

## **BAB V**

### **KESIMPULAN DAN SARAN**

#### **A. Kesimpulan**

Berdasarkan hasil dari penelitian yang telah dilakukan maka dapat disimpulkan bahwa :

Pertama, panjang rantai lipid padat (asam miristat dan asam stearat) berpengaruh dominan terhadap peningkatan efisiensi penyerapan dan aktivitas antioksidan, variasi konsentrasi asam oleat berpengaruh dominan dalam peningkatan pelepasan obat.

Kedua, formula NLC resveratrol yang paling baik adalah formula 2 dengan panjang rantai C18 (asam stearat) dan konsentrasi asam oleat pada aras bawah (0,1) memiliki aktivitas antioksidan dan pelepasan obat yang paling tinggi.

#### **B. Saran**

Berdasarkan hasil dari penelitian yang telah dilakukan, penulis menyarankan perlu dilakukan penelitian lebih lanjut agar menapatkan hasil yang lebih maskimal lagi, yaitu :

1. Perlu dilakukan pengujian ukuran partikel pada NLC resveratrol secara kuantitatif.
2. Perlu dilakukan uji optimasi pada sistem NLC resveratrol.
3. Perlu dilakukan pembuatan sistem NLC resveratrol dijadikan suatu sediaan.

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### Lampiran 1. Gambar NLC Resveratrol



### Lampiran 2. Sertifikat analisis resveratrol



ADDRESS: RM1707, BLDG 5, CHANGFA, 101-1# TAIHU  
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### CERTIFICATE OF ANALYSIS

<b>Product Name</b>	Resveratrol	<b>Code</b>	BPBE-629-A
<b>Botanical Source</b>	Polygonum cuspidatum Sieb.Et Zucc	<b>Used Part</b>	Root
<b>Batch No.</b>	H020862918A	<b>Mfg. Date</b>	Aug. 10, 2018
<b>Packing</b>	25kg/Drum	<b>Retest Date</b>	Aug. 09, 2020
<b>Quantity</b>	10g	<b>Report Date</b>	Aug. 17, 2018
<b>Specification</b>	98%(HPLC)		
	<b>ITEM</b>	<b>SPECIFICATION</b>	<b>RESULT</b>
	<b>Assay(HPLC)</b>	≥98.0%	98.26%
	<b>Appearance</b>	Milky - white powder	Complies
	<b>Odor</b>	Characteristic	Complies
	<b>Taste</b>	Characteristic	Complies
	<b>Particle Size</b>	NLT 95% pass 80 mesh	Complies
	<b>Loss on Drying</b>	≤0.5%	0.20%
	<b>Ash</b>	≤0.5%	0.07%
	<b>Bulk Density</b>	35-45g/100mL	40g/100mL
	<b>Heavy Metals</b>	≤10ppm	Complies Complies Complies Complies
	-As	≤1.0ppm	Complies
	-Pb	≤1.5ppm	Complies
	-Cd	≤0.5ppm	Complies
	-Hg	≤0.1ppm	Complies
	<b>Total Plate Count</b>	≤1000cfu/g	Complies Complies Negative
	-Yeast & Mold	≤100cfu/g Negative Negative	Negative
	-E.Coli		
	-Salmonella		
	<b>Conclusion</b>	Comply with the specification.	
	<b>Storage</b>	Preserve in tight containers, protected from strong light and high heat. Store in dry cool place.	
	Analysist :	QC MANAGER:	QA:

### Lampiran 3. Kurva kalibrasi dan validasi metode analisis

#### 1. Hasil kurva kalibrasi resveratrol dapar posfat

##### a. Hasil kurva kalibrasi resveratrol

1) Penimbangan dan Pembuatan larutan induk resveratrol  $\frac{49,52 \text{ mg}}{10 \text{ mL}} \times 1000 \text{ mL} = 4952 \text{ ppm}$

2) Pembuatan larutan stock resveratrol 99,04 ppm

Rumus :  $V1. C1 = V2. C2$

$100 \mu\text{L} \times 4952 \text{ ppm} / 10000 \mu\text{L} \times C2$

$C2 : 200 \mu\text{L} \times 4952 \text{ ppm} / 10000 \mu\text{L} = 99,04 \text{ ppm}$

3) Hasil Penentuan panjang gelombang maksimum

Perhitunga pembuatan panjang gelombang maksimum :

$99,04 \text{ ppm} : V1 \times 4952 \text{ ppm} / 10000 \mu\text{L} \times 99,04 \text{ ppm} = 200 \mu\text{L}$

Wavelength	Abs.
317.00	0.9096

##### b. Hasil validasi metode analisis

1) Linieritas

larutan baku resveratrol 99,04 ppm dibuat 9 seri pengenceran yaitu 0,49 ppm; 0,98 ppm; 1,94 ppm; 2,91 ppm; 3,81 ppm; 4,76 ppm; 5,65 ppm; 6,52 ppm dan 7,40 ppm.

konsentrasi (ppm)	volume yang diambil ( $\mu\text{L}$ )	volume yang dibuat ( $\mu\text{L}$ )
0,59	50	10000
0,98	99	10000
1,94	196	10000
2,91	294	10000
3,81	385	10000
4,76	481	10000
5,65	570	10000
6,52	659	10000
7,40	747	10000

