BAB V
KESIMPULAN DAN SARAN

A. Kesimpulan

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

Pertama, variasi konsentrasi tween 80 dan perbedaan panjang rantai asam miristat dan asam stearat berpengaruh terhadap efisiensi penjerapan, pelepasan obat dan uji aktivitas antioksidan NLC resveratrol

Kedua, formula NLC resveratrol yang paling baik adalah formula 3 dengan panjang rantai C14 (asam miristat) dan konsentrasi tween 80 memberikan hasil terbaik pada pengujian efisiensi penjerapan, *drug loading* dan aktivitas antioksidan. Formula 1 hasil terbaik terdapat pada pengujian aktivitas antioksidan yaitu pada asam miristat (C14) aras bawah (0,2). Formula 2 dalam pengujian yang dilakukan kurang stabil sehingga belum memberikan hasil yang maksimal, formula 4 memberikan hasil yang terbaik pada pelepasan obat.

B. Saran

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

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

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LAMPIRAN

Lampiran 1. Sertifikat analisis resveratrol

ADDRESS: RM1707, BLDG 5, CHANGFA, 101-1#
TAIHU ROAD, 213022, P.R.CHINA
TEL: +86 519 89880626 FAX: +86-519-89880629
Email:tcc@thanenchem.com

CERTIFICATE OF ANALYSIS

Product Name	Resveratrol	Code	BPBE-629-A
Botanical Source	Polygonum cuspidatum Sieb.Et Zucc	Used Part	Root
Batch No.	H020862918A	Mfg. Date	Aug. 10, 2018
Packing	25kg/Drum	Retest Date	Aug. 09, 2020
Quantity	10g	Report Date	Aug. 17, 2018
Specification	98%(HPLC)		

ITEM	SPECIFICATION	RESULT
Assay(HPLC)	≥98.0%	98.26%
Appearance	Milky - white powder	Complies
Odor	Characteristic	Complies
Taste	Characteristic	Complies
Particle Size	NLT 95% pass 80 mesh	Complies
Loss on Drying	≤0.5%	0.20%
Ash	≤0.5%	0.07%
Bulk Density	35-45g/100mL	40g/100mL
Heavy Metals	≤10ppm	Complies Complies Complies Complies
-As	≤1.0ppm	Complies
-Pb	≤1.5ppm	
-Cd	≤0.5ppm	
-Hg	≤0.1ppm	
Total Plate Count	≤1000cfu/g	Complies Complies Negative
-Yeast & Mold	≤100cfu/g Negative Negative	Negative
-E.Coli		
-Salmonella		
Conclusion	Comply with the specification.	
Storage	Preserve in tight containers, protected from strong light and high heat. Store in dry cool place.	

Analyst: QCManager: QA:

Lampiran 2. 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 $\frac{49,52\ mg}{10\ mL} \times 1000\ mL =$

    $49,52\ mg/10mL = 4952\ mg/1000\ mL = 4952$ ppm

2) Pembuatan larutan stock resveratrol 99,04 ppm

    Rumus : $V_1 \times C_1 = V_2 \times C_2$

$$V1 \times 4952\ ppm = 10000\ \mu L \times 99,04\ ppm$$

$$V1 = 200\ \mu L$$

3) Pembuatan larutan 9,90 ppm

    Larutan 9,90 ppm digunakan untuk menentukan panjang gelombang maksimum.

    Rumus : $V_1 \times C_1 = V_2 \times C_2$

    9,90 ppm $\longrightarrow$ $V_1 \times 99,04$ ppm $= 10000\ \mu L \times 9,90$ ppm

$$V_1 = 1000\ \mu L$$

    Panjang gelombang maksimum :

Wavelength	Abs.
316.00	1.083

    b. Hasil validasi metode analisis

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 (μL)	volume yang dibuat (μL)
0,49	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

