LAMPIRAN A

CONTOH PERHITUNGAN

Lampiran A Contoh Perhitungan

A.1 Perhitungan Pemurnian Aluminium (*Fluxing*)

Pada penelitian ini terdapat perlakuan pemurnian untuk kaleng aluminium, menggunakan metode *fluxing* melalui peleburan dengan menggunakan *induction furnace* dengan jenis flux NaCl : KCl maka didapatkan perhitungan.

Diketahui:

Massa limbah kaleng minuman = 560 gram

Massa flux (NaCl : KCl) = 10% dari massa total limbah kaleng minuman = $\frac{10}{100}$× 560 gram = 56 gram

Massa flux NaCl : KCl (1 :1) = $\frac{1}{2}$ × 56 gram = 18 gram

Ditanya :

Massa ingot dan dross?

Jawab:

Massa material dilebur = Massa limbah keleng + Massa flux
= 560 gram + 86 gram = 646 gram

Massa ingot = 458 gram

Massa dross = Massa material dilebur – Massa ingot
= 646 gram – 458 gram = 158 gram

A. 2 Perhitungan Nilai Kekerasan

Berdasarkan pengujian kekerasan yang telah dilakukan didapatkan data seperti pada tabel A.1:

Sampel	Komposisi (%)	Nilai Kekerasan (HV)	Rata-Rata Nilai Kekerasan (HV)
A	HAp : Ti : Mg : Al (Kaleng) ; 80 : 5 : 5: 10	42,4976	44,4276
		46,5641	
		44,2212	

B	HAp : Ti : Mg : Al (*Fluxing*) ; 80 : 5 : 5: 10	49,7437	45,2866
		43,7469	
		42,3692	
C	HAp : Ti : Mg : Al (*Fluxing*) ; 75 : 10 : 5: 10	46,9353	48,0202
		46,0518	
		51,0735	
D	HAp : Ti : Mg : Al (*Fluxing*) ; 65 : 20 : 5: 10	47,6910	48,8031
		46,7863	
		51,9319	

Adapun untuk contoh perhitungan pengujian kekerasan dari sampel keramik komposit A yaitu:

$$HV = \frac{1{,}854\ x\ P}{d^2}$$

$$= \frac{1{,}854\ x\ 100x10^{-3}}{0{,}0043626^2}$$

$$= 42{,}4976\ HV$$

$$HV = \frac{1{,}854\ x\ P}{d^2}$$

$$= \frac{1{,}854\ x\ 100x10^{-3}}{0{,}00398161^2}$$

$$= 46{,}5641\ HV$$

$$HV = \frac{1{,}854\ x\ P}{d^2}$$

$$= \frac{1{,}854\ x\ 100x10^{-3}}{0{,}00419256^2}$$

$$= 44{,}2212\ HV$$

Nilai Rata-Rata:

$$\text{Rata} - \text{Rata Nilai Kekerasan} = \frac{\text{Jumlah nilai kekerasan}}{\text{Jumlah titik indentasi}}$$

$$\text{Xn} = \frac{42{,}50 + 46{,}56 + 44{,}22}{3} = 44{,}4267 \text{ HV}$$

A. 3 Perhitungan Nilai Kuat Tekan

Sampel	Komposisi	Luas Permukaan Area (cm^2)	Beban Diterima Objek (kg.f)	Nilai Kuat Tekan (MPa)
1	Hap : Mg : Ti : Al (Kaleng) 80 : 5 : 5 : 10	3,4525	1002,19	28,44
2	Hap : Mg : Ti : Al (*Fluxing*) 80 : 5 : 5 : 10	3,4821	1056,72	29,74
3	Hap : Mg : Ti : Al (Fluxing) 75 : 5 : 10 : 10	3,4355	1059,44	30,22
4	Hap : Mg : Ti : Al (Fluxing) 65 : 5 : 20 : 10	3,4619	1170,81	33,58

$$\text{Kuat Tekan} = \frac{\text{Beban diterima objek}}{\text{Luas permukaan area}}$$

