



LAMPIRAN 1



HASIL PENGUJIAN KOMPOSISI KIMIA

Sampel setelah ditambah penghalus butir

Hasil 1

12/18/2007 5:15:42 PM Sample: AL-E3L										
Type standard: KA3BOAY Task: KA380AY										
Run	AISTD	SiH	CuH	Fe	Mn	Mg	Zn	Ti	Pb	Bi
Avg	136.46	9.1268	2.5355	0.9578	0.3312	0.1882	0.5897	0.0390	0.0709	0.0008
	Ni	Cr	V	Na	Sn	B	Ca	%Al		
Avg	0.0737	0.0272	!0.0000	0.0034	0.0282	!0.0000	0.0002	86.30		

Hasil 2


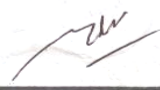
 PT Astra Honda Motor MEASUREMENT & LABORATORY			
LAPORAN PENGUJIAN KOMPOSISI KIMIA			
NAMA PART : SAMPLE MELTING NO PART / TYPE : LPDC 18/09/07S1 MATERIAL : AC4B SEKSI / SUB CON : MELTING		TGL PENGUJIAN : 9/18/2007 11:28:35 AM STANDARD UJI : HES C-101-99 MESIN UJI : SPECTRO SHIMADZHU KETERANGAN : SHIFT 1	
MELTING			
<u>AKTUAL</u>		<u>STANDARD QA AHM</u>	
SI	: 9.412	SI	: 7.00 ~ 10.00
CU	: 2.837	CU	: 2.00 ~ 4.00
MG	: 0.222	MG	: 0.50 MAX
ZN	: 0.712	ZN	: 1.00 MAX
FE	: 0.658	FE	: 1.00 MAX
MN	: 0.242	MN	: 0.50 MAX
NI	: 0.049	NI	: 0.35 MAX
TI	: 0.029	TI	: 0.20 MAX
PB	: 0.124	PB	: 0.20 MAX
SN	: 0.043	SN	: 0.10 MAX
CR	: 0.021	CR	: 0.20 MAX
NOTE - HASIL UKUR YANG BERGARIS BAWAH = NG - LAKUKAN PERBAIKAN BILA HASIL TEST NG		KETERANGAN <div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;">OK</div> <div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 5px auto;"> DIPJAT  FAKRUPROZI </div>	

Sampel setelah ditambah penghalus butir

Hasil 1

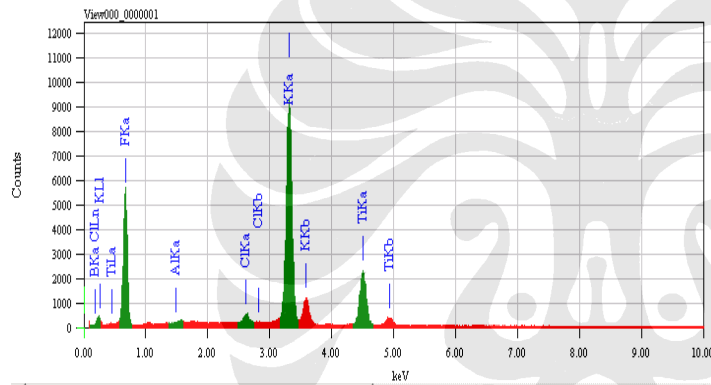
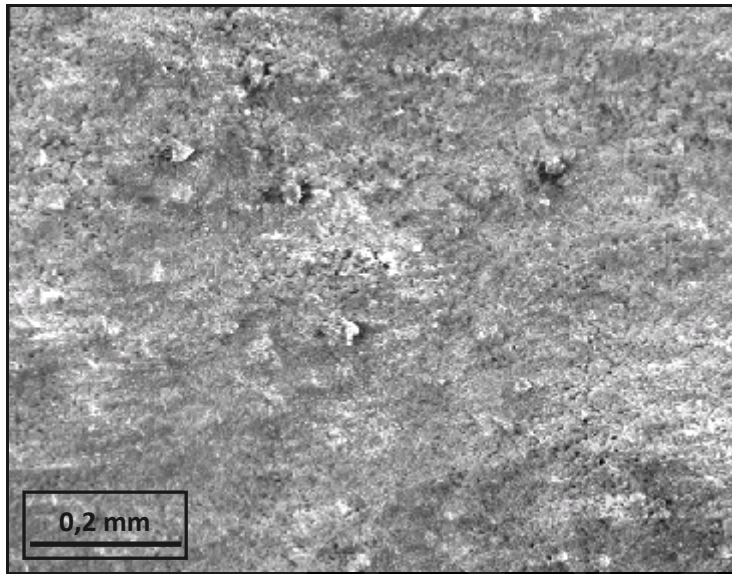
12/18/2007 5:15:42 PM Sample: AL-A											
Type standard: KA3BOAY Task: KA380AY											
Run	AISTD	SiH	CuH	Fe	Mn	Mg	Zn	Ti	Pb	Bi	
Avg	142.07	8.9570	2.5092	0.8863	0.2807	0.1732	0.5420	0.0289	0.0658	0.0012	
	Ni	Cr	V	Na	Sn	B	Ca	%Al			
Avg	0.0549	0.0280	!0.0000	0.0034	0.0282	!0.0000	0.0002	86.71			