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

$$0,98 \; ppm : V1 \; x \; 99,04 \; ppm/10000 \; \mu L \; x \; 1,0 \; ppm = 99 \; \mu l$$

$$1,94 \; ppm : V1 \; x \; 99,04 \; ppm/10000 \; \mu L \; x \; 2,0 \; ppm = 196 \; \mu l$$

$$2,91 \; ppm : V1 \; x \; 99,04 \; ppm/10000 \; \mu L \; x \; 2,9 \; ppm = 294 \; \mu l$$

$$3,81 \; ppm : V1 \; x \; 99,04 \; ppm/10000 \; \mu L \; x \; 3,8 \; ppm = 385 \; \mu l$$

$$4,76 \; ppm : V1 \; x \; 99,04 \; ppm/10000 \; \mu L \; x \; 4,7 \; ppm = 481 \; \mu l$$

$$5,65 \; ppm : V1 \; x \; 99,04 \; ppm/10000 \; \mu L \; x \; 5,7 \; ppm = 570 \; \mu l$$

$$6,52 \; ppm : V1 \; x \; 99,04 \; ppm/10000 \; \mu L \; x \; 6,6 \; ppm = 659 \; \mu l$$

$$7,40 \; ppm : V1 \; x \; 99,04 \; ppm/10000 \; \mu L \; x \; 7,5 \; ppm = 747 \; \mu l$$

RSV Dapar fosfat
$y = 0,1159x - 0,0034$
$R^2 = 0,9995$
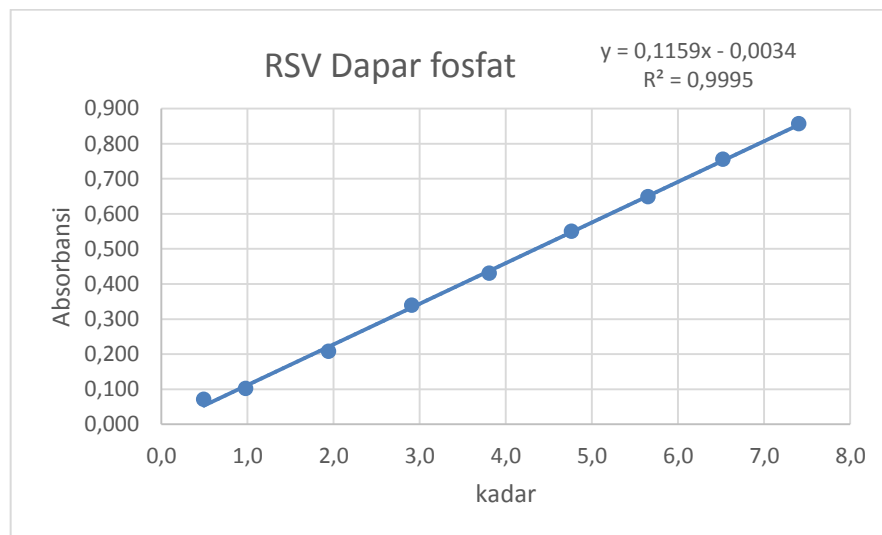
Nilai linieritas pada kurva kaibrasi resveratrol dapar posfat yaitu :

Intercept (a)   = -0,0034

Slope (b)   = 0,1159

Kefisien korelasi (r)   = 0,9995

LOD & LOQ

x	y	y'	y - y'	(y-y')^2
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

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

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

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

Presisi

Konsentrasi	ABS	Konsentrasi
5,65	0,648	5,622
5,65	0,650	5,639
5,65	0,651	5,648
5,65	0,639	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	5,616
	SD	0,045
	CV	0,81%

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

$$\% RSD = \frac{0,045}{5,616} \ x \ 100\% = 0,81\%$$

Akurasi

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

80% = 100,55%

100% = 100,38%   rata-rata = 100,77%

120% = 101,37%

2. Hasil kurva kalibrasi resveratrol metanol

a. Hasil kurva kalibrasi resveratrol

1) Penimbangan dan Pembuatan larutan induk resveratrol $\frac{52,6 \ mg}{10 \ mL} \ x \ 1000 \ mL =$ 52,6 $mg/10ml = 5260mg/1000mL = 5260$ ppm

2) Pembuatan larutan stock resveratrol 105,2 ppm

Rumus : $V_1 \ x \ C_1 = V_2 \ x \ C_2$

$$V1 \ x \ 5260 \ ppm = 10000 \ \mu L \ x \ 105,2 \ ppm$$

$$V1 = 200 \ \mu L$$

3) Pembuatan larutan 9,99 ppm

Larutan 9,99 ppm digunakan untuk menentukan panjang gelombang maksimum.

