Lampiran A. Analisis ED X-Ray dan X-Ray Diffraction ZnO

LEMBAGA ILMU PENGETAHUAN INDONESIA
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Our ref : IX/ INTERNAL/ 1/ 2019

LAPORAN HASIL PEKERJAAN

Telah dilakukan analisa sampel sebagai berikut :

Subject / Hal	: ED X-Ray Flouresscence Panalytical Epsilon 3 XLE dan X-Ray Diffraction Panalytical X'Pert 3 Powder
Description of sample / Keterangan contoh	: Contoh berupa Nano ZnO
Executed for / Dibuat untuk	: Program Insinas Kemitraan BPTM - BBKB (Pemanfaatan Nano Oksida Logam Untuk Meningkatkan Kualitas Pewarnaan dan Sifat Anti Bakteri Pada Batik)
Results / Hasil	: Terlampir

Lampung Selatan, 24 September 2019

Mengetahui
Kepala Balai Penelitian Teknologi Mineral -LIPI

Dr. Eng. Widi Astuti
NIP.197808192002122003

Catatan :
- Hasil analisa ini hanya berlaku untuk contoh yang diuji.
  The analysis result are valid only for the tested samples
- Laporan hasil analisa tidak boleh diperbanyak (digandakan) tanpa izin
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A. 2

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Lampiran 1 : Data analisa ED- XRF Panalytical Epsilon 3 XLE
Kode sampel : Nano ZnO

Kode Sampel : Nano ZnO (Z16t)					
Omnian ED- XRF PANalytical Epsilon 3 XLE					
Element			*Oxides*		
Compound	*Conc*	*Unit*	*Compound*	*Conc*	*Unit*
Ca	0,135	%	CaO	0,156	%
Fe	149,6	ppm	Fe_2O_3	174,8	ppm
Co	113,7	ppm	Co_3O_4	126,7	ppm
Zn	99,792	%	ZnO	99,767	%
Sn	343,2	ppm	SnO_2	347,2	ppm
Te	131,8	ppm	TeO_2	130,2	ppm

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Halaman 2 dari 4

Lampiran 2 : Data analisa ED- XRF Panalytical Epsilon 3 XLE
Kode sampel : Nano ZnO

Catatan :
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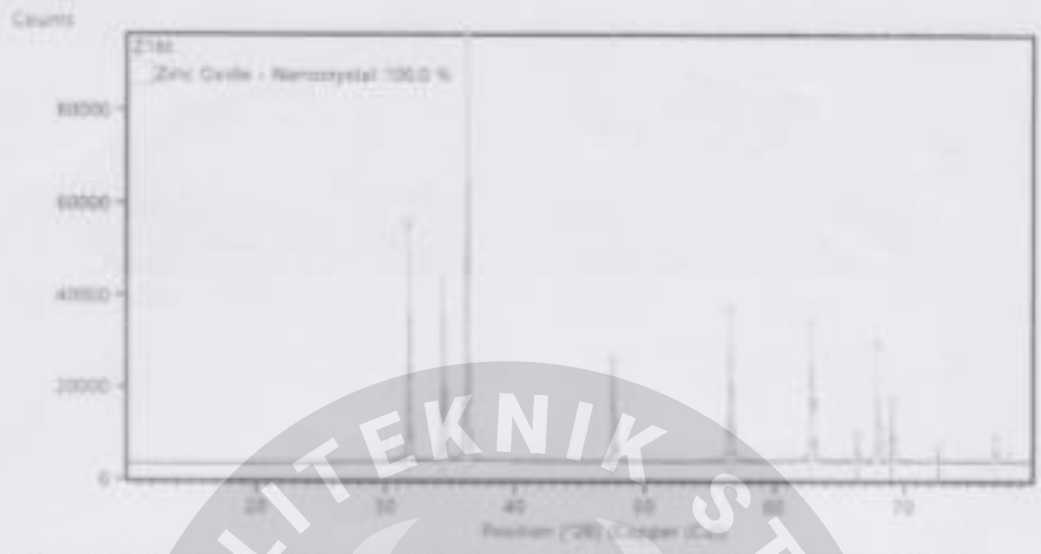
A. 3

Hasil analisis XRD ZnO Nanopartikel



Dari grafik XRD terlihat bahwa produk ZnO yang dihasilkan adalah ZnO nanopartikel dengan perhitungan ukuran partikel ZnO terlihat pada tabel berikut.

