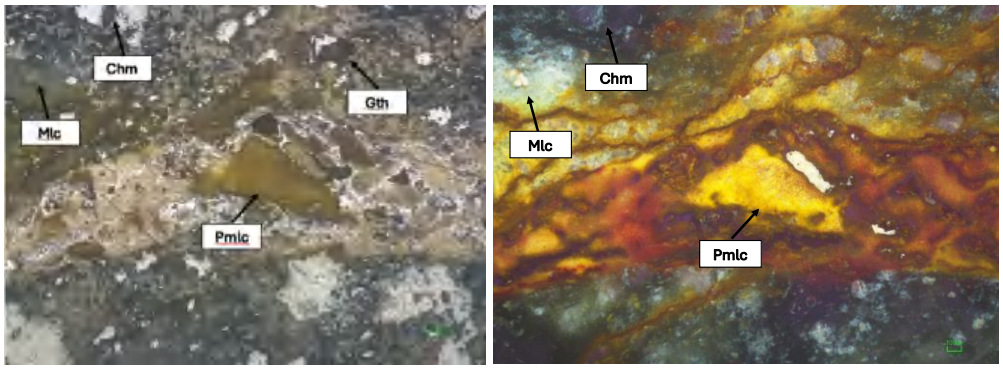
Lokasi	**:** Desa Samaenre, Kecamatan Tonra, Kabupaten Bone	
Tipe Mineralisasi	**: Supergen**	
Mineral Bijih	**: Goetit, Hematit, Kamosit**	
Mineral Pengotor	**: Kuarsa**	
Referensi	**:(Kontak, 2005), (Warr, 2021)**	
Deskripsi Mineralogi		
Komposisi Mineral	**Simbol**	**Keterangan optik mineral**
Maghemit (Mgh)	**(Mgh)**	Sistem kristal isometrik, berwarna putih keabu-abuan dengan bentuk (*subhedral*), ukuran mineral yang tampak yaitu 20 µm-50 µm
Kuarsa	**(Qz)**	Sistem kristal trigonal, berwarna abu-abu terang dengan bentuk (*anhedral-subhedral*), ukuran mineral yang tampak yaitu 20 µm-50 µm

Foto



Lokasi	**:** Desa Samaenre, Kecamatan Tonra, Kabupaten Bone	
Tipe Mineralisasi	**: Supergen**	
Mineral Bijih	**: Goetit, Hematit, Kamosit**	
Mineral Pengotor	**: Kuarsa**	
Referensi	**:(Kontak, 2005), (Warr, 2021)**	
Deskripsi Mineralogi		
Komposisi Mineral	**Simbol**	**Keterangan optik mineral**
Goetit	**(Gth)**	Sistem kristal ortorombik, berwarna hitam kecoklatan dengan bentuk (*subhedral*), ukuran mineral yang tampak yaitu 50 µm-100 µm.
Malasit	**(Mlc)**	Sistem kristal trigonal, berwarna putih dengan bentuk (*anhedral-subhedral*), ukuran mineral yang tampak yaitu 10 µm-100 µm
Pseudomalsit	**(Pmlc)**	Sistem kristal monoklin, berwarna hijau kekuningan dengan bentuk (*anhedral-subhedral*), ukuran mineral yang tampak 10 µm-50 µm
Kamosit (Chm)	**(Chm)**	Sistem kristal monoklin, berwarna hijau gelap dengan bentuk (anhedral-subhedral), ukuran mineral yang tampak yaitu 10 µm-20 µm

Foto



LAMPIRAN 2

HASIL ANALISIS XRD

Lampiran 2 Hasil Analisis XRD

1. Sampel Awal

Match! Phase Analysis Report

Sample: Cu-Manja

Sample Data

File name	Cu-Manja.txt
File path	D:/Manja/Tmbang smstr 7/KP & TA/TA/Doc
Data collected	Jun 1, 2024 22:42:54
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

Matched Phases

Index	*Amount (%)*	*Name*	*Formula sum*
A	52.5	Quartz	O2 Si
B	25.7	Chamosite	Al1.2 Fe2.482 H10 Mg2.518 O18 Si3.8
C	12.1	Langite	Cu4 H10 O12 S
D	6.8	Pseudomalachite	Cu5 H4 O12 P2
E	2.9	Maghemite	Fe2 O3
	14.0	*Unidentified peak area*	

A: Quartz (52.5 %)

Formula sum	O2 Si
Entry number	96-900-9667
Figure-of-Merit (FoM)	0.876387
Total number of peaks	70
Peaks in range	36
Peaks matched	26
Intensity scale factor	0.70
Space group	P 31 2 1
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 4.9158 Å c= 5.4091 Å
I/Ic	3.17
Calc. density	2.644 g/cm³
Reference	Gualtieri A. F., "Accuracy of XRPD QPA using the combined Rietveld-RIR methodLocality: Baveno, Novara, Italy", Journal of Applied Crystallography **33**, 267-278 (2000)

B: Chamosite (25.7 %)

Formula sum	Al1.2 Fe2.482 H10 Mg2.518 O18 Si3.8
Entry number	96-900-9234
Figure-of-Merit (FoM)	0.733949
Total number of peaks	500
Peaks in range	500
Peaks matched	144
Intensity scale factor	0.18
Space group	C -1
Crystal system	triclinic (anorthic)
Unit cell	a= 5.3698 Å b= 9.3031 Å c= 14.2610 Å α= 90.315° β= 97.234 ° γ= 90.022 °
I/Ic	1.65
Calc. density	2.993 g/cm³
Reference	Walker J. R., Bish D. L., "Application of Rietveld refinement techniques to a disordered IIbMg-chamosite Locality: Lebanon, New Hampshire, USA", Clays and Clay Minerals **40**, 319-322 (1992)

C: Langite (12.1 %)

Formula sum	Cu4 H10 O12 S
Entry number	96-901-3896
Figure-of-Merit (FoM)	0.710579
Total number of peaks	576
Peaks in range	251
Peaks matched	70
Intensity scale factor	0.30
	P 1 c 1
	monoclinic
	a= 7.1370 Å b= 6.0310 Å c= 11.2170 Å γ= 90.000 °
	5.99
	3.359 g/cm³
	Gentsch M., Weber K., "Structure of langite, Cu4[(OH)6|SO4]*2H2OLocality: Allihies mine, County Cork, Ireland", Acta Crystallographica, Section C **40**, 1309-1311 (1984)