Konversi satuan kgf/cm^2 menjadi MPa yaitu mengalikan dengan 0,098

Kuat Tekan Sampel A:

$$\text{Kuat Tekan} = \frac{1002{,}19 \text{ kg.f}}{3{,}4525 \text{ cm}^2} = 290{,}279 \ {}^{\text{kg.f}}/_{\text{cm}^2}$$

Kuat Tekan = 290, 279 kg.f/cm^2 x 0,098 = 28,44 MPa

Kuat Tekan Sampel B:

$$\text{Kuat Tekan} = \frac{1056{,}72 \text{ kg.f}}{3{,}4821 \text{ cm}^2} = 303{,}472 \ {}^{\text{kg.f}}/_{\text{cm}^2}$$

Kuat Tekan = 303,472 kg.f/cm^2 x 0,098 = 29,74 MPa

Kuat Tekan Sampel C:

$$\text{Kuat Tekan} = \frac{1059{,}44 \text{ kg.f}}{3{,}4355 \text{ cm}^2} = 308{,}38 \ {}^{\text{kg.f}}/_{\text{cm}^2}$$

Kuat Tekan = 308, 38 kg.f/cm^2 x 0,098 = 30,22 MPa

Kuat Tekan Sampel D:

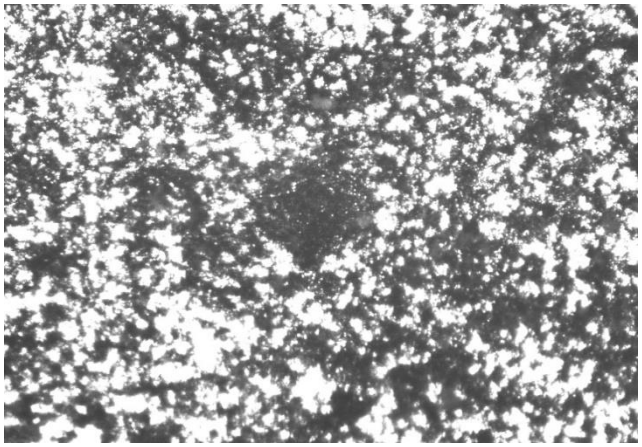
$$\text{Kuat Tekan} = \frac{1170{,}81 \text{ kg.f}}{3{,}4619 \text{ cm}^2} = 342{,}653 \ {}^{\text{kg.f}}/_{\text{cm}^2}$$

