

DAFTAR PUSTAKA

- Allis, C., 2015, *Basics in Mineral Processing*, Metso Corporation: New York.
- Anggayana. K., 2002. "Diktat Kuliah Genesa Batubara", Departemen Teknik Pertambangan, Fakultas Ilmu Kebumihan dan teknologi Mineral, Institut Teknologi Bandung. Bandung. Indonesia.
- Billah, M., 2007. *Peningkatan Nilai Kalor Batubara Peringkat Rendah dengan Menggunakan Minyak Tanah dan Minyak Residu*. Surabaya: UPN Press.
- Buana., 2011. *Proses Pembentukan Batubara*. Analisa Penelitian dan Pengembangan Geologi. ITB: Bandung.
- Drzymala, J., 2007. *Mineral Processing "Foundations of Theory and Practice of Minerallurgy"*, Oficyna Wydawnicza: Wroclaw.
- Gill, B. C., 1921. *Materials Beneficiation*. Ink, Springer-Verlag New York, p. 239.
- Han, O., Kim, M., Kim, B., Subasinghe, N., and Park, C. 2014. *Fine coal beneficiation by column flotation. Fuel Processing Technology*. Vol. 126. No 49-59.
- Kentucky Geological Survey, University of Kentucky. 2012. How is Coal Formed. <http://www.uky.edu/KGS/coal/coalform.htm>. Diakses Juni 2022.
- Li, C., and Somasundaran, P. 1991. Reversal of bubble charge in multivalent inorganic salt solution: Effect of magnesium, *Jour. of Colloid and Interface Science*, 146 (1), 215–218.
- Manik, E. E. dan Gah, E. R., 2018. Penurunan Kadar Sulfur dalam Tailing Batubara dengan Flotasi Menggunakan Lerak (*Sapindus Rarak De Candole*) sebagai Surfaktan. *Makalah Seminar Kerja Praktek Laboratorium*. Jurusan Teknik Kimia UPN "Veteran" Yogyakarta; Halaman 2-8.
- Mandasini, dan Aladin A., 2003. Desulfurisasi Batubara Secara Flotasi, *Prosiding Seminar Nasional Teknologi Proses Kimia V*, UI Jakarta, (ISBN: 1410-9891).
- Malaidji, E., Anshariah dan Budiman, A. A., 2018. Analisis Proksimat, Sulfur, Dan Nilai Kalor Dalam Penentuan Kualitas Batubara Di Desa Pattappa Kecamatan pujananting Kabupaten Barru Provinsi Sulawesi Selatan. *Jurnal Geomine*, 6(3), pp. 131-137.
- Marlina, R., Rahmalina, Y, I, A., 2020. Pengaruh Air Laut Terhadap Pengurangan Kadar Sulfur Pada Batubara Sub-Bituminus. *Jurnal Sains dan Teknologi*. Vol 19. No 2.

- Meshram, P., Purohit, B. K., Sinha, M. K., Sahu, S. K., and Pandey, B. D., 2015. Demineralization of Low Grad Coal – A Review. *Renewable and Sustainable Energy Reviews*. Vol 41. No 745-761.
- Mukherjee, S., Mahiuddin, S., and Borthakur, P. C., 2001. Demineralization and Desulfurization of Subbituminous Coal with Hydrogen Peroxide. *Energy and Fuels*. Vol 15, No 1418-1424.
- Mukherjee, S., Mahiuddin, S., and Borthakur, P. C., 2003. Effect of Leaching High Sulphur Subbituminous Coal by potassium Hydroxide and Acid on Removal of Mineral matter and Sulphur. *Fuel*. Vol 82, 783-788.
- Nieuwenhuijzen, V, A., and Graaf, D, V, J., 2011. *Handbook on Particle Separation Processes*. IWA, London SW1H 0QS, UK, p. 227.
- Nursanto, E., Idrus, A., Amijaya, H., dan Pramumijoyo, S., 2011. Keterdapatan dan Tipe Mineral pada Batubara serta metode Analisisnya. *Jurnal Teknologi Technoscientia*. Vol 4, No 1.
- Nukman dan Poertadji, S., 2006. Pengurangan kadar abu dan sulfur pada batubara sub bituminus dengan metode aglomerasi Air-Minyak Sawit. *Jurnal Sains Materi Indonesia*. Vol. 7, No 3.
- Ozdemir, O., 2013. Specific Ion Effect Of Chloride Salts On Collectorless Flotation Of Coal. *Physicochem. Probl. Miner. Process*. 49(2), 511–524.
- Osborne, D., 2013. *Coal Production: The Coal Handbook Towards Cleaner Production*. Woodhead Publishing, Cambridge: United Kingdom, p. 780.
- Ratanakandilok, S., Ngamprasertsith, S., and Prasassarakich, P., 2001. Coal Desulfurization Eith Methanol/water and Methanol/KOH. *Fuel*. Vol. 80. No 1937-1942.
- Rao, S, D, N., and Gouricharan, T., 2016. *Coal Processing and Utilization*. Balkema, Netherlands, p. 481.
- Speight, J, G., 2005. *Handbook of Coal Analysis*. A John Wiley & Sons. Inc, Publication. USE.
- Sukandarrumidi., 1995. *Batubara dan Gambut*. Universitas Gajah Mada: Yogyakarta.
- Sukandarrumidi., 2006. *Batubara dan Pemanfaatannya*. Gadjra Mada University Press: Yogyakarta.
- Sundari, R., Subandrio., Gaos, H., Yanker, A. 2010. Aplikasi Metode Flotasi Buih Untuk Pencucian Batubara Peringkat Rendah. Teknik Pertambangan Universitas Trisakti: Jakarta.
- Sudarsono, A. S., 2000. Pengantar Preparasi dan Pencucian Batubara. Bandung.