Perhitungan kurva baku resveratrol dapar posfat

$$0,49 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 0,5 \text{ ppm} = 50 \mu\text{l}$$

$$0,98 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 1,0 \text{ ppm} = 99 \mu\text{l}$$

$$1,94 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 2,0 \text{ ppm} = 196 \mu\text{l}$$

$$2,91 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 2,9 \text{ ppm} = 294 \mu\text{l}$$

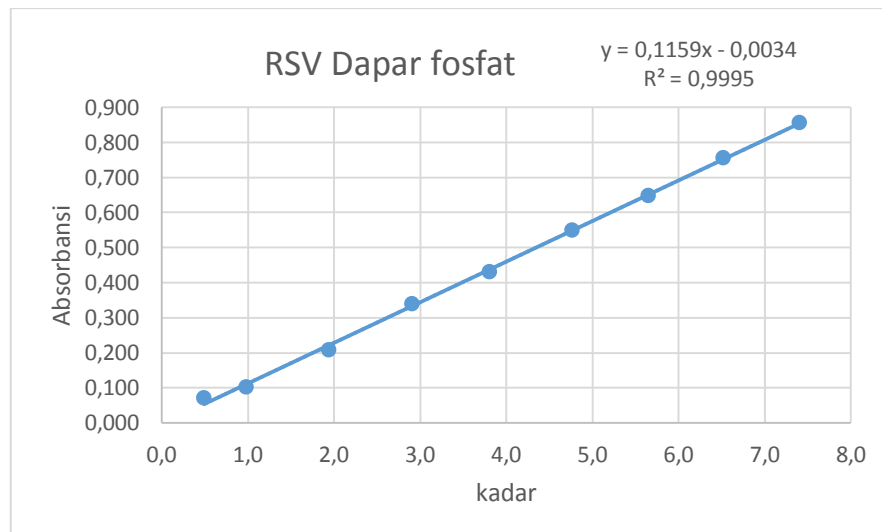
$$3,81 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 3,8 \text{ ppm} = 385 \mu\text{l}$$

$$4,76 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 4,7 \text{ ppm} = 481 \mu\text{l}$$

$$5,65 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 5,7 \text{ ppm} = 570 \mu\text{l}$$

$$6,52 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 6,6 \text{ ppm} = 659 \mu\text{l}$$

$$7,40 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 7,5 \text{ ppm} = 747 \mu\text{l}$$



Nilai linieritas pada kurva kalibrasi resveratrol dapar posfat yaitu :

Intercept (a) = -0,0034

Slope (b) = 0,1159

Kefisien korelasi (r) = 0,9995

## 2) LOD &amp; LOQ

x	Y	y'	y - y'	(y-y') <sup>2</sup>
0,49	0,07125	0,05373	0,01752	0,000306821
0,98	0,1025	0,11026	-0,0078	6,01435E-05
1,94	0,208	0,22164	-0,0136	0,000185996
2,91	0,339	0,33356	0,00544	2,95852E-05
3,81	0,43075	0,43798	-0,0072	5,223E-05
4,76	0,5505	0,54826	0,00224	5,02637E-06
5,65	0,649	0,65126	-0,0023	5,09041E-06
6,52	0,7555	0,75233	0,00317	1,00493E-05
7,40	0,8565	0,85399	0,00251	6,29469E-06

	Jumlah	0,000654942
	Jml / n-2	9,35632E-05
SD	akar jml / n -2	0,009672807

$$\text{Perhitungan : } LOD = \frac{3 Sy/x}{b} \quad LOQ = \frac{10 Sy/x}{b}$$

$$LOD = \frac{3,3 \times 0,0096}{0,1158} = 0,2755$$

$$LOQ = \frac{10 \times 0,0096}{0,1158} = 0,8348$$

$$y' = a + b.x$$

$y - y' = \text{absorbansi} - \text{kadar yang didapatkan}$

$$(y-y')^2$$

## 3) Presisi

Konsentrasi	ABS	Konsentrasi
5,65	0,648	5,622
5,65	0,650	5,639
5,65	0,651	5,648
5,65	0,635	5,510
5,65	0,639	5,544
5,65	0,644	5,587
5,65	0,651	5,648

5,65	0,651	5,648
5,65	0,648	5,622
5,65	0,653	5,665
5,65	0,638	5,536
Rata - rata		5,606
SD		0,054
CV		0,96%

$$\text{Perhitungan \% RSD} = \frac{s}{x} \times 100\%$$

$$\% \text{ RSD} = \frac{0,054}{5,606} \times 100\% = 0,96\%$$

#### 4) Akurasi

REPLIKASI	ABS	KONSENTRASI	SEBENARNYA	%	Rata-rata
1	0,547	4,7922	4,76	101%	100,55%
2	0,543	4,7574	4,76	100%	
3	0,549	4,8096	4,76	101%	
1	0,643	5,6281	5,65	100%	100,38%
2	0,652	5,7065	5,65	101%	
3	0,649	5,6804	5,65	101%	
1	0,759	6,6382	6,52	102%	101,37%
2	0,752	6,5773	6,52	101%	
3	0,756	6,6121	6,52	101%	

$$80\% = 100,55\%$$

$$100\% = 100,38\% \quad \text{rata-rata} = 100,77\%$$

$$120\% = 101,37\%$$

## 2. Hasil kurva kalibrasi resveratrol methanol

### a. Hasil kurva kalibrasi resveratrol

1) Penimbangan dan Pembuatan larutan induk resveratrol  $\frac{52,6 \text{ mg}}{10 \text{ mL}} \times 1000 \text{ mL} =$

$$5260 \text{ ppm}$$

2) Pembuatan larutan stock resveratrol 105,2 ppm

$$\text{Rumus : } V1 \times C1 / V2 \times C2$$

$$100 \mu\text{L} \times 5260 \text{ ppm} / 10000 \mu\text{L} \times C2$$

$$C2 : 200 \mu\text{L} \times 4952 \text{ ppm} / 10000 \mu\text{L} = 105,2 \text{ ppm}$$

