

## **BAB V**

### **KESIMPULAN DAN SARAN**

#### **A. Kesimpulan**

Berdasarkan penelitian yang telah dilakukan dapat disimpulkan bahwa:

- 1) Karakterisasi dari NLC hesperidin (*Nanostructured Lipid Carriers*) menghasilkan ukuran partikel sebesar  $385,2 \pm 3,90$  nm dengan indeks polidispersitas  $0,573 \pm 0,129$ , zeta potensial sebesar  $-25,7 \pm 0,7$  mV dan efisiensi penjerapan sebesar  $96,02\% \pm 0,06$ .
- 2) Variasi konsentrasi xanthan gum sebagai *gelling agent* serum NLC hesperidin berpengaruh terhadap mutu fisik sediaan yaitu viskositas dan stabilitas tetapi tidak berpengaruh terhadap organoleptis, homogenitas, dan pH.
- 3) Formula serum yang menghasilkan mutu fisik paling baik adalah formula serum dengan konsentrasi xanthan gum 0,5% (F1) dan menghasilkan nilai  $IC_{50}$  sebesar 76,17 ppm (kuat).

#### **B. Saran**

Penelitian ini masih banyak kekurangan, maka perlu dilakukan penelitian lebih lanjut mengenai:

- 1) Dapat dilakukan penelitian selanjutnya yakni uji pelepasan obat sediaan serum NLC hesperidin.
- 2) Dapat dilakukan pengujian antioksidan setelah penyimpanan untuk melihat stabilitas antioksidan sediaan serum NLC hesperidin.

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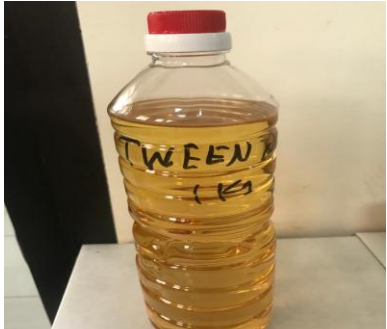


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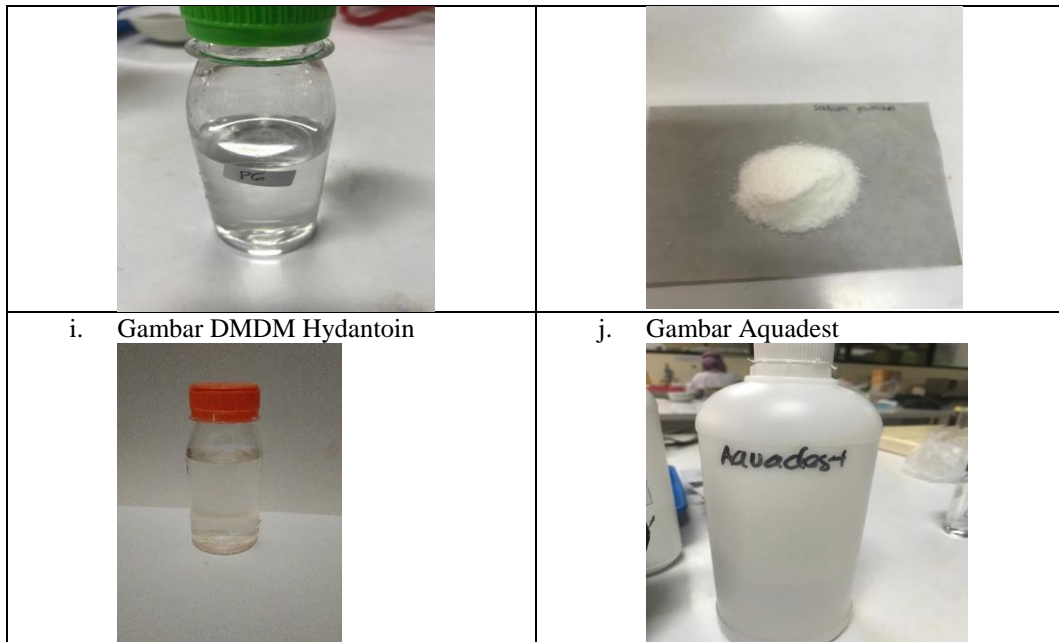
### Lampiran 1 Alat yang digunakan penelitian

Alat	Nama Alat	Kegunaan
	Neraca Analitik	Menimbang bahan baku dan eksipien
	Spektrofotometer UV-Vis	Membaca serapan, mencari lambda maksimum dan OT
	<i>Magnetic stirrer</i>	Menghomogenkan formula dengan pengadukan
	<i>Particle size analyzer</i>	Mengukur ukuran partikel dan zeta potensial

Alat	Nama Alat	Kegunaan
	Viskometer	Mengukur kekentalan sediaan

### Lampiran 1 Bahan yang digunakan dalam penelitian

Bahan	
a. Gambar Hesperidin 	b. Gambar Gliseril Monostearat 
c. Gambar Isopropil Miristat 	d. Gambar Tween 80 
e. Gambar etanol p.a. 	f. Gambar Aqua DM 
g. Gambar Propilenglikol	h. Gambar Sodium Glukonat



## Lampiran 3 Certificate of analysis (COA) hesperidin



## Xi'an Quanao Biotech Co., Ltd.

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### Certificate of Analysis

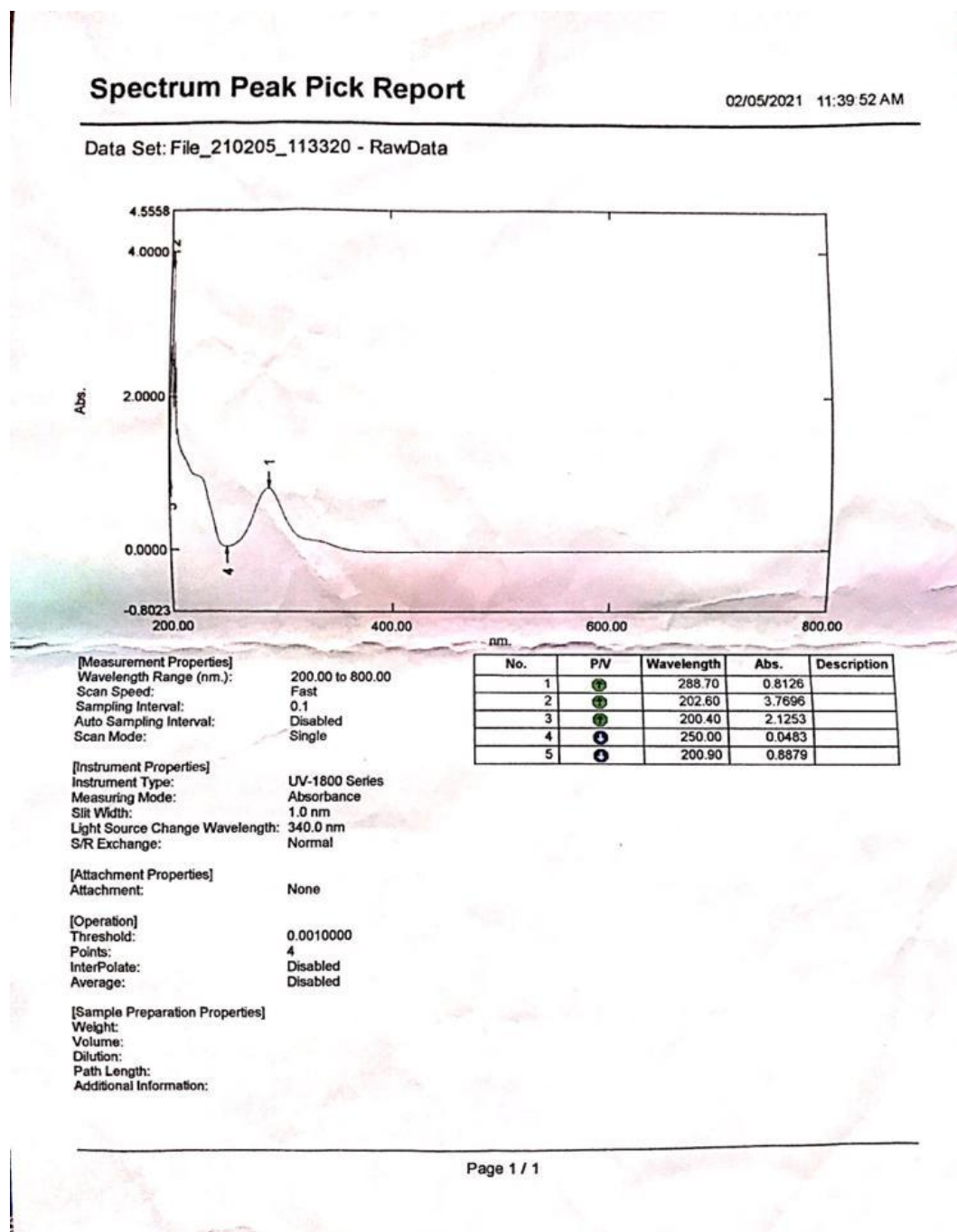
<b>Product Name</b>	Hesperidin 90%		
<b>Latin Name</b>	<i>Citrus aurantium L.</i>	<b>Used Part</b>	Fruit
<b>Production Date</b>	2021-01-05	<b>Batch No.</b>	QC20210105
<b>Expiry Date</b>	2023-01-04	<b>Report Date</b>	2021-01-12
<b>Original</b>			
<b>ITEMS</b>	<b>SPECIFICATIONS</b>		<b>RESULTS</b>
Appearance	Brown Yellow Powder		Complies
Odor & Tasted	Characteristic		Complies
Assay( %)	≥ 90.0 UV		91.35
Loss on Drying(%)	≤5.0		3.2
Residue on Ignition(%)	≤0.5		0.25
Particle size(%)	100% through 80 mesh sieves		Complies
<b>Heavy Metals</b>			
Heavy Metal (ppm)	≤10		Complies
As(ppm)	≤1.0		Complies
<b>Microbiological Tests</b>			
Total Plate Count(cfu/g)	≤ 1000		Complies
Yeasts and Moulds(cfu/g)	≤ 100		Complies
E.coli ( cfu/g)	Negative		Complies
Salmonella	Negative		Complies
<b>Conclusion</b>	Conform to the standard.		
<b>Packing</b>	25kg/drum		
<b>Storage and Handling</b>	Store in a cool and dry place, keep away from direct strong and heat.		
<b>Shelf life</b>	Two years if sealed and store away from direct sun light.		