- Sudarsono, A. S., 2005. *Pengantar Preparasi dan Pencucian Batubara*. Institut Teknologi Bandung: Bandung.
- Saleem, M., 2007. Coal Desulfurization by Solvent Leaching Methods. *Journal of Faculty of Engineering & Technology*. Pp 47-56.
- Tirasonjaya, F., 2006. *Batubara*. Kuliah Umum. Teknologi dan Penelitian Wordpress.com. Hal 16.
- Thomas, L., 2013. *Coal Geology Second Edition*. John Wiley & Sons, Ltd Publication: Oxford, p. 456.
- Ward, C, R., 2002. Analysis and significance of mineral matter in coal seams. *International journal Of Coal Geology*. Vol. 50. No. 135-168
- Wills, B., A., and Napier, T., J., 2005. *Mineral Processing Technology "an Introduction to the Practical Aspects of Ore Treatment and Mineral Recovery"*. Queensland: Elsevier Science & Technology Books.
- Wood, H., Khen, M., Carter, M., and Culberson, W., 1983, *Coal Resource Classification System of The U.S. Geological Survey*, United State Department of The Interior USA.
- Xiuyi, T., 2009. *Mineral Matter in Coal. Coal, Oil Shale, Natural Bitumen, Heavy Oil and Peat – Vol. I*.

LAMPIRAN

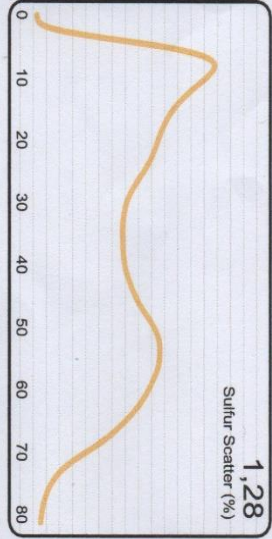
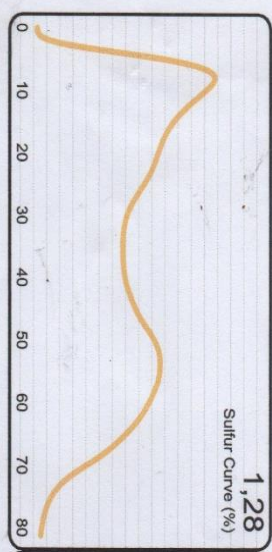
LAMPIRAN A
HASIL ANALISIS SULFUR

Overview
 • Name: PK-1
 • Sulfur Std. Dev.: 0 %
Replicates
 • Sample Mass
 • 0.1009 g

• Method: BB_ADB
 • Sulfur %RSD: 0
Comments

• Sulfur Average: 1,28 %
Sulfur
 1,28 %

• Number of Included Replicates: 1 • Description:
Analysis Date
 27/03/2022 10:59:12

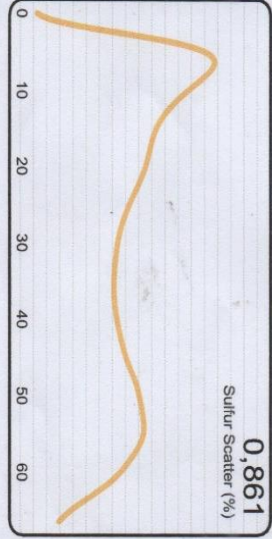
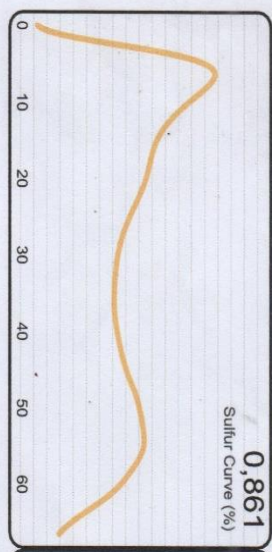


Overview
 • Name: GN-1
 • Sulfur Std. Dev.: 0 %
Replicates
 • Sample Mass
 • 0.1001 g