3) Hasil Penentuan panjang gelombang maksimum

Perhitungan pembuatan panjang gelombang maksimum :

$$105,2 \text{ ppm} : V1 \times 5260 \text{ ppm}/10000 \mu\text{L} \times 105,2 \text{ ppm} = 200 \mu\text{L}$$

Wavelength	Abs.
306.00	0.5096

b. Hasil validasi metode analisis

1) Linieritas

larutan baku resveratrol 99,04 ppm dibuat 9 seri pengenceran yaitu 0,63 ppm; 0,99 ppm; 1,96 ppm; 2,92 ppm; 3,85 ppm; 5,67 dan 7,43 ppm.

konsentrasi (ppm)	volume yang diambil ( $\mu\text{L}$ )	volume yang dibuat ( $\mu\text{L}$ )
0,63	60	10000
0,99	94	10000
1,96	186	10000
2,92	277	10000
3,85	366	10000
5,67	539	10000
7,43	706	10000

Perhitungan kurva baku resveratrol dapar posfat

$$0,63 \text{ ppm} : V1 \times 105,2 \text{ ppm}/10000 \mu\text{L} \times 0,63 \text{ ppm} = 60 \mu\text{l}$$

$$0,99 \text{ ppm} : V1 \times 105,2 \text{ ppm}/10000 \mu\text{L} \times 0,99 \text{ ppm} = 94 \mu\text{l}$$

$$1,96 \text{ ppm} : V1 \times 105,2 \text{ ppm}/10000 \mu\text{L} \times 1,96 \text{ ppm} = 186 \mu\text{l}$$

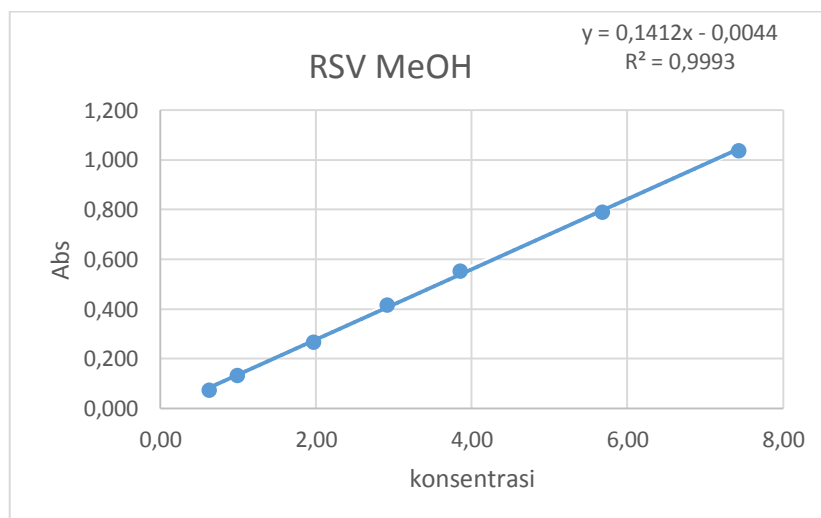
$$2,92 \text{ ppm} : V1 \times 105,2 \text{ ppm}/10000 \mu\text{L} \times 2,92 \text{ ppm} = 277 \mu\text{l}$$

$$3,85 \text{ ppm} : V1 \times 105,2 \text{ ppm}/10000 \mu\text{L} \times 3,85 \text{ ppm} = 366 \mu\text{l}$$

$$5,67 \text{ ppm} : V1 \times 105,2 \text{ ppm}/10000 \mu\text{L} \times 5,67 \text{ ppm} = 539 \mu\text{l}$$

$$7,43 \text{ ppm} : V1 \times 105,2 \text{ ppm}/10000 \mu\text{L} \times 7,43 \text{ ppm} = 706 \mu\text{l}$$

$$6,52 \text{ ppm} : V1 \times 99,04 \text{ ppm}/10000 \mu\text{L} \times 6,6 \text{ ppm} = 659 \mu\text{l}$$



Nilai linieritas pada kurva kalibrasi resveratrol dapar posfat yaitu :