Hasil 2

 PT Astra Honda Motor MEASUREMENT & LABORATORY	
LAPORAN PENGUJIAN KOMPOSISI KIMIA	
NAMA PART : SAMPLE MELTING NO PART / TYPE : Sample No: (+ ALTIB 0.12%) MATERIAL : AC 4B SEKSI / SUB CON : MELTING	TGL.PENGUJIAN : 9/19/2007 1:39:35 PM STANDARD UJI : HES C-101-99 MESIN UJI : SPECTRO SHIMADZHU KETERANGAN : SHIFT 1
MELTING	
<u>AKTUAL</u>	<u>STANDARD QA AHM</u>
SI : 9.574	SI : 7.00 ~ 10.00
CU : 2.767	CU : 2.00 ~ 4.00
MG : 0.181	MG : 0.50 MAX
ZN : 0.736	ZN : 1.00 MAX
FE : 0.659	FE : 1.00 MAX
MN : 0.246	MN : 0.50 MAX
NI : 0.042	NI : 0.35 MAX
TI : 0.073	TI : 0.20 MAX
PB : 0.118	PB : 0.20 MAX
SN : 0.040	SN : 0.10 MAX
CR : 0.021	CR : 0.20 MAX
NOTE - HASIL UKUR YANG BERGARIS BAWAH = NG - LAKUKAN PERBAIKAN BILA HASIL TEST NG	KETERANGAN <div style="border: 1px solid black; padding: 5px; text-align: center; width: 50px; margin: 0 auto;">OK</div> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 10px;">DIBUAT</div> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 5px;">  FAHRURROZI </div>

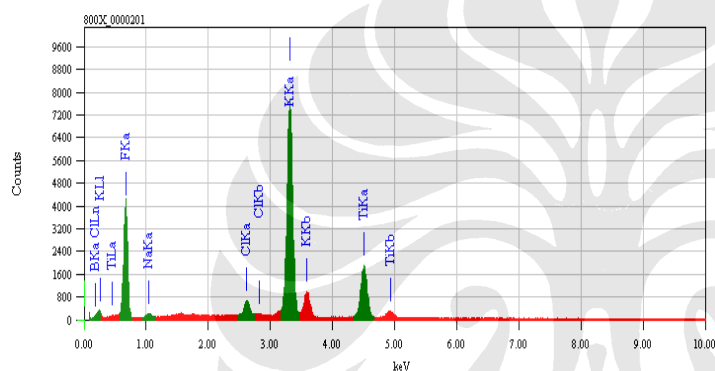
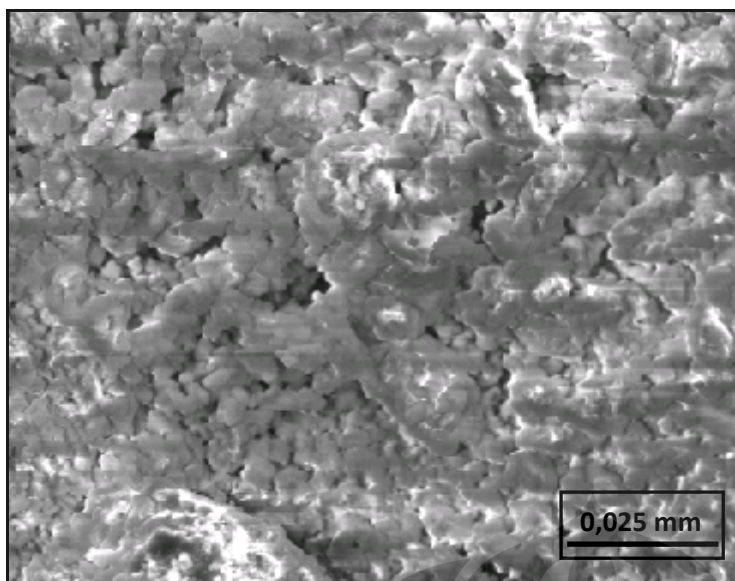


Hasil pengujian komposisi 1



Element	Class.	(keV)	mass%	Error%	At%
B	K [*]				
O			17.02		
F	K	0.677	33.12	0.74	69.18
Al	K [*]				
Cl	K	2.621	1.06	0.36	1.18
K	K	3.312	33.64	0.59	17.07
Ti	K	4.508	15.17	1.33	12.57
Total			100.00		100.00

Hasil pengujian komposisi 2



Element	Class.	(keV)	mass%	Error%	At%
B	K*				
O			16.58		
F	K	0.677	34.51	0.13	70.11
Na	K	1.041	0.55	0.11	0.46
Cl	K	2.621	1.62	0.06	1.76
K	K	3.312	32.03	0.10	15.81
Ti	K	4.508	14.72	0.23	11.86
Total			100.00		100.00

Rata-rata komposisi

Unsur	Hasil pengujian 1 (wt. %)	Hasil pengujian 2 (wt. %)	Rata – rata Komposisi (wt. %)
F	33,12	34,51	34,15
Na	-	0,55	0,55
Cl	1,06	1,62	1,34
K	33,64	32,02	32,84
Ti	15,17	14,72	14,95
O	17,02	16,58	16,8
Total	100	100	100



LAMPIRAN 3
HASIL NILAI KEKERASAN SAMPEL PENGUJIAN
BRINELL

0 wt. % Ti pada proses T4							
time	time in minutes	log time	d1	d2	rata2	rata2-rata2	bhn
as quench	0	0	0.69	0.689	0.6895	0.6945	81.51907
			0.71	0.691	0.7005		
			0.692	0.695	0.6935		
1	60	1.778151	0.69	0.668	0.679	0.6725	87.00823
			0.666	0.687	0.6765		
			0.674	0.65	0.662		
24	1440	3.158362	0.85	0.86	0.855	0.8435	90.08463
			0.85	0.841	0.8455		
			0.84	0.82	0.83		
48	2880	3.459392	0.82	0.83	0.825	0.798333	100.7645
			0.77	0.76	0.765		
			0.81	0.8	0.805		
72	4320	3.635484	0.778	0.783	0.7805	0.791667	102.4975
			0.798	0.791	0.7945		
			0.797	0.803	0.8		
100	6000	3.778151	0.774	0.768	0.771	0.773333	107.4964
			0.781	0.779	0.78		
			0.772	0.766	0.769		
200	12000	4.079181	0.709	0.712	0.7105	0.710167	112.2007
			0.705	0.71	0.7075		
			0.716	0.709	0.7125		
400	24000	4.380211	0.587	0.591	0.589	0.589167	113.6724
			0.59	0.576	0.583		
			0.61	0.581	0.5955		

