

LAMPIRAN A
PERHITUNGAN

1. Perhitungan komposisi % wt Zn

$$\% \text{ wt Zn} = \frac{\text{massa Zn}}{\sum \text{massa Velg Al} + \text{massa Al} + \text{massa Zn} + \text{massa In}} \times 100\%$$

A. Sampel IA, IB dan IC 2,6 % wt Zn

$$\% \text{ wt Zn} = \frac{13\text{g}}{\sum (100\text{g} + 382\text{g} + 13\text{g} + 0,19\text{g})} \times 100\% = 2,625\%$$

B. Sampel IIA, IIB dan IIC 3,6 % wt Zn

$$\% \text{ wt Zn} = \frac{18\text{g}}{\sum (100\text{g} + 377\text{g} + 18\text{g} + 0,19\text{g})} \times 100\% = 3,635\%$$

C. Sampel IIIA, IIIB dan IIIC 5 % wt Zn

$$\% \text{ wt Zn} = \frac{25\text{g}}{\sum (100\text{g} + 370\text{g} + 25\text{g} + 0,19\text{g})} \times 100\% = 5,049\%$$

2. Perhitungan komposisi % wt In

$$\% \text{ wt In} = \frac{\text{massa In}}{\sum \text{massa Velg Al} + \text{massa Al} + \text{massa Zn} + \text{massa In}} \times 100\%$$

A. Sampel IA, IB dan IC 2,6 % wt Zn

$$\% \text{ wt Zn} = \frac{0,19\text{g}}{\sum (100\text{g} + 382\text{g} + 13\text{g} + 0,19\text{g})} \times 100\% = 0,04\%$$

B. Sampel IIA, IIB dan IIC 3,6 % wt Zn

$$\% \text{ wt Zn} = \frac{0,19\text{g}}{\sum (100\text{g} + 377\text{g} + 18\text{g} + 0,19\text{g})} \times 100\% = 0,04\%$$

C. Sampel IIIA, IIIB dan IIIC 5 % wt Zn

$$\% \text{ wt Zn} = \frac{0,19\text{g}}{\sum (100\text{g} + 370\text{g} + 25\text{g} + 0,19\text{g})} \times 100\% = 0,04\%$$

3. Perhitungan *Current Capacity* Aktual (Ah/kg)

$$\text{Current Capacity (CC)} = \frac{\text{Current (A)} \times \text{time (h)}}{\text{Weight loss (kg)}}$$

A. Sampel IA 2,6%Zn 650°C

$$\text{CC} = \frac{0,00073 \text{ A} \times 240 \text{ h}}{0,0000833 \text{ kg}} = 2102,40 \text{ Ah/kg}$$

B. Sampel IB 2,6%Zn 700°C

$$\text{CC} = \frac{0,00078 \text{ A} \times 240 \text{ h}}{0,0000833 \text{ kg}} = 2246,40 \text{ Ah/kg}$$

C. Sampel IC 2,6%Zn 750°C

$$\text{CC} = \frac{0,00113 \text{ A} \times 240 \text{ h}}{0,0001233 \text{ kg}} = 2198,92 \text{ Ah/kg}$$

D. Sampel IIA 3,6%Zn 650°C

$$\text{CC} = \frac{0,00143 \text{ A} \times 240 \text{ h}}{0,0001733 \text{ kg}} = 1980,00 \text{ Ah/kg}$$

E. Sampel IIB 3,6%Zn 700°C

$$\text{CC} = \frac{0,00091 \text{ A} \times 240 \text{ h}}{0,0001 \text{ kg}} = 2184,00 \text{ Ah/kg}$$

F. Sampel IIC 3,6%Zn 750°C

$$\text{CC} = \frac{0,00085 \text{ A} \times 240 \text{ h}}{0,0000967 \text{ kg}} = 2110,34 \text{ Ah/kg}$$

G. Sampel IIIA 5%Zn 650°C

$$\text{CC} = \frac{0,00160 \text{ A} \times 240 \text{ h}}{0,0001833 \text{ kg}} = 2394,55 \text{ Ah/kg}$$

H. Sampel IIIB 5% Zn 700°C

$$\text{CC} = \frac{0,00122 \text{ A} \times 240 \text{ h}}{0,0001233 \text{ kg}} = 2374,05 \text{ Ah/kg}$$

I. Sampel IIIC 5% Zn 750°C

$$\text{CC} = \frac{0,00130 \text{ A} \times 240 \text{ h}}{0,0001333 \text{ kg}} = 2340,00 \text{ Ah/kg}$$

4. Perhitungan *Current Capacity* Teoritis (Ah/kg)

$$CC_{T \text{ Paduan}} = \sum (\% \text{ wt}_{\text{Unsur}} \cdot CC_{T \text{ Unsur}})$$

A. Paduan I 2,6% Zn

$$\begin{aligned} CC_T &= (94,97\% \text{ Al} \cdot 2979,99 \text{ Ah/kg}) + (2,696\% \text{ Zn} \cdot 819,82 \text{ Ah/kg}) \\ &= 2852,25 \text{ Ah/kg} \end{aligned}$$

B. Paduan II 3,6% Zn

$$\begin{aligned} CC_T &= (94,40\% \text{ Al} \cdot 2979,99 \text{ Ah/kg}) + (3,692\% \text{ Zn} \cdot 819,82 \text{ Ah/kg}) \\ &= 2843,49 \text{ Ah/kg} \end{aligned}$$

C. Paduan III 5% Zn

$$\begin{aligned} CC_T &= (92,79\% \text{ Al} \cdot 2979,99 \text{ Ah/kg}) + (5,099\% \text{ Zn} \cdot 819,82 \text{ Ah/kg}) \\ &= 2806,78 \text{ Ah/kg} \end{aligned}$$

5. Perhitungan Nilai Efisiensi (%)

$$\text{Efisiensi} = \frac{\text{Kapasitas Aktual}}{\text{Kapasitas Teoritis}} \times 100\%$$

A. Sampel IA 2,6%Zn 650°C

$$\text{Efisiensi} = \frac{2102,40 \text{ Ah/kg}}{2852,25 \text{ Ah/kg}} \times 100\% = 73,71\%$$

B. Sampel IB 2,6%Zn 700°C

$$\text{Efisiensi} = \frac{2246,40 \text{ Ah/kg}}{2852,25 \text{ Ah/kg}} \times 100\% = 78,76\%$$

C. Sampel IC 2,6%Zn 750°C

$$\text{Efisiensi} = \frac{2198,92 \text{ Ah/kg}}{2852,25 \text{ Ah/kg}} \times 100\% = 77,09\%$$

D. Sampel IIA 3,6%Zn 650°C

$$\text{Efisiensi} = \frac{1980,00 \text{ Ah/kg}}{2843,49 \text{ Ah/kg}} \times 100\% = 69,63\%$$

E. Sampel IIB 3,6%Zn 700°C

$$\text{Efisiensi} = \frac{2184,00 \text{ Ah/kg}}{2843,49 \text{ Ah/kg}} \times 100\% = 76,81\%$$

F. Sampel IIC 3,6%Zn 750°C

$$\text{Efisiensi} = \frac{2110,34 \text{ Ah/kg}}{2843,49 \text{ Ah/kg}} \times 100\% = 74,22\%$$

G. Sampel IIIA 5%Zn 650°C

$$\text{Efisiensi} = \frac{2094,55 \text{ Ah/kg}}{2806,78 \text{ Ah/kg}} \times 100\% = 74,62\%$$

H. Sampel IIIB 5% Zn 700°C

$$\text{Efisiensi} = \frac{2374,05 \text{ Ah/kg}}{2806,78 \text{ Ah/kg}} \times 100\% = 84,58\%$$

I. Sampel IIIC 5% Zn 750°C

$$\text{Efisiensi} = \frac{2340,00 \text{ Ah/kg}}{2806,78 \text{ Ah/kg}} \times 100\% = 83,37\%$$

LAMPIRAN B
DATA PENELITIAN

Lampiran B. 1 Data Komposisi Inalum *Primary Aluminium Ingot*

QA-FR27-044



PT. INDONESIA ASAHAN ALUMINIUM

Smelting Plant
Po Box-1 Kuala Tanjung 21657, Kab. Batu Bara, Sumatera Utara - Indonesia, Phone (0622) 31311, Fax (0622) 31001

Id :CoA/0715/2023

CERTIFICATE OF ANALYSIS

Page : 1/1

CUSTOMER : PT. PERINTIS PROTEKSI SEJAHTERA

COMMODITY : PRIMARY ALUMINIUM INGOT BRAND : INAL (LME REG. 1987) DATE OF ISSUANCE : 31.08.2023

GRADE : ALUMINIUM INGOT 99.70% (G1) NAME OF VESSEL : Trailer ORDER NO : 6011777

LOT NO	CHEMICAL COMPOSITION (%)												
	Date of Analysis	Al*	Si	Fe	Cu	Ti	Mn	V	Ga	Mg	Zn	Na	Pb
0000276028	18/08/2023	99,78	0,05	0,17	0,00	<0,01	<0,01	<0,01	<0,01	<0,01	0,00	0,00	0,00
0000276029	18/08/2023	99,84	0,03	0,13	0,00	<0,01	<0,01	<0,01	<0,01	<0,01	0,00	0,00	0,00

% Al IS CALCULATED IN ACCORDANCE WITH JIS H2102
THE ANALYSIS GRADE WERE PERFORMED IN ACCORDANCE WITH JIS H1305
THE VALUE IN THE CERTIFICATE IS RELATED ONLY TO THE SPECIMENTS TESTED
THE VALUE DESCRIPTION IS ACCORDING TO CA DESCRIPTION OF LME EXPORT
REQUIREMENT

PT INDONESIA ASAHAN ALUMINIUM (Persero)

Manager Quality Assurance Section

Gambar B.1 Data Komposisi Inalum *Primary Aluminium Ingot Grade G1*

Lampiran B. 2 Data Komposisi Nyrstar Zinc Ingot

Certificate of Analysis "3.1" conform EN 10204

Date : 21.07.2021

Delivery note number : 9213122/30952289

Order number : UNKNOWN AUSTRALIA

Customer : VENETIA /V2025N

Vessel/Voyage : 199.446 TO

Net weight : 4

Product Code : Nyrstar A-Z Z1

Product Description : Produced under ISO 9001 according to ISO752 ZN1 and EN 1179 Z1

26 kg slabs strapped in bundles of 1040 kgs

G.I. Date :

Seal number :

Container number :

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99.995% ZINC MINIMUM
LAME DELIVERABLE QUALITY

Zinc by difference using named impurities.

Assay No. 0004210314151 Lot no : SHZE

Bundle from 2360032

Bundle to 2360061

Total weight 5.201

Prod. release date 11.07.2021

Zinc 99.996

000421031416 Lot no : SHZE

2360242

2360247

5.329

11.07.2021

99.996

Aluminium % (4d)	Min	Max					
	0.0000	0.0014	<	<	0.0002	<	0.0002
Tin % (4d)	0.0000	0.0014	<	<	0.0004	<	0.0004
Lead % (4d)	0.0000	0.0034	<	<	0.0029	<	0.0029
Iron % (4d)	0.0000	0.0014	<	<	0.0003	<	0.0003
Copper % (4d)	0.0000	0.0014	<	<	0.0001	<	0.0001
Cadmium % (4d)	0.0000	0.0024	<	<	0.0004	<	0.0004
Total Impurities (3d)	0.0000	0.005			0.004		0.004

Nyrstar Sales & Marketing SA, 1 Rue du Jargonnet Geneva 1207, Switzerland
• Telephone + 41 44 745 81 00 • Facsimile + 41 44 745 81 10

Gambar B.2 Komposisi Zinc Ingot Nyrstar A-Z Z1

Lampiran B. 3 Data Hasil Uji OES Velg Aluminium dan *Primary Aluminium Ingot*

HITACHI PMI-MASTER OPTICAL EMISSION SPECTROSCOPY							
FMS	SNr.	71X0292	Optik Nr.	71X0365			
Sample	:AL Alloy						
Alloy	: Al_400	Mode	: PA 8/9/2024 5:38:20 PM				
	Al	Si	Fe	Cu	Mn	Mg	Zn
1	92.29	7.23	0.116	< 0.0030	0.0019	0.279	0.0124
2	92.31	7.21	0.129	< 0.0030	0.0020	0.274	0.0116
3	92.38	7.15	0.121	< 0.0030	0.0020	0.272	0.0129
Average	92.33	7.20	0.122	< 0.0030	0.0019	0.275	0.0123
	Cr	Ni	Ti	Be	Ca	Li	Pb
1	< 0.0010	< 0.0020	< 0.0010	< 0.0001	0.0004	< 0.0002	0.0010
2	< 0.0010	< 0.0020	< 0.0010	< 0.0001	< 0.0001	< 0.0002	< 0.0010
3	< 0.0010	< 0.0020	< 0.0010	< 0.0001	0.0003	< 0.0002	< 0.0010
Average	< 0.0010	< 0.0020	< 0.0010	< 0.0001	0.0002	< 0.0002	< 0.0010
	Sn	Sr	V	Na	Bi	Zr	B
1	< 0.0050	0.0007	0.0256	0.0006	< 0.0050	< 0.0010	< 0.0005
2	< 0.0050	0.0006	0.0250	< 0.0002	< 0.0050	< 0.0010	< 0.0005
3	< 0.0050	0.0007	0.0249	< 0.0002	< 0.0050	< 0.0010	< 0.0005
Average	< 0.0050	0.0007	0.0252	0.0002	< 0.0050	< 0.0010	< 0.0005
	Ga	Cd	Co	Ag	Hg	In	Sb
1	0.0165	< 0.0010	< 0.0020	< 0.0010	< 0.0050	< 0.0020	0.0180
2	0.0166	< 0.0010	< 0.0020	< 0.0010	< 0.0050	< 0.0020	0.0143
3	0.0162	< 0.0010	< 0.0020	< 0.0010	< 0.0050	< 0.0020	0.0159
Average	0.0164	< 0.0010	< 0.0020	< 0.0010	< 0.0050	< 0.0020	0.0161
	Ce	La	Mo	Sc			
1	< 0.0010	< 0.0005	< 0.0010	0.0015			
2	< 0.0010	< 0.0005	< 0.0010	0.0016			
3	< 0.0010	< 0.0005	< 0.0010	0.0016			
Average	< 0.0010	< 0.0005	< 0.0010	0.0015			



Gambar B.3 Data Hasil Uji OES Velg Aluminium

HITACHI PMI-MASTER OPTICAL EMISSION SPECTROSCOPY

FMS SNr. 71X0292 Optik Nr. 71X0365

Sample : AL Ingot

Alloy : Al_100 Mode : PA 8/9/2024 5:32:52 PM

	Al	Si	Fe	Cu	Mn	Mg	Zn
1	99.70	0.0568	0.182	< 0.0030	0.0021	0.0020	< 0.0010
2	99.70	0.0529	0.177	< 0.0030	0.0017	0.0010	< 0.0010
3	99.71	0.0526	0.173	< 0.0030	0.0016	< 0.0010	< 0.0010
Average	99.71	0.0541	0.177	< 0.0030	0.0018	0.0013	< 0.0010

	Cr	Ni	Ti	Be	Ca	Li	Pb
1	< 0.0010	< 0.0020	< 0.0010	< 0.0001	0.0020	< 0.0002	< 0.0010
2	< 0.0010	0.0021	< 0.0010	< 0.0001	0.0010	< 0.0002	< 0.0010
3	< 0.0010	< 0.0020	< 0.0010	< 0.0001	0.0008	< 0.0002	< 0.0010
Average	< 0.0010	< 0.0020	< 0.0010	< 0.0001	0.0013	< 0.0002	< 0.0010