Rumus : $V_1 \ x \ C_1 = V_2 \ x \ C_2$

9,99 ppm $\longrightarrow$ $V_1 \ x \ 105,2 \ ppm = 10000 \ \mu L \ x \ 9,99 \ ppm$

$$V_1 = 950 \ \mu L$$

Panjang gelombang maksimum :

Wavelength	Abs.
306.00	0.9705

b. Hasil validasi metode analisis

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 (µL)	volume yang dibuat (µL)
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

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

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

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

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

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

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

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

$$6{,}52 \; ppm : V1 \; x \; 99{,}04 \; ppm/10000 \; \mu L \; x \; 6{,}6 \; ppm = 659 \; \mu l$$
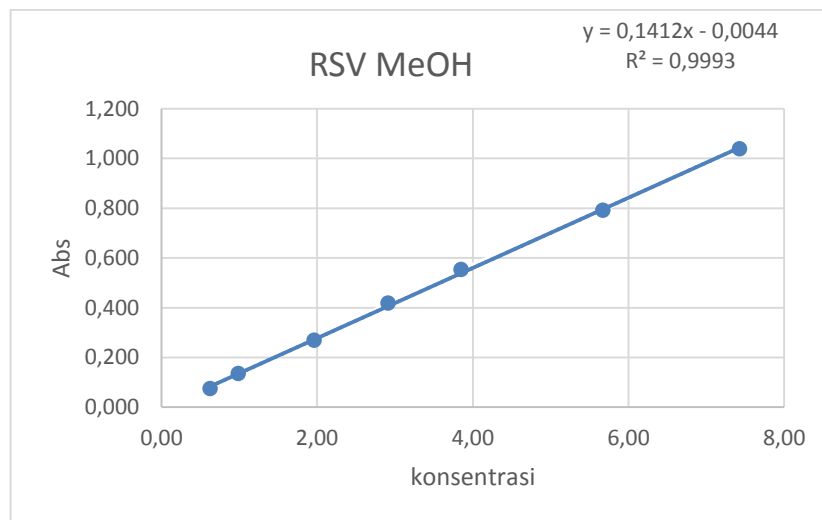
Nilai linieritas pada kurva kaibrasi resveratrol metanol yaitu :

Intercept (a)   = -0,00437

Slope (b)   = 0,14115

Kefisien korelasi (r)   = 0,9997

LOD & LOQ

x	y	y'	y - y'	(y-y')^2
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	

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

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

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

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	0,504	3,602
3,85	0,506	3,616
3,85	0,503	3,595
	Rata - rata	3,606
	SD	0,013
	CV	0,36%

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

$$\% \ RSD = \frac{0,013}{3,606} \ x \ 100\% = 0,36\%$$

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%
1	0,544	3,8855	3,85	101%
2	0,546	3,8997	3,85	101%
3	0,549	3,9209	3,85	102%
1	0,791	5,6357	5,67	99%
2	0,789	5,6215	5,67	99%
3	0,793	5,6498	5,67	100%

80% = 101,12%

100% = 101,35%   rata-rata = 100,62%

120% = 99,39%

Lampiran 3. Efisiensi penjerapan

Rep	formula 1	formula 2	formula 3	formula 4
1	0,530	0,598	0,647	0,596
2	0,673	0,586	0,611	0,570
3	0,497	0,572	0,610	0,603
Perhitungan %EP	75,886	85,600	86,357	85,314
	74,861	83,886	82,456	81,600
	71,171	81,886	87,314	86,314
rata2	73,973	83,790	85,376	84,410
SD	2,479	1,,859	2,573	2,484

%EP	F1	F2	F3	F4
	18,971	21,400	21,589	21,329
	18,715	20,971	20,614	20,400
	17,793	20,471	21,829	21,579
DL	2,710	3,057	3,084	3,047
	2,674	2,996	2,945	2,914
	2,542	2,924	3,118	3,083
rata-rata	2,642	2,993	3,049	3,015

Contoh perhitungan :

$$perhitungan\ obat\ dalam\ sistem = \frac{0,530 + 0,0012}{0,1148}\ x\ \frac{2000 + 50}{50} = 189,71$$

$$efisiensi\ penjerapan\ (\%) = \frac{189,71}{250}\ x100 = 75,88$$

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

Lampiran 4.   Uji Pelepasan Obat

Formula 1

NLC-RSV			Drug content		mg				
Slope	0,1234		Tablet Weight		mg				
Intercept	-0,0124								

Replikasi 1

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,022	1	0,279	500	139	0,000	139,38	5,575	7,920	0,024
10	0,022	1	0,279	500	139	1,394	140,78	5,631	7,999	
15	0,023	1	0,287	500	143	1,394	144,83	5,793	8,229	
30	0,030	1	0,344	500	172	1,434	173,23	6,929	9,843	
45	0,031	1	0,352	500	176	1,718	177,57	7,103	10,089	
60	0,032	1	0,360	500	180	1,759	181,66	7,266	10,322	
120	0,033	1	0,368	500	184	1,799	185,75	7,430	10,554	