0.027 wt. %Ti pada proses T4							
time	time in minutes	log time	d1	d2	rata2	rata2-rata2	bhn
as quench	0	0	0.671	0.677	0.674	0.669333	87.8432
			0.672	0.66	0.666		
			0.662	0.674	0.668		
1	60	1.778151	0.657	0.667	0.662	0.662833	89.59472
			0.68	0.652	0.666		
			0.681	0.64	0.6605		
24	1440	3.158362	0.855	0.83	0.8425	0.836667	91.59013
			0.84	0.83	0.835		
			0.845	0.82	0.8325		
48	2880	3.459392	0.784	0.798	0.791	0.793833	101.9295
			0.812	0.788	0.8		
			0.809	0.772	0.7905		
72	4320	3.635484	0.784	0.781	0.7825	0.783	104.8169
			0.78	0.797	0.7885		
			0.783	0.773	0.778		
100	6000	3.778151	0.76	0.784	0.772	0.7625	110.6211
			0.756	0.751	0.7535		
			0.769	0.755	0.762		
200	12000	4.079181	0.704	0.689	0.6965	0.698833	115.9179
			0.717	0.698	0.7075		
			0.694	0.691	0.6925		
400	24000	4.380211	0.579	0.587	0.583	0.578667	117.8724
			0.582	0.58	0.581		
			0.575	0.569	0.572		

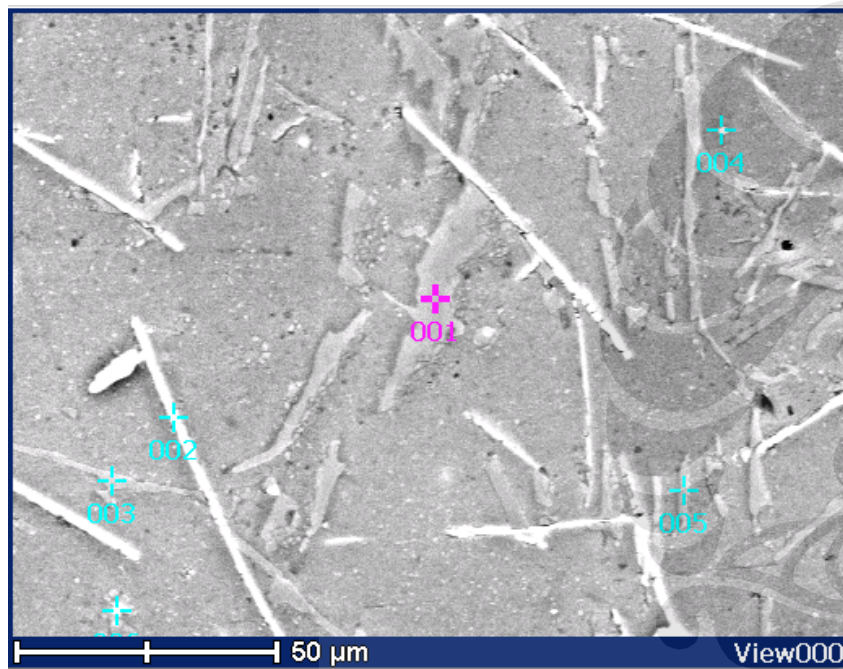
0 wt. %Ti pada proses T6							
time	time in minutes	log time	d1	d2	rata2	rata2-rata2	bhn
as quench	0	0	0.694	0.684	0.689	0.678167	83.36888
			0.699	0.68	0.6895		
			0.667	0.645	0.656		
5"	5	0.698970004	0.678	0.682	0.68	0.664333	87.01629
			0.607	0.656	0.6315		
			0.679	0.684	0.6815		
15"	15	1.176091259	0.67	0.624	0.647	0.645167	92.4621
			0.605	0.66	0.6325		
			0.645	0.667	0.656		
30"	30	1.477121255	0.661	0.623	0.642	0.642167	93.35883
			0.647	0.662	0.6545		
			0.61	0.65	0.63		
1h	60	1.77815125	0.643	0.612	0.6275	0.631	96.80963
			0.647	0.626	0.6365		
			0.631	0.627	0.629		
2h	120	2.079181246	0.618	0.622	0.62	0.615667	101.8569
			0.621	0.615	0.618		
			0.615	0.603	0.609		
4h	240	2.380211242	0.608	0.594	0.601	0.608833	104.2299
			0.628	0.623	0.6255		
			0.583	0.617	0.6		
6h	360	2.556302501	0.593	0.585	0.589	0.584167	113.4988
			0.57	0.59	0.58		
			0.578	0.589	0.5835		
8h	480	2.681241237	0.609	0.607	0.608	0.609833	103.8777
			0.628	0.611	0.6195		
			0.593	0.611	0.602		
10h	600	2.77815125	0.63	0.601	0.6155	0.614	102.4284
			0.619	0.627	0.623		
			0.617	0.59	0.6035		
24h	1440	3.158362492	0.642	0.625	0.6335	0.622833	99.45153
			0.607	0.623	0.615		
			0.63	0.61	0.62		
48h	2880	3.459392488	0.614	0.658	0.636	0.653833	92.00145
			0.672	0.651	0.6615		
			0.668	0.66	0.664		
72h	4320	3.635483747	0.641	0.669	0.655	0.683	84.2168
			0.684	0.7	0.692		
			0.686	0.718	0.702		
100h	6000	3.77815125	0.718	0.699	0.7085	0.712667	77.25854
			0.71	0.699	0.7045		
			0.7	0.75	0.725		