Intercept (a) = -0,1412

Slope (b) = 0,0044

Kefisien korelasi (r) = 0,9993

##### 5) LOD & LOQ

x	y	y'	y - y'	(y-y') <sup>2</sup>
0,63	0,075	0,0841805	-0,0091805	8,428E-05
0,99	0,134	0,1353493	-0,0013493	1,82E-06
1,96	0,269	0,272463	-0,003463	1,199E-05
2,92	0,418	0,4070448	0,0109552	0,00012
3,85	0,554	0,5391625	0,0148375	0,0002202
5,67	0,792	0,7962749	-0,0042749	1,827E-05
7,43	1,038	1,0443055	-0,0063055	3,976E-05
Jumlah	0,0004963			
Jml / n-2	8,272E-05			
SD	akar jml / n -2	0,0090948		

$$\text{Perhitungan : } LOD = \frac{3 Sy/x}{b} \quad LOQ = \frac{10 Sy/x}{b}$$

$$LOD = \frac{3,3 \times 0,0090}{0,1411} = 0,2126$$

$$LOQ = \frac{10 \times 0,0090}{0,1411} = 0,6444$$

## 6) Presisi

Konsentrasi	ABS	Konsentrasi
3,85	0,504	3,602
3,85	0,507	3,623
3,85	0,502	3,588
3,85	0,506	3,616
3,85	0,507	3,623
3,85	0,503	3,595
3,85	0,503	3,595
3,85	0,501	3,581
3,85	0,504	3,602
3,85	0,506	3,616
3,85	0,503	3,595
	Rata - rata	3,603
	SD	0,014
	CV	0,40%

$$\text{Perhitungan \% RSD} = \frac{s}{x} \times 100\%$$

$$\% \text{ RSD} = \frac{0,014}{3,603} \times 100\% = 0,40\%$$

## 7) Akurasi

REPLIKASI	ABS	KONSENTRASI	SEBENARNYA	%	
1	0,41	2,9361	2,92	101%	
2	0,415	2,9715	2,92	102%	
3	0,412	2,9502	2,92	101%	101,12%
1	0,544	3,8855	3,85	101%	
2	0,546	3,8997	3,85	101%	
3	0,549	3,9209	3,85	102%	101,35%
1	0,791	5,6357	5,67	99%	
2	0,789	5,6215	5,67	99%	
3	0,793	5,6498	5,67	100%	99,39%

$$80\% = 101,12\%$$

$$100\% = 101,35\% \quad \text{rata-rata} = 100,62\%$$

$$120\% = 99,39\%$$



**Lampiran 4. Efisiensi penjerapan**

Rep	formula 1	formula 2	formula 3	formula 4
1	0,635	0,541	0,521	0,542
2	0,670	0,576	0,547	0,558
3	0,669	0,585	0,510	0,531
Perhitungan %EP	90,838	77,410	82,060	85,308
	95,838	82,410	86,146	87,822
	95,695	83,695	80,331	83,579
rata2	94,124	81,171	82,846	85,570
SD	2,846	3,321	2,986	2,134

%EP	F1	F2	F3	F4
	22,710	19,352	20,515	21,327
	23,960	20,602	21,536	21,955
	23,924	20,924	20,083	20,895

DL	4,129	3,519	2,414	2,509
	4,356	3,746	2,534	2,583
	4,350	3,804	2,363	2,458
rata-rata	4,278	3,690	2,437	2,517

Contoh perhitungan :

$$\text{perhitungan obat dalam sistem} = \frac{0,635 + 0,0012}{0,1148} \times \frac{2000 + 50}{50} = 227,095$$

$$\text{efisiensi penjerapan (\%)} = \frac{227,09}{250} \times 100 = 90,83$$

Masing-masing replikasi dihitung, sesuai contoh perhitungan efisiensi penjerapan, kemudian dirata-rata.

## Lampiran 5. Uji Pelepasan Obat

### Formula 1

NLC-RSV	
Slope	0,1234
Intercept	-0,0124

### Replikasi 1

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluks
5	0,022	1	0,279	500	139	0,00	139	7,11	0,0831
10	0,021	1	0,271	500	135	1,39	137	6,98	
15	0,021	1	0,271	500	135	1,35	137	6,97	
30	0,032	1	0,360	500	180	1,35	181	9,25	
45	0,031	1	0,352	500	176	1,80	178	9,06	
60	0,044	1	0,457	500	229	1,76	230	11,75	

### Replikasi 2

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	Fluks
5	0,022	1	0,279	500	139	0,00	139	7,11	0,0824
10	0,022	1	0,277	500	138	1,39	140	7,13	
15	0,022	1	0,279	500	139	1,38	141	7,18	
30	0,032	1	0,360	500	180	1,39	181	9,25	
45	0,032	1	0,356	500	178	1,80	180	9,17	
60	0,044	1	0,459	500	230	1,78	231	11,80	

### Replikasi 3

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (L)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,022	1	0,279	500	139	0	139	7,11	0,0816
10	0,023	1	0,283	500	141	1,394	143	7,29	
15	0,023	1	0,287	500	143	1,414	145	7,39	
30	0,032	1	0,360	500	180	1,434	181	9,25	
45	0,032	1	0,360	500	180	1,799	182	9,27	
60	0,045	1	0,461	500	231	1,799	232	11,85	

### Formula 2

#### Replikasi 1

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,010	1	0,182	500	91	0,00	91	3,78	0,0193
10	0,014	1	0,214	500	107	0,91	108	4,49	
15	0,018	1	0,246	500	123	1,07	124	5,18	
30	0,022	1	0,279	500	139	1,23	141	5,86	
45	0,025	1	0,303	500	152	1,39	153	6,37	
60	0,025	1	0,303	500	152	1,52	153	6,38	
120	0,025	1	0,303	500	152	1,52	153	6,38	