• Method: BB_ADB
 • Sulfur %RSD: 0
Comments

• Sulfur Average: 0,861 %
Sulfur
 0,861 %

• Number of Included Replicates: 1 • Description:
Analysis Date
 27/03/2022 11:01:24



Overview
 • Name: GN-2
 • Sulfur Std. Dev.: 0 %

• Method: BB_ADB
 • Sulfur %RSD: 0

• Sulfur Average: 1,24 %

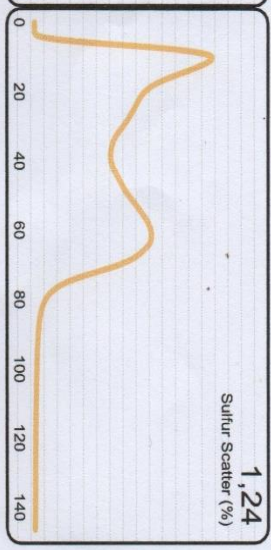
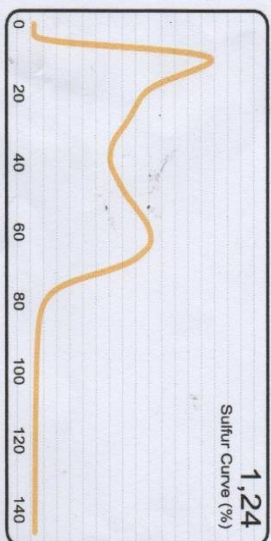
• Number of Included Replicates: 1 • Description:

Replicates
Sample Mass
0.1009 g

Comments

Sulfur
1.24 %

Analysis Date
27/03/2022 11:03:40

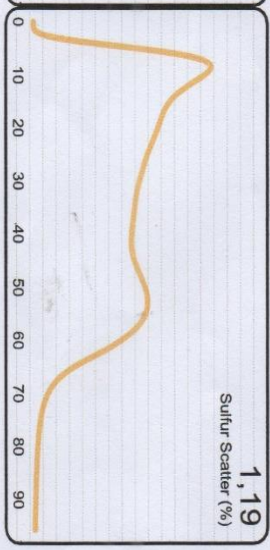
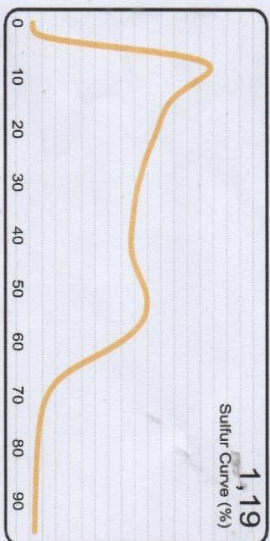


Overview
Name: GN-3
Sulfur Std. Dev.: 0 %
Replicates
Sample Mass
0.1005 g

Comments

Sulfur
1.19 %

Analysis Date
27/03/2022 11:06:54



Overview
Name: RWK-1
Sulfur Std. Dev.: 0 %
Replicates
Sample Mass
0.1003 g

Comments

Sulfur
1.25 %

Analysis Date
27/03/2022 11:09:11

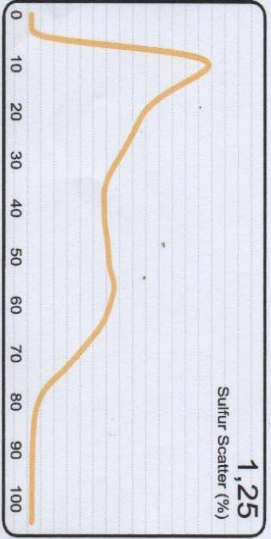
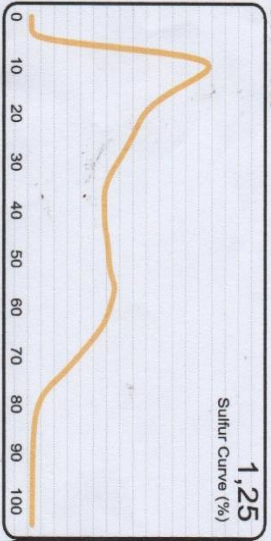
Method: BB_ADB
Sulfur %/RSD: 0

Sulfur Average: 1.25 %

Number of Included Replicates: 1

Description:

Set Plots

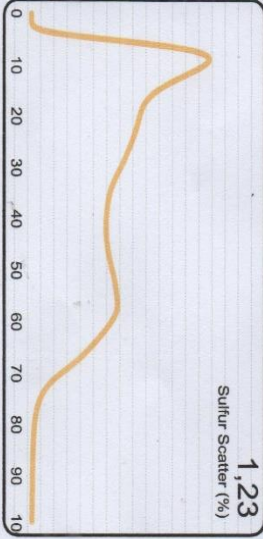
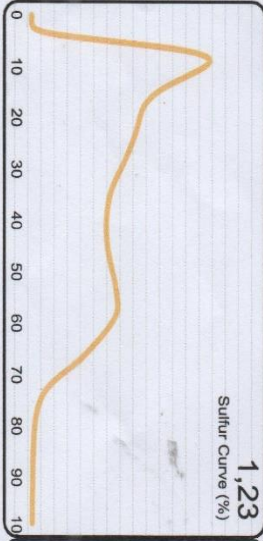