6.8 %)

Formula sum	Cu5 H4 O12 P2
Entry number	96-900-0590
Figure-of-Merit (FoM)	0.549178
Total number of peaks	912
Peaks in range	355
Peaks matched	81
Intensity scale factor	0.06
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	2.20
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)

E: Maghemite (2.9 %)

Formula sum	Fe2 O3
Entry number	96-901-2693
Figure-of-Merit (FoM)	0.548935
Total number of peaks	384
Peaks in range	171
Peaks matched	50
Intensity scale factor	0.05
Space group	P 43 21 2
Crystal system	tetragonal
Unit cell	a= 8.3396 Å c= 8.3220 Å
I/Ic	3.86
Calc. density	4.887 g/cm³
Reference	Greaves C., "A powder neutron diffraction investigation of vacancy ordering and covalencein gamma-Fe2O3 Locality: synthetic Sample: T = 4 K", Journal of Solid State Chemistry **49**, 325-333 (1983)

Candidates

Name	*Formula*	*Entry No.*	*FoM*
Silicon carbide (Moissanite 3C)	Si C	96-101-1032	0.7533
	Tb Zn	96-154-1250	0.7528
	Tb Zn	96-153-9649	0.7461
	Tb Zn	96-152-7843	0.7417
Si C N	C N Si	96-154-1620	0.7416
	Au Y	96-151-0319	0.7387
(Gd0.5 Tm0.5) Zn	Gd0.5 Tm0.5 Zn	96-152-7068	0.7363
Si C	C Si	96-154-1662	0.7312
	Ni2 Tm	96-152-3457	0.7241
Zr2 Pd D1.70	D1.7 Pd Zr2	96-153-0331	0.7175
	Dy Zn	96-152-4959	0.7160
	Ho Zn	96-152-2550	0.7112
	La Pd3	96-153-8083	0.7069
	Au2 Er2 Sn	96-720-9406	0.7035
	Hg Pd	96-153-9167	0.7000
	Ag3 P	96-901-5866	0.6987
(Fe0.08 Ti0.092 V0.828)	Fe0.08 Ti0.092 V0.828	96-152-2405	0.6982
	Fe2 O3	96-154-6384	0.6967
	Ga3 Ho	96-152-3405	0.6960
	Ag3 P	96-901-5628	0.6955
La Rh3 B	B La Rh3	96-151-1212	0.6946
	Cd Li3	96-152-5522	0.6901
	Pd Zr2	96-152-2409	0.6897
(Ce0.05 Ru0.95)	Ce0.05 Ru0.95	96-152-5250	0.6870
Silver phosphate	Ag3 O4 P	96-101-0606	0.6836
Silver phosphate	Ag3 O4 P	96-101-0325	0.6831
	Ga3 Ho Mn0.08	96-400-1866	0.6823
Ru3 Th B0.9	B0.9 Ru3 Th	96-151-1380	0.6814
Silver phosphate	Ag3 O4 P	96-101-0494	0.6803
Ho Cu (As0.99 P1.01)	As0.99 Cu Ho P1.01	96-153-1903	0.6767
Silver phosphate	Ag3 O4 P	96-100-7044	0.6737
Potarite	Hg Pd	96-900-4222	0.6728
Ti50.64 Fe28 Al41.36	Al41.36 Fe28 Ti50.64	96-153-3512	0.6719
La Pd3 B	B La Pd3	96-151-1208	0.6715
Ag3 (P O4)	Ag3 O4 P	96-210-6405	0.6702
Fluorine	F2	96-901-2472	0.6702
La Rh3 B	B La Rh3	96-151-1211	0.6677
Lanthanum nickel deuteride (1/5/5.0) - \b	D5 La Ni5	96-100-8335	0.6655
Er Cu (As1.07 P0.93)	As1.07 Cu Er P0.93	96-153-1904	0.6594
	Er Ga3 Mn0.03	96-400-1869	0.6590
	Fe1.9 H0.06 O3	96-900-2162	0.6570
	Ga0.4 Re0.6	96-152-2718	0.6565
pha	Mn2 O3	96-151-4104	0.6523
	Al0.17 Dy Ge2	96-434-0060	0.6520
	Hg6.4 In1.6	96-153-8678	0.6517
	Nb	96-153-4904	0.6508
	Ag3.09 O4 P	96-153-0490	0.6496

Ag3 P O4	Ag3 O4 P	96-151-0028	0.6494
	Dy Ga3	96-152-4227	0.6483
	Mn2 O3	96-900-7521	0.6470
Nb2 (N0.86 O0.14)	N0.86 Nb2 O0.14	96-152-2265	0.6465
Silicon carbide (Moissanite 3C)	Si C	96-101-0996	0.6391
and 97 others...			

Search-Match

Settings

Reference database used	COD-Inorg REV218120 2019.09.10
Automatic zeropoint adaptation	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:

96-900-9234;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;96-900-9716;96-901-3896;96-900-1115;96-900-6317;96-900-6318;96-900-6319;96-901-2693

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	6.30	14.0297	52.73	0.2814	B
2	12.38	7.1498	331.60	0.6727	B,C
3	18.86	4.7054	64.56	0.7511	B,D
4	20.10	4.4178	145.14	0.7511	B,C,D
5	20.80	4.2707	467.04	0.2539	A,B,C,D
6	25.16	3.5396	329.17	0.6156	B,C,D
7	26.70	3.3389	1000.00	0.2611	A,B
8	33.18	2.7001	39.91	0.5745	B,C,D
9	35.06	2.5595	98.23	0.5745	B,C,D
10	35.66	2.5178	128.74	0.9613	B,E
11	36.58	2.4566	215.24	0.9613	A,B,D
12	38.48	2.3395	93.59	0.9613	B,C,D
13	39.52	2.2803	89.81	0.9613	A,B
14	42.50	2.1271	16.06	0.5433	A,B,C,D
15	42.50	2.1271	24.46	0.3571	
16	45.08	2.0112	49.40	0.6822	B,C,D,E
17	45.80	1.9812	34.57	1.1468	A,B,C,D
18	50.14	1.8194	20.62	0.6548	A,B,C,D,E
19	54.00	1.6981	36.24	0.9828	B,C,D,E
20	54.94	1.6713	66.79	0.9271	A,B,C,D,E
21	59.96	1.5428	139.98	0.3932	A,B,C,D,E
22	62.46	1.4869	65.18	0.7638	B,C,D
23	64.04	1.4540	40.08	0.5049	A,B,C,D,E
24	67.72	1.3837	82.34	0.5049	A,C,D,E
25	68.32	1.3730	131.72	0.5120	A,C,D,E