**Replikasi 2**

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,013	1	0,206	500	103	0,00	103	4,29	0,0193
10	0,016	1	0,230	500	115	1,03	116	4,84	
15	0,018	1	0,246	500	123	1,15	124	5,18	
30	0,024	1	0,295	500	147	1,23	149	6,20	
45	0,025	1	0,303	500	152	1,47	153	6,38	
60	0,025	1	0,303	500	152	1,52	153	6,38	
120	0,027	1	0,319	500	160	1,52	161	6,71	

**Replikasi 3**

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (L)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,012	1	0,194	500	97	0	97	4,03	0,0190
10	0,015	1	0,222	500	111	0,968	112	4,67	
15	0,018	1	0,246	500	123	1,110	124	5,18	
30	0,023	1	0,287	500	143	1,232	145	6,03	
45	0,025	1	0,303	500	152	1,434	153	6,37	
60	0,025	1	0,303	500	152	1,515	153	6,38	
120	0,026	1	0,311	500	156	1,515	157	6,55	

### Formula 3

#### Replikasi 1

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,012	1	0,198	500	99	0,00	99	5,65	0,109
10	0,013	1	0,206	500	103	0,99	104	5,94	
15	0,015	1	0,222	500	111	1,03	112	6,40	
30	0,020	1	0,263	500	131	1,11	132	7,57	
45	0,024	1	0,295	500	147	1,31	149	8,50	
60	0,032	1	0,360	500	180	1,47	181	10,36	
120	0,066	1	0,635	500	318	1,80	319	18,26	

#### Replikasi 2

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,012	1	0,198	500	99	0,00	99	5,65	0,118
10	0,015	1	0,222	500	111	0,99	112	6,40	
15	0,020	1	0,263	500	131	1,11	132	7,57	
30	0,024	1	0,295	500	147	1,31	149	8,50	
45	0,027	1	0,319	500	160	1,47	161	9,21	
60	0,034	1	0,376	500	188	1,60	190	10,83	
120	0,073	1	0,692	500	346	1,88	348	19,88	

### Replikasi 3

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (L)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,012	1	0,198	500	99	0	99	5,65	0,113
10	0,014	1	0,214	500	107	0,989	108	6,17	
15	0,018	1	0,242	500	121	1,070	122	6,98	
30	0,022	1	0,279	500	139	1,212	141	8,03	
45	0,026	1	0,307	500	154	1,394	155	8,85	
60	0,033	1	0,368	500	184	1,536	185	10,60	
120	0,070	1	0,664	500	332	1,840	334	19,07	

### Formula 4

#### Replikasi 1

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,028	1	0,327	500	164	0,00	164	8,18	0,038
10	0,031	1	0,352	500	176	1,64	177	8,87	
15	0,033	1	0,368	500	184	1,76	186	9,29	
30	0,036	1	0,392	500	196	1,84	198	9,90	
45	0,037	1	0,400	500	200	1,96	202	10,11	
60	0,041	1	0,433	500	216	2,00	218	10,92	
120	0,051	1	0,514	500	257	2,16	259	12,95	

**Replikasi 2**

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,030	1	0,344	500	172	0,00	172	8,59	0,037
10	0,032	1	0,360	500	180	1,72	182	9,08	
15	0,033	1	0,368	500	184	1,80	186	9,29	
30	0,036	1	0,392	500	196	1,84	198	9,90	
45	0,040	1	0,425	500	212	1,96	214	10,71	
60	0,042	1	0,441	500	220	2,12	223	11,13	
120	0,051	1	0,514	500	257	2,20	259	12,95	

**Replikasi 3**

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (L)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	Q(mcg /cm <sup>2</sup> )	fluk
5	0,029	1	0,335	500	168	0	168	8,39	0,038
10	0,032	1	0,356	500	178	1,677	180	8,98	
15	0,033	1	0,368	500	184	1,779	186	9,29	
30	0,036	1	0,392	500	196	1,840	198	9,90	
45	0,039	1	0,412	500	206	1,961	208	10,41	
60	0,042	1	0,437	500	218	2,062	220	11,02	
120	0,051	1	0,514	500	257	2,184	259	12,95	

### Lampiran 6. Hasil uji antioksidan resveratrol dan NLC RSV

1. Penimbangan resveratrol

$$49,52 \text{ ppm} = \frac{49,52 \text{ mg}}{1000 \text{ mL}} = \frac{4,95 \text{ mg}}{100 \text{ mL}}$$

2. Hasil panjang gelombang maksimum

Wavelength	Abs.
516.00	0.909

3. Pembuatan seri konsentrasi

Larutan induk resveratrol 49,52 ppm dibuat 8 seri pengenceran 7,67 ppm; 14,33 ppm; 27,67 ppm; 54,33 ppm; 106,26 ppm; 211,53 ppm; 422,05 ppm dan 667,67 ppm.