QC: Li Ting

QA: T



## Lampiran 4 Panjang gelombang maksimum dan OT hesperidin



**Kinetics Data Print Report**

02/05/2021 02:01:26 PM

Time ( Minute )	RawData ...
0.000	0.976
1.000	0.976
2.000	0.976
3.000	0.975
4.000	0.975
5.000	0.975
6.000	0.976
7.000	0.975
8.000	0.976
9.000	0.977
10.000	0.976
11.000	0.976
12.000	0.976
13.000	0.976
14.000	0.977
15.000	0.977
16.000	↑ 0.978
17.000	0.978
18.000	0.978
19.000	0.978
20.000	0.978
21.000	0.979
22.000	0.978
23.000	0.979
24.000	0.979
25.000	0.979
26.000	0.980
27.000	0.980
28.000	0.980
29.000	0.981
30.000	0.981

**Lampiran 5 Kurva kalibrasi dan verifikasi metode analisis****1. Kurva kalibrasi hesperidin dalam metanol****a. Hasil kurva kalibrasi**

1) Perhitungan larutan induk hesperidin

Berat penimbangan = 0,0104 gram = 10,4 mg

$$\frac{10,4 \text{ mg}}{100 \text{ mL}} = \frac{104 \text{ mg}}{1000 \text{ mL}} = 104 \text{ ppm}$$

Panjang gelombang maksimum:

Wavelength	Abs
288.00	0.8126

**b. Hasil verifikasi metode analisis**

1) Linearitas

Larutan baku hesperidin 104 ppm dibuat 6 seri konsentrasi yaitu 3 ppm; 5 ppm; 7 ppm; 9 ppm; 11 ppm ; dan 13 ppm.

Konsentrasi (ppm)	Volume yang diambil (ml)	Volume yang dibuat (ml)
3	0,3	10
5	0,5	10
7	0,7	10
9	0,9	10
11	1,1	10
13	1,3	10

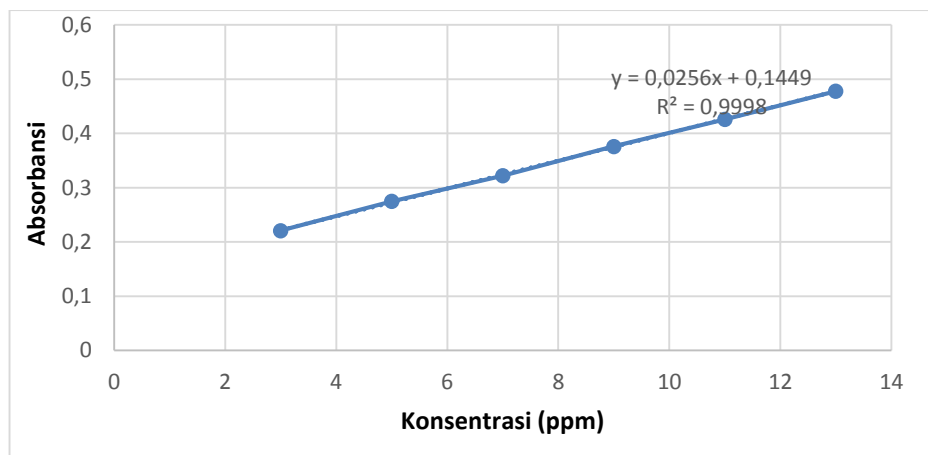
Perhitungan konsentrasi kurva kalibrasi:

$$\begin{aligned}
 1) \quad V_1 \times C_1 &= V_2 \times C_2 \\
 V_1 \times 104 \text{ ppm} &= 10 \text{ ml} \times 3 \text{ ppm} \\
 V_1 &= 0,3 \text{ ml} \\
 2) \quad V_1 \times C_1 &= V_2 \times C_2 \\
 V_1 \times 104 \text{ ppm} &= 10 \text{ ml} \times 5 \text{ ppm} \\
 V_1 &= 0,5 \text{ ml} \\
 3) \quad V_1 \times C_1 &= V_2 \times C_2 \\
 V_1 \times 104 \text{ ppm} &= 10 \text{ ml} \times 7 \text{ ppm} \\
 V_1 &= 0,7 \text{ ml} \\
 4) \quad V_1 \times C_1 &= V_2 \times C_2 \\
 V_1 \times 104 \text{ ppm} &= 10 \text{ ml} \times 9 \text{ ppm} \\
 V_1 &= 0,9 \text{ ml} \\
 5) \quad V_1 \times C_1 &= V_2 \times C_2 \\
 V_1 \times 104 \text{ ppm} &= 10 \text{ ml} \times 11 \text{ ppm} \\
 V_1 &= 1,1 \text{ ml} \\
 6) \quad V_1 \times C_1 &= V_2 \times C_2 \\
 V_1 \times 104 \text{ ppm} &= 10 \text{ ml} \times 13 \text{ ppm}
 \end{aligned}$$



V1 = 1,3 ml

KONSENTRASI (ppm)	ABSORBANSI
3	0,221
5	0,275
7	0,322
9	0,376
11	0,426
13	0,478



Nilai linieritas pada kurva kalibrasi hesperidin dalam metanol yaitu:

Intercept (a) = 0,14486667

Slope (b) = 0,0256

Koefisien korelasi (r) = 0,999889574

Hasil linieritas diperoleh  $r = 0,999889574$ , sehingga dapat disimpulkan bahwa data tersebut linier.

## 2) Akurasi

Konsentrasi (ppm)	Absorbansi	y-a/b	konsentrasi dalam %	konsentrasi rata-rata	konsentrasi rata-rata
7	0,322	6,919	98,847	99,405	100,028
	0,323	6,958	99,405		
	0,324	6,997	99,963		
9	0,376	9,029	100,318	100,608	100,028
	0,377	9,068	100,752		
	0,377	9,068	100,752		
11	0,426	10,982	99,834	100,071	100,028
	0,427	11,021	100,189		
	0,427	11,021	100,189		

Nilai rata-rata recovery dilihat dari data diatas adalah 100,082%

## 3) Presisi

Konsentrasi (ppm)	Abs	Konsentrasi
9	0.376	9,029
9	0.377	9,068
9	0.377	9,068
9	0.378	9,107
9	0.376	9,029
9	0.377	9,068
	Rata-rata	9.061
	SD	2.94%
	CV	0,32%

Nilai CV yang didapatkan adalah sebesar 0,32%, hasil ini sudah sesuai dengan persyaratan presisi yaitu  $\leq 2\%$ .