No	Pos. [°2θ]	θ	FWHM Left [°2θ]	Radian	Cos θ	D (nm)
1	31.7916	15.8958	0.14760	0.002576107	0.9617	55.9448
2	34.4638	17.2319	0.14760	0.002576107	0.9551	56.3314
3	36.2842	18.1421	0.19680	0.003434809	0.9503	42.4619
4	47.5853	23.7927	0.19680	0.003434809	0.9150	44.1001
5	56.5984	28.2992	0.24600	0.004293512	0.8805	36.6624
6	62.8715	31.4358	0.19680	0.003434809	0.8532	47.2944
7	66.3680	33.1840	0.14760	0.002576107	0.8369	64.2874
8	67.9431	33.9716	0.14760	0.002576107	0.8293	64.8765
9	69.0789	34.5395	0.18000	0.003141594	0.8237	53.5604
10	69.3253	34.6627	0.12000	0.002094396	0.8225	80.4579
11	72.5891	36.2946	0.18000	0.003141594	0.8059	54.7434
12	76.9601	38.4801	0.18000	0.003141594	0.7828	56.3589
					Rata-rata	54.7566

Dari tabel di atas diketahui bahwa ukuran partikel ZnO yang dihasilkan adalah sekitar 54 nm. Ukuran partikel ini adalah ukuran nanopartikel karena <100 nm. Produk yang dihasilkan sesuai dengan produk ZnO nanopartikel komersial yang dihasilkan oleh Sygma Aldrich.

A. 4

Hasil analisis XRF ZnO Nanopartikel

Sample results

Sample Ident
Z16t

Application	[illegible]
Sequence	1 of 1
Position	1
Measurement time	[illegible]

Normalisation factor	[illegible]
Minimum He Flow (l/min)	[illegible]

Compound	CaO	Fe_2O_3	Co_3O_4	ZnO	SnO_2	[illegible]
Conc	[illegible]	[illegible]	[illegible]	99,767	[illegible]	[illegible]
Unit	%	ppm	ppm	%	ppm	ppm

Dari hasil analisa XRF terlihat bahwa kadar ZnO yang dihasilkan adalah 99,767%, atau kadar Zn sekitar 80,5%. Kadar ZnO atau Zn ini setara dengan kadar ZnO atau Zn yang ada pada produk ZnO nanopartikel komersil yang dihasilkan oleh Sygma Aldrich.

Lampiran B Hasil Uji PSA

No.	Sampel	Mean (µm)
1	ZnO + PEG 0%	0.736
2	ZnO + PEG 0,1 %	0.703
3	ZnO + PEG 0,2 %	0.722
4	ZnO + PEG 0,7 %	0.827

Lampiran C Analisis Spectrofotometer UPF

[Comments]	
Sample name	
Comment	
User	
Division	
Company	Balai Besar Tekstil Bandung
[Measurement Information]	
Instrument name	Jasco V750
Model name	V-750
Serial No.	D082461799
Accessory	ISV-922
Accessory S/N	B027461889
Beam trap	Use
Ref. beam	
Measurement date	27/11/2019 9:22
Parameter file	C:\Users\Balai Besar Tekstil\Documents\Training\parameter UPF 2 okt 19.uvsp
Photometric mode	%T
Measurement range	450 - 200 nm
Data interval	1 nm
Bandwidth	5.0 nm
Response	0.96 sec
Scan mode	Continuous
Scan speed	100 nm/min
Change source at	340 nm
Light source	D2/WI
Filter exchange	Step
Correction	Baseline
No. of accumulations	1