Overview
• Name: RWK-2
• Sulfur Std. Dev.: 0 %
Replicates
• Sample Mass
0.1003 g

Comments
• Method: BB_ADB
• Sulfur %RSD: 0

Sulfur
1,23 %

• Sulfur Average: 1.23 %
• Number of Included Replicates: 1
• Description:
Analysis Date
27/03/2022 11:14:45



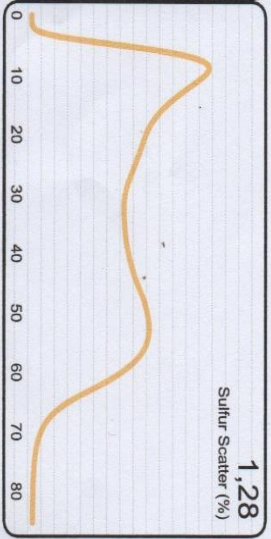
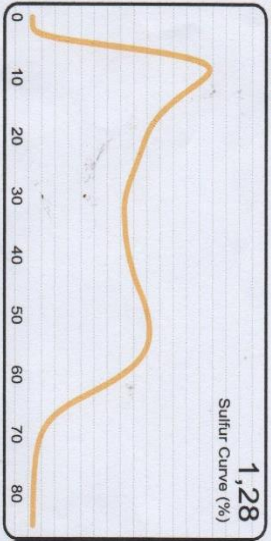
Overview
• Name: RWK-3
• Sulfur Std. Dev.: 0 %
Replicates
• Sample Mass
0.1008 g

Comments
• Method: BB_ADB
• Sulfur %RSD: 0

Sulfur
1,28 %

• Sulfur Average: 1.28 %
• Number of Included Replicates: 1
• Description:
Analysis Date
27/03/2022 11:14:16

Set Plots



27/03/2022 11:17:01

S832DR 52573 2.10.1

LAMPIRAN B
HASIL ANALISIS XRD

Match! Phase Analysis Report

Sample: PK-01 (5-70)

Sample Data

File name	PK-01.ORG
File path	C:/Users/ASUS/Downloads/PK-01
Data collected	May 14, 2022 16:19:42
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	Yes
Radiation	X-rays
Wavelength	1.540600 Å

Matched Phases

Index	Amount (%)	Name	Formula sum
A	68.3	Illite	Al ₂ H ₂ K O ₁₂ Si ₄
B	28.7	Quartz	O ₂ Si
C	3.0	Pyrite	Cu _{0.6} Fe _{0.4} S ₂
	17.0	Unidentified peak area	

Amounts calculated by RIR (Reference Intensity Ratio) method

Elemental composition of sample (identified crystalline phases only)

Element Amount (weight %)

O	48.11% (*)
Si	32.63%
Al	9.22%
K	6.68%
S	1.55%
Cu	0.92%
Fe	0.54%
H	0.34% (*)
*LE (sum)	48.46%

Matching entry details

A: Illite (68.3 %)*

Formula sum	Al ₂ H ₂ K O ₁₂ Si ₄
Entry number	96-901-3723
Figure-of-Merit (FoM)	0.654035*
Total number of peaks	263
Peaks in range	106
Peaks matched	38
Intensity scale factor	0.39*
Space group	C 1 2/m 1
Crystal system	monoclinic
Unit cell	a= 5.2350 Å b= 9.0320 Å c= 10.1400 Å β= 101.520 °
I/c	0.89
Calc. density	2.822 g/cm ³
Reference	Drits V. A., Zviagina B. B., McCarty D. K., Salyn A. L., "Factors responsible for crystal-chemical variations in the solid solutions from illite to alunoceladonite and from glauconite to celadonite. Locality: South Urals, Russia. Sample Name: 60", American Mineralogist 95 , 348-361 (2010)

B: Quartz (28.7 %)*

Formula sum	O ₂ Si
Entry number	96-900-9667
Figure-of-Merit (FoM)	0.822472*
Total number of peaks	35
Peaks in range	18
Peaks matched	13
Intensity scale factor	0.84*
Space group	P 31 2 1
Crystal system	trigonal (hexagonal axes)
Unit cell	a= 4.9158 Å c= 5.4091 Å
I/c	4.52
Calc. density	2.644 g/cm ³
Reference	Gualtieri A. F., "Accuracy of XRPD QPA using the combined Rietveld-RIR method. Locality: Baveno, Novara, Italy", Journal of Applied Crystallography 33 , 267-278 (2000)