Konsentrasi (ppm)	Volume yang diambil ( $\mu\text{L}$ )	Volume yang dibuat ( $\mu\text{L}$ )
7,67	1304	10000
14,33	698	10000
27,67	361	10000
54,33	184	10000
106,26	94	10000
211,53	47	10000
422,05	24	10000
667,67	15	10000

Contoh perhitungan :

$$7,67 \text{ ppm} : V1 \times 4952 \text{ ppm}/10000 \mu\text{L} \times 7,67 \text{ ppm} = 1304 \mu\text{l}$$

$$14,33 \text{ ppm} : V1 \times 4952 \text{ ppm}/10000 \mu\text{L} \times 14,33 \text{ ppm} = 698 \mu\text{l}$$

$$27,67 \text{ ppm} : V1 \times 4952 \text{ ppm}/10000 \mu\text{L} \times 27,67 \text{ ppm} = 361 \mu\text{l}$$

$$54,33 \text{ ppm} : V1 \times 4952 \text{ ppm}/10000 \mu\text{L} \times 54,33 \text{ ppm} = 184 \mu\text{l}$$

$$106,26 \text{ ppm} : V1 \times 4952 \text{ ppm}/10000 \mu\text{L} \times 106,26 \text{ ppm} = 94 \mu\text{l}$$

$$211,53 \text{ ppm} : V1 \times 4952 \text{ ppm}/10000 \mu\text{L} \times 211,53 \text{ ppm} = 47 \mu\text{l}$$



$$422,05 \text{ ppm} : V1 \times 4952 \text{ ppm} / 10000 \mu\text{L} \times 422,05 \text{ ppm} = 24 \mu\text{l}$$

$$667,67 \text{ ppm} : V1 \times 4952 \text{ ppm} / 10000 \mu\text{L} \times 667,67 \text{ ppm} = 15 \mu\text{l}$$

#### 4. Operating Time larutan standar resveratrol

Waktu (menit)	Absorbansi	Waktu (menit)	Absorbansi	Waktu (menit)	Absorbansi
0	0.264	21	0.120	42	0,118
1	0.208	22	0.119	43	0,118
2	0.183	23	0.119	44	0,118
3	0.168	24	0.119	45	0,118
4	0.158	25	0.119	46	0,118
5	0.150	26	0.118	47	0,118
6	0.145	27	0.118	48	0,118
7	0.140	28	0.118	49	0,118
8	0.137	<b>29</b>	<b>0.117</b>	50	0,118
9	0.134	<b>30</b>	<b>0.117</b>	51	0,118
10	0.131	<b>31</b>	<b>0.117</b>	52	0,118
11	0.129	<b>32</b>	<b>0.117</b>	53	0,118
12	0.127	<b>33</b>	<b>0.117</b>	54	0,118
13	0.126	<b>34</b>	<b>0.117</b>	55	0,118
14	0.125	<b>35</b>	<b>0.117</b>	56	0,118
15	0.124	<b>36</b>	<b>0.117</b>	57	0,118
16	0.123	<b>37</b>	<b>0.117</b>	58	0,118
17	0.122	<b>38</b>	<b>0.117</b>	59	0,118
18	0.121	<b>39</b>	<b>0.117</b>	60	0,118
19	0.121	<b>40</b>	<b>0,117</b>		
20	0.120	41	0,118		

#### 5. Perhitungan IC<sub>50</sub> resveratrol

$$\text{inhibition concentration } 50 = \frac{50 - 5,167}{22,647} \times 100 = 7,2 \text{ ppm}$$

### Lampiran 7. Perhitungan %inhibisi resveratrol

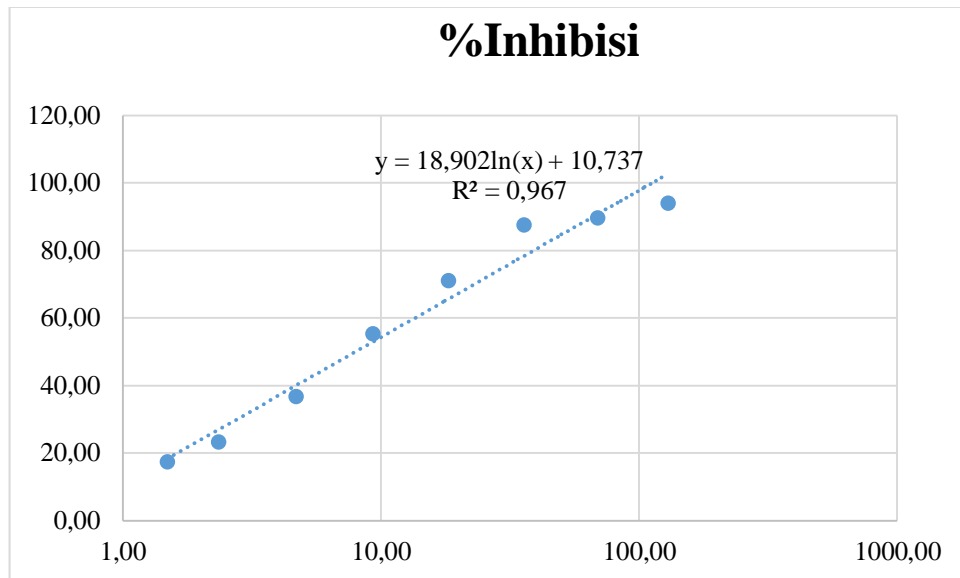
induk 4952  
Abs Kontrol 0,9096

volume	pengencer	pengenceran	kadar
1304	10000	7,66	645
700	10000	14,33	345
300	10000	27,66	178
200	10000	54,33	91
100	10000	106,26	46
50	10000	211,52	23
25	10000	422,05	11
15	10000	667,66	7