## 4) LOD &amp; LOQ

Konsentrasi (ppm)	Absorbans i	y'	y-y'	(y-y') <sup>2</sup>
3	0,221	0,221666667	-0,000666667	4,44444E-07
5	0,275	0,272866667	0,002133333	4,55111E-06
7	0,322	0,324066667	-0,002066667	4,27111E-06
9	0,376	0,375266667	0,000733333	5,37778E-07
11	0,426	0,426466667	-0,000466667	2,17778E-07
13	0,478	0,477666667	0,000333333	1,11111E-07

Jumlah = 1,01333E-05

$$S_{y/x} = 0,001591645$$

$$LOD = \frac{3 s_{y/x}}{b} \quad LOQ = \frac{10 s_{y/x}}{b}$$

$$LOD = \frac{3.3 \times 1,01333E-05}{0,001591645} = 0,036256981$$

$$LOQ = \frac{10 \times 1,01333E-05}{0,001591645} = 0,10986964$$

**Lampiran 6 Hasil pengujian ukuran partikel dan indeks polidispersitas  
Replikasi 1**

## Size Distribution Report by Intensity

v2.2



### Sample Details

Sample Name: NLC rep 1  
 SOP Name: NLC\_0321.sop  
 General Notes: original

File Name: 1.dts	Dispersant Name: Water
Record Number: 45	Dispersant RI: 1.330
Material RI: 1.52	Viscosity (cP): 0.8872
Material Absorbtion: 0.100	Measurement Date and Time: Friday, March 12, 2021 4:21:1...

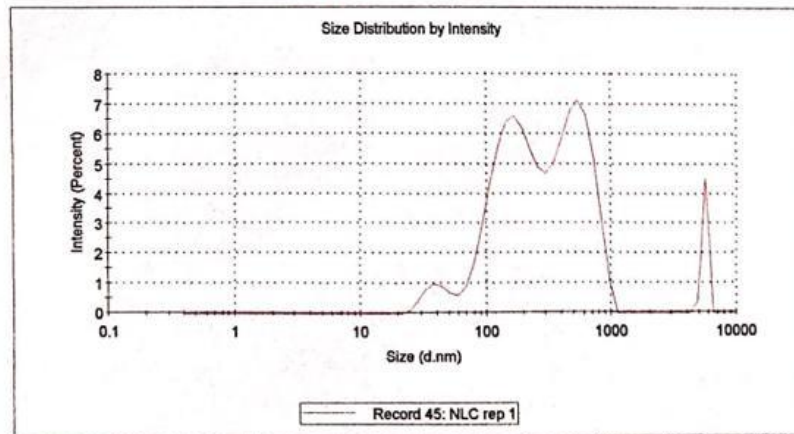
### System

Temperature (°C): 25.0	Duration Used (s): 60
Count Rate (kcps): 324.1	Measurement Position (mm): 4.65
Cell Description: Disposable sizing cuvette	Attenuator: 9

### Results

	Size (d.nm):	% Intensity:	St Dev (d.n...
<b>Z-Average (d.nm):</b> 381.2	Peak 1: 171.8	47.9	64.64
<b>PdI:</b> 0.718	Peak 2: 520.5	43.1	166.2
<b>Intercept:</b> 0.875	Peak 3: 5501	4.6	202.5

**Result quality :** Refer to quality report



Replikasi 2

# Size Distribution Report by Intensity

v2.2



### Sample Details

Sample Name: NLC rep 2  
 SOP Name: NLC\_0321.sop  
 General Notes: original

File Name: 1.dts	Dispersant Name: Water
Record Number: 46	Dispersant RI: 1.330
Material RI: 1.52	Viscosity (cP): 0.8872
Material Absorbtion: 0.100	Measurement Date and Time: Friday, March 12, 2021 3:59:0...

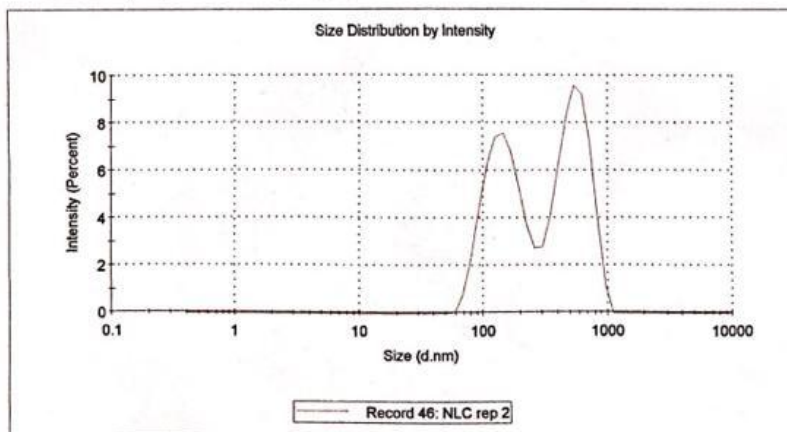
### System

Temperature (°C): 25.0	Duration Used (s): 70
Count Rate (kcps): 164.2	Measurement Position (mm): 4.65
Cell Description: Disposable sizing cuvette	Attenuator: 7

### Results

	Size (d.nm):	% Intensity:	St Dev (d.n...)
<b>Z-Average (d.nm): 385.4</b>	Peak 1: 533.5	53.7	166.3
<b>Pdl: 0.532</b>	Peak 2: 146.1	46.3	48.09
<b>Intercept: 1.02</b>	Peak 3: 0.000	0.0	0.000

Result quality : Refer to quality report



Replikasi 3

## Size Distribution Report by Intensity

v2.2



### Sample Details

Sample Name: NLC rep 3  
 SOP Name: NLC\_0321.sop  
 General Notes: original

File Name: 1.dts	Dispersant Name: Water
Record Number: 47	Dispersant RI: 1.330
Material RI: 1.52	Viscosity (cP): 0.8872
Material Absorbion: 0.100	Measurement Date and Time: Friday, March 12, 2021 4:01:3...

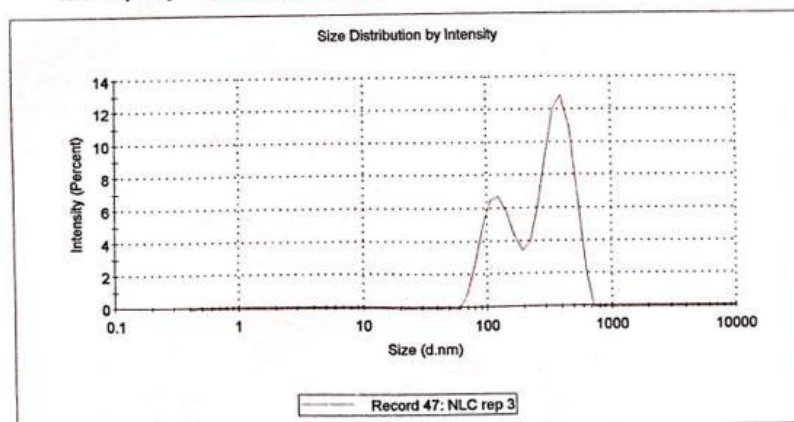
### System

Temperature (°C): 25.0	Duration Used (s): 70
Count Rate (kcps): 155.3	Measurement Position (mm): 4.65
Cell Description: Disposable sizing cuvette	Attenuator: 7

### Results

	Size (d.nm):	% Intensity:	St Dev (d.n...
<b>Z-Average (d.nm):</b> 389.0	<b>Peak 1:</b> 369.8	65.7	105.4
<b>Pdl:</b> 0.470	<b>Peak 2:</b> 125.2	34.3	33.50
<b>Intercept:</b> 1.01	<b>Peak 3:</b> 0.000	0.0	0.000