C: Pyrite (3.0 %)*

Formula sum Cu_{0.6} Fe_{0.4} S₂
 Entry number 96-900-6172
 Figure-of-Merit (FoM) 0.588492*
 Total number of peaks 23
 Peaks in range 11
 Peaks matched 8
 Intensity scale factor 0.08*
 Space group P a -3
 Crystal system cubic
 Unit cell a= 5.5624 Å
 I/c 3.91
 Calc. density 4.809 g/cm³
 Reference Schmid-Beurmann P, Lottemoser W, "57Fe-Moessbauer spectra, electronic and crystal structure of members of the CuS₂-FeS₂ solid solution series", Physics and Chemistry of Minerals **19**, 571-577 (1993)

(*)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
Quartz	O2 Si	96-230-0371	0.8235
Quartz	O2 Si	96-900-9667	0.8225
Quartz	O2 Si	96-901-2601	0.8177
Quartz	O2 Si	96-210-0189	0.8176
Quartz	O2 Si	96-901-3322	0.8154
Silicon oxide α -Quartz low	O2 Si	96-101-1173	0.8138
Silicon oxide α -Quartz low	O2 Si	96-101-1098	0.8114
Silicon oxide (Quartz)	O2 Si	96-500-0036	0.8106
Quartz	O2 Si	96-901-1494	0.8076
Quartz	O2 Si	96-710-3015	0.8072
Quartz	O2 Si	96-900-5019	0.8003
Si O2	O2 Si	96-153-8065	0.7999
Quartz	O2 Si	96-901-0147	0.7993
Quartz	O2 Si	96-901-0146	0.7970
Quartz	O2 Si	96-900-0776	0.7960
Quartz	O2 Si	96-900-5021	0.7934
Quartz	O2 Si	96-900-5018	0.7918
Quartz	O2 Si	96-900-5020	0.7913
Quartz	O2 Si	96-901-0145	0.7841
Be F2	Be F2	96-153-1932	0.7803
Si O2	O2 Si	96-153-6390	0.7793
Si O2	O2 Si	96-152-6861	0.7784
Si O2	O2 Si	96-153-2513	0.7784
Al P O4	Al O4 P	96-231-0665	0.7625
Berlinite	Al O4 P	96-900-6550	0.7582
Co O3	Co O3	96-152-5956	0.7338
Marshite	Cu I	96-901-3925	0.7325
(Mo _{0.7} Re _{0.3})	Mo _{0.7} Re _{0.3}	96-152-2723	0.7266
Rh V O4	O4 Rh V	96-153-5994	0.7098
Cobalt nitropentaammiacate hexafluorosilicon	C20 Cl10 N6	96-151-7089	0.7045
Iron phosphate hydroxide	Co F6 H15 N6 O2 Si	96-200-8744	0.7032
Iron phosphate fluoride hydroxide hydrate (1.2/1/0.5/0.2/0.4)	Fe _{1.176} O ₅ P	96-400-0553	0.6997
Bottinoite	F _{0.45} Fe _{1.212} O _{4.55} P	96-901-5494	0.6978
Na La6 Os I12	F _{0.45} Fe _{1.21} H _{0.92} O _{4.55} P	96-100-0352	0.6976
bismuth tungsten oxide	Ni O18 Sb2	96-900-1787	0.6967
Bi14 Cr O24	I12 La6 Na Os	96-152-6866	0.6961
Ge Bi2 Te4	Bi14 O24 W	96-200-3106	0.6958
Fe _{2.95} (P O ₄) ₂ (O H) ₂	C14 Cl2 F8	96-402-4047	0.6955
bismuth tungsten oxide	Bi14 Cr O24	96-152-2145	0.6915
Cd I2	Bi2 Ge Te4	96-154-1804	0.6908
Au Cu	Fe _{2.95} H ₂ O ₁₀ P ₂	96-153-0949	0.6907
(Co _{1.63} Mo _{0.37}) Zr	Bi14 Mo O24	96-200-3107	0.6899
Cr4 (Ti Zr)	As ₄ O ₆	96-451-3299	0.6899
Brassite	Cd I2	96-210-6206	0.6892
Zn Br2	Au Cu	96-151-0115	0.6875
Fe ₂ (Mo _{0.15} Zr _{0.85})	Co _{1.63} Mo _{0.37} Zr	96-152-5074	0.6870
Fe ₂ (Sc _{0.5} Zr _{0.5})	Cr ₄ Ti Zr	96-152-4738	0.6865
and 586 others...	As H9 Mg O8	96-900-7614	0.6861
	Br ₂ Zn	96-810-4394	0.6852
	F ₁₅ K ₁₅ Mo ₅ O ₁₅	96-450-8552	0.6850
	Fe ₂ Mo _{0.15} Zr _{0.85}	96-152-4604	0.6845
	Fe ₂ Sc _{0.5} Zr _{0.5}	96-152-2713	0.6843