C. 2

No.	File Name	AS/NZS 4399:2017-UPF	AS/NZS 4399:2017-UPF rating	Sample Name	Comment
1		9,3		Blanko	
2		9,3		Blanko	
3		9,4		Blanko	
4		9,4		Blanko	
5			less than 15		
6		11,5		Binder	
7		12,4		Binder	
8		11,7		Binder	
9		12,1		Binder	
10			less than 15		
11		14,7		ZnO 1%	
12		14,4		ZnO 1%	
13		15,3		ZnO 1%	
14		14,9		ZnO 1%	
15			less than 15		
16		15		ZnO 2%	
17		15,1		ZnO 2%	
18		14,4		ZnO 2%	
19		14,1		ZnO 2%	
20			less than 15		

AS/NZS 4399:2017-UVB Transmittance	Sample Name
9,5	Blanko
9,8	Blanko
9,8	Blanko
10,0	Blanko
7,9	Binder
7,4	Binder
7,9	Binder
7,5	Binder
6,3	ZnO 1%
6,4	ZnO 1%
6,0	ZnO 1%
6,1	ZnO 1%
6,1	ZnO 2%
6,0	ZnO 2%
6,2	ZnO 2%
6,4	ZnO 2%

No.	File Name	AS/NZS 4399:2017-UPF	AS/NZS 4399:2017-UPF rating	Sample Name	Comment
21		15,4		ZnO 3%	
22		15,6		ZnO 3%	
23		15,2		ZnO 3%	
24		15,4		ZnO 3%	
25			15		
26		15,2		ZnO 4%	
27		15,9		ZnO 4%	
28		15,8		ZnO 4%	
29		15,8		ZnO 4%	
30			15		

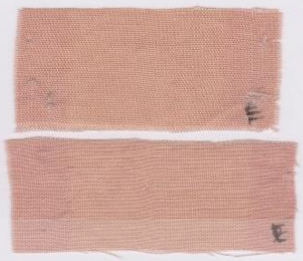
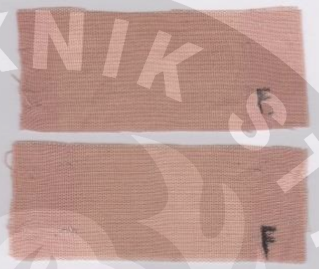
AS/NZS 4399:2017-UVB Transmittance	Sample Name
6,0	ZnO 3%
5,9	ZnO 3%
6,2	ZnO 3%
6,0	ZnO 3%
5,9	ZnO 4%
5,8	ZnO 4%
5,8	ZnO 4%
5,7	ZnO 4%

Lampiran D Hasil uji tahan luntur warna terhadap cahaya matahari

HASIL UJI TAHAN LUNTUR WARNA TERHADAP CAHAYA MATAHARI
SNI ISO 105-B 01:2010

No.	Sampel		Nilai
1	Blanko Before	After	2
2	Blanko + *binder* Before	After	2
3	Blanko + *binder* + ZnO 1% Before	After	2-3
4	Blanko + *binder* + ZnO 2% Before	After	2-3

D. 2

No.	Sampel		Nilai
5	Blanko + *binder* + ZnO 3% Before 	After 	3
6	Blanko + *binder* + ZnO 4% Before 	After 	3-4

Blue wool


Lampiran E Uji statistik

E.1 T-test

Untuk mengetahui pengaruh penambahan binder pada kain batik terhadap nilai UPF yang dihasilkan

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
upf	Equal variances assumed	1.662	.238	-3.247	7	.014	-2.00000	.61586	-3.45628	-.54372
	Equal variances not assumed			-3.592	5.049	.015	-2.00000	.55678	-3.42706	-.57294

Analisis :

Penambahan *binder* poliakrilat pada kain batik zat warna alam secang menghasilkan nilai rata – rata UPF yang tidak berbeda secara signifikan terhadap nilai rata-rata UPF pada blanko (sig > 0,05).