0.027 wt. %Ti pada proses T6							
time	time in minutes	log time	d1	d2	rata2	rata2-rata2	bhn
as quench	0	0	0.679	0.649	0.664	0.664833	86.88048
			0.675	0.622	0.6485		
			0.7	0.664	0.682		
5"	5	0.698970004	0.669	0.643	0.656	0.660833	87.97555
			0.661	0.67	0.6655		
			0.651	0.671	0.661		
15"	15	1.176091259	0.663	0.664	0.6635	0.641	93.71096
			0.663	0.629	0.646		
			0.57	0.657	0.6135		
30"	30	1.477121255	0.612	0.654	0.633	0.635167	95.50075
			0.632	0.647	0.6395		
			0.637	0.629	0.633		
1h	60	1.77815125	0.637	0.613	0.625	0.628167	97.71456
			0.666	0.643	0.6545		
			0.607	0.603	0.605		
2h	120	2.079181246	0.558	0.59	0.574	0.584833	113.2328
			0.607	0.602	0.6045		
			0.591	0.561	0.576		
4h	240	2.380211242	0.583	0.578	0.5805	0.5815	114.572
			0.567	0.588	0.5775		
			0.597	0.576	0.5865		
6h	360	2.556302501	0.553	0.57	0.5615	0.563833	122.0705
			0.56	0.569	0.5645		
			0.576	0.555	0.5655		
8h	480	2.681241237	0.565	0.587	0.576	0.57	119.3739
			0.566	0.569	0.5675		
			0.58	0.553	0.5665		
10h	600	2.77815125	0.578	0.598	0.588	0.585833	112.8355
			0.59	0.572	0.581		
			0.6	0.577	0.5885		
24h	1440	3.158362492	0.592	0.602	0.597	0.6065	105.0586
			0.613	0.605	0.609		
			0.606	0.621	0.6135		
48h	2880	3.459392488	0.672	0.594	0.633	0.618333	103.0024
			0.64	0.626	0.633		
			0.598	0.58	0.589		
72h	4320	3.635483747	0.609	0.607	0.608	0.6235	101.2838
			0.655	0.623	0.639		
			0	0			
100h	6000	3.77815125	0.67	0.663	0.6665	0.657	91.10581
			0.648	0.66	0.654		
			0.645	0.656	0.6505		

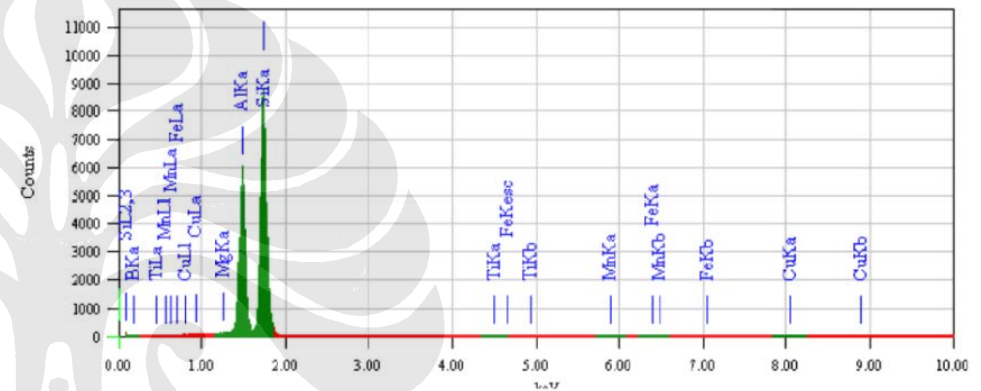


LAMPIRAN 4
GAMBAR MIKROSTRUKTUR SEM DAN GRAFIK
EDS

Al-9Si-2Cu tanpa penambahan Ti pada kondisi *overaged* (10 jam)