Search-Match

Settings

Reference database used COD-Inorg REV184238 2016.07.05
 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:

96-101-0930;96-101-0941;96-210-4742;96-210-4743;96-210-4753;96-210-4754;96-500-0116;96-900-0110;96-900-0595;96-900-0596;96-900-6171;96-900-6172;96-900-7573;96-901-0012;96-901-3070;96-901-3071;96-901-3072;96-901-3409;96-901-3698;96-901-5006;96-901-5235;96-901-5637;96-901-5843;96-901-6640;96-101-1046;96-901-5000;96-101-1241;96-101-1268;96-591-0083;96-900-0140;96-900-2161;96-900-2162;96-900-2163;96-900-9783;96-901-4881;96-901-5066;96-901-5504;96-901-5965;96-901-6458;96-900-1665;96-900-4787;96-900-4919;96-900-7429;96-900-7612;96-900-9523;96-900-9666;96-901-0118;96-901-0494;96-901-0549;96-901-1123;96-901-1745;96-901-1746;96-901-2893;96-901-3719;96-901-3720;96-901-3721;96-901-3722;96-901-3723;96-901-3724;96-901-3733;96-901-3985;96-901-6664;96-100-8767;96-100-8768;96-100-8769;96-101-1088;96-221-1653;96-900-2159;96-900-2160;96-900-3077;96-900-3078;96-900-3079;96-900-3080;96-900-3081;96-901-0407;96-901-0408;96-901-0409;96-901-0410;96-901-0411;96-901-1413;96-901-5697;96-901-6060;96-901-6179;96-901-6407;96-101-1098;96-101-1173;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;96-101-1014;96-500-0038;96-900-0006;96-901-3068;96-901-3069;96-101-1247;96-101-1248;96-500-0091;96-110-1055;96-900-2780;96-901-0957;96-901-0958;96-901-0959;96-901-0960;96-900-0123;96-900-3082;96-900-3083;96-901-3920;96-901-3940;96-101-1033;96-101-1085;96-900-0927;96-900-0928;96-900-0929;96-900-0930;96-900-0931;96-900-0932;96-900-0933;96-900-0934;96-900-0935;96-900-2317;96-900-2318;96-900-2319;96-900-2320;96-900-2321;96-900-2322;96-900-2323;96-900-2324;96-900-2325;96-900-2326;96-900-2327;96-900-2328;96-900-2329;96-900-2330;96-900-2331;96-900-2332;96-900-2333;96-900-2674;96-900-2675;96-900-4088;96-900-4156;96-900-4157;96-900-5813;96-900-5814;96-900-5815;96-900-5816;96-900-5817;96-900-5837;96-900-5838;96-900-5839;96-900-5840;96-900-5841;96-900-5842;96-900-5843;96-900-6185;96-900-6190;96-900-6195;96-900-6200;96-900-6243;96-900-6248;96-900-6253;96-900-6266;96-900-6921;96-900-6922;96-900-7645;96-900-7707;96-900-7708;96-900-9769;96-900-9770;96-901-0940;96-901-0941;96-901-0942;96-901-3530;96-901-3531;96-901-3532;96-901-3533;96-901-3534;96-901-3535;96-901-3536

Peak List

No.	2theta [°]	d [Å]	I/I0 (peak height)	Counts (peak area)	FWHM	Matched
1	17.90	4.9514	274.75	210.90	2.0000	A
2	19.44	4.5625	329.14	198.32	1.5700	A
3	21.04	4.2190	491.89	215.21	1.1400	B
4	24.34	3.6539	707.30	97.72	0.3600	A
5	26.66	3.3410	1000.00	107.46	0.2800	A,B
6	27.68	3.2202	341.02	111.31	0.8505	C
7	29.08	3.0682	162.76	36.91	0.5909	A
8	32.34	2.7660	26.72	6.20	0.6049	C
9	35.92	2.4981	23.79	4.42	0.4842	A,C
10	36.54	2.4571	95.55	23.35	0.6366	A,B
11	39.60	2.2740	82.17	44.74	1.4186	A,B,C
12	40.30	2.2361	86.45	55.72	1.6792	A,B
13	42.38	2.1311	94.10	21.66	0.5998	B
14	44.26	2.0448	294.85	27.16	0.2400	A
15	45.72	1.9829	94.76	25.19	0.6926	A,B
16	46.00	1.9714	66.52	15.07	0.5901	C
17	50.14	1.8179	158.22	17.17	0.2828	A,B
18	53.42	1.7138	49.22	9.31	0.4927	A
19	54.90	1.6710	32.99	5.90	0.4658	A,B,C
20	57.54	1.6005	16.95	1.17	0.1800	A,C
21	60.00	1.5406	63.04	8.02	0.3314	A,B,C
22	63.92	1.4552	45.49	3.14	0.1800	A,B
23	64.58	1.4420	332.87	32.91	0.2576	A
24	68.06	1.3765	200.11	13.82	0.1800	B
25	68.32	1.3718	213.30	14.74	0.1800	A,B