**Result quality :** Refer to quality report









## Zeta Potential Report

v2.3



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### Sample Details

Sample Name: Zeta rep 3  
 SOP Name: mansettings.nano  
 General Notes: original

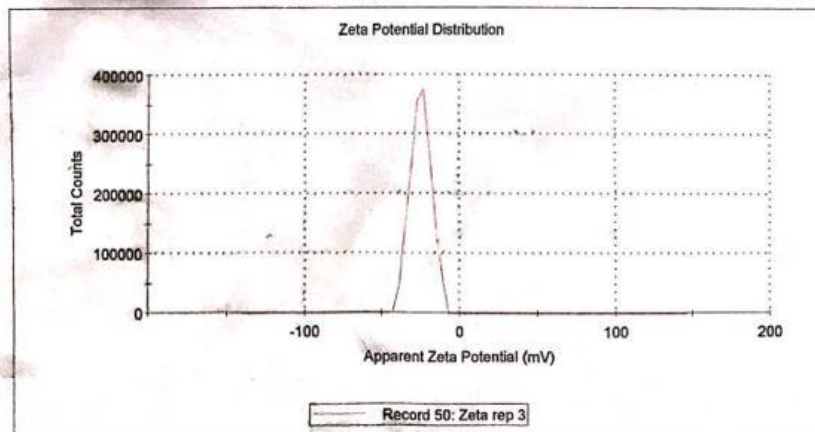
File Name: 1.dls Dispersant Name: Water  
 Record Number: 50 Dispersant RI: 1.330  
 Date and Time: Wednesday, March 10, 2021 8:19:.... Viscosity (cP): 0.8872  
 Dispersant Dielectric Constant: 78.5

### System

Temperature (°C): 25.0 Zeta Runs: 12  
 Count Rate (kcps): 457.9 Measurement Position (mm): 4.50  
 Cell Description: Zeta dip cell Attenuator: 4

### Results

	Mean (mV)	Area (%)	St Dev (mV)
Zeta Potential (mV): -25.2	Peak 1: -25.2	100.0	6.64
Zeta Deviation (mV): 6.64	Peak 2: 0.00	0.0	0.00
Conductivity (mS/cm): 0.0136	Peak 3: 0.00	0.0	0.00
Result quality: <b>Good</b>			



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Zetasizer Ver. 7.12  
Serial Number: MAL1105275

File name: lengkap  
Record Number: 50  
18 Mar 2021 12:53:23 PM

## Lampiran 8 Hasil pengujian efisiensi penjerapan

1) Replikasi 1

Absorbansi = 0,248

$$\begin{aligned}
 y &= a + bx \\
 y &= 0,1448 + 0,0256x \\
 0,248 &= 0,1448 + 0,0256x \\
 x &= \frac{0,248 - 0,1448}{0,0256} \\
 x &= 4,0312 \text{ ppm} \\
 \text{jumlah hesperidin yang tidak terjerap:} \\
 x &= \frac{4,0312 \text{ ppm}}{5000 \text{ ppm}} \times 500 \text{ mg} \times 50 \\
 x &= 20,156 \text{ mg} \\
 \%EP &= \frac{W_a - W_s}{W_a} \times 100\% \\
 &= \frac{500 \text{ mg} - 20,156 \text{ mg}}{500 \text{ mg}} \times 100\% \\
 &= 95,96\%
 \end{aligned}$$

## 2) Replikasi 2

$$\begin{aligned}
 \text{Absorbansi} &= 0,245 \\
 y &= a + bx \\
 y &= 0,1448 + 0,0256x \\
 0,245 &= 0,1448 + 0,0256x \\
 x &= \frac{0,245 - 0,1448}{0,0256} \\
 x &= 3,9140 \text{ ppm} \\
 \text{jumlah hesperidin yang tidak terjerap:} \\
 x &= \frac{3,9140 \text{ ppm}}{5000 \text{ ppm}} \times 500 \text{ mg} \times 50 \\
 x &= 19,57 \text{ mg} \\
 \%EP &= \frac{W_a - W_s}{W_a} \times 100\% \\
 &= \frac{500 \text{ mg} - 19,57 \text{ mg}}{500 \text{ mg}} \times 100\% \\
 &= 96,08\%
 \end{aligned}$$

## 3) Replikasi 3

$$\begin{aligned}
 \text{Absorbansi} &= 0,246 \\
 y &= a + bx \\
 y &= 0,1448 + 0,0256x \\
 0,246 &= 0,1448 + 0,0256x \\
 x &= \frac{0,246 - 0,1448}{0,0256} \\
 x &= 3,9531 \text{ ppm} \\
 \text{jumlah hesperidin yang tidak terjerap:} \\
 x &= \frac{3,9531 \text{ ppm}}{5000 \text{ ppm}} \times 500 \text{ mg} \times 50 \\
 x &= 19,7655 \text{ mg} \\
 \%EP &= \frac{W_a - W_s}{W_a} \times 100\% \\
 &= \frac{500 \text{ mg} - 19,7655 \text{ mg}}{500 \text{ mg}} \times 100\% \\
 &= 96,04\% \\
 \text{Rata-rata} &= \frac{95,96\% + 96,08\% + 96,04\%}{3}
 \end{aligned}$$

= 96,02%

### Lampiran 9 Lampiran hasil uji pH

	Data Uji Ph							
	F1		F2		F3		K-	
	1	21	1	21	1	21	1	21
Replikasi 1	6,30	5,27	6,15	5,07	6,02	4,74	6,55	6,49
Replikasi 2	6,31	5,28	6,15	5,06	6,00	4,75	6,53	6,48
Replikasi 3	6,32	5,29	6,15	5,05	6,01	4,73	6,54	6,48
Rata2	6,31	5,28	6,15	5,06	6,01	4,74	6,54	6,48

### Lampiran 10 Hasil analisis uji pH dengan SPSS

#### Uji One Way ANOVA

##### ANOVA

pH

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.442	3	.481	.995	.481
Within Groups	1.933	4	.483		
Total	3.375	7			

#### Uji Independent T-Test

##### Tests of Normality

	pH	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Nilai	Hari ke-1	.174	4	.	.984	4	.924
	Hari ke-21	.308	4	.	.877	4	.327

a. Lilliefors Significance Correction

##### Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means

	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Nilai i	2.872	.141	2.175	6	.073	.86250	.39653	-.10778	1.83278
			Equal variances not assumed	2.175	3.534	.104	.86250	.39653	-.29818

### Lampiran 11 Hasil uji viskositas

	Data Uji Viskositas (cPs)							
	F1		F2		F3		K-	
	1	21	1	21	1	21	1	21
Replikasi 1	600	500	800	700	1000	900	800	700
Replikasi 2	610	505	810	710	1000	910	805	700
Replikasi 3	605	510	805	705	1000	905	810	705
Rata2	605	505	805	705	1000	905	805	701,67

### Lampiran 12 Hasil analisis uji viskositas dengan SPSS

#### One Way ANOVA

##### ANOVA

Viskositas

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	158009.371	3	52669.790	10.613	.022
Within Groups	19851.044	4	4962.761		
Total	177860.415	7			

#### Post Hoc Tests

##### Multiple Comparisons

Dependent Variable: Viskositas

Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
F1	F2	-200.00000	70.44687	.144	-486.7791	86.7791
	F3	-397.50000*	70.44687	.017	-684.2791	-110.7209

	K-	-198.33500	70.44687	.148	-485.1141	88.4441
	F1	200.00000	70.44687	.144	-86.7791	486.7791
F2	F3	-197.50000	70.44687	.149	-484.2791	89.2791
	K-	1.66500	70.44687	1.000	-285.1141	288.4441
	F1	397.50000*	70.44687	.017	110.7209	684.2791
F3	F2	197.50000	70.44687	.149	-89.2791	484.2791
	K-	199.16500	70.44687	.146	-87.6141	485.9441
	F1	198.33500	70.44687	.148	-88.4441	485.1141
K-	F2	-1.66500	70.44687	1.000	-288.4441	285.1141
	F3	-199.16500	70.44687	.146	-485.9441	87.6141

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

## Homogeneous Subsets

### Viskositas

Tukey HSD<sup>a</sup>

Formula	N	Subset for alpha = 0.05	
		1	2
F1	2	555.0000	
K-	2	753.3350	753.3350
F2	2	755.0000	755.0000
F3	2		952.5000
Sig.		.144	.146

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 2.000.