E.2 Oneway Anova

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
UPF	ZnO 0%	4	9.350	.7594	.3797	8.142	10.558	8.7	10.4
	ZnO 1%	4	14.100	1.4353	.7176	11.816	16.384	12.1	15.4
	ZnO 2%	4	14.425	.4031	.2016	13.784	15.066	14.1	15.0
	ZnO 3%	4	14.925	.2872	.1436	14.468	15.382	14.6	15.3
	ZnO 4%	4	15.075	.7500	.3750	13.882	16.268	14.3	15.9
	Total	20	13.575	2.3172	.5181	12.491	14.659	8.7	15.9
TUVA	ZnO 0%	4	15.425	1.3301	.6651	13.309	17.541	13.7	16.9
	ZnO 1%	4	10.525	1.4245	.7122	8.258	12.792	9.5	12.6
	ZnO 2%	4	10.300	.2828	.1414	9.850	10.750	9.9	10.5
	ZnO 3%	4	9.950	.4435	.2217	9.244	10.656	9.4	10.4
	ZnO 4%	4	9.775	.2062	.1031	9.447	10.103	9.5	10.0
	Total	20	11.195	2.3305	.5211	10.104	12.286	9.4	16.9
TUVB	ZnO 0%	4	10.075	.8461	.4230	8.729	11.421	9.0	10.8
	ZnO 1%	4	6.575	.8732	.4366	5.186	7.964	5.9	7.8
	ZnO 2%	4	6.375	.1893	.0946	6.074	6.676	6.1	6.5
	ZnO 3%	4	6.100	.2944	.1472	5.632	6.568	5.8	6.4
	ZnO 4%	4	6.050	.1291	.0645	5.845	6.255	5.9	6.2
	Total	20	7.035	1.6509	.3692	6.262	7.808	5.8	10.8

E. 2

Analisis Homogenitas Pada Nilai UPF : Variasi konsentrasi ZNO menghasilkan nilai varians UPF yang tidak berbeda secara signifikan (Sig > 0,05).

Analisis Homogenitas Pada Nilai Transmitance UVA : Variasi konsentrasi ZNO menghasilkan nilai varians Transmitance UVA yang tidak berbeda secara signifikan (Sig > 0,05).

Analisis Homogenitas Pada Nilai Transmitance UVB : Variasi konsentrasi ZNO menghasilkan nilai varians Transmitance UVB yang berbeda secara signifikan (Sig < 0,05).

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
UPF	1.974	4	15	.150
TUVA	2.728	4	15	.069
TUVB	4.065	4	15	.020

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
UPF	Between Groups	91.685	4	22.921	33.275	.000
	Within Groups	10.333	15	.689		
	Total	102.018	19			
TUVA	Between Groups	90.837	4	22.709	27.577	.000
	Within Groups	12.353	15	.823		
	Total	103.189	19			
TUVB	Between Groups	46.933	4	11.733	36.270	.000
	Within Groups	4.852	15	.323		
	Total	51.785	19			

Analisis Anava Pada Nilai UPF : Variasi konsentrasi ZNO menghasilkan nilai rata-rata UPF yang berbeda secara signifikan (Sig < 0,05).

Analisis Anava Pada Nilai Transmitance UVA : Variasi konsentrasi ZNO menghasilkan nilai rata-rata Transmitance UVA yang berbeda secara signifikan (Sig < 0,05).

Analisis Anava Pada Nilai Transmitance UVB : Variasi konsentrasi ZNO menghasilkan nilai rata-rata Transmitance UVB yang berbeda secara signifikan (Sig < 0,05).