Replikasi 2

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,022	1	0,279	500	139	0,000	139,38	5,575	7,920	0,019
10	0,023	1	0,287	500	143	1,394	144,83	5,793	8,229	
15	0,023	1	0,287	500	143	1,434	144,87	5,795	8,231	
30	0,032	1	0,360	500	180	1,434	181,34	7,253	10,303	
45	0,032	1	0,360	500	180	1,799	181,70	7,268	10,324	
60	0,032	1	0,360	500	180	1,799	181,70	7,268	10,324	
120	0,031	1	0,352	500	176	1,799	177,65	7,106	10,094	

Replikasi 3

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,022	1	0,279	500	139	0,000	139,38	5,575	5,575	0,022
10	0,023	1	0,283	500	141	1,394	142,80	5,793	5,712	
15	0,023	1	0,287	500	143	1,414	144,85	5,795	5,794	
30	0,031	1	0,352	500	176	1,434	177,29	7,253	7,091	
45	0,032	1	0,356	500	178	1,759	179,64	7,268	7,185	
60	0,032	1	0,360	500	180	1,779	181,68	7,268	7,267	
120	0,032	1	0,360	500	180	1,799	181,70	7,106	7,268	

Formula 2

Replikasi 1

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,030	1	0,344	500	172	0,000	171,80	6,872	8,260	0,022
10	0,032	1	0,360	500	180	1,718	181,62	7,265	8,732	
15	0,033	1	0,368	500	184	1,799	185,75	7,430	8,930	
30	0,035	1	0,384	500	192	1,840	193,90	7,756	9,322	
45	0,036	1	0,392	500	196	1,921	198,03	7,921	9,521	
60	0,040	1	0,425	500	212	1,961	214,28	8,571	10,302	
120	0,043	1	0,449	500	224	2,123	226,60	9,064	10,894	

Replikasi 2

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,030	1	0,344	500	172	0,000	171,80	6,872	8,260	0,022
10	0,033	1	0,368	500	184	1,718	185,67	7,427	8,927	
15	0,033	1	0,368	500	184	1,840	185,79	7,432	8,932	
30	0,034	1	0,376	500	188	1,840	189,85	7,594	9,127	
45	0,037	1	0,400	500	200	1,880	202,04	8,082	9,714	
60	0,042	1	0,441	500	220	2,002	222,42	8,897	10,693	
120	0,043	1	0,449	500	224	2,204	226,68	9,067	10,898	

Replikasi 3

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (L)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,030	1	0,344	500	172	0,000	171,80	6,872	8,260	0,022
10	0,033	1	0,364	500	182	1,718	183,65	7,346	8,829	
15	0,033	1	0,368	500	184	1,819	185,77	7,431	8,931	
30	0,035	1	0,380	500	190	1,840	191,87	7,675	9,225	
45	0,037	1	0,396	500	198	1,900	200,04	8,001	9,617	
60	0,041	1	0,433	500	216	1,981	218,35	8,734	10,498	
120	0,043	1	0,449	500	224	2,164	226,64	9,065	10,896	

Formula 3

Replikasi 1

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,020	1	0,263	500	131	0,000	131,280	5,251	6,251	0,045
10	0,024	1	0,295	500	147	1,313	148,801	5,952	7,086	
15	0,028	1	0,327	500	164	1,475	165,170	6,607	7,865	
30	0,037	1	0,400	500	200	1,637	201,799	8,072	9,609	
45	0,037	1	0,400	500	200	2,002	202,164	8,087	9,627	
60	0,044	1	0,457	500	229	2,002	230,527	9,221	10,977	
120	0,048	1	0,489	500	245	2,285	247,018	9,881	11,763	

Replikasi 2

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,020	1	0,263	500	131	0,000	131,280	5,251	6,251	0,045
10	0,020	1	0,263	500	131	1,313	132,593	5,304	6,314	
15	0,031	1	0,352	500	176	1,313	177,164	7,087	8,436	
30	0,035	1	0,384	500	192	1,759	193,817	7,753	9,229	
45	0,038	1	0,408	500	204	1,921	206,135	8,245	9,816	
60	0,04	1	0,425	500	212	2,042	214,360	8,574	10,208	
120	0,048	1	0,489	500	245	2,123	246,856	9,874	11,755	