## Uji Independent T-Test

### Tests of Normality

	Viskositas	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Nilai	Hari ke-1	.253	4	.	.945	4	.682
	Hari ke-21	.248	4	.	.948	4	.706

a. Lilliefors Significance Correction

### Independent Samples Test

Levene's Test for Equality of Variances	t-test for Equality of Means
---	------------------------------

	F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Nil ai	.000	.986	.86 8	6	.419	99.583	114.756	-181.215	380.380
			.86 8	5.99 9	.419	99.583	114.756	-181.226	380.391

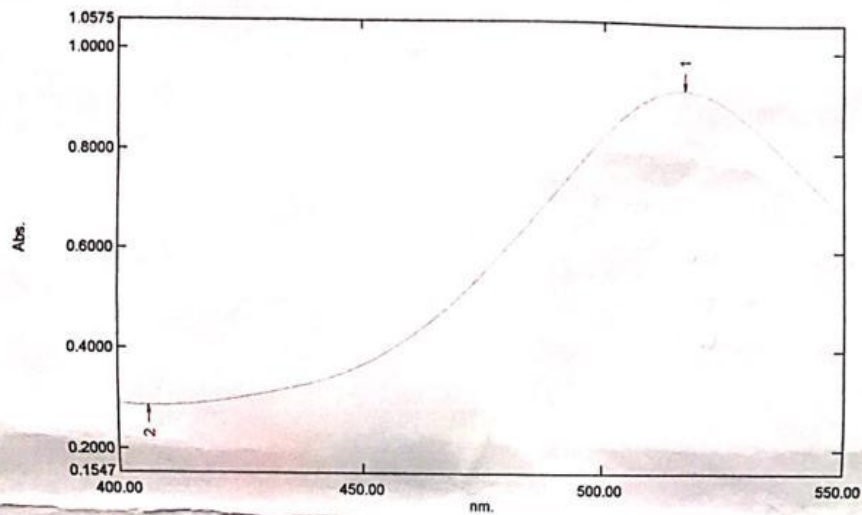
### Lampiran 13 Uji aktivitas antioksidan

#### 1. Penetapan panjang gelombang maksimum DPPH

## Spectrum Peak Pick Report

02/10/2021 11:15:02 AM

Data Set: File\_210210\_111403 - RawData



[Measurement Properties]  
 Wavelength Range (nm.): 400.00 to 550.00  
 Scan Speed: Fast  
 Sampling Interval: 1.0  
 Auto Sampling Interval: Disabled  
 Scan Mode: Single

No.	P/V	Wavelength	Abs.	Description
1	●	517.00	0.9250	
2	●	406.00	0.2872	

[Instrument Properties]  
 Instrument Type: UV-1800 Series  
 Measuring Mode: Absorbance  
 Slit Width: 1.0 nm  
 Light Source Change Wavelength: 340.0 nm  
 S/R Exchange: Normal

[Attachment Properties]  
 Attachment: None

[Operation]  
 Threshold: 0.0010000  
 Points: 4  
 InterPolate: Disabled  
 Average: Disabled

[Sample Preparation Properties]  
 Weight:  
 Volume:  
 Dilution:  
 Path Length:  
 Additional Information:

## 2. Penetapan *operating time*

## Kinetics Data Print Report

02/11/2021 12:20:21 PM

Time ( Minute )	RawData ...
0.000	0.622
1.000	0.622
2.000	0.621
3.000	0.620
4.000	0.619
5.000	0.618
6.000	0.617
7.000	0.616
8.000	0.616
9.000	0.615
10.000	0.614
11.000	0.614
12.000	0.613
13.000	0.612
14.000	0.611
15.000	0.611
16.000	0.610
17.000	0.609
18.000	0.609
19.000	0.608
20.000	0.607
21.000	0.607
22.000	0.606
23.000	0.605
24.000	0.605
25.000	0.604
26.000	0.604
27.000	0.603
28.000	0.602
29.000	0.602
30.000	0.601
31.000	0.601
32.000	0.600
33.000	0.599
34.000	0.599
35.000	0.598
36.000	0.598
37.000	0.597
38.000	0.596
39.000	0.596
40.000	0.596
41.000	0.595
42.000	0.594
43.000	0.594
44.000	0.593
45.000	0.593
46.000	0.592
47.000	0.592
48.000	0.591
49.000	0.590
50.000	0.590

## Kinetics Data Print Report

02/11/2021 12:20:21 PM

Time ( Minute )	RawData ...
51.000	0.589
52.000	0.589
53.000	0.588
54.000	0.587
55.000	0.587
56.000	0.586
57.000	0.586
58.000	0.585
59.000	0.585
60.000	0.584



### 3. Uji DPPH hesperidin

Larutan stok DPPH 159 ppm → 159 mg hesperidin + ad 100 ml etanol *p.a.*  
 Larutan stok hesperidin 5010 ppm → 501 mg hesperidin + ad 100 ml etanol

*p.a.*  
 Absorbansi DPPH = 0,893  
 Lamda maksimal = 517 nm  
 Operating Time = 38 menit

Perhitungan konsentrasi kurva kalibrasi 50; 40; 30; 20; 10 ppm :

1)  $V1 \times C1 = V2 \times C2$

$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 50 \text{ ppm}$

$V1 = 1 \text{ ml}$

2)  $V1 \times C1 = V2 \times C2$

$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 40 \text{ ppm}$

$V1 = 0,8 \text{ ml}$

3)  $V1 \times C1 = V2 \times C2$

$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 30 \text{ ppm}$

$V1 = 0,6 \text{ ml}$

4)  $V1 \times C1 = V2 \times C2$

$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 20 \text{ ppm}$

$V1 = 0,4 \text{ ml}$

5)  $V1 \times C1 = V2 \times C2$

$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 10 \text{ ppm}$

$V1 = 0,2 \text{ ml}$

#### a. Replikasi I

Konsentrasi (ppm)	Absorbansi	% Inhibisi
50	0,314	64,83
40	0,415	53,52
30	0,535	42,32
20	0,631	29,33
10	0,723	19,03

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$a = 7,069$

$b = 1,1579$

$r = 0,9993$

$y = a + bx$

$y = 7,069 + 1,1579x$

keterangan :

$x$  = konsentrasi (ppm)

$y = 50$

**Perhitungan IC<sub>50</sub> hesperidin**

$$50 = a + bx$$

$$50 = 7,069 + 1,1579x$$

$$1,1579x = 42,931$$

$$x = 37,07 \text{ ppm}$$

### b. Replikasi II

Konsentrasi (ppm)	Absorbansi	% Inhibisi
50	0,322	63,94
40	0,419	53,07
30	0,520	41,76
20	0,628	29,67
10	0,710	20,38

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = 8,608$$

$$b = 1,1052$$

$$r = 0,9996$$

$$y = a + bx$$

$$y = 8,608 + 1,1052x$$

keterangan :

x = konsentrasi (ppm)

y = 50

### Perhitungan IC<sub>50</sub> hesperidin

$$50 = a + bx$$

$$50 = 8,608 + 1,1052x$$

$$1,1052x = 41,392$$

$$x = 37,45 \text{ ppm}$$

### c. Replikasi III

Konsentrasi (ppm)	Absorbansi	% Inhibisi
50	0,321	64,05
40	0,414	53,63
30	0,518	41,99
20	0,634	29,00
10	0,721	19,26

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai :

$$a = 7,323$$

$$b = 1,1421$$

$$r = 0,9991$$

$$y = a + bx$$

$$y = 7,323 + 1,1421x$$

keterangan :

x = konsentrasi (ppm)

y = 50

### Perhitungan IC<sub>50</sub> hesperidin

$$50 = a + bx$$

$$50 = 7,323 + 1,1421x$$

$$1,1421x = 42,677$$

$$x = 37,36 \text{ ppm}$$

**Rata-rata IC<sub>50</sub> Hesperidin :**

Replikasi I = 37,07 ppm

Replikasi II = 37,45 ppm

Replikasi III = 37,36 ppm



37,29 ppm

Nilai IC<sub>50</sub> hesperidin sebesar 37,29 ppm, memiliki aktivitas antioksidan sangat kuat karena senyawa dinyatakan memiliki aktivitas antioksidan yang sangat kuat jika nilai IC<sub>50</sub> kurang dari 50 ppm (IC<sub>50</sub> < 50 ppm)