Rep 1		Rep 2		Rep 3		Rep 4	
abs	% inhibisi	abs	% inhibisi	abs	% inhibisi	Abs	% inhibisi
0,054	94,06	0,055	93,95	0,054	94,06	0,054	94,06
0,091	90,00	0,091	90,00	0,097	89,34	0,095	89,56
0,118	87,03	0,117	87,14	0,109	88,02	0,107	88,24
0,260	71,42	0,260	71,42	0,265	70,87	0,265	70,87
0,452	50,31	0,452	50,31	0,361	60,31	0,360	60,42
0,594	34,70	0,594	34,70	0,556	38,87	0,555	38,98
0,703	22,71	0,704	22,60	0,692	23,92	0,692	23,92
0,771	15,24	0,772	15,13	0,732	19,53	0,732	19,53

Inhibisi (%)				Konsentrasi	Inhibisi	SD
Rep 1	Rep 2	Rep 3	Rep 4			
94,06	93,95	94,06	94,06	129,18	94,04	0,054
90,00	90,00	89,34	89,56	69,10	89,72	0,329
87,03	87,14	88,02	88,24	35,80	87,60	0,611
71,42	71,42	70,87	70,87	18,23	71,14	0,317
50,31	50,31	60,31	60,42	9,32	55,34	5,807
34,70	34,70	38,87	38,98	4,68	36,81	2,444
22,71	22,60	23,92	23,92	2,35	23,29	0,731
15,24	15,13	19,53	19,53	1,48	17,35	2,507
				IC50	7,23 ppm	

**Kurva %inhibisi**



**Uji ANOVA IC50**

Nonlinear Curve Fit (Hill1) (2/21/2019 19:21:33)

Notes

Input Data

Parameters

		Value	Standard Error	t-Value	Prob> t	Dependency
Inhibisi	START	10.08232	4.05904	2.48392	0.06793	0.91903
	END	96.35986	2.26614	42.52162	1.82857E-6	0.82526
	k	8.68762	0.76364	11.37666	3.40445E-4	0.83261
	n	1.32316	0.16365	8.08513	0.00127	0.88127

Reduced Chi-sqr = 3.14702081177  
 COD(R<sup>2</sup>) = 0.9981072828829  
 Iterations Performed = 6  
 Total Iterations in Session = 6  
 Fit converged. Chi-Sqr tolerance value of 1E-9 was reached.  
 Standard Error was scaled with square root of reduced Chi-Sqr.

Statistics

	Inhibisi
Number of Points	8
Degrees of Freedom	4
Reduced Chi-Sqr	3.14702
Residual Sum of Squares	12.58808
R-Square(COD)	0.99811
Adj. R-Square	0.99669
Fit Status	Succeeded(100)

Fit Status Code :  
 100 : Fit converged. Chi-Sqr tolerance value of 1E-9 was reached.

Summary

	START		END		k		n		Statistics	
	Value	Standard Error	Value	Standard Error	Value	Standard Error	Value	Standard Error	Reduced Chi-Sqr	Adj. R-Square
Inhibisi	10.08232	4.05904	96.35986	2.26614	8.68762	0.76364	1.32316	0.16365	3.14702	0.99669

ANOVA

		DF	Sum of Squares	Mean Square	F Value	Prob>F
Inhibisi	Regression	4	34876.59595	8719.14899	2770.60435	4.33753E-7
	Residual	4	12.58808	3.14702		
	Uncorrected Total	8	34889.18403			
	Corrected Total	7	6650.799			

Fitted Curves Plot

## Lampiran 8. Hasil uji aktivitas antioksidan NLC-RSV

### Perhitungan %inhibisi NLC-RSV hari ke-1

formula 1	formula 2	formula 3	formula 4	
0,131	0,121	0,130	0,130	
0,131	0,128	0,126	0,132	
0,136	0,127	0,128	0,134	
%inhibisi	%inhibisi	%inhibisi	%inhibisi	
85,159	86,292	85,272	85,272	
85,159	85,498	85,725	85,045	
84,592	85,612	85,498	84,819	
84,970	85,801	85,499	85,045	Rata-rata
0,327	0,429	0,227	0,227	SD

lar. Dpph	Kadar	absorbansi
	40 ppm	0,908
		0,870
		0,870
	rata-rata	0,883

### Perhitungan %inhibisi

$$\text{Rumus : } \frac{\text{Abs DPPH} - \text{Abs Sediaan}}{\text{Abs DPPH}} \times 100\%$$