Integrated Profile Areas

Based on calculated profile

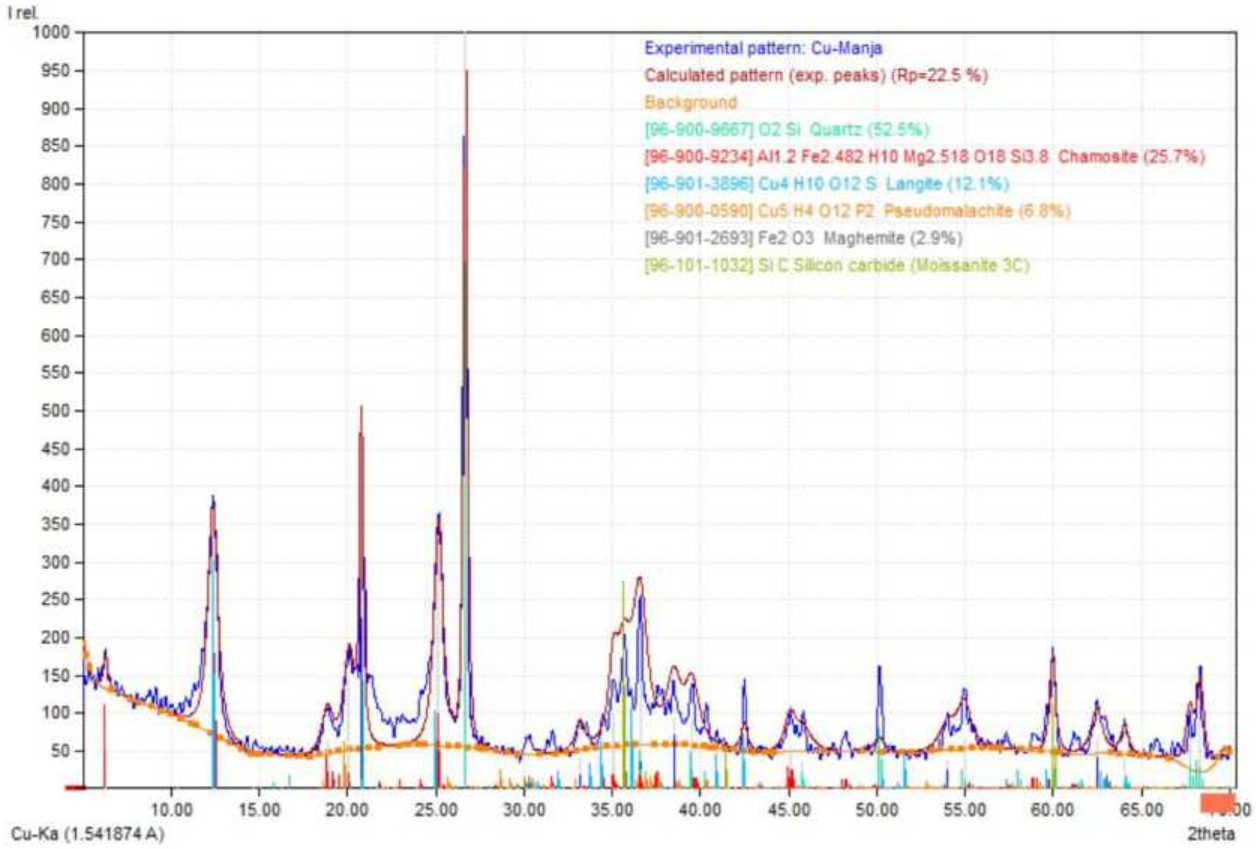
Profile area	***Counts***	***Amount***
Overall diffraction profile	135919	100.00%
Background radiation	83973	61.78%
Diffraction peaks	51946	38.22%
Peak area belonging to selected phases	32962	24.25%
Peak area of phase A (Quartz)	*11476*	*8.44%*
te)	*9387*	*6.91%*
	7425	*5.46%*
alachite)	*3294*	*2.42%*
ite)	*1380*	*1.02%*
	18984	13.97%

Peak Residuals

Counts	***Amount***

Overall peak intensity	1092	100.00%
Peak intensity belonging to selected phases	1011	92.52%
Unidentified peak intensity	82	7.48%

Diffraction Pattern Graphics



2. Pelindian 2 M 1,5 Jam

Match! Phase Analysis Report

Sample: MANJA-1-5-JAM-2-M

Sample Data

File name	MANJA-1-5-JAM-2-M.txt
File path	D:/Manja/Tmbang smstr 7/KP & TA/TA/Doc
Data collected	Jul 14, 2024 22:27:19
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

Matched Phases

Index	*Amount (%)*	*Name*	*Formula sum*
A	79.2	Quartz	O2 Si
B	8.7	Chamosite	Al1.2 Fe2.482 H10 Mg2.518 O18 Si3.8
C	6.0	Pseudomalachite	Cu5 H4 O12 P2
D	4.6	Langite	Cu4 H10 O12 S
E	1.5	Maghemite	Fe2 O3
	14.7	*Unidentified peak area*	

A: Quartz (79.2 %)

Formula sum	O2 Si
Entry number	96-900-9667
Figure-of-Merit (FoM)	0.900934
Total number of peaks	70
Peaks in range	36
Peaks matched	26
Intensity scale factor	0.97
Space group	P 31 2 1
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 4.9158 Å c= 5.4091 Å
I/Ic	3.17
Calc. density	2.644 g/cm³
Reference	Gualtieri A. F., "Accuracy of XRPD QPA using the combined Rietveld-RIR methodLocality: Baveno, Novara, Italy", Journal of Applied Crystallography **33**, 267-278 (2000)

B: Chamosite (8.7 %)