**4. Uji DPPH NLC hesperidin**

Larutan stok DPPH 159 ppm 15,9 mg + ad 100 ml etanol *p.a*

Larutan stok NLC 5020 ppm 502 mg NLC hesperidin + ad 100 ml etanol *p.a.*

Absorbansi DPPH = 0,893

Lamda maksimal = 517 nm

Operating Time = 38 menit

Perhitungan konsentrasi kurva kalibrasi 60; 50; 40; 30; 20 ppm :

1)  $V_1 \times C_1 = V_2 \times C_2$

$$V_1 \times 5020 \text{ ppm} = 100 \text{ ml} \times 60 \text{ ppm}$$

$$V_1 = 1,2 \text{ ml}$$

2)  $V_1 \times C_1 = V_2 \times C_2$

$$V_1 \times 5020 \text{ ppm} = 100 \text{ ml} \times 50 \text{ ppm}$$

$$V_1 = 1 \text{ ml}$$

3)  $V_1 \times C_1 = V_2 \times C_2$

$$V_1 \times 5020 \text{ ppm} = 100 \text{ ml} \times 40 \text{ ppm}$$

$$V_1 = 0,8 \text{ ml}$$

4)  $V_1 \times C_1 = V_2 \times C_2$

$$V_1 \times 5020 \text{ ppm} = 100 \text{ ml} \times 30 \text{ ppm}$$

$$V_1 = 0,6 \text{ ml}$$

5)  $V_1 \times C_1 = V_2 \times C_2$

$$V_1 \times 5020 \text{ ppm} = 100 \text{ ml} \times 20 \text{ ppm}$$

$$V_1 = 0,4 \text{ ml}$$

**a. Replikasi I**

Konsentrasi (ppm)	Absorbansi	% Inhibisi
60	0,305	65,84
50	0,409	54,19
40	0,517	42,10
30	0,628	29,67
20	0,712	20,26

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -3,86$$

$$b = 1,1568$$

$$r = 0,999$$

$$y = a + bx$$

$$y = -3,86 + 1,1568x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

#### Perhitungan IC<sub>50</sub> NLC hesperidin

$$50 = a + bx$$

$$50 = -3,86 + 1,1568x$$

$$1,1568x = 53,86$$

$$x = 46,55 \text{ ppm}$$

#### b. Replikasi II

Konsentrasi (ppm)	Absorbansi	% Inhibisi
60	0,311	65,17
50	0,424	52,51
40	0,509	43,00
30	0,617	30,90
20	0,732	18,02

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -4,444$$

$$b = 1,1591$$

$$r = 0,998$$

$$y = a + bx$$

$$y = -4,444 + 1,1591x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

#### Perhitungan IC<sub>50</sub> NLC hesperidin

$$50 = a + bx$$

$$50 = -4,444 + 1,1591x$$

$$1,1591x = 54,444$$

$$x = 46,97 \text{ ppm}$$

#### C. Replikasi III

Konsentrasi (ppm)	Absorbansi	% Inhibisi
60	0,309	65,39
50	0,419	53,07
40	0,522	41,54
30	0,616	31,01
20	0,708	20,71

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -2,224$$

$$b = 1,1142$$

$$r = 0,9992$$

$$y = a + bx$$

$$y = -2,224 + 1,1142x$$

keterangan :

x = konsentrasi (ppm)

y = 50

**Perhitungan IC<sub>50</sub> NLC hesperidin**


$$50 = a + bx$$

$$50 = -2,224 + 1,1142x$$

$$1,1142x = 52,224$$



$$x = 46,87 \text{ ppm}$$

**Rata-rata IC<sub>50</sub> Hesperidin :**

Replikasi I	= 46,55 ppm		46,79 ppm
Replikasi II	= 46,97 ppm		
Replikasi III	= 46,87 ppm		

Nilai IC<sub>50</sub> NLC hesperidin sebesar 46,79 ppm, memiliki aktivitas antioksidan yang kuat karena senyawa dinyatakan memiliki aktivitas antioksidan yang sangat kuat jika nilai IC<sub>50</sub> kurang dari 50 ppm (IC<sub>50</sub> < 50 ppm)

**5. Uji DPPH serum (Formula I)**

Larutan stok DPPH	159		ppm 15,9 mg+ ad 100 ml etanol <i>p.a</i>
Larutan stok F1	4990		ppm 499 mg serum NLC hesperidin + ad 100 ml etanol <i>p.a.</i>
Absorbansi DPPH	= 0,885		
Lamda maksimal	= 517 nm		
Operating Time	= 38 menit		

Perhitungan konsentrasi kurva kalibrasi 100; 90; 80; 70; 60 ppm :

**1) V<sub>1</sub> x C<sub>1</sub> = V<sub>2</sub> x C<sub>2</sub>**

$$V_1 \times 4990 \text{ ppm} = 100\text{ml} \times 100 \text{ ppm}$$

$$V_1 = 2 \text{ ml}$$

**2) V<sub>1</sub> x C<sub>1</sub> = V<sub>2</sub> x C<sub>2</sub>**

$$V_1 \times 4990 \text{ ppm} = 100\text{ml} \times 90 \text{ ppm}$$

$$V_1 = 1,8 \text{ ml}$$

**3) V<sub>1</sub> x C<sub>1</sub> = V<sub>2</sub> x C<sub>2</sub>**

$$V_1 \times 4990 \text{ ppm} = 100\text{ml} \times 80 \text{ ppm}$$

$$V_1 = 1,6 \text{ ml}$$

**4) V<sub>1</sub> x C<sub>1</sub> = V<sub>2</sub> x C<sub>2</sub>**

$$V_1 \times 4990 \text{ ppm} = 100\text{ml} \times 70 \text{ ppm}$$

$$V_1 = 1,4 \text{ ml}$$

**5) V<sub>1</sub> x C<sub>1</sub> = V<sub>2</sub> x C<sub>2</sub>**

$$V_1 \times 4990 \text{ ppm} = 100 \text{ ml} \times 60 \text{ ppm}$$

$$V_1 = 1,2 \text{ ml}$$

#### a. Replikasi I

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,306	65,42
90	0,362	59,09
80	0,414	53,22
70	0,471	46,77
60	0,542	38,75

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = 0,122$$

$$b = 0,6566$$

$$r = 0,9990$$

$$y = a + bx$$

$$y = 0,122 + 0,6566x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

#### Perhitungan IC<sub>50</sub> serum NLC hesperidin

$$50 = a + bx$$

$$50 = 0,122 + 0,6566x$$

$$0,6566x = 49,878$$

$$x = 75,96 \text{ ppm}$$

#### b. Replikasi II

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,305	65,53
90	0,367	58,53
80	0,422	52,31
70	0,475	46,32
60	0,539	39,09

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = 0,284$$

$$b = 0,6509$$

$$r = 0,9995$$

$$y = a + bx$$

$$y = 0,284 + 0,6509x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

#### Perhitungan IC<sub>50</sub> serum NLC hesperidin

$$50 = a + bx$$

$$50 = 0,284 + 0,6509x$$

$$0,6509x = 49,716$$

$$x = 76,38 \text{ ppm}$$

### C. Replikasi III

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,309	65,08
90	0,368	58,41
80	0,418	52,76
70	0,470	46,89
60	0,540	38,98

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = 1,448$$

$$b = 0,6372$$

$$r = 0,998$$

$$y = a + bx$$

$$y = 1,448 + 0,6372x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

### Perhitungan IC<sub>50</sub> serum NLC hesperidin

$$50 = a + bx$$

$$50 = 1,448 + 0,6372x$$

$$0,6372x = 48,55$$

$$x = 76,19 \text{ ppm}$$

### Rata-rata IC<sub>50</sub> Hesperidin :

$$\text{Replikasi I} = 75,96 \text{ ppm}$$

$$\text{Replikasi II} = 76,38 \text{ ppm}$$

$$\text{Replikasi III} = 76,19 \text{ ppm}$$



$$76,17 \text{ ppm}$$

Nilai IC<sub>50</sub> serum NLC hesperidin (F1) sebesar 76,17 ppm, memiliki aktivitas antioksidan yang kuat karena senyawa dinyatakan memiliki aktivitas antioksidan yang kuat jika nilai IC<sub>50</sub> kurang dari 100 ppm (IC<sub>50</sub> < 100 ppm)

### 6. Uji DPPH serum (Formula II)

Larutan stok DPPH 159

Larutan stok F2

+ ad 100 ml etanol *p.a.*

Absorbansi DPPH = 0,885

Lamda maksimal = 517 nm

Operating Time = 38 menit



ppm 15,9 mg+ ad 100 ml etanol *p.a.*

5010ppm 501 mg serum NLC hesperidin (5010 ppm)