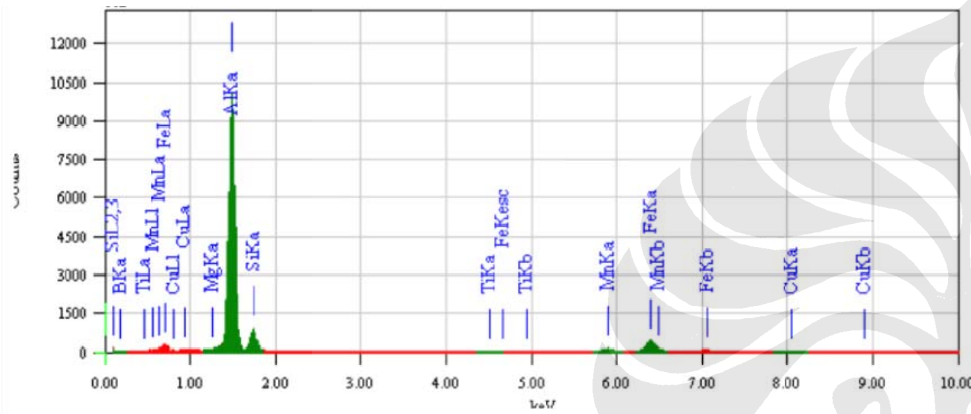


NO.1



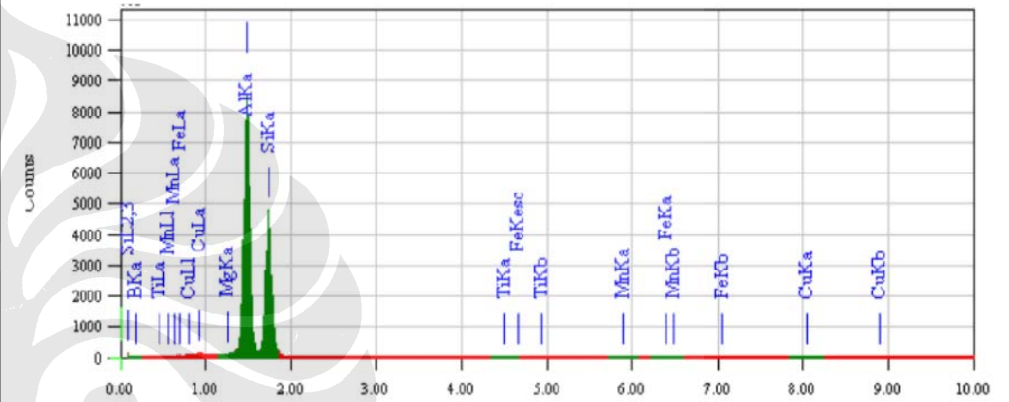
Element	Class.	(keV)	mass%	Error%	At%
B	K		50.25		
O			0.91	1.13	2.65
Mg	K	1.253	20.41	0.94	26.87
Al	K	1.486	27.42	1.03	69.34
Si	K	1.739			
Ti	K				
Mn	K				
Fe	K	6.398	0.09	2.40	0.11
Cu	K	8.040	0.92	4.69	1.02
Total			100.00		100.00

No. 2



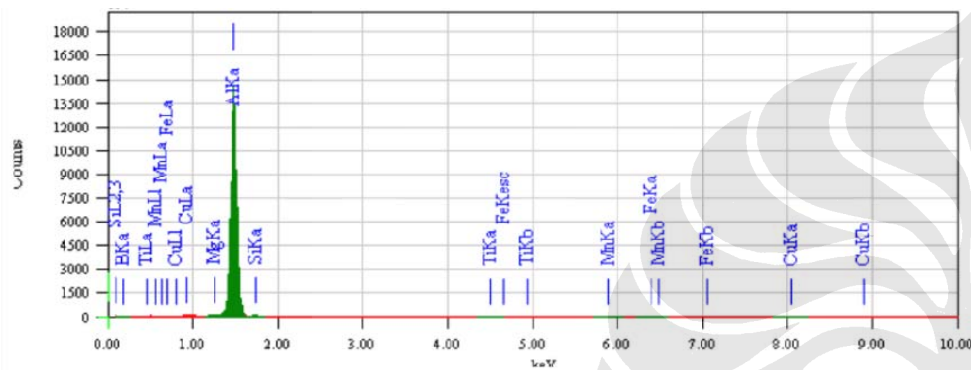
Element	Class.	(keV)	mass%	Error%	At%
B	K		43.38		
O					
Mg	K	1.253	2.02	1.56	7.01
Al	K	1.486	35.52	0.98	55.55
Si	K	1.739	5.88	2.31	17.66
Ti	K	4.508	0.04	1.92	0.07
Mn	K	5.894	1.86	2.53	2.86
Fe	K	6.398	10.09	2.58	15.25
Cu	K	8.040	1.20	5.23	1.60
Total			100.00		100.00

No. 3



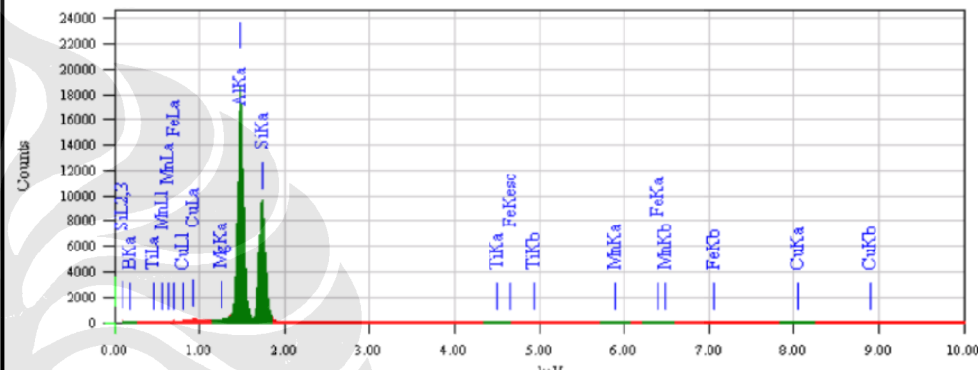
Element	Class.	(keV)	mass%	Error%	At%
B	K		49.02		
O					
Mg	K	1.253	1.36	1.10	4.24
Al	K	1.486	27.55	0.83	38.72
Si	K	1.739	20.35	1.29	54.96
Ti	K	4.508	0.01	1.76	0.01
Mn	K	5.894	0.10	2.27	0.13
Fe	K	6.398	0.05	2.33	0.07
Cu	K	8.040	1.56	4.56	1.86
Total			100.00		100.00