Formula sum	Al1.2 Fe2.482 H10 Mg2.518 O18 Si3.8
Entry number	96-900-9234
Figure-of-Merit (FoM)	0.584266
Total number of peaks	500
Peaks in range	500
Peaks matched	103
Intensity scale factor	0.06
Space group	C -1
Crystal system	triclinic (anorthic)
Unit cell	a= 5.3698 Å b= 9.3031 Å c= 14.2610 Å α= 90.315° β= 97.234 ° γ= 90.022 °
I/Ic	1.65
Calc. density	2.993 g/cm³
Reference	Walker J. R., Bish D. L., "Application of Rietveld refinement techniques to a disordered IIbMg-chamosite Locality: Lebanon, New Hampshire, USA", Clays and Clay Minerals **40**, 319-322 (1992)

C: Pseudomalachite (6.0 %)

Formula sum	Cu5 H4 O12 P2
Entry number	96-900-0590
Figure-of-Merit (FoM)	0.508213
Total number of peaks	912
Peaks in range	355
Peaks matched	62
	0.05
	P 1 21/c 1
	monoclinic
	a= 4.4728 Å b= 5.7469 Å c= 17.0320 Å β= 91.043 °
	2.20
	4.368 g/cm³
	Shoemaker G. L., Anderson J. B., Kostiner E., "Refinement of the crystal structure of pseudomalachite", American Mineralogist **62**, 1042-1048 (1977)

Formula sum	Cu4 H10 O12 S
Entry number	96-901-3896
Figure-of-Merit (FoM)	0.683255
Total number of peaks	576
Peaks in range	251
Peaks matched	58
Intensity scale factor	0.11
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	5.99
Calc. density	3.359 g/cm³
Reference	Gentsch M., Weber K., "Structure of langite, Cu4[(OH)6|SO4]*2H2OLocality: Allihies mine, County Cork, Ireland", Acta Crystallographica, Section C **40**, 1309-1311 (1984)

E: Maghemite (1.5 %)

Formula sum	Fe2 O3
Entry number	96-901-2693
Figure-of-Merit (FoM)	0.247086
Total number of peaks	384
Peaks in range	171
Peaks matched	32
Intensity scale factor	0.02
Space group	P 43 21 2
Crystal system	tetragonal
Unit cell	a= 8.3396 Å c= 8.3220 Å
I/Ic	3.86
Calc. density	4.887 g/cm³
Reference	Greaves C., "A powder neutron diffraction investigation of vacancy ordering and covalencein gamma-Fe2O3 Locality: synthetic Sample: T = 4 K", Journal of Solid State Chemistry **49**, 325-333 (1983)

Candidates

Name	*Formula*	*Entry No.*	*FoM*
Magadiite	H2 O13 Si6	96-901-1596	0.6242
	C40 N20 O12 Pd4	96-431-4739	0.6174
	Al2 Ca H15.68 O11.84	96-901-6560	0.6149
Langite	Cu4 H10 O12 S	96-900-9716	0.5355
Chamosite	Al1.2 Fe2.482 H10 Mg2.518 O18 Si3.8	96-900-9234	0.3791
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
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
Quartz	O2 Si	96-900-0781	0.0000
Titanomaghemite	Fe2.18 O4 Ti0.42	96-900-1115	0.0000
Quartz	O2 Si	96-900-5018	0.0000
Quartz	O2 Si	96-900-5019	0.0000
Quartz	O2 Si	96-900-5020	0.0000
Quartz	O2 Si	96-900-5021	0.0000
Quartz	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
	O2 Si	96-900-7379	0.0000
	O2 Si	96-900-8093	0.0000
	O2 Si	96-900-8094	0.0000
	O2 Si	96-900-9667	0.0000
	O2 Si	96-901-0145	0.0000
	O2 Si	96-901-0146	0.0000
	O2 Si	96-901-0147	0.0000

Quartz	O2 Si	96-901-1494	0.0000
Quartz	O2 Si	96-901-1495	0.0000
Quartz	O2 Si	96-901-1496	0.0000
Quartz	O2 Si	96-901-1497	0.0000
Quartz	O2 Si	96-901-2601	0.0000

and 11 others...

Search-Match

Settings

Reference database used	COD-Inorg REV218120 2019.09.10
Automatic zeropoint adaptation	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:

96-900-9234;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;96-900-1115;96-900-6317;96-900-6318;96-900-6319;96-901-2693;96-900-9716;96-901-3896

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	6.28	14.0744	7.44	0.7221	B
2	12.22	7.2431	101.83	0.7221	B,D
3	20.02	4.4353	73.88	0.7221	B,C,D
4	20.94	4.2424	166.72	0.4483	A,B,C,D
5	24.92	3.5732	88.20	0.4483	B,C,D
6	26.64	3.3462	1000.00	0.2349	A,B
7	35.02	2.5623	47.15	0.4286	B,C,D
8	36.58	2.4566	87.11	0.2842	A,B,C
9	38.42	2.3430	47.47	0.7592	B,C,D
10	39.50	2.2814	56.69	0.5936	A,B
11	42.48	2.1280	55.50	0.2383	A,B,C,D
12	45.80	1.9812	33.81	0.2866	A,B,C,D
13	50.14	1.8194	128.91	0.2179	A,B,C,D,E
14	54.90	1.6724	63.93	0.3744	A,B,C,D,E
15	59.98	1.5423	92.34	0.2506	A,B,C,D,E
16	62.42	1.4878	39.56	0.5765	B,C,D
17	64.04	1.4540	14.20	0.5167	A,B,C,D,E
18	67.74	1.3833	45.45	0.5167	A,C,D,E
19	68.32	1.3730	65.27	0.4578	A,C,D,E