	Sn	Sr	V	Na	Bi	Zr	B
1	< 0.0050	< 0.0001	0.0052	0.0004	< 0.0050	< 0.0010	< 0.0005
2	< 0.0050	0.0001	0.0056	0.0003	< 0.0050	< 0.0010	< 0.0005
3	< 0.0050	< 0.0001	0.0056	0.0002	< 0.0050	< 0.0010	< 0.0005
Average	< 0.0050	< 0.0001	0.0055	0.0003	< 0.0050	< 0.0010	< 0.0005

	Ga	Cd	Co	Ag	Hg	In	Sb
1	0.0086	< 0.0010	< 0.0020	< 0.0010	< 0.0050	< 0.0020	0.0270
2	0.0086	< 0.0010	< 0.0020	< 0.0010	< 0.0050	< 0.0020	0.0344
3	0.0084	< 0.0010	< 0.0020	< 0.0010	< 0.0050	< 0.0020	0.0294
Average	0.0085	< 0.0010	< 0.0020	< 0.0010	< 0.0050	< 0.0020	0.0303

	Ce	La	Mo	Sc
1	< 0.0010	0.0005	< 0.0010	0.0005
2	< 0.0010	0.0005	< 0.0010	0.0007
3	< 0.0010	< 0.0005	< 0.0010	0.0007
Average	< 0.0010	0.0005	< 0.0010	0.0006



Gambar B.4 Data Hasil Uji OES *Aluminium Ingot*

Lampiran B. 4 Data Hasil Uji XRF Sampel Anoda

Tabel B.1 Hasil Perhitungan Rata-rata Komposisi Uji XRF IA

<i>Element</i>	<i>Concentration /ppm</i>			<i>Average Concentration / ppm</i>	<i>Average Concentration (%)</i>
	<i>Test No. 1</i>	<i>Test No. 2</i>	<i>Test No. 3</i>		
Ag 47	ND <2.6	ND <2.5	ND <2.6		
Al 13	961049	960329	957860	959746,0	94,972%
As 33	0,9	1,2	1,4	1,2	0,000%
Au 79	ND <0.9	ND <0.9	ND <0.9		
Ba 56	ND <86.9	ND <87.1	ND <85.4		
Bi 83	ND <0.5	ND <0.5	ND <0.5		
Br 35	ND <0.2	ND <0.2	ND <0.2		
Ca 20	166	191	ND <67.8	178,5	0,018%
Cd 48	ND <3.0	ND <1.6	ND <2.7		
Ce 58	ND <41.2	ND <41.3	ND <40.5		
Cl 17	ND <256	ND <268	ND <190		
Co 27	ND <14.7	ND <15.2	ND <15.7		
Cr 24	254	268	280	267,3	0,026%
Cu 29	234	256	232	240,7	0,024%
Fe 26	10262	11191	12698	11383,7	1,126%
Ga 31	76	92,5	75,7	81,4	0,008%
Hf 72	ND <10.1	ND <9.8	ND <9.8		
Hg 80	ND <0.8	ND <0.8	ND <0.8		
In 49	337	352	314	334,3	0,033%
K 19	ND <66.3	ND <108	ND <82.9		
La 57	ND <64.1	ND <66.9	ND <62.5		
Mn 25	241	254	278	257,7	0,025%
Ni 28	ND <5.5	ND <5.5	ND <5.3		
P 15	ND <1282	ND <1471	ND <1187		
Pb 82	19,6	20,1	18,6	19,4	0,002%
Rb 37	ND <0.3	ND <0.3	ND <0.3		
S 16	ND <647	ND <586	ND <539		
Sb 51	ND <7.2	17,6	13,8	15,7	0,002%
Se 34	ND <0.3	ND <0.3	ND <0.3		
Si 14	ND <9941	ND <10809	ND <10492	10414,0	1,031%
Sn 50	8,4	ND <7.0	9,5		0,001%
Sr 38	ND <0.6	ND <0.6	ND <0.6		
Ta 73	ND <9.0	ND <8.4	ND <9.1		
Ti 22	241	283	216	246,7	0,024%
V 23	ND <24.7	ND <25.3	ND <21.3		
W 74	ND <34.0	ND <33.1	108	108,0	0,011%
Zn 30	27111	26734	27895	27246,7	2,696%
	1000000	999989	1000000	1010541	100,000%

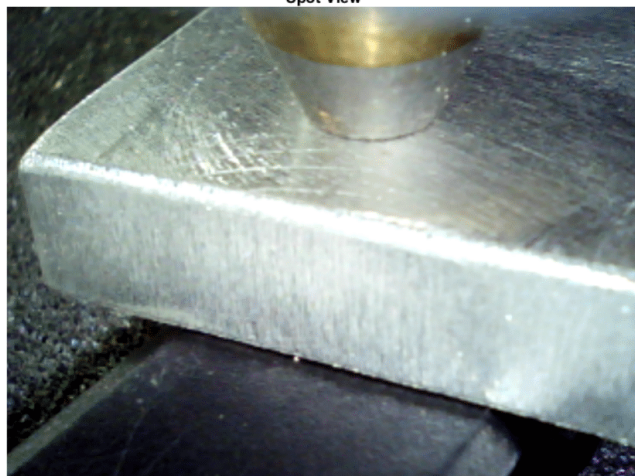
Tabel B.2 Hasil Perhitungan Rata-rata Komposisi Uji XRF IIA

<i>Element</i>	<i>Concentration /ppm</i>			<i>Average Concentration / ppm</i>	<i>Average Concentration (%)</i>
	<i>Test No. 1</i>	<i>Test No. 2</i>	<i>Test No. 3</i>		
Ag 47	ND <2.3	ND <2.3	ND <1.3		
Al 13	953837	953053	954532	953807,3	94,404%
As 33	ND <0.2	1,4	ND <0.2		0,000%
Au 79	ND <0.9	ND <0.9	ND <1.0		
Ba 56	ND <86.0	ND <83.8	ND <86.3		
Bi 83	ND <0.5	ND <0.5	ND <0.5		
Br 35	ND <0.2	ND <0.3	ND <0.3		
Ca 20	ND <68.6	ND <48.8	ND <51.6		
Cd 48	ND <2.8	ND <2.6	ND <2.7		
Ce 58	ND <40.8	ND <39.7	ND <40.9		
Cl 17	ND <222	ND <260	ND <294		
Co 27	ND <14.0	ND <14.2	ND <14.0		
Cr 24	85	99,6	89,7	91,4	0,009%
Cu 29	39,7	41,3	50,7	43,9	0,004%
Fe 26	7997	8408	7986	8130,3	0,805%
Ga 31	70,1	72,5	76	72,9	0,007%
Hf 72	ND <7.5	ND <7.4	ND <7.6		
Hg 80	ND <0.9	ND <0.9	ND <0.9		
In 49	72	74,1	83,4	76,5	0,008%
K 19	ND <83.9	ND <78.8	ND <61.8		
La 57	ND <64.0	ND <63.9	ND <64.3		
Mn 25	98,4	107	87,8	97,7	0,010%
Ni 28	ND <5.4	ND <5.4	ND <5.5		
P 15	ND <1752	ND <1319	ND <1379		
Pb 82	11,7	9,1	12,2	11,0	0,001%
Rb 37	ND <0.3	ND <0.3	ND <0.3		
S 16	ND <592	ND <503	ND <608		
Sb 51	17,7	17,4	16,2	17,1	0,002%
Se 34	ND <0.3	ND <0.3	ND <0.3		
Si 14	ND <10703	ND <9895	ND <10439	10345,7	1,024%
Sn 50	ND <6.8	10,2	ND <6.8	10,2	0,001%
Sr 38	ND <0.6	ND <0.6	ND <0.6		
Ta 73	ND <8.6	ND <8.6	ND <8.7		
Ti 22	239	195	248	227,3	0,023%
V 23	ND <22.7	ND <23.2	ND <23.6		
W 74	106	113	114	111,0	0,011%
Zn 30	37419	37799	36702	37306,7	3,692%
	999993	1000001	999998	1010349	100,000%

Tabel B.3 Hasil Perhitungan Rata-rata Komposisi Uji XRF IIIA

<i>Element</i>	<i>Concentration /ppm</i>			<i>Average Concentration / ppm</i>	<i>Average Concentration (%)</i>
	<i>Test No. 1</i>	<i>Test No. 2</i>	<i>Test No. 3</i>		
Ag 47	ND <3.0	ND <2.5	ND <2.9		
Al 13	939722,0	935232,0	939486,0	938146,7	92,785%
As 33	ND <0.1	2,5	1,7	2,1	0,000%
Au 79	ND <1.0	ND <1.0	ND <1.0		
Ba 56	ND <96.1	ND <93.3	ND <94.7		
Bi 83	ND <0.6	ND <0.6	ND <0.6		
Br 35	ND <0.3	ND <0.3	ND <0.3		
Ca 20	502,0	199,0	ND <83.5	350,5	0,035%
Cd 48	ND <3.2	ND <3.1	ND <3.3		
Ce 58	ND <45.5	ND <44.2	ND <44.8		
Cl 17	ND <433	ND <288	ND <404		
Co 27	ND <10.5	ND <16.1	ND <15.6		
Cr 24	46,1	42,0	37,1	41,7	0,004%
Cu 29	ND <3.3	ND <3.2	ND <4.3		
Fe 26	8386,0	10406,0	8555,0	9115,7	0,902%
Ga 31	96,3	106,0	98,0	100,1	0,010%
Hf 72	ND <7.3	ND <7.3	ND <7.1		
Hg 80	ND <1.1	ND <1.1	ND <1.0		
In 49	405,0	408,0	409,0	407,3	0,040%
K 19	ND <143	ND <114	ND <121		
La 57	ND <69.2	ND <66.8	ND <68.6		
Mn 25	35,9	36,9	36,9	36,6	0,004%
Ni 28	ND <6.1	ND <6.0	ND <6.1		
P 15	ND <1634	ND <1444	ND <1670		
Pb 82	11,4	7,4	5,0	7,9	0,001%
Rb 37	ND <0.3	ND <0.3	ND <0.3		
S 16	ND <799	ND <723	ND <637		
Sb 51	16,7	24,0	17,2	19,3	0,002%
Se 34	ND <0.3	ND <0.3	ND <0.3		
Si 14	ND <10456	ND <11701	ND <10782	10979,7	1,086%
Sn 50	ND <7.6	ND <7.1	ND <7.5		
Sr 38	ND <0.6	ND <0.6	ND <0.6		
Ta 73	ND <6.2	ND <6.1	ND <6.0		
Ti 22	214,0	198,0	244,0	218,7	0,022%
V 23	ND <22.4	ND <20.6	ND <22.7		
W 74	119,0	120,0	105,0	114,7	0,011%
Zn 30	50446,0	53218,0	51005,0	51556,3	5,099%
	1000000	1000000	1000000	1011097	100,000%

Spot View



Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<2.6	±2.6	-	0,0
Al 13	961049	±33486	-	5073,7
As 33	0.9	±0.3	-	98,9
Au 79	ND<0.9	±0.9	-	0,0
Ba 56	ND<86.9	±86.9	-	0,0
Bi 83	ND<0.5	±0.5	-	0,0
Br 35	ND<0.2	±0.2	-	0,0
Ca 20	166	±35.4	-	84,0
Cd 48	ND<3.0	±3.0	-	0,0
Ce 58	ND<41.2	±41.2	-	0,0
Cl 17	ND<256	±256	-	0,0
Co 27	ND<14.7	±14.7	-	0,0
Cr 24	254	±21.5	-	1056,9
Cu 29	234	±6.8	-	7490,4
Fe 26	10262	±68.1	-	107318,9
Ga 31	76.0	±4.4	-	4646,5
Hf 72	ND<10.1	±10.1	-	0,0
Hg 80	ND<0.8	±0.8	-	0,0
In 49	337	±12.4	-	45,5
K 19	ND<66.3	±66.3	-	0,0
La 57	ND<64.1	±64.1	-	0,0
Mn 25	241	±15.9	-	1604,9
Ni 28	ND<5.5	±5.5	-	0,0
P 15	ND<1282	±1282	-	0,0
Pb 82	19.6	±1.1	-	1346,5
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<647	±647	-	0,0
Sb 51	ND<7.2	±7.2	-	0,0
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<9941	±9941	-	0,0
Sn 50	8.4	±2.0	-	1,5
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<9.0	±9.0	-	0,0
Ti 22	241	±42.7	-	360,6
V 23	ND<24.7	±24.7	-	0,0
W 74	ND<34.0	±34.0	-	0,0
Zn 30	27111	±122	-	1224014,5
RT 1.0				

Sample

1395_IA 1_1922

Coating: ☐

Substrate: Metal

Name: IA 1

Lot:

Optimization: Default

Method: Quantify

System

Scan #: 1402

Serial #: HDG200618001

Date: 2024-Okt-03

Time: 19:55:47

Operator: metalurgi

Description:

System Serial Number: HDG200618001

GUI Software Version: 1.3.2 2912

Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS

S7 4SS]

Solver Version: 2.5.7-22

HW Server Version: 1.5.34

Detector Version: 6.09.04 EOG

OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:43 EDT 2012

Gambar B.5 Data Hasil Uji XRF Anoda IA 1

Spot View



Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<2.5	±2.5	-	0,0
Al 13	960329	±33391	-	5105,6
As 33	1.2	±0.5	-	135,4
Au 79	ND<0.9	±0.9	-	0,0
Ba 56	ND<87.1	±87.1	-	0,0
Bi 83	ND<0.5	±0.5	-	0,0
Br 35	ND<0.2	±0.2	-	0,0
Ca 20	191	±39.6	-	98,4
Cd 48	ND<1.6	±1.6	-	0,0
Ce 58	ND<41.3	±41.3	-	0,0
Cl 17	ND<268	±268	-	0,0
Co 27	ND<15.2	±15.2	-	0,0
Cr 24	268	±21.9	-	1138,4
Cu 29	256	±6.7	-	8312,5
Fe 26	11191	±70.4	-	119345,6
Ga 31	92.5	±4.3	-	5739,1
Hf 72	ND<9.8	±9.8	-	0,0
Hg 80	ND<0.8	±0.8	-	0,0
In 49	352	±12.6	-	48,4
K 19	ND<108	±108	-	0,0
La 57	ND<66.9	±66.9	-	0,0
Mn 25	254	±16.1	-	1726,1
Ni 28	ND<5.5	±5.5	-	0,0
P 15	ND<1471	±1471	-	0,0
Pb 82	20.1	±1.3	-	1402,8
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<586	±586	-	0,0
Sb 51	17.6	±6.0	-	4,7
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<10809	±10809	-	0,0
Sn 50	ND<7.0	±7.0	-	1,2
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<8.4	±8.4	-	0,0
Ti 22	283	±45.6	-	432,3
Tl 81	4.5	±1.7	-	222,8
V 23	ND<25.3	±25.3	-	0,0
W 74	ND<33.1	±33.1	-	0,0
Zn 30	26734	±120	-	1225281,9
RT 1.0				

Sample

1397_IA 2_1928

Coating:

Substrate: Metal

Name: IA 2

Lot:

Optimization: Default

Method: Quantify

System

Scan #: 1403

Serial #: HDG200618001

Date: 2024-Okt-03

Time: 20:00:40

Operator: metalurgi

Description:

System Serial Number: HDG200618001

GUI Software Version: 1.3.2 2912

Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS S7 4SS]

Solver Version: 2.5.7-22

HW Server Version: 1.5.34

Detector Version: 6.09.04 E0G

OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:43 EDT 2012

Gambar B.6 Data Hasil Uji XRF Anoda IA 2

Spot View



Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<2.6	±2.6	-	0,0
Al 13	957860	±31367	-	5692,7
As 33	1.4	±0.3	-	169,7
Au 79	ND<0.9	±0.9	-	0,0
Ba 56	ND<85.4	±85.4	-	0,0
Bi 83	ND<0.5	±0.5	-	0,0
Br 35	ND<0.2	±0.2	-	0,0
Ca 20	ND<67.8	±67.8	-	0,0
Cd 48	ND<2.7	±2.7	-	0,0
Ce 58	ND<40.5	±40.5	-	0,0
Cl 17	ND<190	±190	-	0,0
Co 27	ND<15.7	±15.7	-	0,0
Cr 24	280	±21.8	-	1248,2
Cu 29	232	±6.6	-	7824,1
Fe 26	12698	±73.2	-	141868,1
Ga 31	75.7	±4.3	-	4879,7
Hf 72	ND<9.8	±9.8	-	0,0
Hg 80	ND<0.8	±0.8	-	0,0
In 49	314	±11.7	-	45,3
K 19	ND<82.9	±82.9	-	0,0
La 57	ND<62.5	±62.5	-	0,0
Mn 25	278	±16.3	-	1982,0
Ni 28	ND<5.3	±5.3	-	0,0
P 15	ND<1187	±1187	-	0,0
Pb 82	18.6	±1.1	-	1342,6
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<539	±539	-	0,0
Sb 51	13.8	±5.6	-	3,8
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<10492	±10492	-	0,0
Sn 50	9.5	±2.1	-	1,8
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<9.1	±9.1	-	0,0
Ti 22	216	±38.6	-	346,0
V 23	ND<21.3	±21.3	-	0,0
W 74	108	±7.7	-	2429,3
Zn 30	27895	±125	-	1328735,8
RT 1.0				

Sample

1398_JA 3_1935

Coating: ☐

Substrate: Metal

Name: IA 3

Lot:

Optimization: Default

Method: Quantify

System

Scan #: 1404

Serial #: HDG200618001

Date: 2024-Okt-03

Time: 20:05:26

Operator: metalurgi

Description:

System Serial Number: HDG200618001

GUI Software Version: 1.3.2 2912

Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS

S7 4SS]

Solver Version: 2.5.7-22

HW Server Version: 1.5.34

Detector Version: 6.09.04 EOG

OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:

43 EDT 2012

Gambar B.7 Data Hasil Uji XRF Anoda IA 3

Spot View



Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<2.3	±2.3	-	0,0
Al 13	953837	±33459	-	5060,8
As 33	ND<0.2	±0.2	-	0,0
Au 79	ND<0.9	±0.9	-	0,0
Ba 56	ND<86.0	±86.0	-	0,0
Bi 83	ND<0.5	±0.5	-	0,0
Br 35	ND<0.2	±0.2	-	0,0
Ca 20	ND<68.6	±68.6	-	0,0
Cd 48	ND<2.8	±2.8	-	0,0
Ce 58	ND<40.8	±40.8	-	0,0
Cl 17	ND<222	±222	-	0,0
Co 27	ND<14.0	±14.0	-	0,0
Cr 24	85.0	±15.0	-	375,4
Cu 29	39.7	±3.9	-	1325,9
Fe 26	7997	±59.1	-	86690,9
Ga 31	70.1	±4.7	-	4478,0
Hf 72	ND<7.5	±7.5	-	0,0
Hg 80	ND<0.9	±0.9	-	0,0
In 49	72.0	±5.8	-	10,1
K 19	ND<83.9	±83.9	-	0,0
La 57	ND<64.0	±64.0	-	0,0
Mn 25	98.4	±11.9	-	680,1
Ni 28	ND<5.4	±5.4	-	0,0
P 15	ND<1752	±1752	-	0,0
Pb 82	11.7	±1.0	-	792,4
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<592	±592	-	0,0
Sb 51	17.7	±5.8	-	4,8
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<10703	±10703	-	0,0
Sn 50	ND<6.8	±6.8	-	1,2
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<8.6	±8.6	-	0,0
Ti 22	239	±40.4	-	371,9
V 23	ND<22.7	±22.7	-	0,0
W 74	106	±7.9	-	2372,8
Zn 30	37419	±168	-	1765338,6
RT 1.0				

Sample

1399_IIA_1_1940

Coating: ☐

Substrate: Metal

Name: IIA 1

Lot:

Optimization: Default

Method: Quantify

System

Scan #: 1399

Serial #: HDG200618001

Date: 2024-Okt-03

Time: 19:40:58

Operator: metalurgi

Description:

System Serial Number: HDG200618001

GUI Software Version: 1.3.2 2912

Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS S7 4SS]

Solver Version: 2.5.7-22

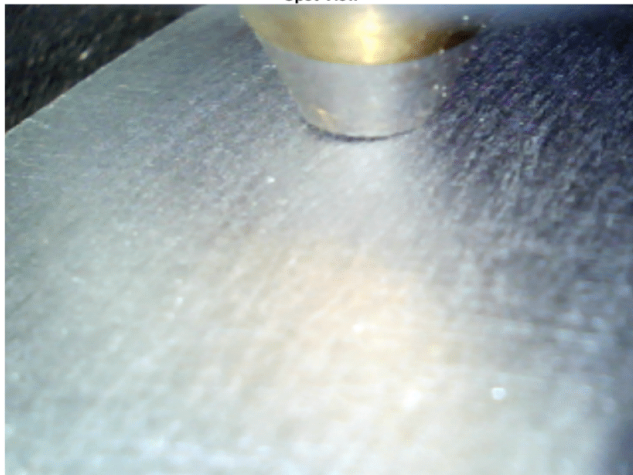
HW Server Version: 1.5.34

Detector Version: 6.09.04 E0G

OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:43 EDT 2012

Gambar B.8 Data Hasil Uji XRF Anoda IIA 1

Spot View



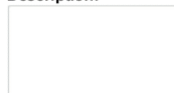
Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<2.3	±2.3	-	0,0
Al 13	953053	±32556	-	5307,0
As 33	1.4	±0.2	-	155,1
Au 79	ND<0.9	±0.9	-	0,0
Ba 56	ND<83.8	±83.8	-	0,0
Bi 83	ND<0.5	±0.5	-	0,0
Br 35	ND<0.3	±0.3	-	0,0
Ca 20	ND<48.8	±48.8	-	0,0
Cd 48	ND<2.6	±2.6	-	0,0
Ce 58	ND<39.7	±39.7	-	0,0
Cl 17	ND<260	±260	-	0,0
Co 27	ND<14.2	±14.2	-	0,0
Cr 24	99.6	±16.0	-	446,7
Cu 29	41.3	±4.0	-	1397,1
Fe 26	8408	±60.1	-	92517,8
Ga 31	72.5	±4.7	-	4690,3
Hf 72	ND<7.4	±7.4	-	0,0
Hg 80	ND<0.9	±0.9	-	0,0
In 49	74.1	±5.9	-	10,5
K 19	ND<78.8	±78.8	-	0,0
La 57	ND<63.9	±63.9	-	0,0
Mn 25	107	±12.1	-	751,9
Ni 28	ND<5.4	±5.4	-	0,0
P 15	ND<1319	±1319	-	0,0
Pb 82	9.1	±1.0	-	621,1
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<503	±503	-	0,0
Sb 51	17.4	±5.7	-	4,7
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<9895	±9895	-	0,0
Sn 50	10.2	±2.2	-	1,9
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<8.6	±8.6	-	0,0
Ti 22	195	±36.4	-	307,6
V 23	ND<23.2	±23.2	-	0,0
W 74	113	±8.1	-	2559,2
Zn 30	37799	±170	-	1806270,0
RT 1.0				

Sample
1400_IIA_2_1945
Coating: 
Substrate: Metal
Name: IIA 2
Lot:
Optimization: Default
Method: Quantify

System
Scan #: 1400
Serial #: HDG200618001
Date: 2024-Okt-03
Time: 19:45:51

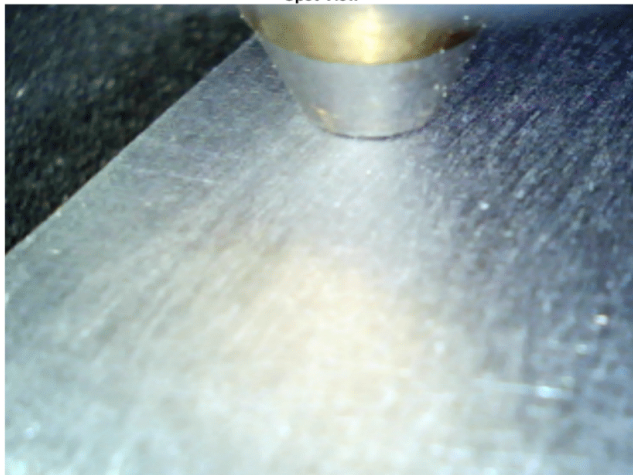
Operator: metalurgi
Description:



System Serial Number: HDG200618001
GUI Software Version: 1.3.2 2912
Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS S7 4SS]
Solver Version: 2.5.7-22
HW Server Version: 1.5.34
Detector Version: 6.09.04 EOG
OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:43 EDT 2012

Gambar B.9 Data Hasil Uji XRF Anoda IIA 2

Spot View



Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<1.3	±1.3	-	0,0
Al 13	954532	±32966	-	5181,4
As 33	ND<0.2	±0.2	-	0,0
Au 79	ND<1.0	±1.0	-	0,0
Ba 56	ND<86.3	±86.3	-	0,0
Bi 83	ND<0.5	±0.5	-	0,0
Br 35	ND<0.3	±0.3	-	0,0
Ca 20	ND<51.6	±51.6	-	0,0
Cd 48	ND<2.7	±2.7	-	0,0
Ce 58	ND<40.9	±40.9	-	0,0
Cl 17	ND<294	±294	-	0,0
Co 27	ND<14.0	±14.0	-	0,0
Cr 24	89.7	±15.6	-	388,0
Cu 29	50.7	±4.2	-	1660,0
Fe 26	7986	±59.7	-	84729,0
Ga 31	76.0	±4.7	-	4752,7
Hf 72	ND<7.6	±7.6	-	0,0
Hg 80	ND<0.9	±0.9	-	0,0
In 49	83.4	±6.3	-	11,4
K 19	ND<61.8	±61.8	-	0,0
La 57	ND<64.3	±64.3	-	0,0
Mn 25	87.8	±11.7	-	593,9
Ni 28	ND<5.5	±5.5	-	0,0
P 15	ND<1379	±1379	-	0,0
Pb 82	12.2	±1.0	-	812,1
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<608	±608	-	0,0
Sb 51	16.2	±6.0	-	4,3
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<10439	±10439	-	0,0
Sn 50	ND<6.8	±6.8	-	0,3
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<8.7	±8.7	-	0,0
Ti 22	248	±41.9	-	376,9
V 23	ND<23.6	±23.6	-	0,0
W 74	114	±8.3	-	2492,2
Zn 30	36702	±165	-	1695289,8
RT 1.0				

Sample

1401_IIA 3_1950

Coating:

Substrate: Metal

Name: IIA 3

Lot:

Optimization: Default

Method: Quantify

System

Scan #: 1401

Serial #: HDG200618001

Date: 2024-Okt-03

Time: 19:50:47

Operator: metalurgi

Description:

System Serial Number: HDG200618001

GUI Software Version: 1.3.2 2912

Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS S7 4SS]

Solver Version: 2.5.7-22

HW Server Version: 1.5.34

Detector Version: 6.09.04 E0G

OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:43 EDT 2012

Gambar B.10 Data Hasil Uji XRF Anoda IIA 3

Spot View



Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<3.0	±3.0	-	0,0
Al 13	939722	±39023	-	3786,2
As 33	ND<0.0	±0.0	-	0,0
Au 79	ND<1.0	±1.0	-	0,0
Ba 56	ND<96.1	±96.1	-	0,0
Bi 83	ND<0.6	±0.6	-	0,0
Br 35	ND<0.3	±0.3	-	0,0
Ca 20	502	±81.0	-	240,8
Cd 48	ND<3.2	±3.2	-	0,0
Ce 58	ND<45.5	±45.5	-	0,0
Cl 17	ND<433	±433	-	0,0
Co 27	ND<10.5	±10.5	-	0,0
Cr 24	46.1	±11.7	-	185,6
Cu 29	ND<3.3	±3.3	-	0,0
Fe 26	8386	±63.5	-	82614,3
Ga 31	96.3	±11.3	-	5545,4
Hf 72	ND<7.3	±7.3	-	0,0
Hg 80	ND<1.1	±1.1	-	0,0
In 49	405	±14.7	-	51,8
K 19	ND<143	±143	-	0,0
La 57	ND<69.2	±69.2	-	0,0
Mn 25	35.9	±10.8	-	225,7
Ni 28	ND<6.1	±6.1	-	0,0
P 15	ND<1634	±1634	-	0,0
Pb 82	11.4	±1.1	-	652,0
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<799	±799	-	0,0
Sb 51	16.7	±6.7	-	4,1
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<10456	±10456	-	0,0
Sn 50	ND<7.6	±7.6	-	0,0
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<6.2	±6.2	-	0,0
Ti 22	214	±39.4	-	303,0
V 23	ND<22.4	±22.4	-	0,0
W 74	119	±9.1	-	2394,2
Zn 30	50446	±226	-	2148557,5
RT 1.0				

Sample

1402_IIIA 1_1955

Coating:

Substrate: Metal

Name: IIIA 1

Lot:

Optimization: Default

Method: Quantify

System

Scan #: 1395

Serial #: HDG200618001

Date: 2024-Okt-03

Time: 19:22:35

Operator: metalurgi

Description:

System Serial Number: HDG200618001

GUI Software Version: 1.3.2 2912

Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS

S7 4SS]

Solver Version: 2.5.7-22

HW Server Version: 1.5.34

Detector Version: 6.09.04 EOG

OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:43 EDT 2012

Gambar B.11 Data Hasil Uji XRF Anoda IIIA 1

Spot View



Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<2.5	±2.5	-	0,0
Al 13	935232	±37154	-	4125,5
As 33	2.5	±0.3	-	249,7
Au 79	ND<1.0	±1.0	-	0,0
Ba 56	ND<93.3	±93.3	-	0,0
Bi 83	ND<0.6	±0.6	-	0,0
Br 35	ND<0.3	±0.3	-	0,0
Ca 20	199	±40.7	-	102,3
Cd 48	ND<3.1	±3.1	-	0,0
Ce 58	ND<44.2	±44.2	-	0,0
Cl 17	ND<288	±288	-	0,0
Co 27	ND<16.1	±16.1	-	0,0
Cr 24	42.0	±11.1	-	180,7
Cu 29	ND<3.2	±3.2	-	0,0
Fe 26	10406	±68.3	-	109707,9
Ga 31	106	±11.4	-	6460,9
Hf 72	ND<7.3	±7.3	-	0,0
Hg 80	ND<1.1	±1.1	-	0,0
In 49	408	±14.3	-	56,0
K 19	ND<114	±114	-	0,0
La 57	ND<66.8	±66.8	-	0,0
Mn 25	36.9	±10.7	-	248,1
Ni 28	ND<6.0	±6.0	-	0,0
P 15	ND<1444	±1444	-	0,0
Pb 82	7.4	±1.0	-	445,3
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<723	±723	-	0,0
Sb 51	24.0	±6.4	-	6,3
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<11701	±11701	-	0,0
Sn 50	ND<7.1	±7.1	-	0,0
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<6.1	±6.1	-	0,0
Ti 22	198	±37.4	-	300,3
V 23	ND<20.6	±20.6	-	0,0
W 74	120	±9.0	-	2562,7
Zn 30	53218	±239	-	2399534,3
RT 1.0				