Post Hoc Tests

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) ZnO	(J) ZnO	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
UPF	ZnO 0%	ZnO 1%	-4.7500*	.5869	.000	-6.562	-2.938
		ZnO 2%	-5.0750*	.5869	.000	-6.887	-3.263
		ZnO 3%	-5.5750*	.5869	.000	-7.387	-3.763
		ZnO 4%	-5.7250*	.5869	.000	-7.537	-3.913
	ZnO 1%	ZnO 0%	4.7500*	.5869	.000	2.938	6.562
		ZnO 2%	-.3250	.5869	.980	-2.137	1.487
		ZnO 3%	-.8250	.5869	.633	-2.637	.987
		ZnO 4%	-.9750	.5869	.484	-2.787	.837
	ZnO 2%	ZnO 0%	5.0750*	.5869	.000	3.263	6.887
		ZnO 1%	.3250	.5869	.980	-1.487	2.137
		ZnO 3%	-.5000	.5869	.910	-2.312	1.312
		ZnO 4%	-.6500	.5869	.800	-2.462	1.162
	ZnO 3%	ZnO 0%	5.5750*	.5869	.000	3.763	7.387
		ZnO 1%	.8250	.5869	.633	-.987	2.637
		ZnO 2%	.5000	.5869	.910	-1.312	2.312
		ZnO 4%	-.1500	.5869	.999	-1.962	1.662
	ZnO 4%	ZnO 0%	5.7250*	.5869	.000	3.913	7.537
		ZnO 1%	.9750	.5869	.484	-.837	2.787
		ZnO 2%	.6500	.5869	.800	-1.162	2.462
		ZnO 3%	.1500	.5869	.999	-1.662	1.962
TUVA	ZnO 0%	ZnO 1%	4.9000*	.6417	.000	2.919	6.881
		ZnO 2%	5.1250*	.6417	.000	3.144	7.106
		ZnO 3%	5.4750*	.6417	.000	3.494	7.456
		ZnO 4%	5.6500*	.6417	.000	3.669	7.631

E. 4

	ZnO 1%	ZnO 0%	-4.9000*	.6417	.000	-6.881	-2.919
		ZnO 2%	.2250	.6417	.996	-1.756	2.206
		ZnO 3%	.5750	.6417	.894	-1.406	2.556
		ZnO 4%	.7500	.6417	.768	-1.231	2.731
	ZnO 2%	ZnO 0%	-5.1250*	.6417	.000	-7.106	-3.144
		ZnO 1%	-.2250	.6417	.996	-2.206	1.756
		ZnO 3%	.3500	.6417	.981	-1.631	2.331
		ZnO 4%	.5250	.6417	.921	-1.456	2.506
	ZnO 3%	ZnO 0%	-5.4750*	.6417	.000	-7.456	-3.494
		ZnO 1%	-.5750	.6417	.894	-2.556	1.406
		ZnO 2%	-.3500	.6417	.981	-2.331	1.631
		ZnO 4%	.1750	.6417	.999	-1.806	2.156
	ZnO 4%	ZnO 0%	-5.6500*	.6417	.000	-7.631	-3.669
		ZnO 1%	-.7500	.6417	.768	-2.731	1.231
		ZnO 2%	-.5250	.6417	.921	-2.506	1.456
		ZnO 3%	-.1750	.6417	.999	-2.156	1.806
TUVB	ZnO 0%	ZnO 1%	3.5000*	.4022	.000	2.258	4.742
		ZnO 2%	3.7000*	.4022	.000	2.458	4.942
		ZnO 3%	3.9750*	.4022	.000	2.733	5.217
		ZnO 4%	4.0250*	.4022	.000	2.783	5.267
	ZnO 1%	ZnO 0%	-3.5000*	.4022	.000	-4.742	-2.258
		ZnO 2%	.2000	.4022	.986	-1.042	1.442
		ZnO 3%	.4750	.4022	.762	-.767	1.717
		ZnO 4%	.5250	.4022	.692	-.717	1.767
	ZnO 2%	ZnO 0%	-3.7000*	.4022	.000	-4.942	-2.458
		ZnO 1%	-.2000	.4022	.986	-1.442	1.042
		ZnO 3%	.2750	.4022	.957	-.967	1.517
		ZnO 4%	.3250	.4022	.924	-.917	1.567
	ZnO 3%	ZnO 0%	-3.9750*	.4022	.000	-5.217	-2.733
		ZnO 1%	-.4750	.4022	.762	-1.717	.767
		ZnO 2%	-.2750	.4022	.957	-1.517	.967
		ZnO 4%	.0500	.4022	1.000	-1.192	1.292
	ZnO 4%	ZnO 0%	-4.0250*	.4022	.000	-5.267	-2.783
		ZnO 1%	-.5250	.4022	.692	-1.767	.717
		ZnO 2%	-.3250	.4022	.924	-1.567	.917
		ZnO 3%	-.0500	.4022	1.000	-1.292	1.192