Integrated Profile Areas

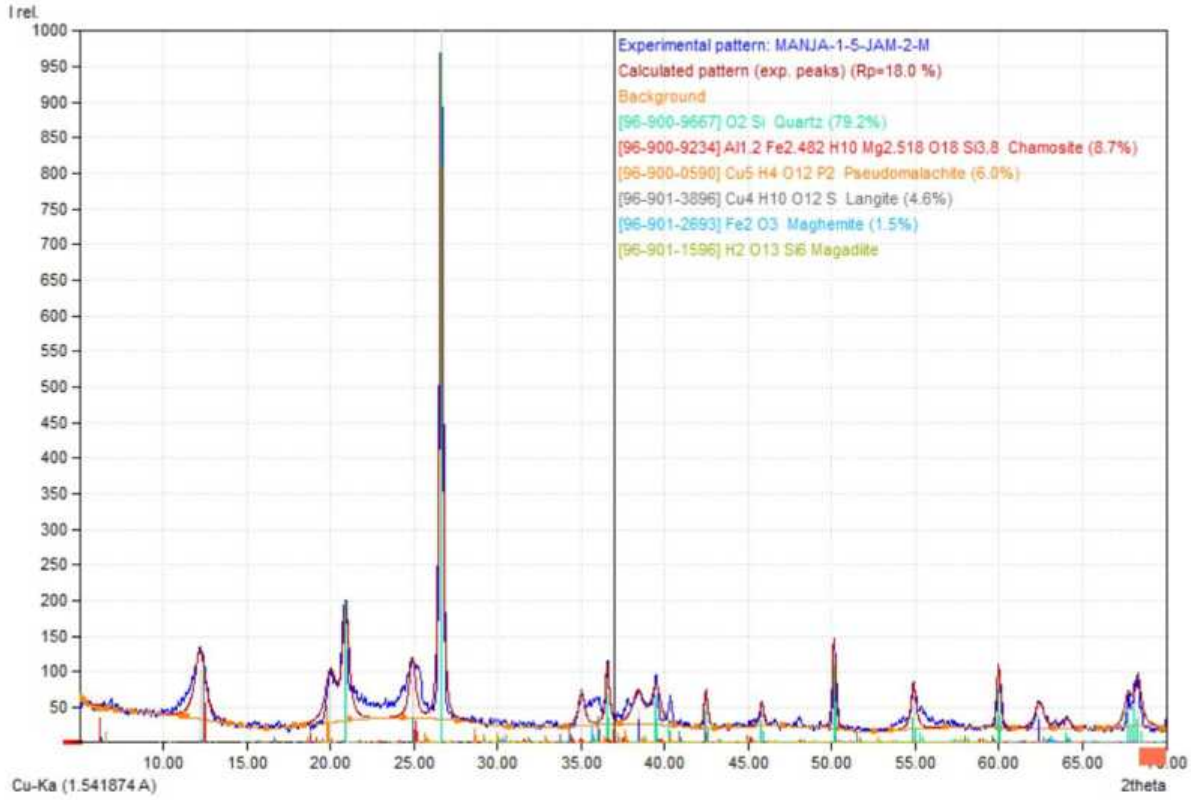
Based on calculated profile

Profile area	***Counts***	***Amount***
Overall diffraction profile	163818	100.00%
Background radiation	97526	59.53%
Diffraction peaks	66292	40.47%
Peak area belonging to selected phases	42219	25.77%
Peak area of phase A (Quartz)	*27692*	*16.90%*
Peak area of phase B (Chamosite)	*4253*	*2.60%*
Peak area of phase C (Pseudomalachite)	*4306*	*2.63%*
Peak area of phase D (Langite)	*4817*	*2.94%*
Peak area of phase E (Maghemite)	*1152*	*0.70%*
Unidentified peak area	24073	14.70%

Peak Residuals

	Counts	***Amount***
	1130	100.00%
o selected phases	1108	98.01%
	23	1.99%

Diffraction Pattern Graphics



3. Pelindian 6 M 2 Jam

Match! Phase Analysis Report

Sample: MANJA-1-JAM-6-M

Sample Data

File name	MANJA-1-JAM-6-M.txt
File path	D:/Manja/Tmbang smstr 7/KP & TA/TA/Doc
Data collected	Jul 14, 2024 22:08:07
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

Matched Phases

Index	*Amount (%)*	*Name*	*Formula sum*
A	80.9	Quartz	O2 Si
B	9.4	Chamosite	Al1.2 Fe2.482 H10 Mg2.518 O18 Si3.8
C	5.0	Pseudomalachite	Cu5 H4 O12 P2
D	3.8	Langite	Cu4 H10 O12 S
E	0.9	Maghemite	Fe2 O3
	16.9	*Unidentified peak area*	

A: Quartz (80.9 %)

Formula sum	O2 Si
Entry number	96-900-9667
Figure-of-Merit (FoM)	0.892302
Total number of peaks	70
Peaks in range	36
Peaks matched	26
Intensity scale factor	0.79
Space group	P 31 2 1
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 4.9158 Å c= 5.4091 Å
I/Ic	3.17
Calc. density	2.644 g/cm³
Reference	Gualtieri A. F., "Accuracy of XRPD QPA using the combined Rietveld-RIR methodLocality: Baveno, Novara, Italy", Journal of Applied Crystallography **33**, 267-278 (2000)

B: Chamosite (9.4 %)

Formula sum	Al1.2 Fe2.482 H10 Mg2.518 O18 Si3.8
Entry number	96-900-9234
Figure-of-Merit (FoM)	0.639482
Total number of peaks	500
Peaks in range	500
Peaks matched	119
Intensity scale factor	0.05
Space group	C -1
Crystal system	triclinic (anorthic)
Unit cell	a= 5.3698 Å b= 9.3031 Å c= 14.2610 Å α= 90.315° β= 97.234 ° γ= 90.022 °
I/Ic	1.65
Calc. density	2.993 g/cm³
Reference	Walker J. R., Bish D. L., "Application of Rietveld refinement techniques to a disordered IIbMg-chamosite Locality: Lebanon, New Hampshire, USA", Clays and Clay Minerals **40**, 319-322 (1992)

C: Pseudomalachite (5.0 %)

Formula sum	Cu5 H4 O12 P2
Entry number	96-900-0590
Figure-of-Merit (FoM)	0.482483
Total number of peaks	912
Peaks in range	355
Peaks matched	74
Intensity scale factor	0.03
	P 1 21/c 1
	monoclinic
	a= 4.4728 Å b= 5.7469 Å c= 17.0320 Å β= 91.043 °
	2.20
	4.368 g/cm³
	Shoemaker G. L., Anderson J. B., Kostiner E., "Refinement of the crystal structure of pseudomalachite", American Mineralogist **62**, 1042-1048 (1977)