Sample

1403_IIIA 2_2000

Coating:

Substrate: Metal

Name: IIIA 2

Lot:

Optimization: Default

Method: Quantify

System

Scan #: 1397

Serial #: HDG200618001

Date: 2024-Okt-03

Time: 19:28:55

Operator: metalurgi

Description:

System Serial Number: HDG200618001

GUI Software Version: 1.3.2 2912

Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS

S7 4SS]

Solver Version: 2.5.7-22

HW Server Version: 1.5.34

Detector Version: 6.09.04 EOG

OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:43 EDT 2012

Gambar B.12 Data Hasil Uji XRF Anoda IIIA 2

Spot View



Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density ($\mu\text{g}/\text{cm}^2$)	Counts
Ag 47	ND<2.9	±2.9	-	0,0
Al 13	939486	±37728	-	4012,4
As 33	1.7	±0.2	-	162,1
Au 79	ND<1.0	±1.0	-	0,0
Ba 56	ND<94.7	±94.7	-	0,0
Bi 83	ND<0.6	±0.6	-	0,0
Br 35	ND<0.3	±0.3	-	0,0
Ca 20	ND<83.5	±83.5	-	0,0
Cd 48	ND<3.3	±3.3	-	0,0
Ce 58	ND<44.8	±44.8	-	0,0
Cl 17	ND<404	±404	-	0,0
Co 27	ND<15.6	±15.6	-	0,0
Cr 24	37.1	±10.9	-	151,3
Cu 29	ND<4.3	±4.3	-	0,0
Fe 26	8555	±63.6	-	85550,5
Ga 31	98.0	±11.3	-	5724,1
Hf 72	ND<7.1	±7.1	-	0,0
Hg 80	ND<1.0	±1.0	-	0,0
In 49	409	±14.7	-	53,0
K 19	ND<121	±121	-	0,0
La 57	ND<68.6	±68.6	-	0,0
Mn 25	36.9	±10.8	-	235,5
Ni 28	ND<6.1	±6.1	-	0,0
P 15	ND<1670	±1670	-	0,0
Pb 82	5.0	±1.0	-	287,1
Rb 37	ND<0.3	±0.3	-	0,0
S 16	ND<637	±637	-	0,0
Sb 51	17.2	±6.6	-	4,3
Se 34	ND<0.3	±0.3	-	0,0
Si 14	ND<10782	±10782	-	0,0
Sn 50	ND<7.5	±7.5	-	0,0
Sr 38	ND<0.6	±0.6	-	0,0
Ta 73	ND<6.0	±6.0	-	0,0
Ti 22	244	±42.4	-	351,3
V 23	ND<22.7	±22.7	-	0,0
W 74	105	±8.5	-	2149,5
Zn 30	51005	±229	-	2203114,5
RT 1.0				

Sample

1404_IIIA 3_2005

Coating:

Substrate: Metal

Name: IIIA 3

Lot:

Optimization: Default

Method: Quantify

System

Scan #: 1398

Serial #: HDG200618001

Date: 2024-Okt-03

Time: 19:35:47

Operator: metalurgi

Description:

System Serial Number: HDG200618001

GUI Software Version: 1.3.2 2912

Firmware Version: XOS [HD MOBILE 1.2.6 IOP-M2 10WPS S7 4SS]

Solver Version: 2.5.7-22

HW Server Version: 1.5.34

Detector Version: 6.09.04 E0G

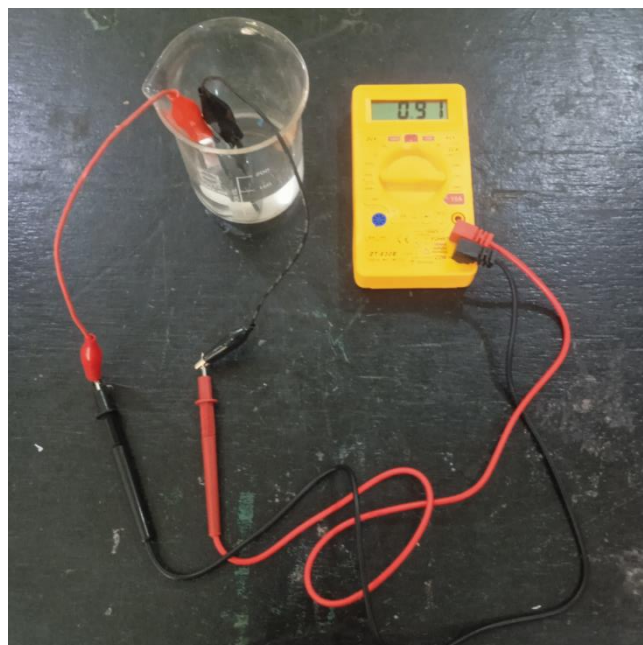
OS Version: Linux 2.6.36.2HDMobile Tue Jul 31 13:06:43 EDT 2012

Gambar B.13 Data Hasil Uji XRF Anoda IIIA 3

Lampiran B. 5 Pengolahan dan Data Hasil Pengujian Galvanik



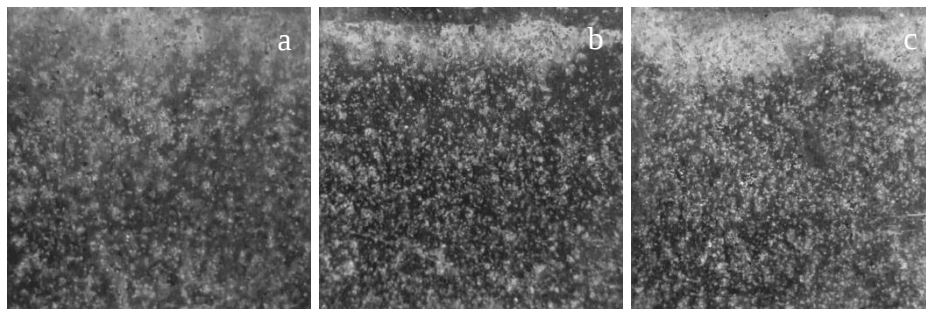
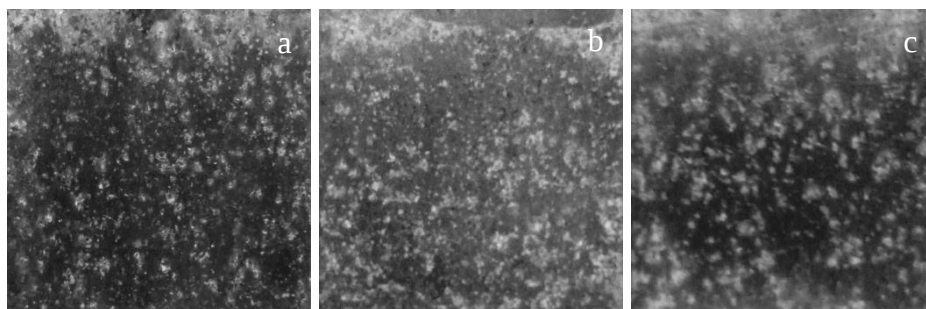
Gambar B.14 Sel Galvanik Pengujian

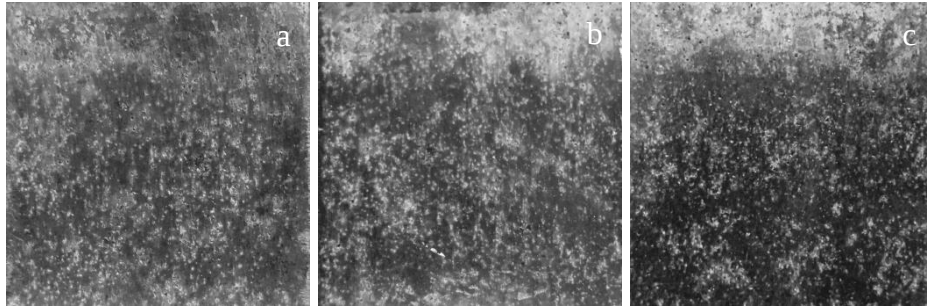


Gambar B.15 Pengukuran Arus

Tabel B.4 Data Hasil Pengukuran Pengujian Galvanik

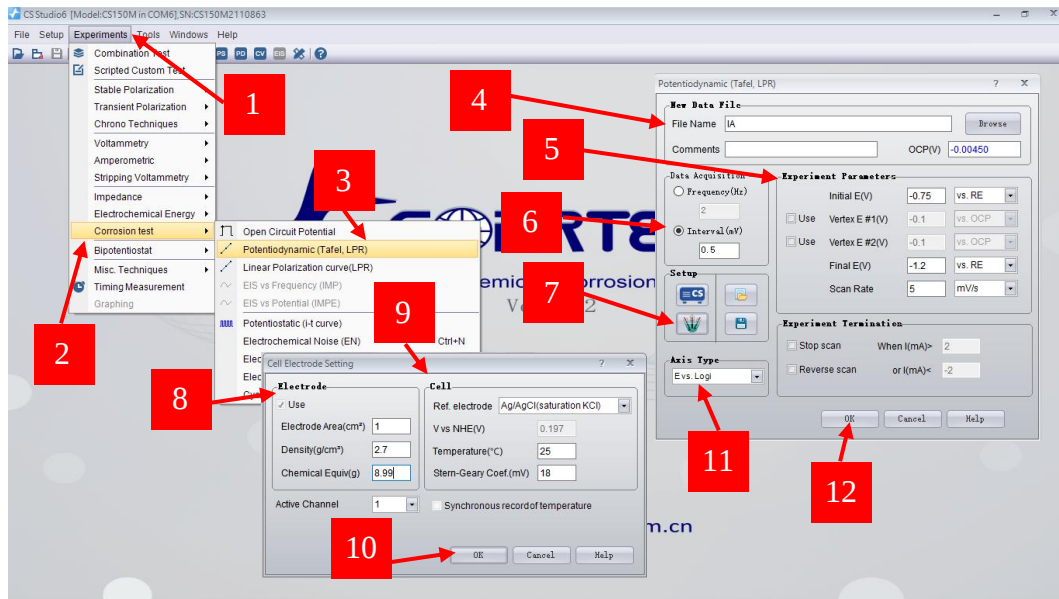
Sampel	Massa Awal (gr)	Massa Akhir (gr)	Arus (mA)	Waktu (hour)	Kapasitas Aktual (Ah/kg)	Kapasitas teoritis paduan (Ah/kg)	Efisiensi (%)
2,6% Zn 750°C	33,673	33,550	1,13	240	2198,92	2852,25	77,09%
2,6% Zn 700°C	32,393	32,310	0,78	240	2246,40	2852,25	78,76%
2,6% Zn 650°C	33,513	33,430	0,73	240	2102,40	2852,25	73,71%
3,6% Zn 750°C	34,697	34,600	0,85	240	2110,34	2843,49	74,22%
3,6% Zn 700°C	31,740	31,640	0,91	240	2184,00	2843,49	76,81%
3,6% Zn 650°C	31,953	31,780	1,43	240	1980,00	2843,49	69,63%
5% Zn 750°C	35,393	35,260	1,30	240	2340,00	2806,78	83,37%
5% Zn 700°C	33,263	33,140	1,22	240	2374,05	2806,78	84,58%
5% Zn 650°C	33,273	33,090	1,60	240	2094,55	2806,78	74,62%

**Gambar B.16** Makrografi Anoda 2,6% Zn Temperatur Tuang (a) 750°C, (b) 700°C, dan (c) 650°C**Gambar B.17** Makrografi Anoda 3,6% Zn Temperatur Tuang (a) 750°C, (b) 700°C, dan (c) 650°C

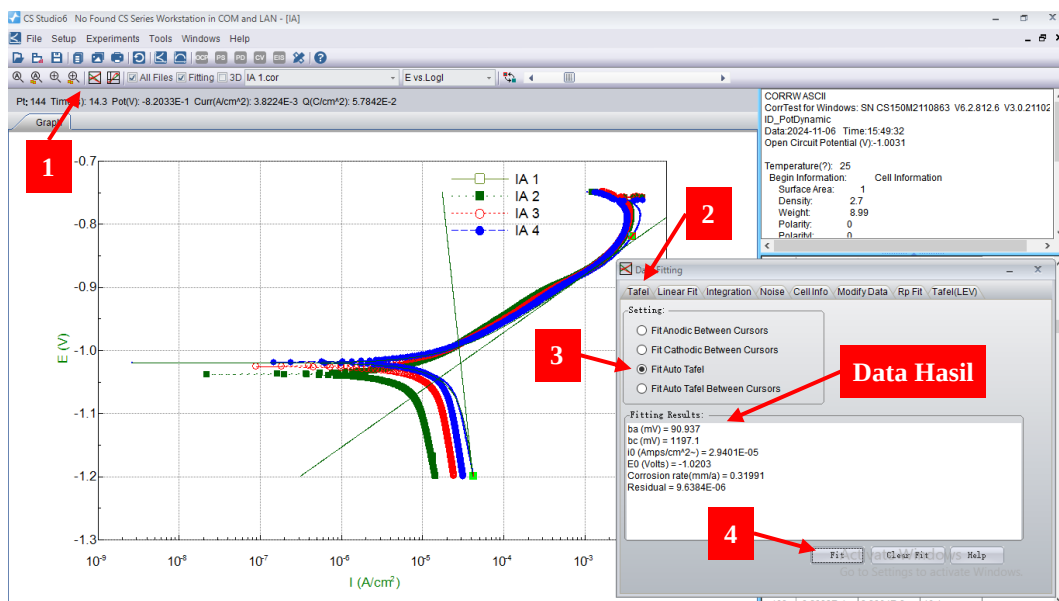


Gambar B.18 Makrografi Anoda 5% Zn Temperatur Tuang (a) 750°C, (b) 700°C, dan (c) 650°C

Lampiran B. 6 Pengolahan dan Data Hasil Uji Tafel Polarisasi Sampel Anoda



Gambar B.19 Parameter Eksperimen *Software* Corrttest Studio 6



Gambar B.20 Pengolahan Data *Software* Corrttest Studio 6

Tabel B.4 Data Hasil Perhitungan Rata-Rata Pengujian Tafel Polarisasi

Sampel			Uji ke-	OCP (V)	Laju korosi (mm/tahun)	OCP rata-rata (V)	Laju korosi rata-rata (mm/year)
2,6	IA % Zn	650°C	1	-0,94164	0,025295	-0,9234625	0,04962275
			2	-0,92589	0,054015		
			3	-0,91671	0,056949		
			4	-0,90961	0,062232		
2,6	IB % Zn	700°C	1	-0,91987	0,04708	-0,90818	0,08193175
			2	-0,90487	0,07028		
			3	-0,91091	0,079117		
			4	-0,89707	0,13125		
2,6	IC % Zn	750°C	1	-0,91813	0,025106	-0,91398	0,0538355
			2	-0,91643	0,077263		
			3	-0,89394	0,049887		
			4	-0,92742	0,063086		
3,6	IIA % Zn	650°C	1	-0,88188	0,067411	-0,89215	0,07829425
			2	-0,89016	0,074517		
			3	-0,89397	0,081201		
			4	-0,90259	0,090048		
3,6	IIB % Zn	700°C	1	-0,89711	0,14562	-0,8958825	0,15265
			2	-0,89603	0,15087		
			3	-0,89759	0,14507		
			4	-0,8928	0,16904		
3,6	IIC % Zn	750°C	1	-0,87611	0,17921	-0,8804125	0,136924
			2	-0,87932	0,14728		
			3	-0,88193	0,12275		
			4	-0,88429	0,098456		
5	IIIA % Zn	650°C	1	-0,90474	0,031896	-0,9896	0,160184
			2	-0,99996	0,11806		
			3	-1,0262	0,11806		
			4	-1,0275	0,37272		
5	IIIB % Zn	700°C	1	-1,0493	0,15185	-1,0498	0,24952
			2	-1,0537	0,22639		
			3	-1,0481	0,29133		
			4	-1,0481	0,32851		
5	IIIC % Zn	750°C	1	-1,0031	0,31991	-1,0271	0,23701
			2	-1,04	0,11402		
			3	-1,0439	0,21185		
			4	-1,0214	0,30226		