No. 4



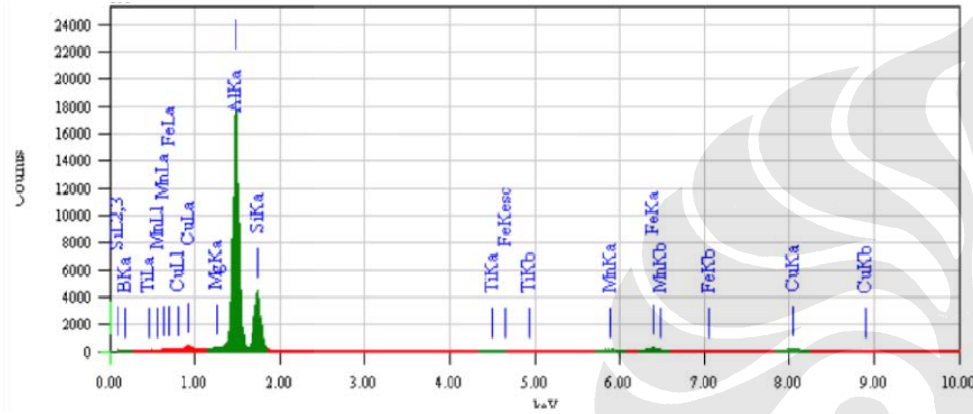
Element	Class.	(keV)	mass%	Error%	At%
B K					
O			45.84		
Mg K		1.253	2.82	2.00	10.86
Al K		1.486	48.13	1.30	83.60
Si K		1.739	0.40	4.40	1.32
Ti K					
Mn K		5.894	0.08	4.12	0.14
Fe K		6.398	0.19	4.23	0.32
Cu K		8.040	2.55	8.34	3.76
Total			100.00		100.00

No. 5



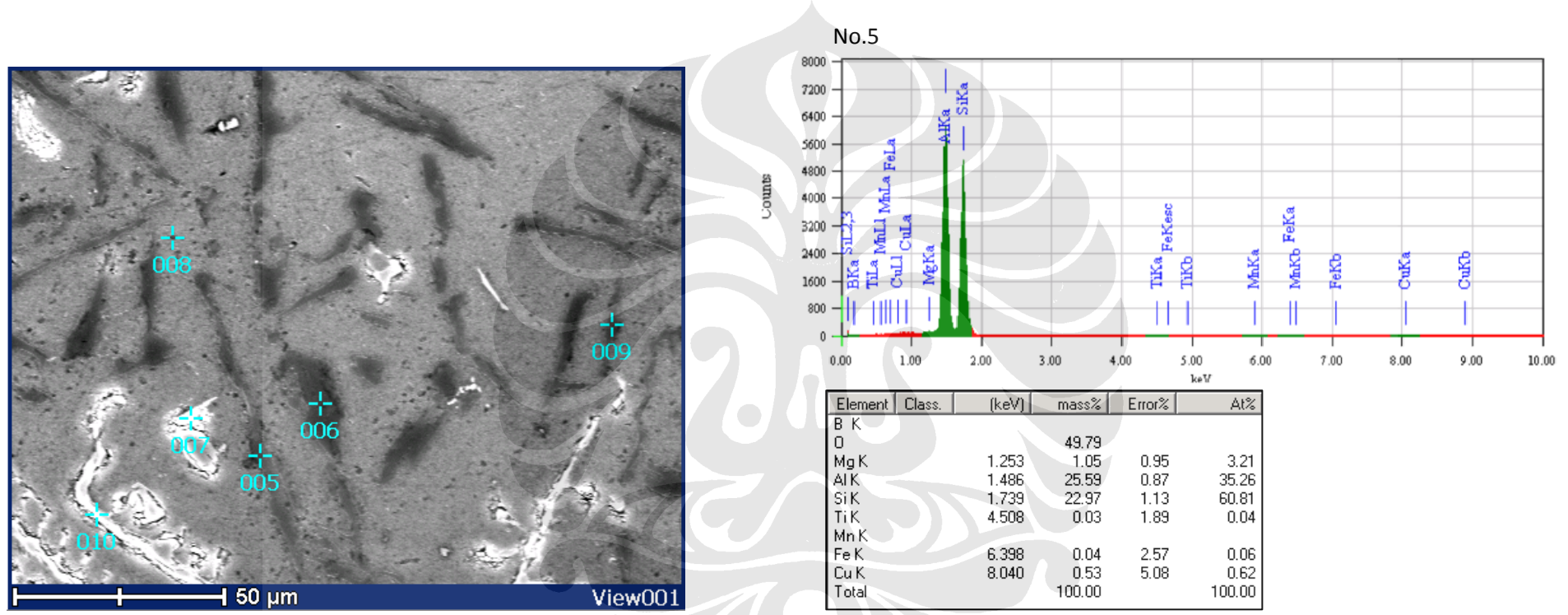
Element	Class.	(keV)	mass%	Error%	At%
B K					
O			49.04		
Mg K		1.253	1.42	1.10	4.45
Al K		1.486	28.33	0.83	40.06
Si K		1.739	19.78	1.33	53.75
Ti K		4.508	0.02	1.79	0.03
Mn K		5.894	0.04	2.30	0.06
Fe K		6.398	0.07	2.36	0.10
Cu K		8.040	1.29	4.62	1.55
Total			100.00		100.00