Kuat Tekan = 342,653 kg.f/cm^2 x 0,098 = 33,58 MPa

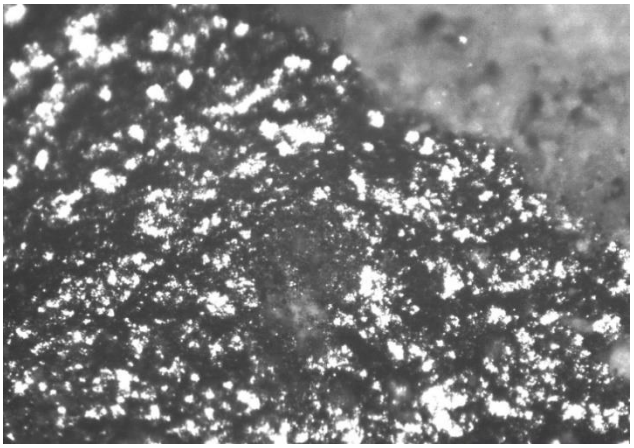
LAMPIRAN B

DATA HASIL PENELITIAN

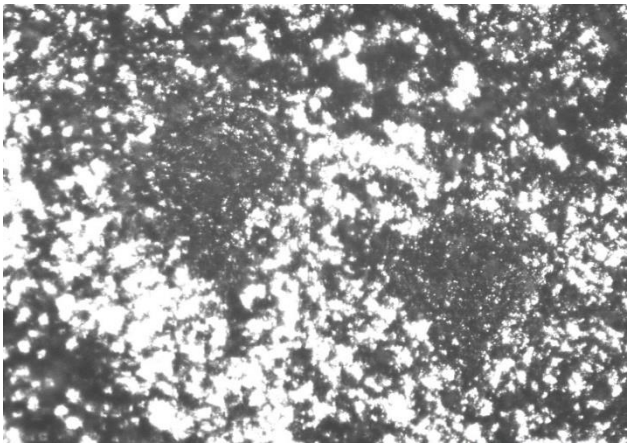
Lampiran B. Data Hasil Penelitian



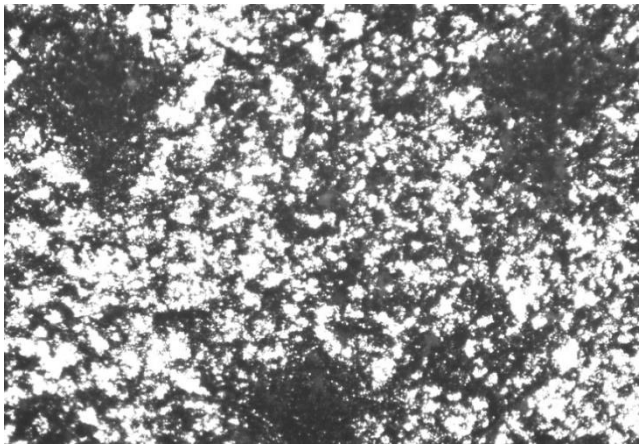
Gambar B.1 Hasil Uji Kekerasan Sampel A



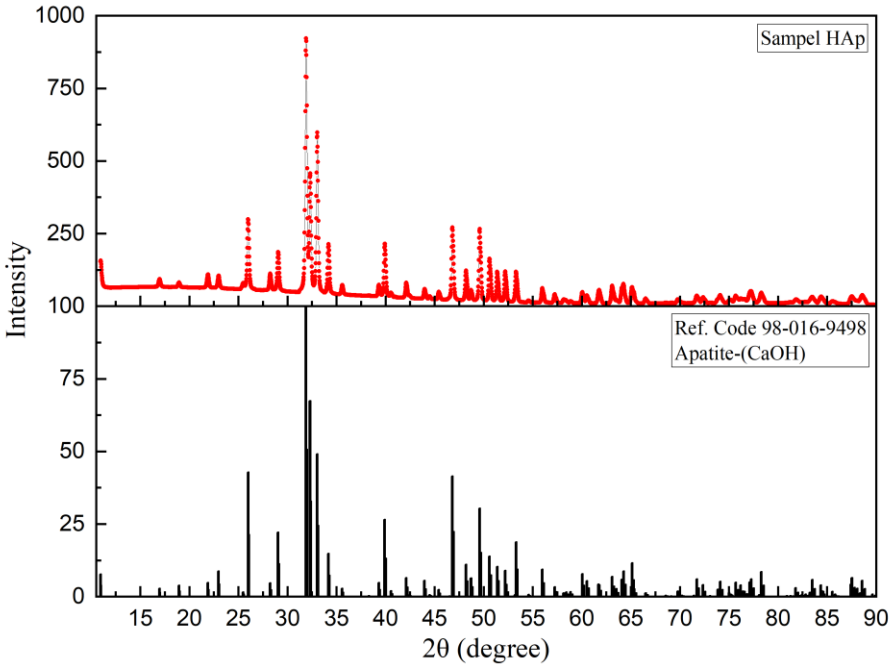
Gambar B.2 Hasil Uji Kekerasan Sampel B



Gambar B.3 Hasil Uji Kekerasan Sampel C



Gambar B.4 Hasil Uji Kekerasan Sampel D



Gambar B.5 Hasil XRD Kalsinasi Tulang Sapi 750^{O}C 6 Jam

Coded Coefficients

Term	Coef	SE Coef	T-Value	P-Value	VIF
Constant	48,300	0,230	210,14	0,000	
Titanium	2,005	0,182	11,03	0,000	1,00
Aluminium	0,593	0,182	3,26	0,014	1,00
Titanium*Titanium	-1,440	0,195	-7,39	0,000	1,02
Aluminium*Aluminium	-0,315	0,195	-1,62	0,150	1,02
Titanium*Aluminium	0,145	0,257	0,56	0,590	1,00