Perhitungan konsentrasi kurva kalibrasi 100; 90; 80; 70; 60 ppm :

$$1) V1 \times C1 = V2 \times C2$$

$$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 100 \text{ ppm}$$

$$V1 = 2 \text{ ml}$$

$$2) V1 \times C1 = V2 \times C2$$

$$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 90 \text{ ppm}$$

$$V1 = 1,8 \text{ ml}$$

$$3) V1 \times C1 = V2 \times C2$$

$$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 80 \text{ ppm}$$

$$V1 = 1,6 \text{ ml}$$

$$4) V1 \times C1 = V2 \times C2$$

$$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 70 \text{ ppm}$$

$$V1 = 1,4 \text{ ml}$$

$$5) V1 \times C1 = V2 \times C2$$

$$V1 \times 5010 \text{ ppm} = 100\text{ml} \times 60\text{ppm}$$

$$V1 = 1,2 \text{ ml}$$

#### a. Replikasi I

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,310	64,97
90	0,372	57,96
80	0,430	51,41
70	0,489	44,74
60	0,545	38,41

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -1,574$$

$$b = 0,6634$$

$$r = 0,9998$$

$$y = a + bx$$

$$y = -0,1574 + 0,6634x$$

keterangan :

x = konsentrasi (ppm)

y = 50

**Perhitungan IC<sub>50</sub> serum NLC hesperidin**

$$50 = a + bx$$

$$50 = -1,574 + 0,6634x$$

$$0,6634x = 51,574$$

$$x = 77,44 \text{ ppm}$$

#### b. Replikasi II

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,311	64,85
90	0,370	58,19
80	0,429	51,52
70	0,490	44,63
60	0,543	38,64



Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -1,218$$

$$b = 0,6598$$

$$r = 0,9997$$

$$y = a + bx$$

$$y = -1,218 + 0,6598x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

**Perhitungan IC<sub>50</sub> serum NLC hesperidin**

$$50 = a + bx$$

$$50 = -1,218 + 0,6598x$$

$$0,6598x = 51,218$$

$$x = 77,62 \text{ ppm}$$

**C. Replikasi III**

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,313	64,63
90	0,368	58,41
80	0,431	51,29
70	0,491	44,51
60	0,541	38,87

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -0,794$$

$$b = 0,6542$$

$$r = 0,9993$$

$$y = a + bx$$

$$y = -0,794 + 0,6542x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

**Perhitungan IC<sub>50</sub> serum NLC hesperidin**

$$50 = a + bx$$

$$50 = -0,794 + 0,6542x$$

$$0,6542x = 50,794$$

$$x = 77,64 \text{ ppm}$$

**Rata-rata IC<sub>50</sub> Serum NLC Hesperidin :**

$$\text{Replikasi I} = 77,44 \text{ ppm}$$

$$\text{Replikasi II} = 77,62 \text{ ppm}$$

$$\text{Replikasi III} = 77,64 \text{ ppm}$$



$$77,56 \text{ ppm}$$

Nilai IC<sub>50</sub> serum NLC hesperidin (F2) sebesar 77,56 ppm, memiliki aktivitas antioksidan yang kuat karena senyawa dinyatakan memiliki aktivitas antioksidan yang kuat jika nilai IC<sub>50</sub> kurang dari 100 ppm (IC<sub>50</sub> < 100 ppm)

<b>7. Uji DPPH serum</b>	<b>(Formula III)</b>
Larutan stok DPPH 159	ppm 15,9 mg + ad 100 ml etanol <i>p.a</i>
Larutan stok F3 5030	ppm 503 mg serum NLC hesperidin + ad 100 ml etanol <i>p.a.</i>
Absorbansi DPPH = 0,885	
Lamda maksimal = 517 nm	
Operating Time = 38 menit	

Perhitungan konsentrasi kurva kalibrasi 100; 90; 80; 70; 60 ppm :

1)  $V1 \times C1 = V2 \times C2$

$V1 \times 5030 \text{ ppm} = 100\text{ml} \times 100 \text{ ppm}$

$V1 = 2 \text{ ml}$

2)  $V1 \times C1 = V2 \times C2$

$V1 \times 5030 \text{ ppm} = 100\text{ml} \times 90 \text{ ppm}$

$V1 = 1,8 \text{ ml}$

3)  $V1 \times C1 = V2 \times C2$

$V1 \times 5030 \text{ ppm} = 100\text{ml} \times 80 \text{ ppm}$

$V1 = 1,6 \text{ ml}$

4)  $V1 \times C1 = V2 \times C2$

$V1 \times 5030 \text{ ppm} = 100\text{ml} \times 70 \text{ ppm}$

$V1 = 1,4 \text{ ml}$

5)  $V1 \times C1 = V2 \times C2$

$V1 \times 5030 \text{ ppm} = 100\text{ml} \times 60\text{ppm}$

$V1 = 1,2 \text{ ml}$

#### a. Replikasi I

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,321	63,72
90	0,382	56,83
80	0,445	49,71
70	0,495	44,06
60	0,557	37,06

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$a = -2,596$

$b = 0,6609$

$r = 0,9993$

$y = a + bx$

$y = -2,596 + 0,6609x$

keterangan :

x = konsentrasi (ppm)

y = 50

**Perhitungan IC<sub>50</sub> serum NLC hesperidin**

$$50 = a + bx$$

$$50 = -2,596 + 0,6609x$$

$$0,6609x = 52,596$$

$$x = 79,58 \text{ ppm}$$

### b. Replikasi II

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,320	63,84
90	0,385	56,49
80	0,441	50,16
70	0,497	43,84
60	0,555	37,28

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -2,294$$

$$b = 0,6577$$

$$r = 0,9995$$

$$y = a + bx$$

$$y = -2,294 + 0,6577x$$

keterangan :

x = konsentrasi (ppm)

y = 50

### Perhitungan IC<sub>50</sub> serum NLC hesperidin

$$50 = a + bx$$

$$50 = -2,294 + 0,6577x$$

$$0,6577x = 52,294$$

$$x = 79,51 \text{ ppm}$$

### c. Replikasi III

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,324	63,38
90	0,387	56,27
80	0,448	49,37
70	0,501	43,38
60	0,560	36,72

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -3,144$$

$$b = 0,6621$$

$$r = 0,9995$$

$$y = a + bx$$

$$y = -3,144 + 0,6621x$$

keterangan :

x = konsentrasi (ppm)

y = 50

**Perhitungan IC<sub>50</sub> serum NLC hesperidin**

$$50 = a + bx$$

$$50 = -3,144 + 0,6621x$$

$$0,6621x = 53,144$$

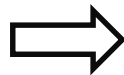
$$x = 80,26 \text{ ppm}$$

**Rata-rata IC<sub>50</sub> serum NLC Hesperidin :**

$$\text{Replikasi I} = 79,58 \text{ ppm}$$

$$\text{Replikasi II} = 79,51 \text{ ppm}$$

$$\text{Replikasi III} = 80,26 \text{ ppm}$$



$$79,78 \text{ ppm}$$

Nilai IC<sub>50</sub> serum NLC hesperidin (F3) sebesar 79,78 ppm, memiliki aktivitas antioksidan yang kuat karena senyawa dinyatakan memiliki aktivitas antioksidan yang kuat jika nilai IC<sub>50</sub> kurang dari 100 ppm (IC<sub>50</sub> < 100 ppm)