Formula sum	Cu4 H10 O12 S
Entry number	96-901-3896
Figure-of-Merit (FoM)	0.667226
Total number of peaks	576
Peaks in range	253
Peaks matched	66
Intensity scale factor	0.07
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	5.99
Calc. density	3.359 g/cm³
Reference	Gentsch M., Weber K., "Structure of langite, Cu4[(OH)6|SO4]*2H2OLocality: Allihies mine, County Cork, Ireland", Acta Crystallographica, Section C **40**, 1309-1311 (1984)

E: Maghemite (0.9 %)

Formula sum	Fe2 O3
Entry number	96-901-2693
Figure-of-Merit (FoM)	0.247243
Total number of peaks	384
Peaks in range	171
Peaks matched	37
Intensity scale factor	0.01
Space group	P 43 21 2
Crystal system	tetragonal
Unit cell	a= 8.3396 Å c= 8.3220 Å
I/Ic	3.86
Calc. density	4.887 g/cm³
Reference	Greaves C., "A powder neutron diffraction investigation of vacancy ordering and covalencein gamma-Fe2O3 Locality: synthetic Sample: T = 4 K", Journal of Solid State Chemistry **49**, 325-333 (1983)

Candidates

Name	***Formula***	***Entry No.***	***FoM***
Ti4 P3	P3 Ti4	96-153-9453	0.6631
I F7	F7 I	96-231-0566	0.6538
Cd (C N)2	C2 Cd N2	96-412-4710	0.6433
(Ni (N H3)) (C N)2 (H2 O).25	C2 H3.5 N3 Ni O0.25	96-153-8520	0.6384
	Hg Pd	96-153-9167	0.6269
Ti50.64 Fe28 Al41.36	Al41.36 Fe28 Ti50.64	96-153-3512	0.6002
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
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
Quartz	O2 Si	96-900-0781	0.0000
Titanomaghemite	Fe2.18 O4 Ti0.42	96-900-1115	0.0000
Quartz	O2 Si	96-900-5018	0.0000
Quartz	O2 Si	96-900-5019	0.0000
Quartz	O2 Si	96-900-5020	0.0000
Quartz	O2 Si	96-900-5021	0.0000
Quartz	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
	Fe2 O3	96-900-6318	0.0000
	Fe3 O4	96-900-6319	0.0000
	O2 Si	96-900-7379	0.0000
	O2 Si	96-900-8093	0.0000
	O2 Si	96-900-8094	0.0000
	Al1.2 Fe2.482 H10 Mg2.518 O18 Si3.8	96-900-9234	0.0000
	O2 Si	96-900-9667	0.0000
	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
Quartz	O2 Si	96-901-1495	0.0000

and 14 others...

Search-Match

Settings

Reference database used	COD-Inorg REV218120 2019.09.10
Automatic zeropoint adaptation	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:

96-900-9234;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;96-900-1115;96-900-6317;96-900-6318;96-900-6319;96-901-2693;96-900-9716;96-901-3896

Peak List

No.	*2theta [°]*	*d [Å]*	*I/I0*	*FWHM*	*Matched*
1	6.22	14.2100	12.20	0.2508	B
2	12.28	7.2078	71.24	0.8859	B,D
3	20.14	4.4091	66.52	0.8859	B,C,D
4	20.88	4.2545	248.65	0.3733	A,B,C,D
5	25.10	3.5479	75.81	1.0439	B,C,D
6	26.72	3.3364	1000.00	0.2480	A,B
7	32.70	2.7386	8.57	0.2323	C
8	35.06	2.5595	37.49	0.4034	B,C,D
9	36.64	2.4527	107.63	0.2512	A,B,C
10	38.46	2.3407	38.93	0.8468	B,C,D
11	39.52	2.2803	84.13	0.2857	A,B
12	42.52	2.1261	72.72	0.2244	A,B,C,D
13	45.86	1.9788	56.39	0.2776	A,B,C,D,E
14	50.18	1.8181	132.27	0.2353	A,B,C,D,E
15	54.18	1.6929	9.26	0.9665	B,C,D,E
16	54.90	1.6724	57.12	0.3725	A,B,C,D,E
17	60.00	1.5419	114.49	0.2531	A,B,C,D,E
18	62.36	1.4891	39.38	0.4535	B,C,D
19	64.02	1.4544	17.39	0.4662	A,B,C,D,E
20	67.78	1.3826	66.04	0.4662	A,C,D,E
21	68.38	1.3719	109.05	0.5433	A,C,D,E