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

UPF

Tukey HSD[a]

ZnO	N	Subset for alpha = 0.05	
		1	2
ZnO 0%	4	9.350	
ZnO 1%	4		14.100
ZnO 2%	4		14.425
ZnO 3%	4		14.925
ZnO 4%	4		15.075
Sig.		1.000	.484

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 4,000.

TUVA

Tukey HSD[a]

ZnO	N	Subset for alpha = 0.05	
		1	2
ZnO 4%	4	9.775	
ZnO 3%	4	9.950	
ZnO 2%	4	10.300	
ZnO 1%	4	10.525	
ZnO 0%	4		15.425
Sig.		.768	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 4,000.

E. 6

TUVB

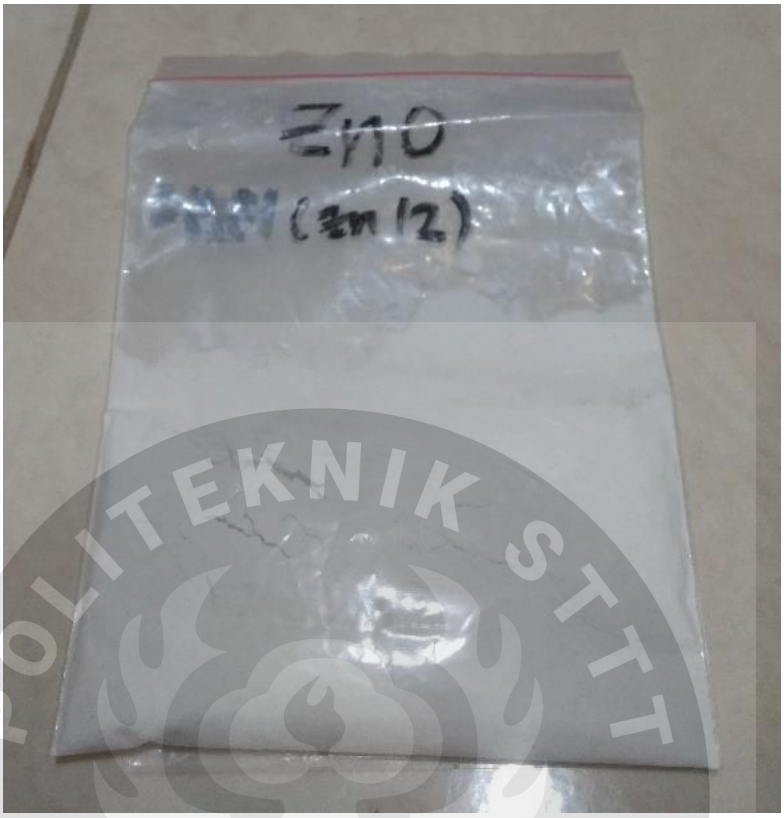
Tukey HSD[a]