**8. Uji DPPH serum (K-)**

$$\text{Larutan stok DPPH} = 159$$

$$\text{Larutan stok K-} = 5010$$

etanol *p.a.* (5010 ppm)

$$\text{Absorbansi DPPH} = 0,885$$

$$\text{Lamda maksimal} = 517 \text{ nm}$$

$$\text{Operating Time} = 38 \text{ menit}$$



$$\text{ppm } 15,9 \text{ mg} + \text{ad } 100 \text{ ml etanol } p.a$$

$$\text{ppm } 501 \text{ mg serum K-} + \text{ad } 100 \text{ ml}$$

Perhitungan konsentrasi kurva kalibrasi 100; 90; 80; 70; 60 ppm :

$$1) V_1 \times C_1 = V_2 \times C_2$$

$$V_1 \times 5010 \text{ ppm} = 100 \text{ ml} \times 100 \text{ ppm}$$

$$V_1 = 2 \text{ ml}$$

$$2) V_1 \times C_1 = V_2 \times C_2$$

$$V_1 \times 5010 \text{ ppm} = 100 \text{ ml} \times 90 \text{ ppm}$$

$$V_1 = 1,8 \text{ ml}$$

$$3) V_1 \times C_1 = V_2 \times C_2$$

$$V_1 \times 5010 \text{ ppm} = 100 \text{ ml} \times 80 \text{ ppm}$$

$$V_1 = 1,6 \text{ ml}$$

$$4) V_1 \times C_1 = V_2 \times C_2$$

$$V_1 \times 5010 \text{ ppm} = 100 \text{ ml} \times 70 \text{ ppm}$$

$$V_1 = 1,4 \text{ ml}$$

$$5) V_1 \times C_1 = V_2 \times C_2$$

$$V_1 \times 5010 \text{ ppm} = 100 \text{ ml} \times 60 \text{ ppm}$$

$$V_1 = 1,2 \text{ ml}$$

**a. Replikasi I**

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,843	4,74
90	0,851	3,84
80	0,860	2,82
70	0,871	1,58
60	0,879	0,67

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -5,59$$

$$b = 0,104$$

$$r = 0,998$$

$$y = a + bx$$

$$y = -5,59 + 0,104x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

**Perhitungan IC50 hesperidin**

$$50 = a + bx$$

$$50 = -5,59 + 0,104x$$

$$0,104x = 55,59$$

$$x = 534,51 \text{ ppm}$$

**b. Replikasi II**

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,844	4,63
90	0,850	3,95
80	0,861	2,71
70	0,870	1,69
60	0,878	0,79

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai :

$$a = -5,198$$

$$b = 0,0994$$

$$r = 0,996$$

$$y = a + bx$$

$$y = -5,198 + 0,0994x$$

keterangan :

x = konsentrasi (ppm)

$$y = 50$$

**Perhitungan IC50 hesperidin**

$$50 = a + bx$$

$$50 = -5,198 + 0,0994x$$

$$0,0994x = 55,198$$

$$x = 555,31 \text{ ppm}$$

### c. Replikasi III

Konsentrasi (ppm)	Absorbansi	% Inhibisi
100	0,843	4,40
90	0,851	3,84
80	0,861	2,71
70	0,871	1,58
60	0,879	0,67

Persamaan regresi linier antara konsentrasi dan % inhibisi diperoleh nilai:

$$a = -5,136$$

$$b = 0,0972$$

$$r = 0,994$$

$$y = a + bx$$

$$y = -5,136 + 0,0972x$$

keterangan :

x = konsentrasi (ppm)

y = 50

#### Perhitungan IC50 hesperidin

$$50 = a + bx$$

$$50 = -5,136 + 0,0972x$$

$$0,0972x = 55,136$$

$$x = 567,24 \text{ ppm}$$

#### Rata-rata IC50 Hesperidin :

Replikasi I = 534,51 ppm

Replikasi II = 555,31 ppm

Replikasi III = 567,24 ppm



552,35 ppm

Nilai IC<sub>50</sub> formula serum (K-) sebesar 552,35 ppm, yang artinya tidak memiliki aktivitas antioksidan karena nilai IC<sub>50</sub> lebih dari 200 ppm (IC<sub>50</sub> > 200 ppm)

## Lampiran 14 Hasil analisis uji antioksidan dengan SPSS

### Uji *One-Way ANOVA*

#### Tests of Normality

	Formula	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
IC50	Hesperidin	,298	3	.	,915	3	,437
	NLC Hesperidin	,298	3	.	,916	3	,439
	Serum F1	,219	3	.	,987	3	,780
	Serum F2	,353	3	.	,824	3	,174
	Serum F3	,381	3	.	,760	3	,052
	K-	,238	3	.	,976	3	,704

**Test of Homogeneity of Variances**

IC50			
Levene Statistic	df1	df2	Sig.
6,607	5	12	,054

**ANOVA**

IC50					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	602098,636	5	120419,727	2629,457	,000
Within Groups	549,557	12	45,796		
Total	602648,193	17			

**Multiple Comparisons**

Dependent Variable: IC50

Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Hesperidin	NLC Hesperidin	-9,50333	5,52548	,545	-28,0630	9,0563
	Serum F1	-39,04000*	5,52548	,000	-57,5997	-20,4803
	Serum F2	-40,27333*	5,52548	,000	-58,8330	-21,7137
	Serum F3	-42,47000*	5,52548	,000	-61,0297	-23,9103
	K-	-515,06000*	5,52548	,000	-533,6197	-496,5003
NLC Hesperidin	Hesperidin	9,50333	5,52548	,545	-9,0563	28,0630
	Serum F1	-29,53667*	5,52548	,002	-48,0963	-10,9770
	Serum F2	-30,77000*	5,52548	,001	-49,3297	-12,2103
	Serum F3	-32,96667*	5,52548	,001	-51,5263	-14,4070
	K-	-505,55667*	5,52548	,000	-524,1163	-486,9970
Serum F1	Hesperidin	39,04000*	5,52548	,000	20,4803	57,5997
	NLC Hesperidin	29,53667*	5,52548	,002	10,9770	48,0963
	Serum F2	-1,23333	5,52548	1,000	-19,7930	17,3263
	Serum F3	-3,43000	5,52548	,987	-21,9897	15,1297
	K-	-476,02000*	5,52548	,000	-494,5797	-457,4603
Serum F2	Hesperidin	40,27333*	5,52548	,000	21,7137	58,8330
	NLC Hesperidin	30,77000*	5,52548	,001	12,2103	49,3297
	Serum F1	1,23333	5,52548	1,000	-17,3263	19,7930
	Serum F3	-2,19667	5,52548	,998	-20,7563	16,3630
	K-	-474,78667*	5,52548	,000	-493,3463	-456,2270
Serum F3	Hesperidin	42,47000*	5,52548	,000	23,9103	61,0297
	NLC Hesperidin	32,96667*	5,52548	,001	14,4070	51,5263
	Serum F1	3,43000	5,52548	,987	-15,1297	21,9897
	Serum F2	2,19667	5,52548	,998	-16,3630	20,7563
	K-	-472,59000*	5,52548	,000	-491,1497	-454,0303
K-	Hesperidin	515,06000*	5,52548	,000	496,5003	533,6197

NLC Hesperidin	505,55667*	5,52548	,000	486,9970	524,1163
Serum F1	476,02000*	5,52548	,000	457,4603	494,5797
Serum F2	474,78667*	5,52548	,000	456,2270	493,3463
Serum F3	472,59000*	5,52548	,000	454,0303	491,1497

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

## Homogeneous Subsets

### IC50


Tukey HSD<sup>a</sup>

Formula	N	Subset for alpha = 0.05		
		1	2	3
Hesperidin	3	37,2933		
NLC Hesperidin	3	46,7967		
Serum F1	3		76,3333	
Serum F2	3		77,5667	
Serum F3	3		79,7633	
K-	3			552,3533
Sig.		,545	,987	1,000

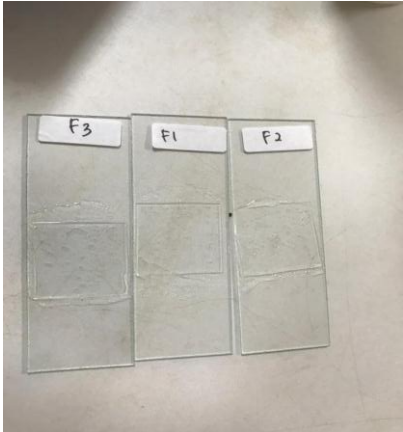
Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3,000.

## Lampiran 15 Gambar pengujian

No	Keterangan	Gambar
1	Gambar NLC hesperidin	



2.	Gambar preparasi uji ukuran partikel NLC	
3	Gambar uji homogenitas NLC hesperidin dalam sediaan serum	
4	Gambar serum NLC hesperidin.  Keterangan : F1: Sediaan serum dengan konsentrasi xanthan gum 0,50% F2: Sediaan serum dengan konsentrasi xanthan gum 0,75% F3: Sediaan serum dengan konsentrasi xanthan gum 1% K-: Kontrol Negatif	