Integrated Profile Areas

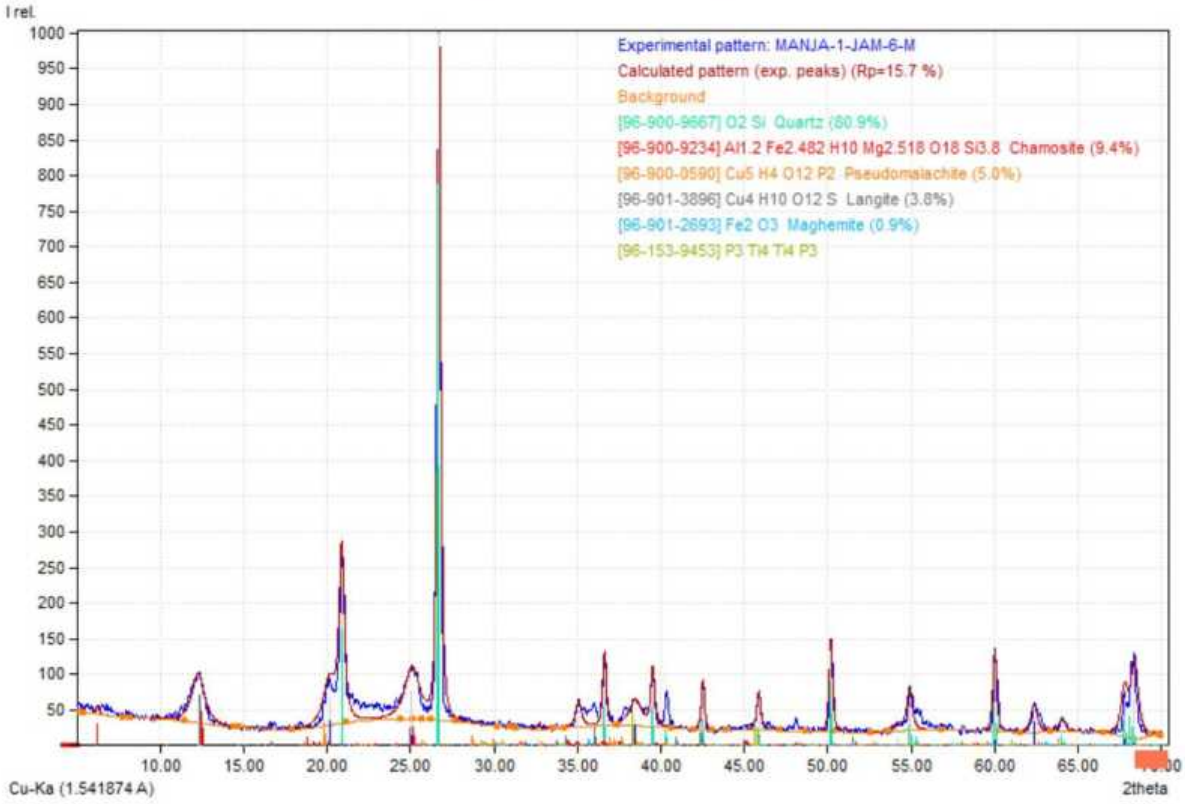
Based on calculated profile

Profile area	***Counts***	***Amount***
Overall diffraction profile	162988	100.00%
Background radiation	95937	58.86%
Diffraction peaks	67051	41.14%
Peak area belonging to selected phases	39449	24.20%
Peak area of phase A (Quartz)	*26884*	*16.49%*
Peak area of phase B (Chamosite)	*4475*	*2.75%*
Peak area of phase C (Pseudomalachite)	*3551*	*2.18%*
Peak area of phase D (Langite)	*3874*	*2.38%*
Peak area of phase E (Maghemite)	*664*	*0.41%*
Unidentified peak area	27602	16.93%

Peak Residuals

	Counts	***Amount***
	1269	100.00%
o selected phases	1225	96.56%
/	44	3.44%

Diffraction Pattern Graphics



LAMPIRAN 3
HASIL ANALISIS AAS

Lampiran 3 Hasil Analisis AAS

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

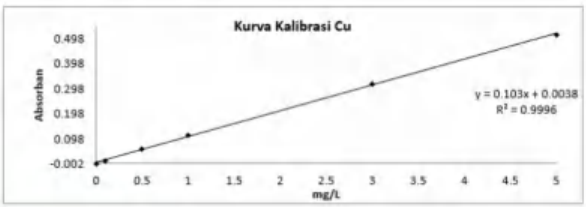
REKAMAN HASIL ANALISIS

Nomor Pekerjaan : LPPS.A-2312-10/8a -8h
Tanggal Penerimaan : 19 Desember 2023
Tanggal Analisis : 22 Desember 2023 – 11 Januari 2024
Suhu Ruangan : 21,9 °C
Kelembapan Ruangan : 59% RH

1. Analisis Logam Tembaga (Cu)

Optimasi Analisa Tembaga (Cu)		
Type Alat: AA 7000 Shimadzu : ASC-7000	Slit width : 0.7 nm	Fuel Gas Flow Rate (0.8-4.0) : 1.8 L/min
HCL Cu Hamamatsu	Flame type : Air-C_2H_2	Support gas flow rate (13.5-17.50) : 15 L/min
P. gelombang : 324,8 nm	Burner Height : 7,0 nm	P. Gelombang Max : 324,59 nm
Lamp Current Low (Peak) (mA) : 8	Burner angle : 0 degree	
	Lamp Mode : BGC-D2	

Cu (mg/L)	Absorban
0	-0.0002
0.1	0.0110
0.5	0.0561
1	0.1122
3	0.3176
5	0.5148



Persyaratan		Hasil	Keterangan keberterimaan hasil analisis		
Linearitas (r)	≥ 0.995	0.9998	Memenuhi	R^2=	0.9996
MDL (mg/L)		0.0076		r=	0.9998
%R	75%-120%	100.85	Memenuhi		

Kontrol sampel	Absorban	[Cu] mg/L
Cu 0,4 mg/L	0.0453	0.40
	0.0454	0.40
Rata-rata	0.0454	0.40

Kontrol	Absorban	[Cu] mg/L	fp (kali)	[Cu] mg/L
Blanko	0.0186	0.14	1	0.15
	0.0190	0.15		
Rata-rata	0.0188	0.15		

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.2312-10/8h	26.6978	27.1982	0.5004	27.1880	0.4902	2.04

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)	B. sampel setelah dilebur (G)
LPPS.A.2312-10/8h	26.6978	27.1880	0.4902	28.6930	27.7458	1.0480

Kode Sampel	Absorban	[Mg] (mg/L)	fp (kali)	[Mg] x fp (mg/L)	([Mg] x fp) - [Blanko]	Berat sebelum peleburan (g)	V. Sampel (L)	Kadar Mg (mg/kg= ppm)
LPPS.A.2312-10/8h	0.0282	0.24	100	23.35	23.2039	0.5004	0.05	2318.53
	0.0275	0.23						
Rata-Rata =	**0.0279**	**0.2335**						

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)	[Cu] yang dilaporkan (mg/L=ppm)
LPPS.A.2312-10/8a		0.0688	0.63			
		0.0694	0.64	1000	633.98	633.98
Rata-Rata	=	**0.0691**	**0.6340**			

Kode Sampel		Absorban	[Cu] (mg/L)	fp (kali)	[Cu] x fp (mg/L)	[Cu] yang dilaporkan (mg/L=ppm)
LPPS.A.2312-10/8b		0.0627	0.57			
		0.0612	0.56	1000	564.56	564.56
Rata-Rata	=	**0.0620**	**0.5646**			
LPPS.A.2312-10/8c		0.0615	0.56			
		0.0609	0.55	1000	557.28	557.28
Rata-Rata	=	**0.0612**	**0.5573**			
LPPS.A.2312-10/8d		0.0717	0.66			
		0.0721	0.66	1000	661.17	661.17
Rata-Rata	=	**0.0719**	**0.6612**			
LPPS.A.2312-10/8e		0.0683	0.63			
		0.0692	0.63	1000	630.58	630.58
Rata-Rata	=	**0.0688**	**0.6306**			
LPPS.A.2312-10/8f		0.0706	0.65			
		0.0701	0.64	1000	646.12	646.12
Rata-Rata	=	**0.0704**	**0.6461**			
LPPS.A.2312-10/8g		0.0678	0.62			
		0.0681	0.62	1000	622.82	622.82
Rata-Rata	=	**0.0680**	**0.6228**			