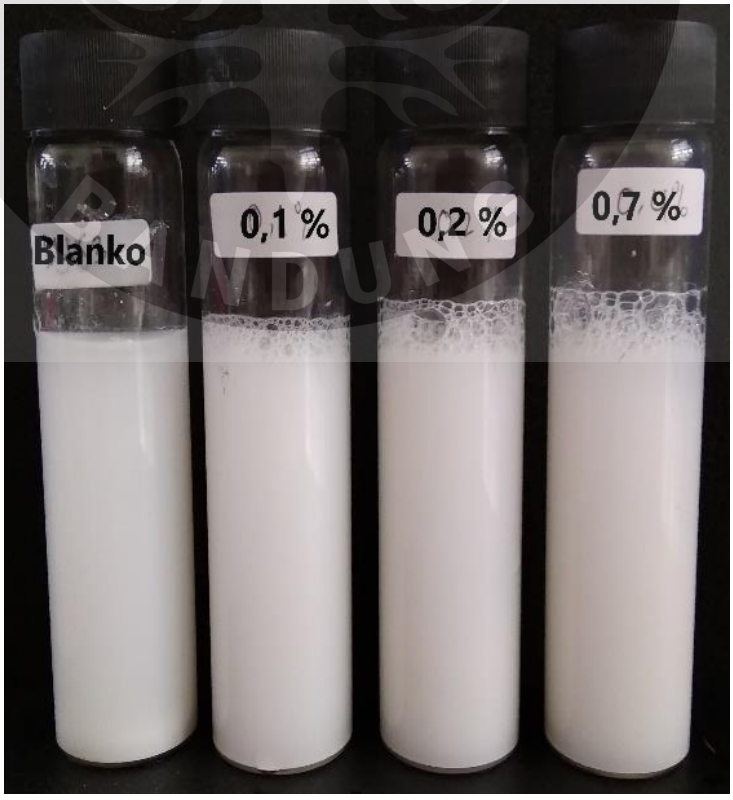
ZnO	N	Subset for alpha = 0.05	
		1	2
ZnO 4%	4	6.050	
ZnO 3%	4	6.100	
ZnO 2%	4	6.375	
ZnO 1%	4	6.575	
ZnO 0%	4		10.075
Sig.		.692	1.000

Means for groups in homogeneous subsets are displayed.

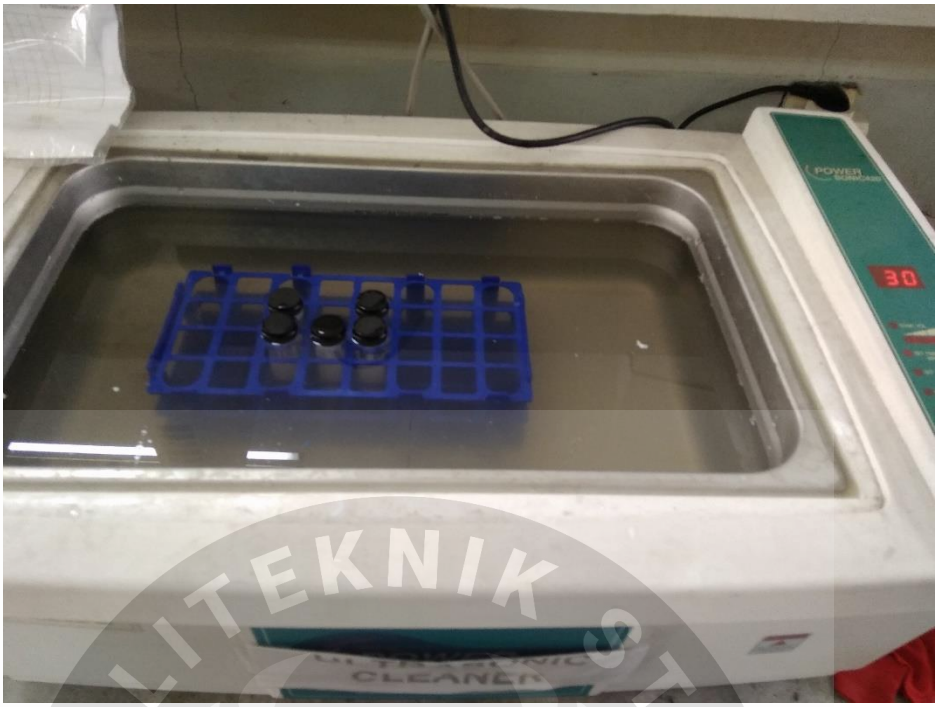
a. Uses Harmonic Mean Sample Size = 4,000.

Lampiran F Dokumentasi proses penelitian





F. 2



F. 3