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Reference User-Defined: 4

Temperature(°C): 25

Stern-Geary: 18

Begin Information: Cell Information

End Information: Cell Information

Surface Area: 1

Begin Experiment:

Density: 2.7

Axes Type: 4

Weight: 8.99

End Experiment:

Polarity: 0

E(V)

PolarityI: 0

i(A/cm²)

Corrosion Unit Type: 1

T(s)

Reference Type: 4 (Ag/AgCl Sat. KCL)

End Comments

Reference Potential: 0.197

IA 1:

IA 2:

Data:2024-11-08 Time:11:45:53

Data:2024-11-08 Time:11:47:55

Open Circuit Potential (V):-0.94164

Open Circuit Potential (V):-0.92589

ba (mV) = 132.63

ba (mV) = 171.33

bc (mV) = 1216.2

bc (mV) = 27965

i0 (Amps/cm²) = 2.3247E-06

i0 (Amps/cm²) = 4.9641E-06

E0 (Volts) = -0.98459

E0 (Volts) = -0.98021

Corrosion rate (mm/a) = 0.025295

Corrosion rate (mm/a) = 0.054015

IA 3:

IA 4:

Data:2024-11-08 Time:11:49:46

Data:2024-11-08 Time:11:51:34

Open Circuit Potential (V):-0.91671

Open Circuit Potential (V):-0.90961

ba (mV) = 170.71

ba (mV) = 163.48

bc (mV) = 2600.9

bc (mV) = 5956.6

i0 (Amps/cm²) = 5.2337E-06

i0 (Amps/cm²) = 5.7193E-06

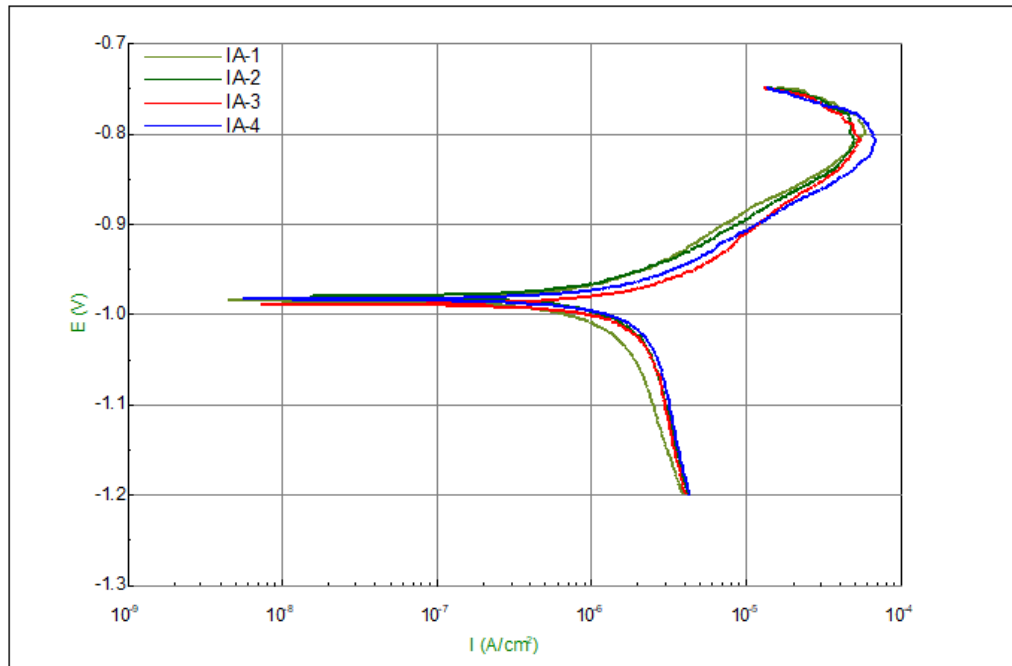
E0 (Volts) = -0.98933

E0 (Volts) = -0.9835

Corrosion rate (mm/a) = 0.056949

Corrosion rate (mm/a) = 0.062232

Graph:



Gambar B.21 Data Hasil Uji Tafel Polarisasi Anoda IA 2,6% Zn 650°C

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Temperature(°C): 25

Begin Information: Cell Information

Surface Area: 1

Density: 2.7

Weight: 8.99

Polarity: 0

PolarityI: 0

Corrosion Unit Type: 1

Reference Type: 4 (Ag/AgCl Sat. KCL)

Reference Potential: 0.197

Reference User-Defined: 4

Stern-Geary: 18

End Information: Cell Information

Begin Experiment:

Axes Type: 4

End Experiment:

E(V)

i(A/cm²)

T(s)

End Comments

IB 1:

Data:2024-11-08 Time:11:32:26

Open Circuit Potential (V):-0.91987

ba (mV) = 81.562

bc (mV) = 35830

i0 (Amps/cm²) = 4.3267E-06

E0 (Volts) = -0.95375

Corrosion rate (mm/a) = 0.04708

IB 3:

Data:2024-11-08 Time:11:36:01

Open Circuit Potential (V):-0.91091

ba (mV) = 136.37

bc (mV) = 4706.8

i0 (Amps/cm²) = 7.271E-06

E0 (Volts) = -0.9615

Corrosion rate (mm/a) = 0.079117

IB 2:

Data:2024-11-08 Time:11:34:09

Open Circuit Potential (V):-0.90487

ba (mV) = 128.99

bc (mV) = 5138.6

i0 (Amps/cm²) = 6.4596E-06

E0 (Volts) = -0.95593

Corrosion rate (mm/a) = 0.07028

IB 4:

Data:2024-11-08 Time:11:37:59

Open Circuit Potential (V):-0.89707

ba (mV) = 275.23

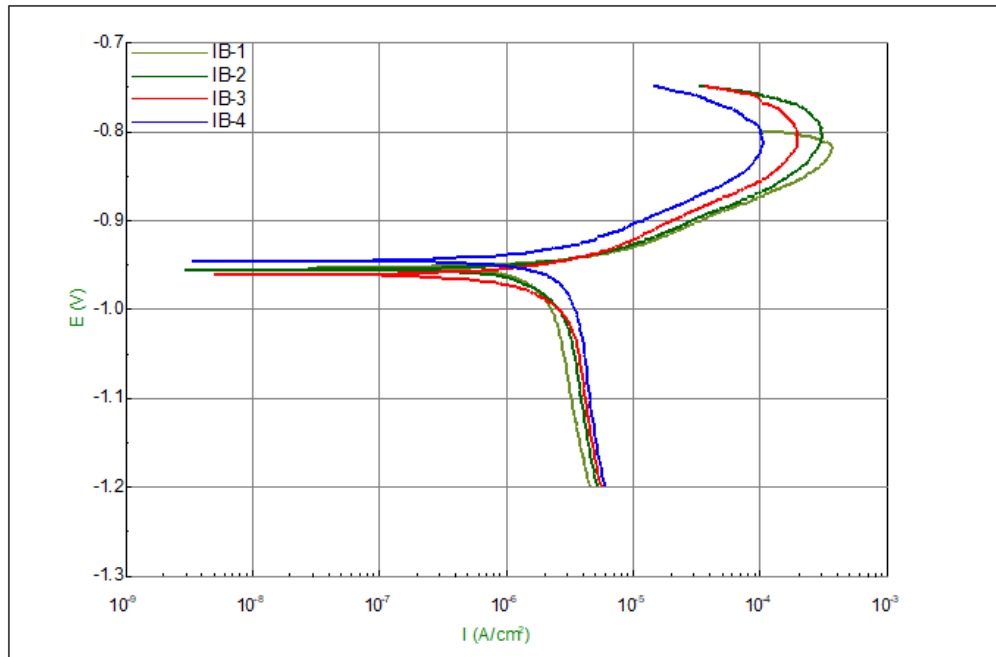
bc (mV) = 4295.7

i0 (Amps/cm²) = 1.2062E-05

E0 (Volts) = -0.94541

Corrosion rate (mm/a) = 0.13125

Graph:



Gambar B.22 Data Hasil Uji Tafel Polarisasi Anoda IB 2,6% Zn 700°C

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Temperature(°C): 25

Begin Information: Cell Information

Surface Area: 1

Density: 2.7

Weight: 8.99

Polarity: 0

PolarityI: 0

Corrosion Unit Type: 1

Reference Type: 4 (Ag/AgCl Sat. KCL)

Reference Potential: 0.197

Reference User-Defined: 4

Stern-Geary: 18

End Information: Cell Information

Begin Experiment:

Axes Type: 4

End Experiment:

E(V)

i(A/cm²)

T(s)

End Comments

IC 1:

Data:2024-11-08 Time:10:50:56

Open Circuit Potential (V):-0.91813

ba (mV) = 203.89

bc (mV) = 1881.9

i0 (Amps/cm²) = 2.3073E-06

E0 (Volts) = -0.93045

Corrosion rate (mm/a) = 0.025106

IC 3:

Data:2024-11-08 Time:10:58:55

Open Circuit Potential (V):-0.89394

ba (mV) = 222.02

bc (mV) = 2433.8

i0 (Amps/cm²) = 4.5847E-06

E0 (Volts) = -0.91688

Corrosion rate (mm/a) = 0.049887

IC 2:

Data:2024-11-08 Time:10:55:41

Open Circuit Potential (V):-0.91643

ba (mV) = 418.97

bc (mV) = 4576.7

i0 (Amps/cm²) = 7.1006E-06

E0 (Volts) = -0.94774

Corrosion rate (mm/a) = 0.077263

IC 4:

Data:2024-11-08 Time:11:04:40

Open Circuit Potential (V):-0.92742

ba (mV) = 238.37

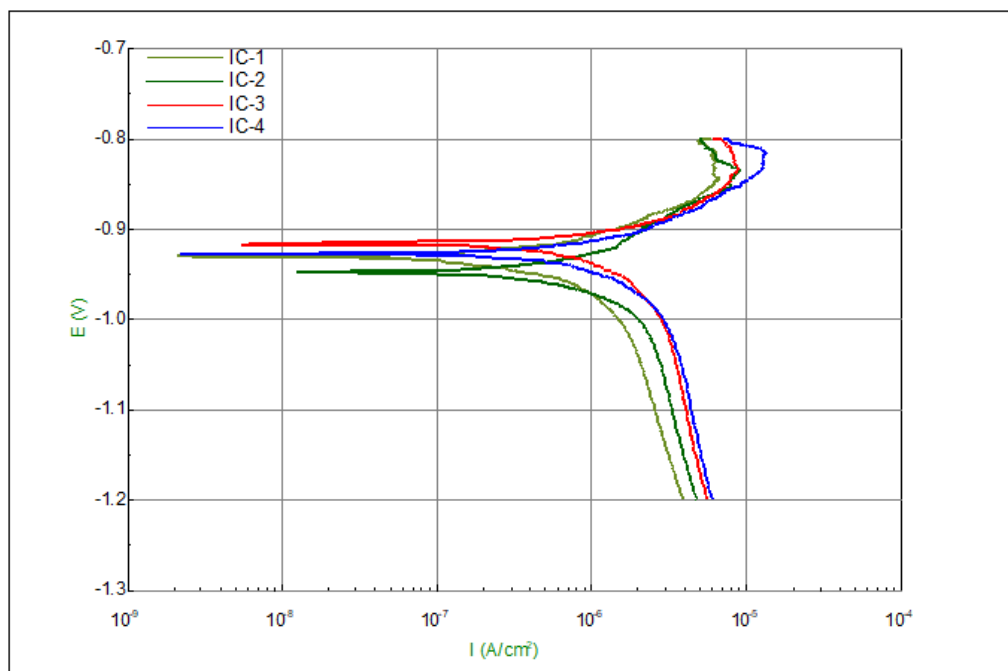
bc (mV) = 2626.5

i0 (Amps/cm²) = 5.7977E-06

E0 (Volts) = -0.9274

Corrosion rate (mm/a) = 0.063086

Graph:



Gambar B.23 Data Hasil Uji Tafel Polarisasi Anoda IC 2,6% Zn 750°C

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Temperature(°C): 25

Begin Information: Cell Information

Surface Area: 1

Density: 2.7

Weight: 8.99

Polarity: 0

PolarityI: 0

Corrosion Unit Type: 1

Reference Type: 4 (Ag/AgCl Sat. KCL)

Reference Potential: 0.197

Reference User-Defined: 4

Stern-Geary: 18

End Information: Cell Information

Begin Experiment:

Axes Type: 4

End Experiment:

E(V)

i(A/cm²)

T(s)

End Comments

IIA 1:

Data:2024-11-07 Time:15:31:19

Open Circuit Potential (V):-0.88188

ba (mV) = 127.56

bc (mV) = 2824.1

i0 (Amps/cm²) = 6.1952E-06

E0 (Volts) = -0.92719

Corrosion rate (mm/a) = 0.067411

IIA 3:

Data:2024-11-07 Time:15:36:41

Open Circuit Potential (V):-0.89397

ba (mV) = 185.16

bc (mV) = 2589

i0 (Amps/cm²) = 7.4625E-06

E0 (Volts) = -0.93385

Corrosion rate (mm/a) = 0.081201

IIA 2:

Data:2024-11-07 Time:15:34:31

Open Circuit Potential (V):-0.89016

ba (mV) = 118.65

bc (mV) = 8838.8

i0 (Amps/cm²) = 6.8482E-06

E0 (Volts) = -0.92842

Corrosion rate (mm/a) = 0.074517

IIA 4:

Data:2024-11-07 Time:15:39:04

Open Circuit Potential (V):-0.90259

ba (mV) = 197.19

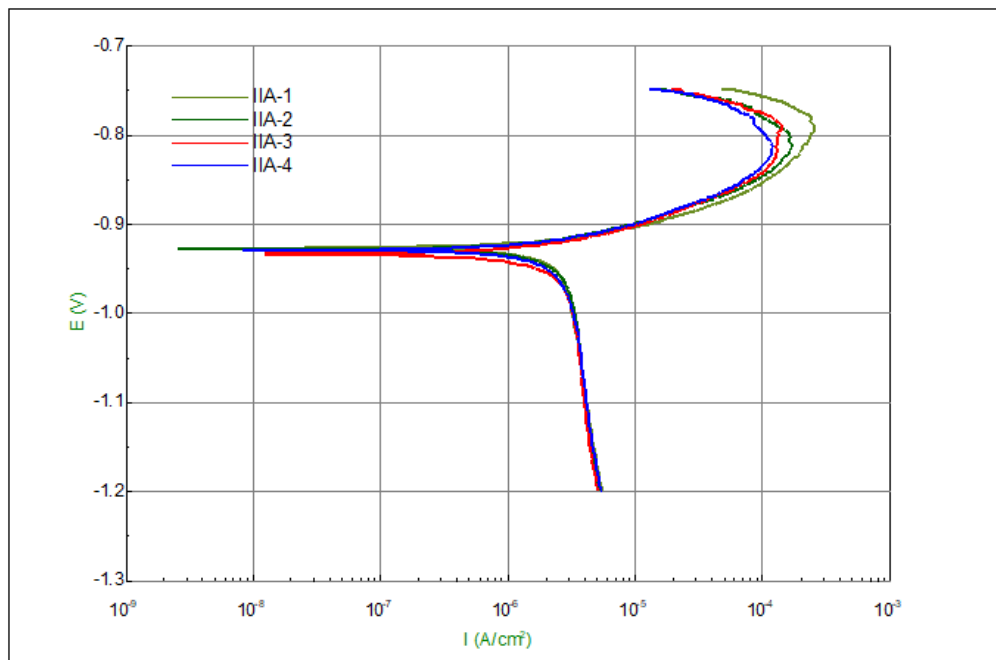
bc (mV) = 3943.1

i0 (Amps/cm²) = 8.2756E-06

E0 (Volts) = -0.92936

Corrosion rate (mm/a) = 0.090048

Graph:



Gambar B.24 Data Hasil Uji Tafel Polarisasi Anoda IIA 3,6% Zn 650°C

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Reference User-Defined: 4

Temperature(°C): 25

Stern-Geary: 18

Begin Information: Cell Information

End Information: Cell Information

Surface Area: 1

Begin Experiment:

Density: 2.7

Axes Type: 4

Weight: 8.99

End Experiment:

Polarity: 0

E(V)

PolarityI: 0

i(A/cm²)

Corrosion Unit Type: 1

T(s)

Reference Type: 4 (Ag/AgCl Sat. KCL)

End Comments

Reference Potential: 0.197

IIB 1:

Data:2024-11-07 Time:15:15:05

Open Circuit Potential (V):-0.89711

ba (mV) = 160.01

bc (mV) = 3509.5

i0 (Amps/cm²) = 1.3383E-05

E0 (Volts) = -0.93722

Corrosion rate (mm/a) = 0.14562

IIB 3:

Data:2024-11-07 Time:15:20:18

Open Circuit Potential (V):-0.89759

ba (mV) = 219.03

bc (mV) = 4900.2

i0 (Amps/cm²) = 1.3332E-05

E0 (Volts) = -0.92973

Corrosion rate (mm/a) = 0.14507

IIB 2:

Data:2024-11-07 Time:15:17:27

Open Circuit Potential (V):-0.89603

ba (mV) = 181.26

bc (mV) = 5230.7

i0 (Amps/cm²) = 1.3866E-05

E0 (Volts) = -0.93127

Corrosion rate (mm/a) = 0.15087

IIB 4:

Data:2024-11-07 Time:15:23:19

Open Circuit Potential (V):-0.8928

ba (mV) = 262.45

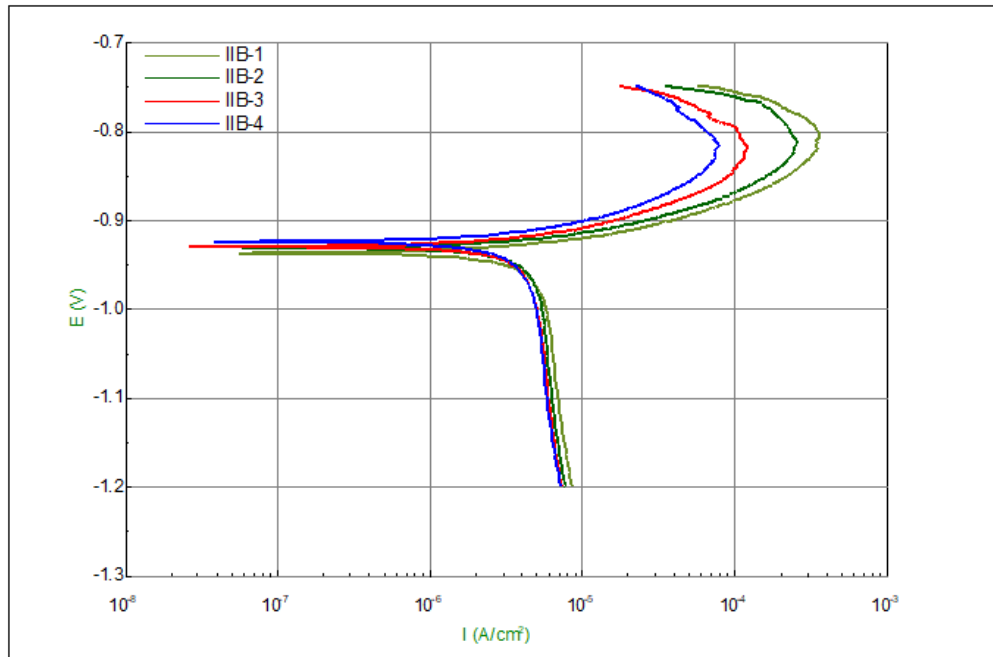
bc (mV) = 6113.5

i0 (Amps/cm²) = 1.5535E-05

E0 (Volts) = -0.92422

Corrosion rate (mm/a) = 0.16904

Graph:



Gambar B.25 Data Hasil Uji Tafel Polarisasi Anoda IIB 3,6% Zn 700°C

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Reference User-Defined: 4

Temperature(°C): 25

Stern-Geary: 18

Begin Information: Cell Information

End Information: Cell Information

Surface Area: 1

Begin Experiment:

Density: 2.7

Axes Type: 4

Weight: 8.99

End Experiment:

Polarity: 0

E(V)

PolarityI: 0

i(A/cm²)

Corrosion Unit Type: 1

T(s)

Reference Type: 4 (Ag/AgCl Sat. KCL)

End Comments

Reference Potential: 0.197

IIC 1:

Data:2024-11-07 Time:14:59:55

Open Circuit Potential (V):-0.87611

ba (mV) = 221.08

bc (mV) = 6014.5

i0 (Amps/cm²) = 1.6469E-05

E0 (Volts) = -0.91314

Corrosion rate (mm/a) = 0.17921

IIC 3:

Data:2024-11-07 Time:15:04:55

Open Circuit Potential (V):-0.88193

ba (mV) = 228.21

bc (mV) = 5205.1

i0 (Amps/cm²) = 1.1281E-05

E0 (Volts) = -0.9166

Corrosion rate (mm/a) = 0.12275

IIC 2:

Data:2024-11-07 Time:15:01:59

Open Circuit Potential (V):-0.87932

ba (mV) = 190.77

bc (mV) = 4822.3

i0 (Amps/cm²) = 1.3536E-05

E0 (Volts) = -0.91035

Corrosion rate (mm/a) = 0.14728

IIC 4:

Data:2024-11-07 Time:15:07:25

Open Circuit Potential (V):-0.88429

ba (mV) = 251.64

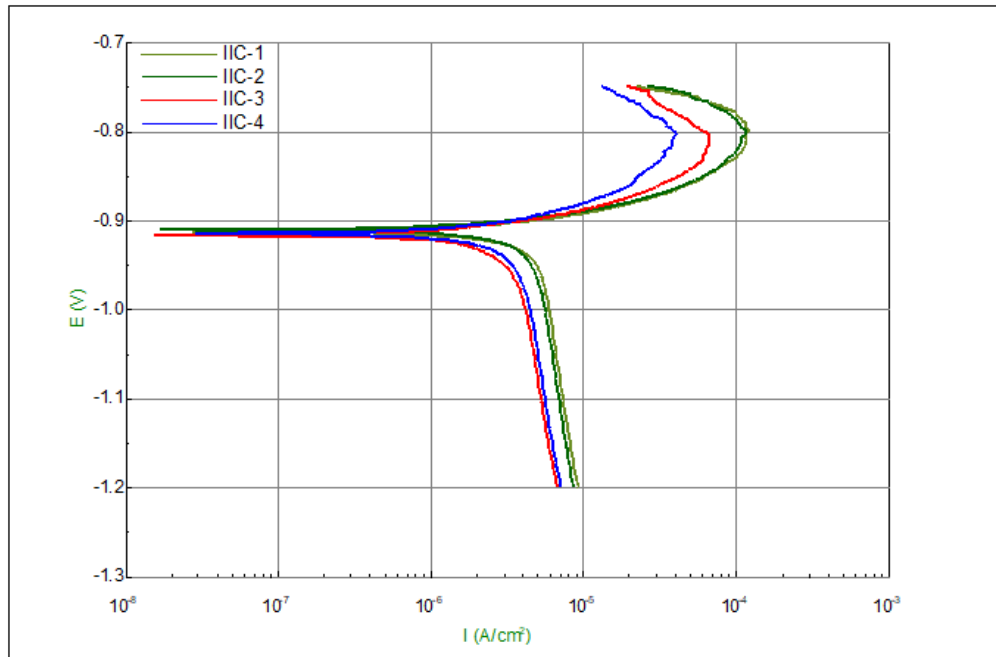
bc (mV) = 4252

i0 (Amps/cm²) = 9.0483E-06

E0 (Volts) = -0.91475

Corrosion rate (mm/a) = 0.098456

Graph:



Gambar B.26 Data Hasil Uji Tafel Polarisasi Anoda IIC 3,6% Zn 750°C

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Temperature(°C): 25

Begin Information: Cell Information

Surface Area: 1

Density: 2.7

Weight: 8.99

Polarity: 0

PolarityI: 0

Corrosion Unit Type: 1

Reference Type: 4 (Ag/AgCl Sat. KCL)

Reference Potential: 0.197

Reference User-Defined: 4

Stern-Geary: 18

End Information: Cell Information

Begin Experiment:

Axes Type: 4

End Experiment:

E(V)

i(A/cm²)

T(s)

End Comments

IIIA 1:

Data:2024-11-07 Time:14:37:30

Open Circuit Potential (V):-0.90474

ba (mV) = 72.539

bc (mV) = 603.59

i0 (Amps/cm²) = 2.9313E-06

E0 (Volts) = -1.04

Corrosion rate (mm/a) = 0.031896

IIIA 2:

IIIA 2:

Data:2024-11-07 Time:14:40:38

Open Circuit Potential (V):-0.99996

ba (mV) = 82.456

bc (mV) = 7416.5

i0 (Amps/cm²) = 1.085E-05

E0 (Volts) = -1.0338

Corrosion rate (mm/a) = 0.11806

IIIA 3:

Data:2024-11-07 Time:14:43:27

Open Circuit Potential (V):-1.0262

ba (mV) = 91.373

bc (mV) = 1.6765E+05

i0 (Amps/cm²) = 2.1768E-05

E0 (Volts) = -1.028

Corrosion rate (mm/a) = 0.23686

Data:2024-11-07 Time:14:45:53

Open Circuit Potential (V):-1.0275

ba (mV) = 97.523

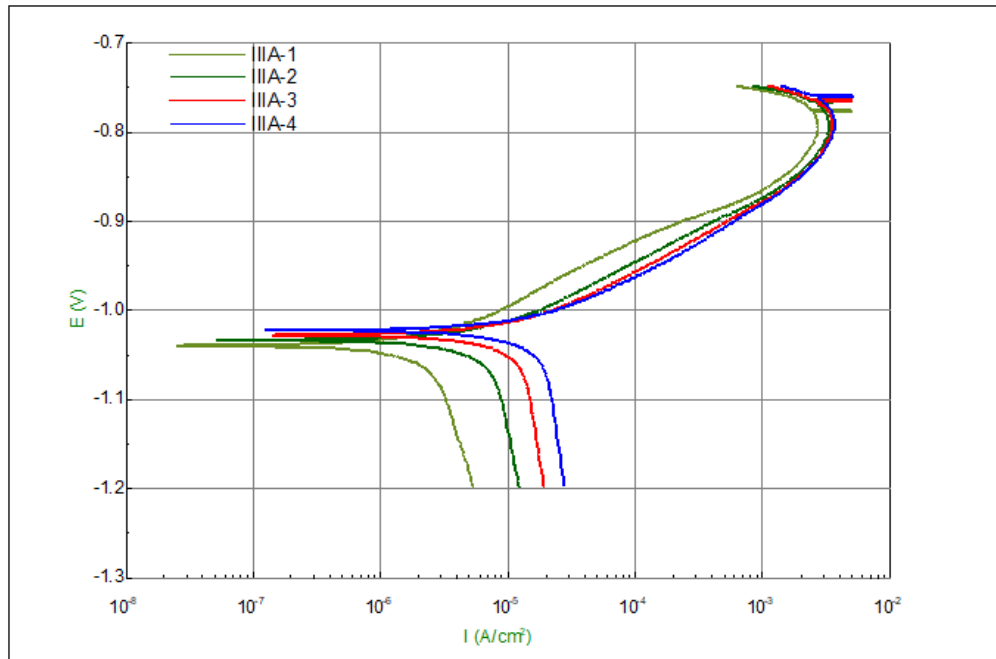
bc (mV) = 2.4511E+05

i0 (Amps/cm²) = 3.4254E-05

E0 (Volts) = -1.0226

Corrosion rate (mm/a) = 0.37272

Graph:



Gambar B.27 Data Hasil Uji Tafel Polarisasi Anoda IIIA 5% Zn 650°C

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Reference User-Defined: 4

Temperature(°C): 25

Stern-Geary: 18

Begin Information: Cell Information

End Information: Cell Information

Surface Area: 1

Begin Experiment:

Density: 2.7

Axes Type: 4

Weight: 8.99

End Experiment:

Polarity: 0

E(V)

PolarityI: 0

i(A/cm²)

Corrosion Unit Type: 1

T(s)

Reference Type: 4 (Ag/AgCl Sat. KCL)

End Comments

Reference Potential: 0.197

IIIB 1:

Data:2024-11-18 Time:12:11:48

Open Circuit Potential (V):-1.0493

ba (mV) = 96.71

bc (mV) = 88980

i0 (Amps/cm²) = 1.3955E-05

E0 (Volts) = -1.0453

Corrosion rate (mm/a) = 0.15185

IIIB 3:

Data:2024-11-18 Time:12:15:47

Open Circuit Potential (V):-1.0481

ba (mV) = 105.85

bc (mV) = 16702

i0 (Amps/cm²) = 2.6774E-05

E0 (Volts) = -1.0305

Corrosion rate (mm/a) = 0.29133

IIIB 2:

Data:2024-11-18 Time:12:13:59

Open Circuit Potential (V):-1.0537

ba (mV) = 102.31

bc (mV) = 109450

i0 (Amps/cm²) = 2.0805E-05

E0 (Volts) = -1.0372

Corrosion rate (mm/a) = 0.22639

IIIB 4:

Data:2024-11-18 Time:12:15:47

Open Circuit Potential (V):-1.0481

ba (mV) = 108.47

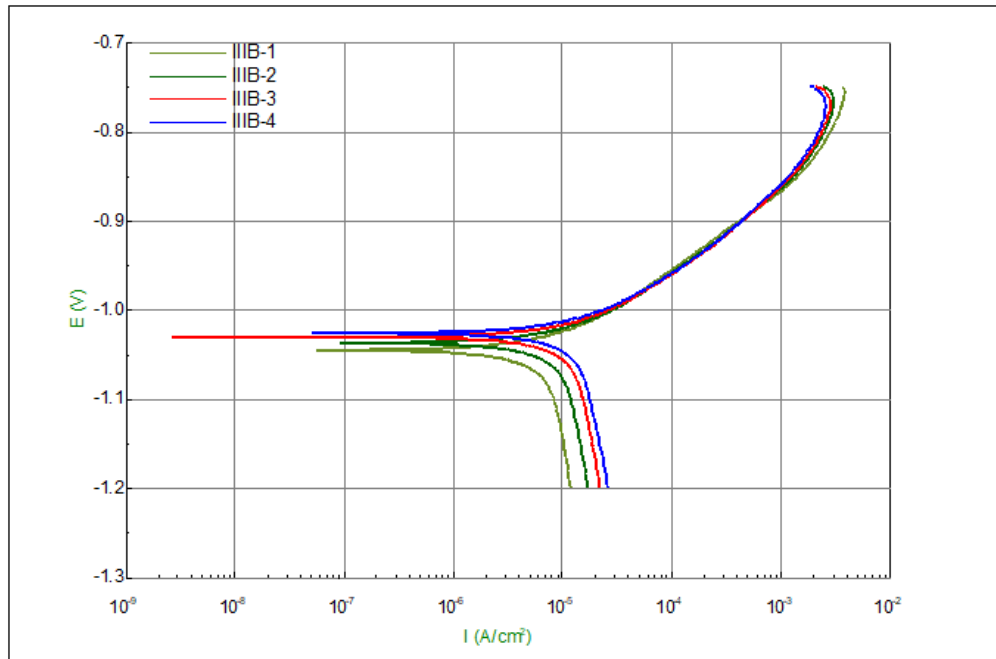
bc (mV) = 11597

i0 (Amps/cm²) = 3.0191E-05

E0 (Volts) = -1.026

Corrosion rate (mm/a) = 0.32851

Graph:



Gambar B.28 Data Hasil Uji Tafel Polarisasi Anoda IIIB 5% Zn 700°C

CORRW ASCII

CorrTest for Windows: SN CS150M2110863 V6.2.812.6 V3.0.211027.1

ID_PotDynamic

Temperature(°C): 25

Begin Information: Cell Information

Surface Area: 1

Density: 2.7

Weight: 8.99

Polarity: 0

PolarityI: 0

Corrosion Unit Type: 1

Reference Type: 4 (Ag/AgCl Sat. KCL)

Reference Potential: 0.197

Reference User-Defined: 4

Stern-Geary: 18

End Information: Cell Information

Begin Experiment:

Axes Type: 4

End Experiment:

E(V)

i(A/cm²)

T(s)

End Comments

IIIC 1:

Data: 2024-11-06 Time: 15:49:32

Open Circuit Potential (V): -1.0031

ba (mV) = 90.937

bc (mV) = 1197.1

i0 (Amps/cm²) = 2.9401E-05

E0 (Volts) = -1.0203

Corrosion rate (mm/a) = 0.31991

IIIC 3:

Data: 2024-11-07 Time: 14:08:44

Open Circuit Potential (V): -1.0439

ba (mV) = 89.95

bc (mV) = 1866.6

i0 (Amps/cm²) = 1.9469E-05

E0 (Volts) = -1.0264

Corrosion rate (mm/a) = 0.21185

IIIC 2:

Data: 2024-11-07 Time: 14:04:03

Open Circuit Potential (V): -1.04

ba (mV) = 85.438

bc (mV) = 1193.3

i0 (Amps/cm²) = 1.0479E-05

E0 (Volts) = -1.0381

Corrosion rate (mm/a) = 0.11402

IIIC 4:

Data: 2024-11-07 Time: 14:12:51

Open Circuit Potential (V): -1.0214

ba (mV) = 94.384

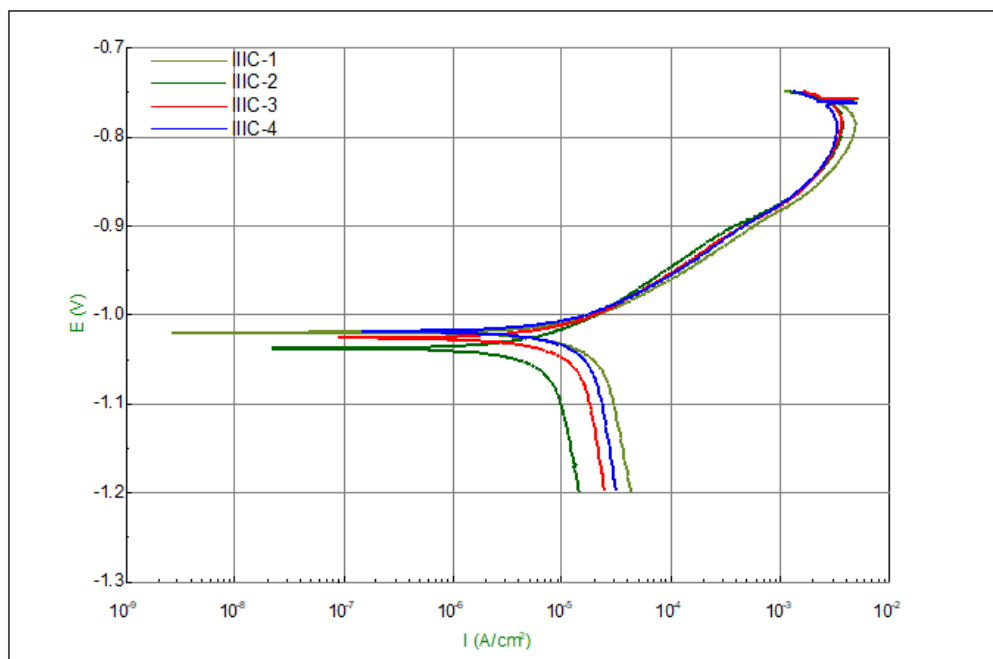
bc (mV) = 9216

i0 (Amps/cm²) = 2.77791E-05

E0 (Volts) = -1.019

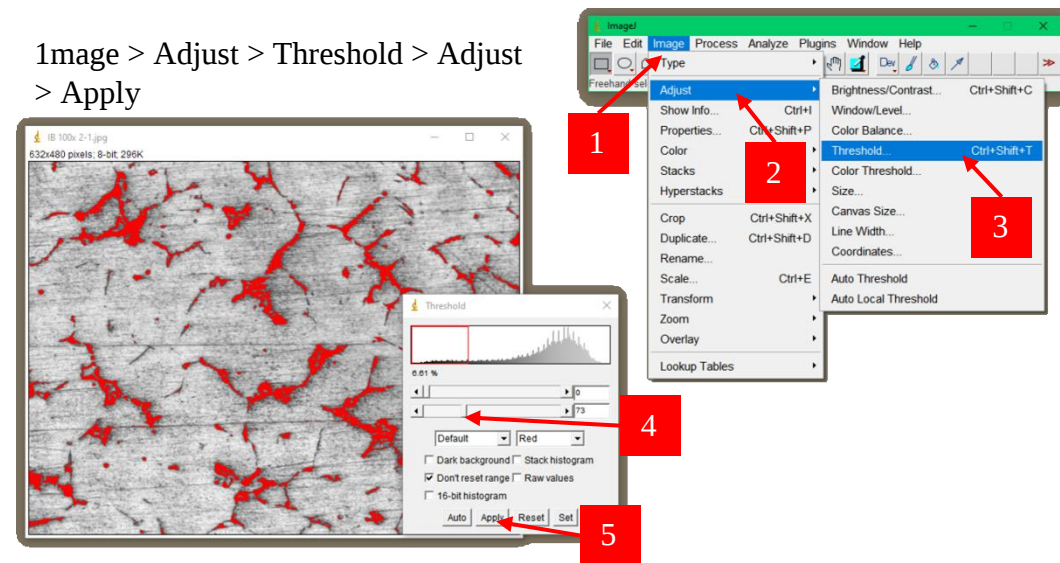
Corrosion rate (mm/a) = 0.30226

Graph:

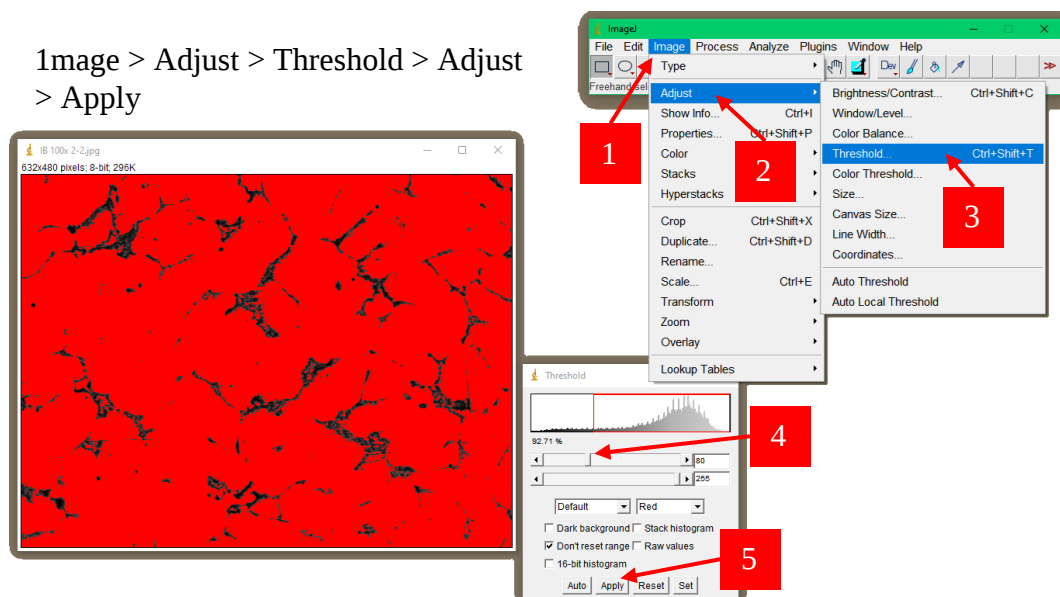


Gambar B.29 Data Hasil Uji Tafel Polarisasi Anoda IIIC 5% Zn 750°C

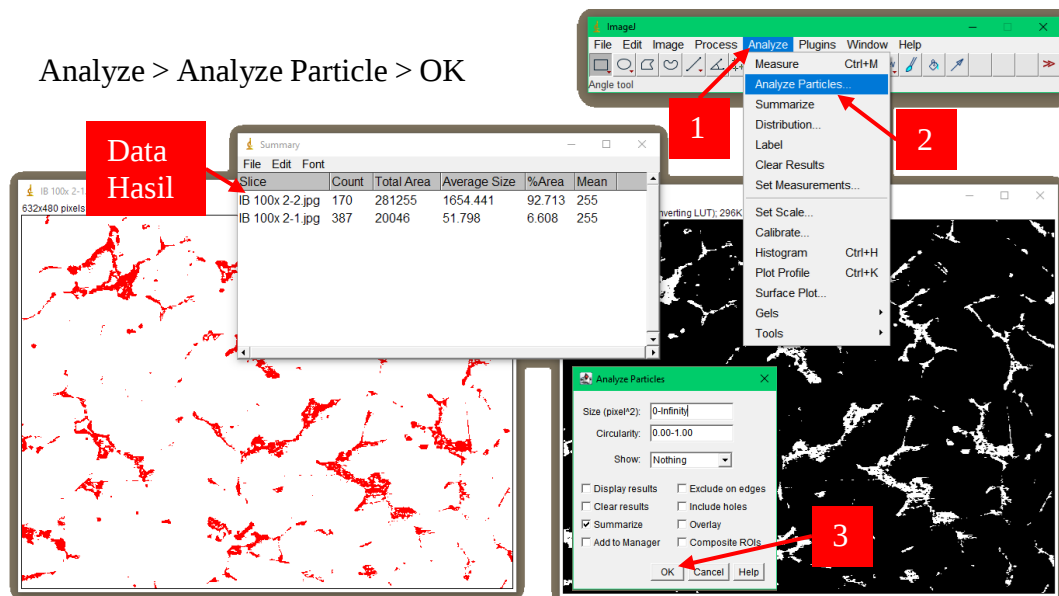
Lampiran B. 7 Pengolahan dan Data Hasil Uji Metalografi Sampel Anoda



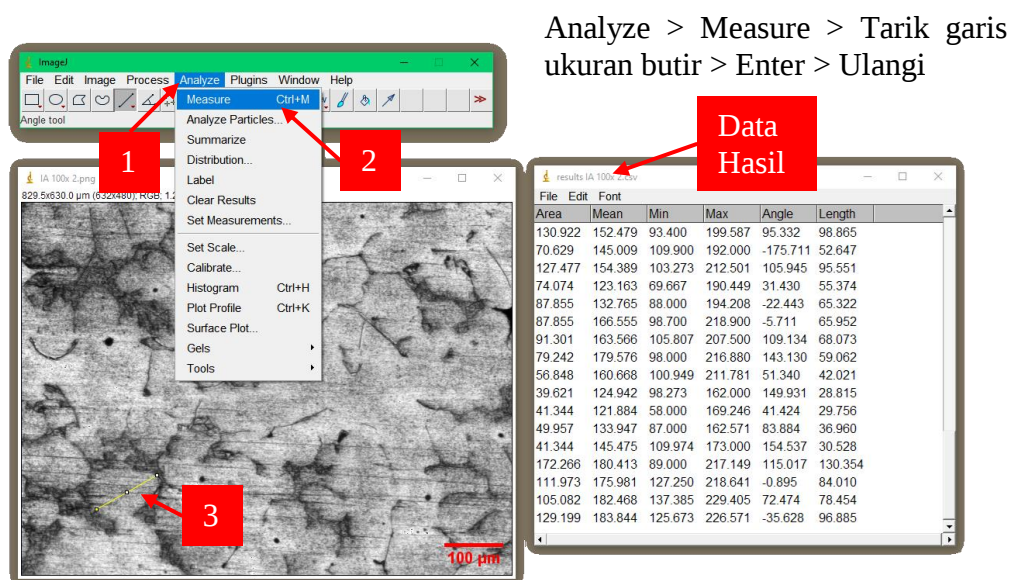
Gambar B.30 Pengolahan Data Distribusi Fasa Zn Software ImageJ



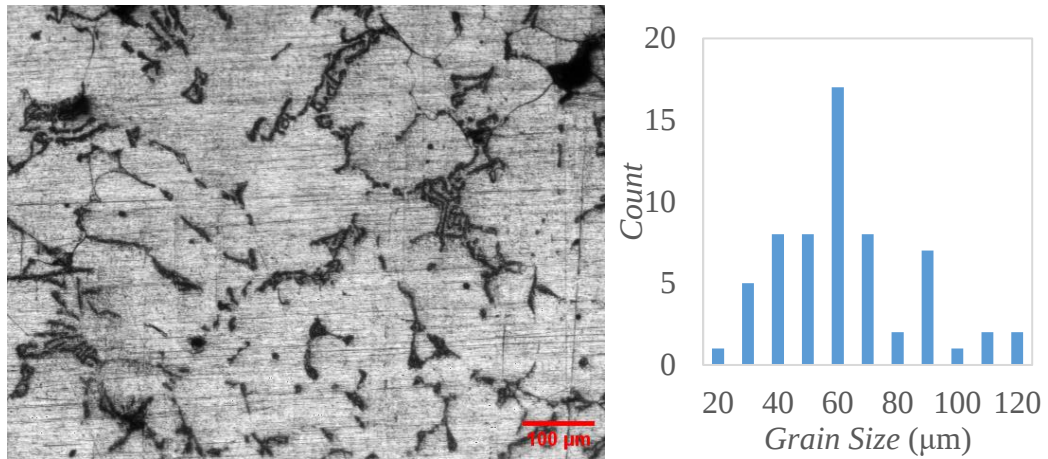
Gambar B.31 Pengolahan Data Distribusi Fasa a-Al Software ImageJ