Integrated Profile Areas

Based on calculated profile

Profile area	Counts	Amount
Overall diffraction profile	397918	100.00%
Background radiation	275071	69.13%
Diffraction peaks	122847	30.87%
Peak area belonging to selected phases	55306	13.90%
Peak area of phase A (Illite)	35977	9.04%
Peak area of phase B (Quartz)	17276	4.34%

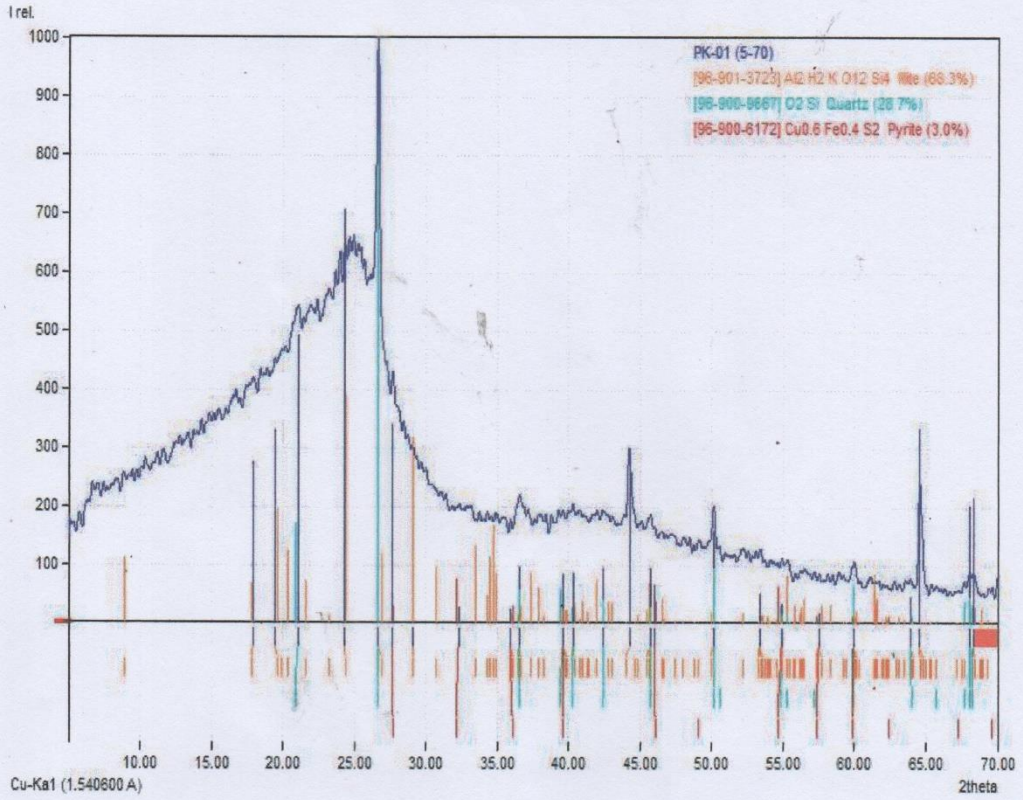
Peak area of phase C (Pyrite) 2052 0.52%
Unidentified peak area 67541 16.97%

Peak Residuals

Peak data

	Counts	Amount
Overall peak intensity	1308	100.00%
Peak intensity belonging to selected phases	0	0.00%
Unidentified peak intensity	1308	100.00%

Diffraction Pattern Graphics



Match! Copyright © 2003-2022 CRYSTAL IMPACT, Bonn, Germany

LAMPIRAN C
HASIL ANALISIS NILAI KALORI



**LABORATORIUM MOTOR BAKAR
DEPARTEMEN TEKNIK MESIN
UNIVERSITAS HASANUDDIN
FAKULTAS TEKNIK**

Jalan Poros Malino Km.6 Bontomarannu (92171) Gowa Sulawesi Selatan
Telp. (0411) 586015, 586162 Fax (0411) 586015

SURAT KETERANGAN HASIL ANALISIS SAMPEL

Nomor : 23/LMB-FT/UH/2022

Pengirim : Rikhardo Wahyu Kasim
NIM : D111 17 1014
Parameter Uji : Nilai Kalor
Peralatan : Bomb Kalorimeter
Jenis Sampel : Batu Bara
Tanggal Uji : 3 Pebruari 2022

No.	Kode Sampel	Nilai Kalor (Kalori/Gram)
1.	PK-01	5.228

Makassar, 10 Maret 2022
Kepala Laboratorium Motor Bakar,

Prof. Dr. Eng. Ir. A. Erwin Eka Putra, S.T., M.T.
NIP. 19711221 199802 1 001



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Telp. (0411) 586015, 586162 Fax (0411) 586015