LAMPIRAN 4

PERHITUNGAN PENGENCERAN ASAM KLORIDA

Lampiran 4 Perhitungan Pengenceran Asam Klorida

Densitas = 1,18 g/mL

Massa molekul relatif (Mr) = 36,5 g/mL

V larutan = 1000 mL

% larutan = 32%

Molaritas (M) = $\frac{\%massa\ x\ densitas\ x\ V}{Mr}$

= $\frac{32\%\ x\ 1{,}18\frac{g}{mL}\ x\ 1000\ mL}{36{,}5\ g/mol}$

= 10,34

1. Larutan 1 M

$M_1V_1 = M_2V_2$

10,34 x V_1= 1 x 150 mL

$V_1 = \frac{1\ x\ 150mL}{10{,}34}$

= 14,50 mL

2. Larutan 2 M

$M_1V_1 = M_2V_2$

10,34 x V_1= 2 x 150 mL

$V_1 = \frac{2\ x\ 150\ mL}{10{,}34}$

= 29,01 mL

3. Larutan 4 M

$M_1V_1 = M_2V_2$

10,34 x V_1= 4 x 150 mL

$V_1 = \frac{4\ x\ 150\ mL}{10{,}34}$

= 58,02 mL

4. Larutan 6 M

$M_1V_1 = M_2V_2$

34 x V_1= 6 x 150 mL

$V_1 = \frac{6\ x\ 150\ mL}{10{,}34}$

= 87,04 mL

LAMPIRAN 5

PERHITUNGAN RECOVERY Cu

Lampiran 5 Perhitungan Tingkat Pelindian Cu

$$\text{Tingkat pelindian} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg) x massa (kg)}} \times 100\%$$

1. Pelindian 1 jam 1 molar

$$\text{Tingkat pelindian Cu} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg)x massa (kg)}} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{633{,}98 \text{ x } 0{,}05}{2318{,}53 \text{ x } 0{,}015} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{31{,}70}{34{,}77} \times 100\%$$

$$\text{Tingkat pelindian Cu} = 91{,}15\%$$

2. Pelindian 1 jam 2 molar

$$\text{Tingkat pelindian Cu} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg)x massa (kg)}} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{564{,}56 \text{ x } 0{,}05}{2318{,}53 \text{ x } 0{,}015} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{28{,}22}{34{,}77} \times 100\%$$

$$\text{Tingkat pelindian Cu} = 81{,}17\%$$

3. Pelindian 1 jam 4 molar

$$\text{Tingkat pelindian Cu} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg)x massa (kg)}} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{557{,}28 \text{ x } 0{,}05}{2318{,}53 \text{ x } 0{,}015} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{27{,}86}{34{,}77} \times 100\%$$

$$\text{Tingkat pelindian Cu} = 80{,}12\%$$

4. Pelindian 1 jam 6 molar

$$\text{t pelindian Cu} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg)x massa (kg)}} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{661{,}17 \text{ x } 0{,}05}{2318{,}53 \text{ x } 0{,}015} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{33{,}06}{34{,}77} \times 100\%$$

$$\text{Tingkat pelindian Cu} = 95{,}06\%$$

5. Pelindian 0,5 jam 2 molar

$$\text{Tingkat pelindian Cu} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg)x massa (kg)}} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{630{,}58 \text{ x } 0{,}05}{2318{,}53 \text{ x } 0{,}015} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{31{,}53}{34{,}77} \times 100\%$$

$$\text{Tingkat pelindian Cu} = 90{,}66\%$$

6. Pelindian 1 jam 2 molar

$$\text{Tingkat pelindian Cu} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg)x massa (kg)}} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{564{,}56 \text{ x } 0{,}05}{2318{,}53 \text{ x } 0{,}015} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{28{,}22}{34{,}77} \times 100\%$$

$$\text{Tingkat pelindian Cu} = 81{,}17\%$$

7. Pelindian 1,5 jam 2 molar

$$\text{Tingkat pelindian Cu} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg)x massa (kg)}} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{646{,}12 \text{ x } 0{,}05}{2318{,}53 \text{ x } 0{,}015} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{32{,}31}{34{,}77} \times 100\%$$

$$\text{Tingkat pelindian Cu} = 92{,}89\%$$

indian 2 jam 2 molar

$$\text{t pelindian Cu} = \frac{\text{Kadar hasil pelindian (mg/L))x Volume (L)}}{\text{Kadar awal (mg/kg)x massa (kg)}} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{622{,}82 \text{ x } 0{,}05}{2318{,}53 \text{ x } 0{,}015} \times 100\%$$

$$\text{Tingkat pelindian Cu} = \frac{31{,}14}{34{,}77} \times 100\%$$

Tingkat pelindian Cu= 89,54%

LAMPIRAN 6

KARTU KONSULTASI

Lampiran 6 Kartu Konsultasi

Lampiran B 10

Kartu Konsultasi Tugas Akhir

JUDUL: STUDI EKSTRAKSI TEMBAGA DARI BIJIH OKSIDA DENGAN MENGGUNAKAN PELARUT ASAM KLORIDA

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
27/6/2024	- Abstrak - Hasil Analisis AAs	
30/6/2024	- Peta penelitian - Diagram Alir - Hasil Mikroskopis	
5/7/2024	- Hasil Mikroskopis - Hasil XRD - Kesimpulan	
9/7/2024	- Tujuan Penelitian - Analisis XRD - Kesimpulan - Daftar Pustaka	
10/7/2024	- Analisis XRD - Grafik AAs - Penulisan Bahasa Inggris	

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
15/7/2023	- Artikel Ilmiah - Poster Ilmiah	
18/7/2023	- Artikel Ilmiah - Poster Ilmiah - Peta penelitian	
30/7/2024	- foto singkapan - foto sampel - grafik AAS	
9/8/2024	- Abstrak	

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