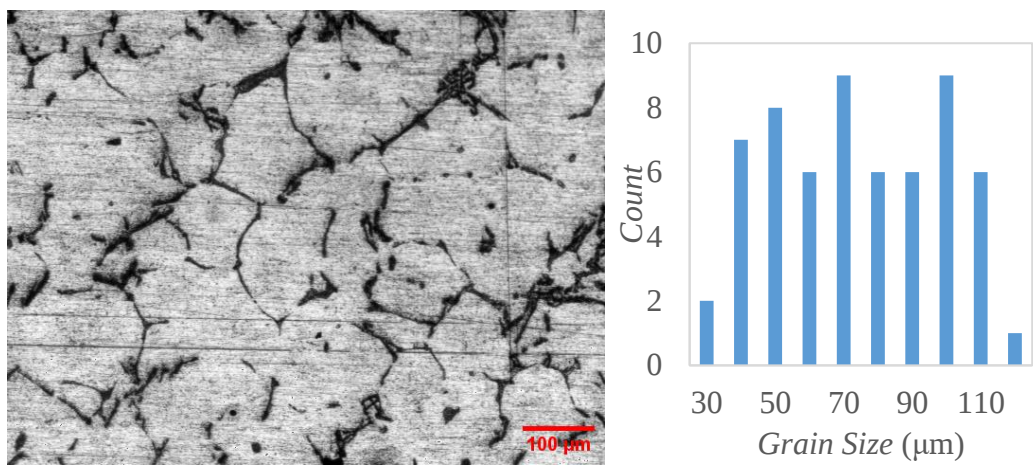
Gambar B.32 Pengambilan Data Distribusi Fasa *Software ImageJ*



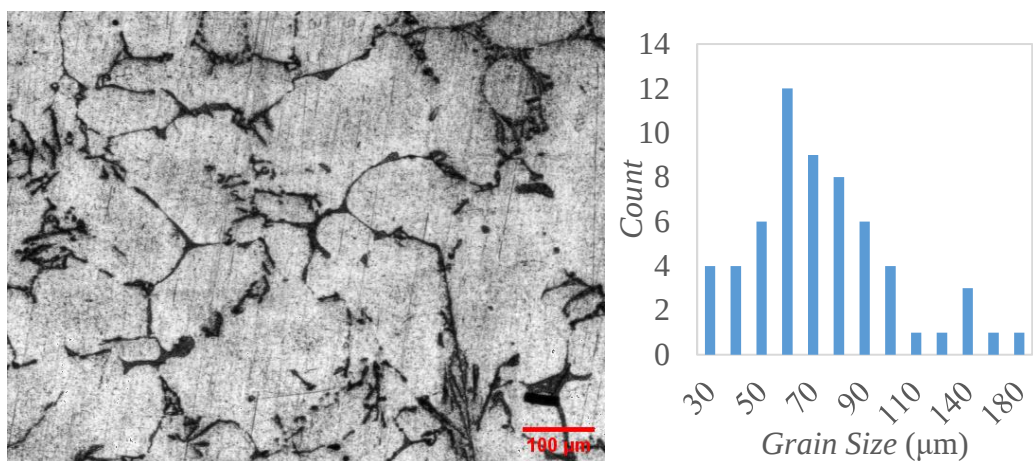
Gambar B.33 Pengolahan Data Distribusi Ukuran Butir *Software ImageJ*



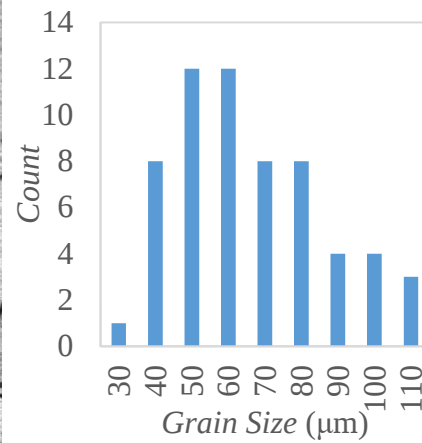
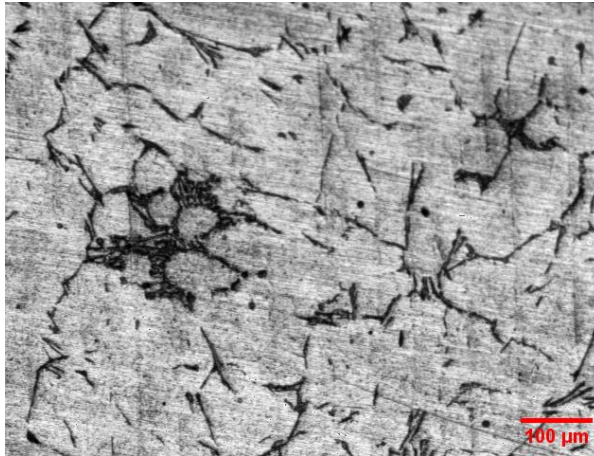
Gambar B.34 Data Hasil Uji Metalografi IA Pembesaran 100x



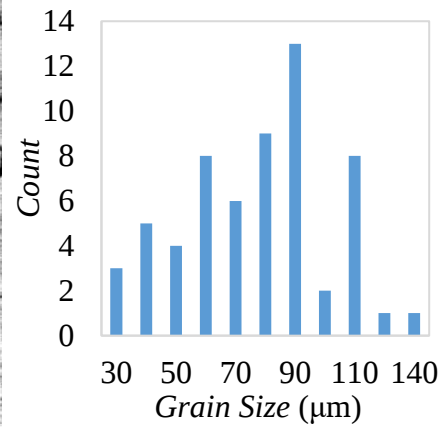
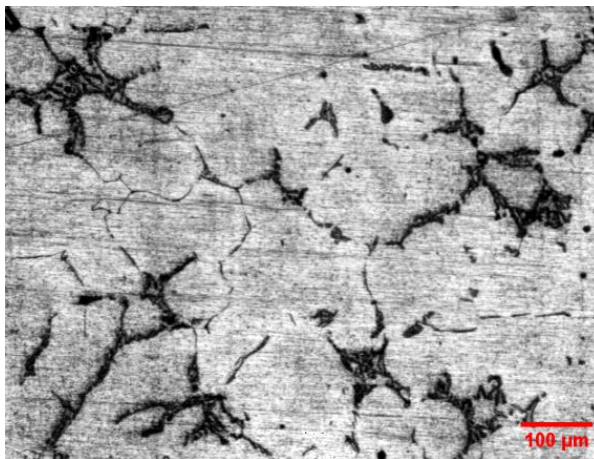
Gambar B.35 Data Hasil Uji Metalografi IB Pembesaran 100x



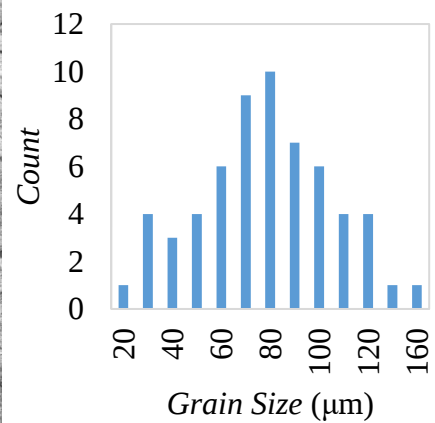
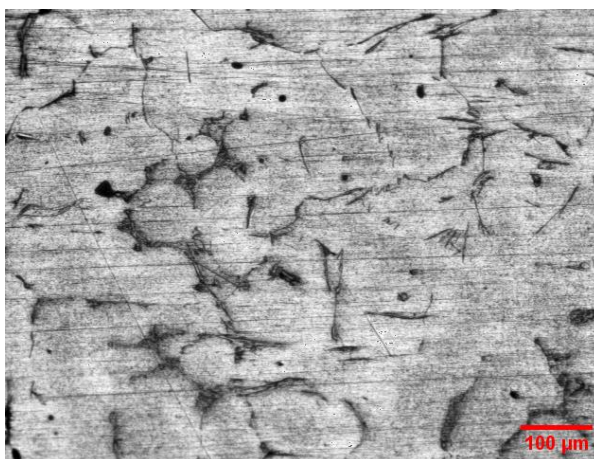
Gambar B.36 Data Hasil Uji Metalografi IC Pembesaran 100x



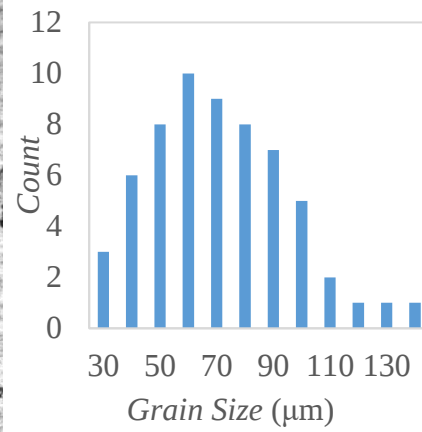
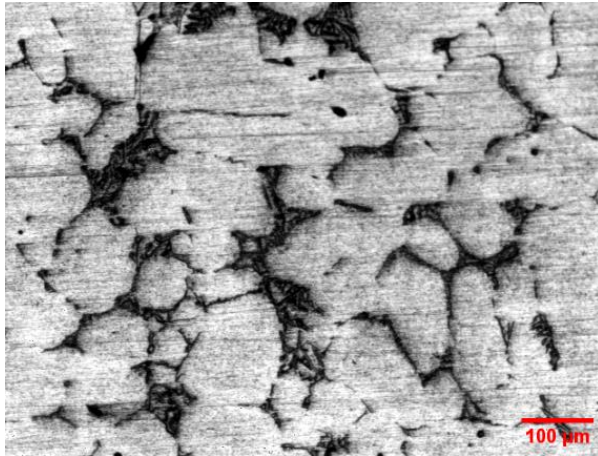
Gambar B.37 Data Hasil Uji Metalografi IIA Pembesaran 100x



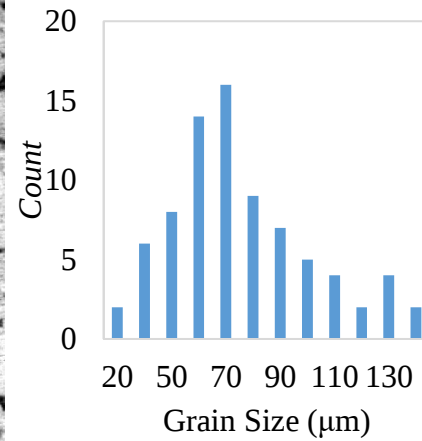
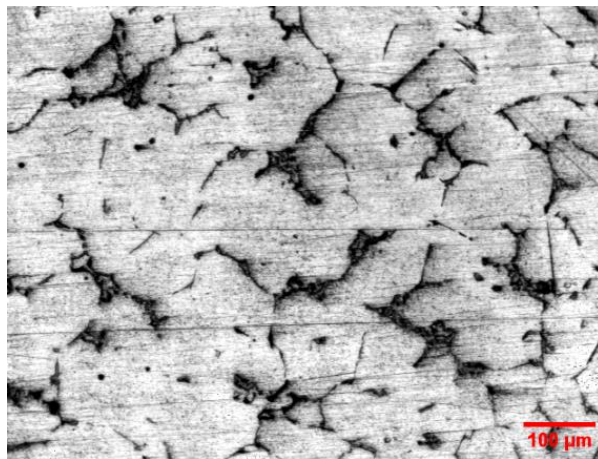
Gambar B.38 Data Hasil Uji Metalografi IIB Pembesaran 100x



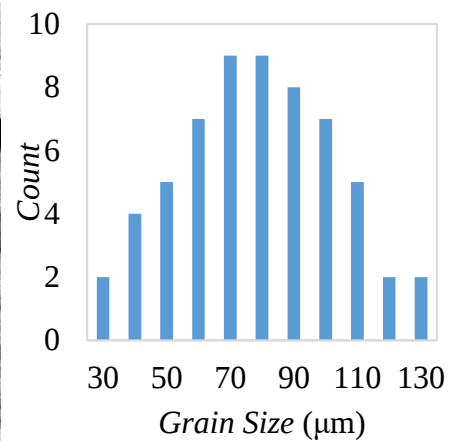
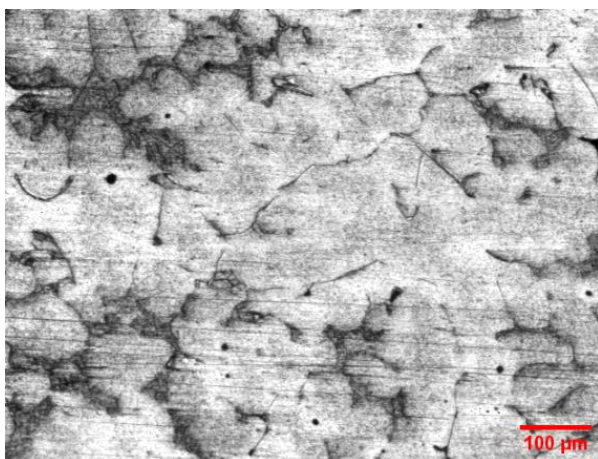
Gambar B.39 Data Hasil Uji Metalografi IIC Pembesaran 100x



Gambar B.40 Data Hasil Uji Metalografi IIIA Pembesaran 100x



Gambar B.41 Data Hasil Uji Metalografi IIIB Pembesaran 100x



Gambar B.42 Data Hasil Uji Metalografi IIIC Pembesaran 100x

LAMPIRAN C
GAMBAR ALAT DAN BAHAN



Gambar C.1 Akuades



Gambar C.2 Alat Pelindung Diri



Gambar C.3 Aluminium Ingot



Gambar C.4 Asam Clorida (HCl)



Gambar C.5 Asam Florida (HF)



Gambar C.6 Asam Nitrat (HNO_3)



Gambar C.7 Batang Pengaduk



Gambar C.8 Counter Electrode



Gambar C.9 *Crocodile Clip*



Gambar C.10 *Crucible*



Gambar C.11 *Garam (NaCl)*



Gambar C.12 *Gelas Beaker*



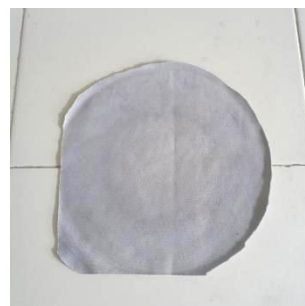
Gambar C.13 *Gerinda Duduk*



Gambar C.14 *Hair Dryer*



Gambar C.15 *Indium (In)*



Gambar C.16 *Kain Polishing*



Gambar C.17 Kertas Ampelas



Gambar C.18 Katoda *Low Carbon Steel*



Gambar C.19 Mesin Bor Tangan



Gambar C.20 Mesin Grinding dan Polishing



Gambar C.21 Mikroskop Optik



Gambar C.22 Multimeter



Gambar C.23 Pencapit *Crucible*



Gambar C.24 Potensiostat



Gambar C.25 Elektroda Referensi
Ag/AgCl



Gambar C.26 Thermogun



Gambar C.27 Timbangan Digital



Gambar C.28 Tungku Gas



Gambar C.29 Velg Aluminium



Gambar C.30 Zinc Ingot Nyzstar AZ-
Z1