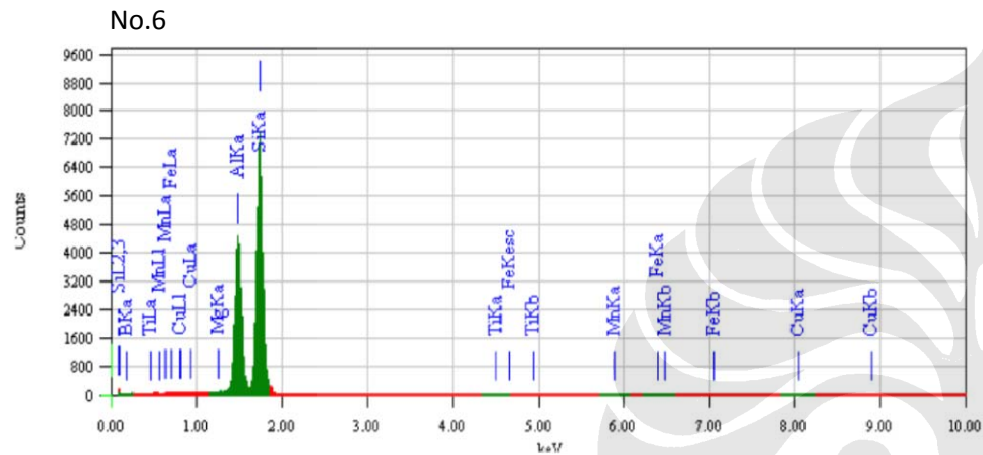
No.6



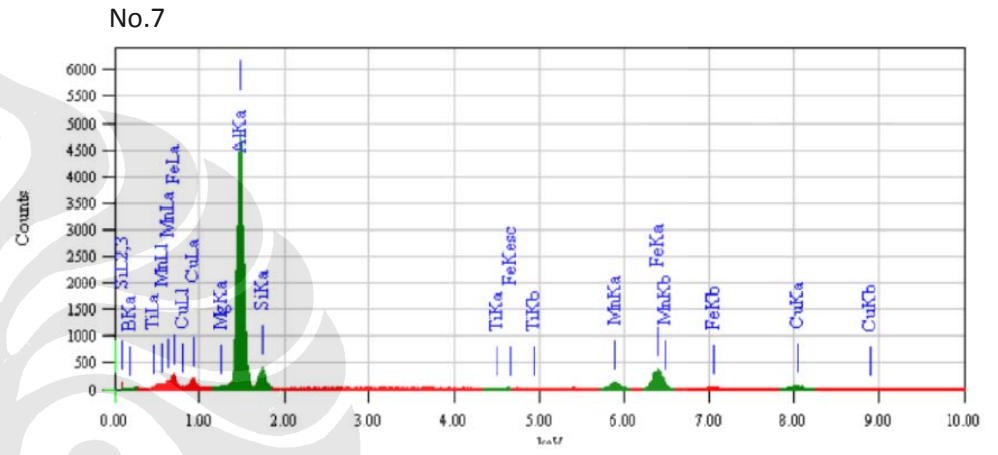
Element	Class.	(keV)	mass%	Error%	At%
B	K				
O			46.16		
Mg	K	1.253	2.04	1.34	6.71
Al	K	1.486	32.08	0.89	47.66
Si	K	1.739	12.60	1.82	35.96
Ti	K				
Mn	K	5.894	0.99	2.40	1.45
Fe	K	6.398	2.77	2.45	3.98
Cu	K	8.040	3.35	4.88	4.23
Total			100.00		100.00

Al-9Si-2Cu dengan penambahan 0,027 wt. % Ti pada kondisi *overaged* (10 jam)

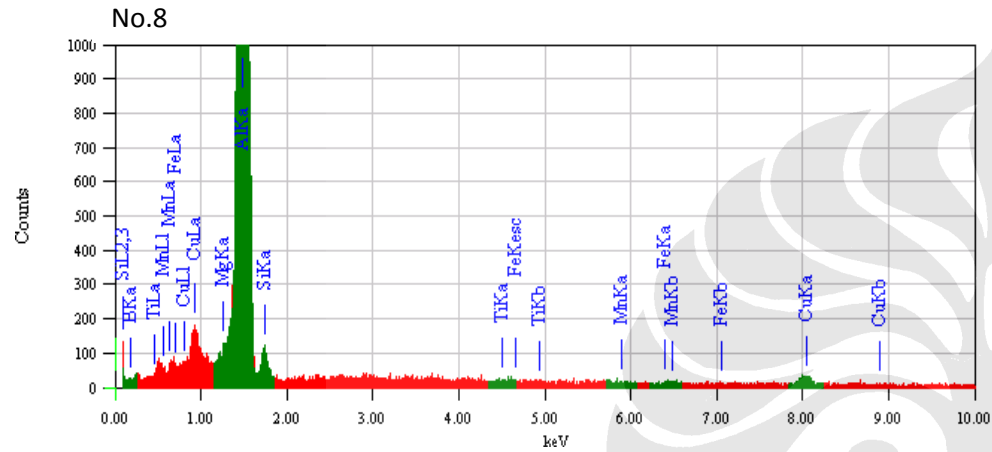




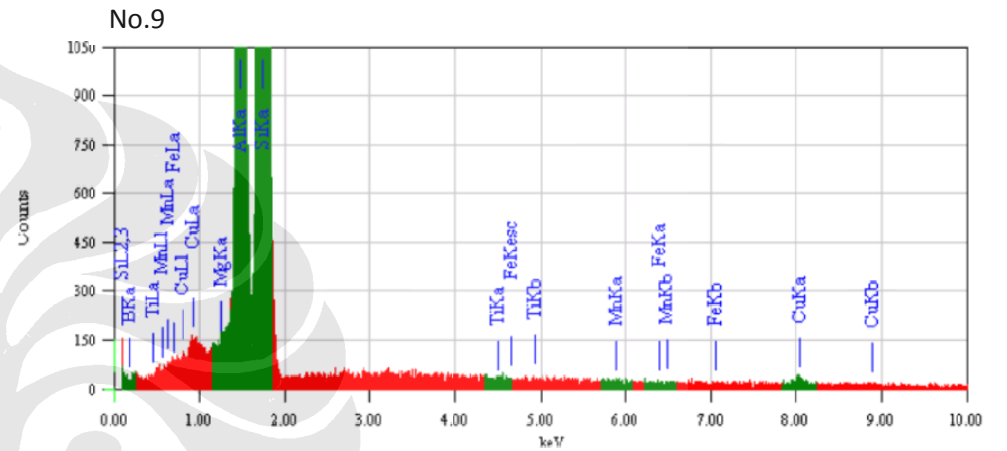
Element	Class.	(keV)	mass%	Error%	At%
B K					
O			50.57		
Mg K		1.253	0.72	0.99	2.10
Al K		1.486	19.61	0.94	25.63
Si K		1.739	28.53	1.02	71.64
Ti K		4.508	0.02	1.94	0.03
Mn K					
Fe K					
Cu K		8.040	0.55	5.21	0.61
Total			100.00		100.00