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
0,513950	96,41%	93,84%	74,44%

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Model	5	49,5918	9,9184	37,55	0,000
Linear	2	34,9682	17,4841	66,19	0,000
Titanium	1	32,1582	32,1582	121,74	0,000
Aluminium	1	2,8100	2,8100	10,64	0,014
Square	2	14,5395	7,2697	27,52	0,000
Titanium*Titanium	1	14,4250	14,4250	54,61	0,000
Aluminium*Aluminium	1	0,6903	0,6903	2,61	0,150
2-Way Interaction	1	0,0841	0,0841	0,32	0,590
Titanium*Aluminium	1	0,0841	0,0841	0,32	0,590
Error	7	1,8490	0,2641		
Lack-of-Fit	3	1,8490	0,6163	*	*
Pure Error	4	0,0000	0,0000		
Total	12	51,4408			

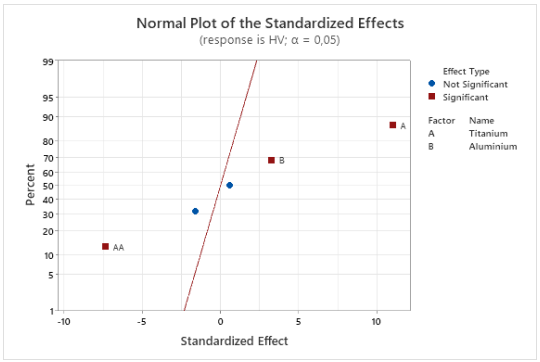
Regression Equation in Uncoded Units

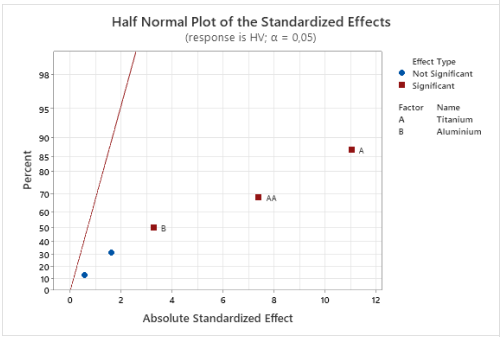
HV = -686 - 0,01 Titanium + 15,14 Aluminium - 0,02560 Titanium*Titanium
- 0,0788 Aluminium*Aluminium + 0,0097 Titanium*Aluminium

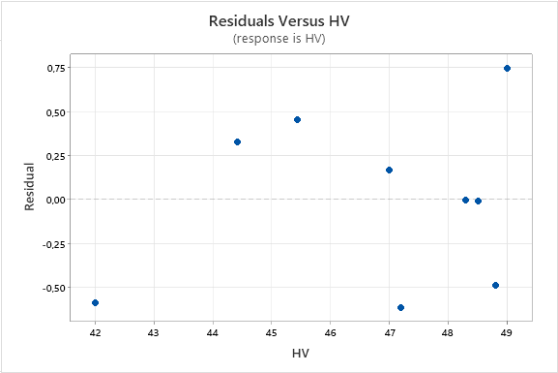
Fits and Diagnostics for Unusual Observations

Obs	HV	Fit	Resid	Std Resid
7	49,000	48,255	0,745	2,37 R

R Large residual







Gambar B.6 RSM Vickers

LAMPIRAN C

GAMBAR ALAT DAN BAHAN

Gambar C.1 Ayakan 200 Mesh

Gambar C.2 Cetakan Kompaksi

.**Gambar C.3** *Disc Mill*

Gambar C.4 Krusibel Alumina

Gambar C.5 *Molding Sintering*

Gambar C.6 *Muffle Furnace*.