#### Formula 1

$$\text{Replikasi 1 : } \frac{0,883 - 0,131}{0,883} \times 100\% = 85,159\%$$

$$\text{Replikasi 2 : } \frac{0,883 - 0,131}{0,883} \times 100\% = 85,159\%$$

$$\text{Replikasi 3 : } \frac{0,883 - 0,136}{0,883} \times 100\% = 84,592\%$$

#### Formula 2

$$\text{Replikasi 1 : } \frac{0,883 - 0,121}{0,883} \times 100\% = 86,292\%$$

$$\text{Replikasi 2 : } \frac{0,883 - 0,128}{0,883} \times 100\% = 85,498\%$$

$$\text{Replikasi 3 : } \frac{0,883-0,127}{0,883} \times 100\% = 85,612\%$$

### Formula 3

$$\text{Replikasi 1 : } \frac{0,883-0,130}{0,883} \times 100\% = 85,272\%$$

$$\text{Replikasi 2 : } \frac{0,883-0,126}{0,883} \times 100\% = 85,725\%$$

$$\text{Replikasi 3 : } \frac{0,883-0,128}{0,883} \times 100\% = 84,498\%$$

### Formula 4

$$\text{Replikasi 1 : } \frac{0,883-0,130}{0,883} \times 100\% = 85,272\%$$

$$\text{Replikasi 2 : } \frac{0,883-0,132}{0,883} \times 100\% = 85,045\%$$

$$\text{Replikasi 3 : } \frac{0,883-0,134}{0,883} \times 100\% = 84,819\%$$

### Perhitungan % inhibisi NLC-RSV hari ke-30

formula 1	formula 2	formula 3	formula 4	
0,170	0,188	0,167	0,174	
0,168	0,171	0,165	0,173	
0,169	0,173	0,168	0,172	
% inhibisi	% inhibisi	% inhibisi	% inhibisi	
81,222	79,234	81,554	80,781	
81,443	81,112	81,775	80,891	
81,333	80,891	81,443	81,001	
81,333	80,412	81,591	80,891	rata-rata
0,111	1,026	0,169	0,110	SD

Larutan DPPH	kadar	Absorbansi
	40 ppm	0,902
		0,903
		0,911
	rata-rata	0,905

Perhitungan % inhibisi

$$\text{Rumus : } \frac{\text{Abs DPPH} - \text{Abs Sediaan}}{\text{Abs DPPH}} \times 100\%$$

Formula 1

$$\text{Replikasi 1 : } \frac{0,883 - 0,170}{0,883} \times 100\% = 81,222\%$$

$$\text{Replikasi 2 : } \frac{0,883 - 0,168}{0,883} \times 100\% = 81,443\%$$

$$\text{Replikasi 3 : } \frac{0,883 - 0,169}{0,883} \times 100\% = 81,333\%$$

Formula 2

$$\text{Replikasi 1 : } \frac{0,883 - 0,188}{0,883} \times 100\% = 79,234\%$$

$$\text{Replikasi 2 : } \frac{0,883 - 0,171}{0,883} \times 100\% = 81,112\%$$

$$\text{Replikasi 3 : } \frac{0,883 - 0,173}{0,883} \times 100\% = 80,891\%$$

Formula 3

$$\text{Replikasi 1 : } \frac{0,883 - 0,167}{0,883} \times 100\% = 81,554\%$$

$$\text{Replikasi 2 : } \frac{0,883 - 0,165}{0,883} \times 100\% = 81,775\%$$

$$\text{Replikasi 3 : } \frac{0,883 - 0,168}{0,883} \times 100\% = 81,443\%$$

Formula 4

$$\text{Replikasi 1 : } \frac{0,883 - 0,174}{0,883} \times 100\% = 80,781\%$$

$$\text{Replikasi 2 : } \frac{0,883 - 0,173}{0,883} \times 100\% = 80,891\%$$

$$\text{Replikasi 3 : } \frac{0,883 - 0,172}{0,883} \times 100\% = 81,001\%$$

## Perhitungan % perubahan aktivitas antioksidan

Rep	%Per.AA			
1	4,623	8,179	4,360	5,267
2	4,364	5,130	4,609	4,884
3	3,853	5,514	4,743	4,501
rata2	4,280	6,275	4,571	4,884
SD	0,392	1,661	0,194	0,383

$$\text{Rumus : } \frac{\%inhibisi \text{ hari ke 1} - \%inhibisi \text{ hari ke 30}}{\%inhibisi \text{ hari ke 1}} \times 100\%$$

## Formula 1

$$\text{Replikasi 1 : } \frac{85,159 - 81,222}{85,159} \times 100\% = 4,623\%$$

$$\text{Replikasi 2 : } \frac{85,159 - 81,443}{85,159} \times 100\% = 4,364\%$$

$$\text{Replikasi 3 : } \frac{84,592 - 81,333}{84,592} \times 100\% = 3,853\%$$

## Formula 2

$$\text{Replikasi 1 : } \frac{85,159 - 79,234}{85,159} \times 100\% = 8,179\%$$

$$\text{Replikasi 2 : } \frac{85,498 - 81,112}{85,498} \times 100\% = 5,130\%$$

$$\text{Replikasi 3 : } \frac{85,612 - 80,891}{85,612} \times 100\% = 5,514\%$$

## Formula 3

$$\text{Replikasi 1 : } \frac{85,272 - 81,554}{85,272} \times 100\% = 4,360\%$$

$$\text{Replikasi 2 : } \frac{85,726 - 81,775}{85,726} \times 100\% = 4,609\%$$

$$\text{Replikasi 3 : } \frac{85,498 - 81,443}{85,498} \times 100\% = 4,571\%$$

Formula 4

$$\text{Replikasi 1 : } \frac{85,272-80,781}{85,272} \times 100\% = 5,267\%$$

$$\text{Replikasi 2 : } \frac{85,045-80,891}{85,045} \times 100\% = 4,884\%$$

$$\text{Replikasi 3 : } \frac{84,819-81,001}{84,819} \times 100\% = 4,884\%$$