Element	Class.	(keV)	mass%	Error%	At%
B K					
O			39.73		
Mg K		1.253	1.81	1.22	6.26
Al K		1.486	31.45	0.90	48.89
Si K		1.739	3.50	1.53	10.46
Ti K		4.508	0.04	1.54	0.08
Mn K		5.894	4.09	2.06	6.24
Fe K		6.398	13.75	2.10	20.65
Cu K		8.040	5.62	4.31	7.42
Total			100.00		100.00

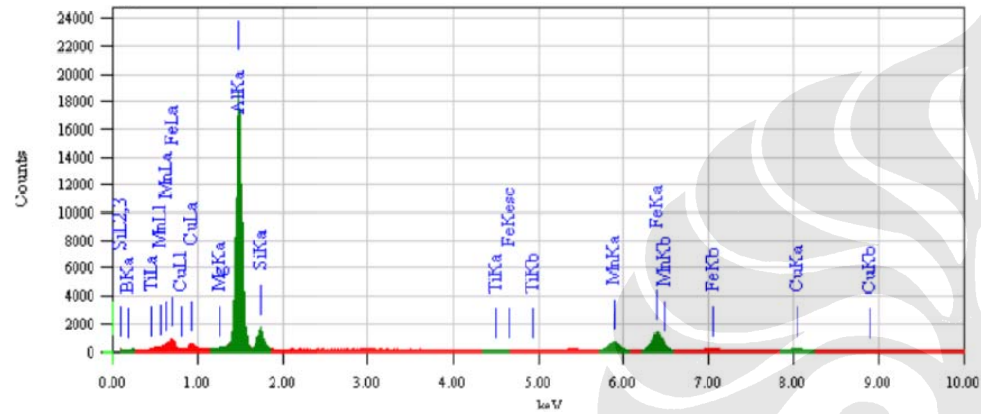


Element	Class.	(keV)	mass%	Error%	At%
B K					
O			46.25		
Mg K		1.253	2.37	1.74	9.29
Al K		1.486	49.46	1.38	87.36
Si K		1.739	0.24	3.57	0.80
Ti K		4.508	0.02	3.47	0.04
Mn K		5.894	0.03	4.57	0.06
Fe K					
Cu K		8.040	1.63	9.33	2.45
Total			100.00		100.00



Element	Class.	(keV)	mass%	Error%	At%
B K					
O			50.42		
Mg K		1.253	0.81	1.00	2.36
Al K		1.486	19.75	0.94	25.86
Si K		1.739	28.17	1.03	70.83
Ti K		4.508	0.02	1.94	0.03
Mn K		5.894	0.03	2.56	0.04
Fe K					
Cu K		8.040	0.79	5.21	0.88
Total			100.00		100.00

No. 10



Element	Class.	(keV)	mass%	Error%	At%
B K					
O			39.95		
Mg K		1.253	1.54	1.16	5.34
Al K		1.486	31.84	0.86	49.63
Si K		1.739	3.57	1.48	10.69
Ti K		4.508	0.03	1.49	0.05
Mn K		5.894	5.64	2.01	8.63
Fe K		6.398	14.20	2.05	21.39
Cu K		8.040	3.23	4.22	4.28
Total			100.00		100.00



COVERAL* GR 2815

Sodium Free Granulated Flux for Grain Refining of Aluminium and Aluminium Alloys

General description	<p>COVERAL GR 2815 is a sodium free grain refining granulated flux suitable for Aluminium and Aluminium alloys including those containing alloying amounts of magnesium. It is a universal grain refiner based on titanium and boron.</p> <p>COVERAL GR 2815 when plunged into the melt reacts to form titanium diboride and aluminium boride. These finely dispersed species are highly efficient nuclei that promote a fine equiaxed grain growth during solidification. This grain structure ensures excellent feeding characteristics leading to optimum mechanical properties in the casting. This improvement in feeding properties is beneficial in sand casting application but is of particular benefit in gravity die casting where solidification rates are usually quite high.</p>
Advantages	<p>COVERAL GR 2815 is sodium free.</p> <p>COVERAL GR 2815 is dust free in use and emits low fume during application.</p> <p>Granulated fluxes can be used at reduced application rates compared to powder fluxes.</p>
Application	<p>Any dross present on the melt surface should be carefully removed. The required amount of COVERAL GR 2815 is then placed on the melt surface and plunged to the bottom of the melt using a clean and preheated plunging tool and stirred vigorously into the melt. After the reaction is complete the melt surface should be drossed off using a suitable skimming tool.</p> <p>Any subsequent degassing by tablets or by FDU impeller treatment can be done without any detrimental effects to the grain refining efficiency.</p>
Application temperature	700 °C and higher.
Addition rate	0.05 - 0.15 % of the metal weight, depending on alloy type.
Packing	25 Kg polyethylene lined multi-ply paper sacks.
Storage	Like all fluxes, COVERAL GR 2815 should be stored in a dry place. Close opened packages or storage bins securely after use.
Labelling	Xn Harmful.
Health and safety	<p>For safety reasons this product must be used only in accordance with the instructions for use contained in this Technical Data Sheet.</p> <p>The Material Safety Data Sheet for this product is available on request.</p>
Further remarks	<p>The data given in this leaflet are only guide values and do not represent a specification. All rights to make technical changes to improve the product are reserved.</p>

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