Gambar C.7 Neraca Digital

Gambar C.8 *Jar Rotary* dan Bola Zirkon

Gambar C.9 Mesin *Press* Carver

Gambar C.10 Mesin Bubut

Gambar C.11 Alu dan Mortar

Gambar C.12 Alat Uji XRD

Gambar C.13 Alat Uji XRF

Gambar C.14 Alat Penjepit

Gambar C.15 Alat Uji Tekan

Gambar C.16 Alat Uji Kekerasan

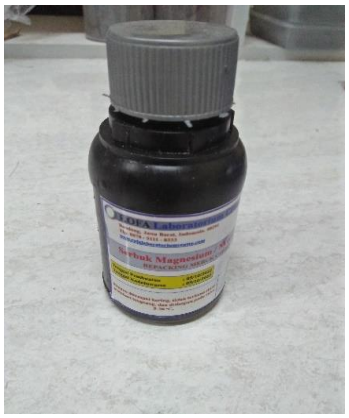
Gambar C.17 Bata Alumina

Gambar C.18 Mikroskop Optik

Gambar C.19 Tungku Pengecoran

C.2 Gambar Bahan

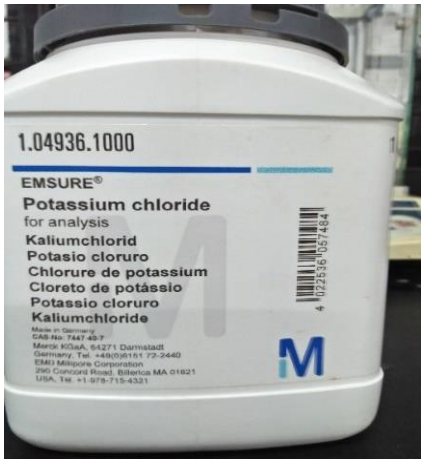
Gambar C.20 Amplas



Gambar C.21 Serbuk Magnesium

Gambar C.22 Serbuk Titanium.

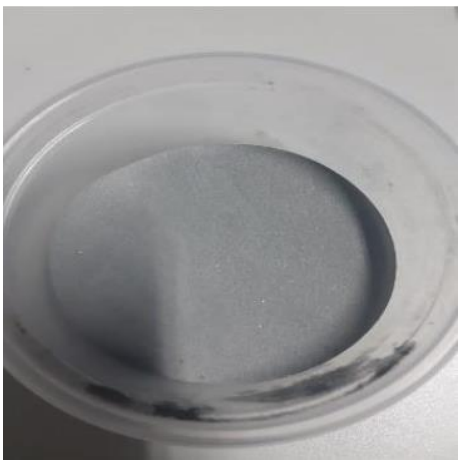
Gambar C.23 Serbuk NaCl.



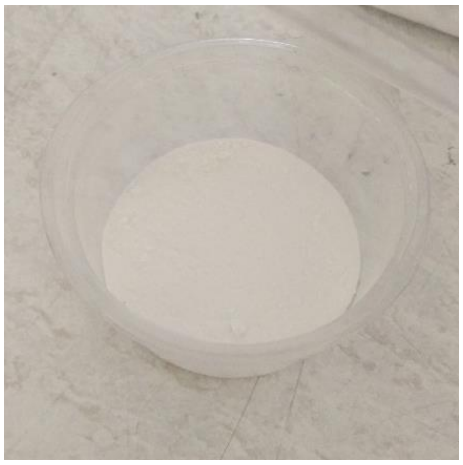
Gambar C.24 Serbuk KCl.

Gambar C.25 Kaleng Aluminium

Gambar C.26 Serbuk Kaleng Aluminium



Gambar C.27 Serbuk aluminium *Fluxing*



Gambar C.28 Serbuk Hidroksiapatit.

Gambar C.29 Tulang Sapi.

Gambar C.30 Tisu.

Gambar C.31 Oli.