SURAT KETERANGAN HASIL ANALISIS SAMPEL

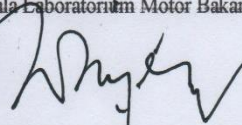
Nomor : 24/LMB-FT/UH/2022

Pengirim : Rickhardo Wahyu Kasim
NIM : D111 17 1014
Parameter Uji : Nilai Kalor
Peralatan : Bomb Kalorimeter
Jenis Sampel : Batu Bara
Tanggal Uji : 13 April 2022

No.	Kode Sampel	Nilai Kalor (kal/gr)
1.	RWK 1	5.496
2.	RWK 2	5.528
3.	RWK 3	5.016
4.	GN 1	5.205
5.	GN 2	5.233
6.	GN 3	4.872



Makassar, 20 April 2022
Kepala Laboratorium Motor Bakar,


Prof. Dr. Eng. Ir. A. Erwin Eka Putra, S.T., M.T.
NIP. 19711221 199802 1 001

LAMPIRAN D
HASIL ANALISIS PROKSIMAT

Moisture (%)

$$\text{Sampel awal} = \frac{1,0009-11,3428}{1,0009} \times 100\%$$

$$= 4,19\%$$

$$\text{RWK-1} = \frac{1,0001-12,3740}{1,0001} \times 100\%$$

$$= 2,52\%$$

$$\text{RWK-2} = \frac{1,0005-11,3541}{1,0005} \times 100\%$$

$$= 3,59\%$$

$$\text{RWK-3} = \frac{1,0008-11,8716}{1,0008} \times 100\%$$

$$= 3,57\%$$

$$\text{GN-1} = \frac{1,0001-12,2648}{1,0001} \times 100\%$$

$$= 3,34\%$$

$$\text{GN-2} = \frac{1,0003-11,5390}{1,0003} \times 100\%$$

$$= 3,78\%$$

$$\text{GN-3} = \frac{1,0007-11,7482}{1,0007} \times 100\%$$

$$= 5,19\%$$

Ash Content (%)

$$\text{Sampel awal} = \frac{10,5147-10,3838}{11,3428-10,3838} \times 100$$

$$= 13,64\%$$

$$\text{RWK-1} = \frac{11,5149-11,3992}{12,3740-11,3992} \times 100$$

$$= 11,86\%$$

$$\text{RWK-2} = \frac{10,5048-10,3896}{11,3541-10,3896} \times 100$$

$$= 11,94\%$$

$$\text{RWK-3} = \frac{11,0654-10,9066}{11,8716-10,9066} \times 100$$

$$= 16,45\%$$

$$\text{GN-1} \quad = \frac{11,4218-11,2982}{12,2648-11,2982} \times 100$$

$$= 12,78\%$$

$$\text{GN-2} \quad = \frac{10,7227-10,5766}{11,5390-10,5766} \times 100$$

$$= 15,18\%$$

$$\text{GN-3} \quad = \frac{10,9953-10,7995}{11,7482-10,7995} \times 100$$

$$= 20,63\%$$

LAMPIRAN E

KEGIATAN PENELITIAN













Lampiran B 10
Kartu Konsultasi Tugas Akhir

JUDUL: Analisis Benefisasi Bakteri Dengan Metode Flotasi Kolom menggunakan air Laut

(Konsultasi minimal 8 kali)

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
04/07/22	<ul style="list-style-type: none"> - Tambahi Lokasi Penelitian di Bab I - Perbaiki Rumusan masalah, Tujuan - Lokasi penelitian lebih spesifik 	
08/07/22	<ul style="list-style-type: none"> - Perbaiki penelitian Bab II - Tambahkan penjelasan flotasi kolom 	
12/07/22	<ul style="list-style-type: none"> - Asistensi penyusunan Bab III - Perbaiki Rumus air - judul penelitian hilangkan kata studi 	
20/07/22	<ul style="list-style-type: none"> - Asistensi data hasil analisis awal - Asistensi gambar hasil pengamatan mikroskop - Perbaiki Grafik hasil penentuan abu dan sulfur 	

TANGGAL	MATERI KONSULTASI	PARAF DOSEN
25/07/22	<ul style="list-style-type: none"> - Asistensi data hasil analisis nilai kalori - Asistensi Bab V - Lebih spesifik kesimpulan poin 3. - penulisan Daftar pustaka 	
29/07/22	<ul style="list-style-type: none"> - Asistensi Abstrak - Asistensi laporan lengkap 	
03/08/22	<ul style="list-style-type: none"> - Asistensi Artikel ilmiah 	
11/08/22	<ul style="list-style-type: none"> - Asistensi perbaikan laporan lengkap <p style="text-align: center;"></p>	