Replikasi 3

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (L)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,020	1	0,263	500	131	0,000	131,280	5,251	6,251	0,046
10	0,022	1	0,279	500	139	1,313	140,697	5,628	6,700	
15	0,030	1	0,340	500	170	1,394	171,167	6,847	8,151	
30	0,033	1	0,368	500	184	1,698	185,652	7,426	8,841	
45	0,038	1	0,404	500	202	1,840	204,028	8,161	9,716	
60	0,042	1	0,441	500	220	2,022	222,443	8,898	10,593	
120	0,048	1	0,489	500	245	2,204	246,937	9,877	11,759	

Formula 4

Replikasi 1

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,058	1	0,571	500	285	0,000	285,251	11,410	12,734	0,358
10	0,059	1	0,579	500	289	2,853	292,156	11,686	13,043	
15	0,062	1	0,603	500	301	2,893	304,352	12,174	13,587	
30	0,067	1	0,643	500	322	3,015	324,733	12,989	14,497	
45	0,083	1	0,773	500	387	3,217	389,765	15,591	17,400	
60	0,140	1	1,235	500	618	3,865	621,370	24,855	27,740	
120	0,28	1	2,370	500	1185	6,175	1190,940	47,638	53,167	

Replikasi 2

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (mL)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg/c m2)	fluk
5	0,058	1	0,571	500	285	0,000	285,251	11,410	12,734	0,202
10	0,058	1	0,571	500	285	2,853	288,104	11,524	12,952	
15	0,062	1	0,603	500	301	2,853	304,311	12,172	13,586	
30	0,067	1	0,643	500	322	3,015	324,733	12,989	14,497	
45	0,080	1	0,749	500	374	3,217	377,609	15,104	17,129	
60	0,093	1	0,854	500	427	3,744	430,810	17,232	23,486	
120	0,186	1	1,608	500	804	4,271	808,160	32,326	44,080	

Replikasi 3

waktu (menit)	abs	pengenceran	konsentrasi (mg/L)	Medium Vol. (L)	Amount of drug (mg)	Correction (mg)	Drug released (mg)	% Released	Q(mcg /cm2)	fluk
5	0,058	1	0,571	500	285	0,000	285,251	11,410	12,734	0,275
10	0,059	1	0,575	500	287	2,853	290,130	11,605	12,862	
15	0,062	1	0,603	500	301	2,873	304,331	12,173	13,585	
30	0,067	1	0,643	500	322	3,015	324,733	12,989	14,497	
45	0,082	1	0,761	500	380	3,217	383,687	15,347	16,858	
60	0,117	1	1,045	500	522	3,805	526,090	21,044	19,233	
120	0,23	1	1,964	500	982	5,223	987,395	39,496	36,079	

Lampiran 5. 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	0.910

3. Pembuatan seri konsentrasi

Larutan induk resveratrol 49,52 ppm dibuat 6 seri pengenceran 27,67 ppm; 54,33 ppm; 106,26 ppm; 211,53 ppm; 422,05 ppm dan 667,67 ppm.

Konsentrasi (ppm)	Volume yang diambil (μL)	Volume yang dibuat (μL)
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 :

$$27,67 \; ppm : V1 \; x \; 4952 \; ppm/10000 \; \mu L \; x \; 27,67 \; ppm = 361 \; \mu l$$

$$54,33 \; ppm : V1 \; x \; 4952 \; ppm/10000 \; \mu L \; x \; 54,33 \; ppm = 184 \; \mu l$$

$$106,26 \; ppm : V1 \; x \; 4952 \; ppm/10000 \; \mu L \; x \; 106,26 \; ppm = 94 \; \mu l$$

$$211,53 \; ppm : V1 \; x \; 4952 \; ppm/10000 \; \mu L \; x \; 211,53 \; ppm = 47 \; \mu l$$

$$422,05 \; ppm : V1 \; x \; 4952 \; ppm/10000 \; \mu L \; x \; 422,05 \; ppm = 24 \; \mu l$$

$$667,67 \; ppm : V1 \; x \; 4952 \; ppm/10000 \; \mu L \; x \; 667,67 \; ppm = 15 \; \mu l$$

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	**29**	**0.117**	50	0,118
9	0.134	**30**	**0.117**	51	0,118
10	0.131	**31**	**0.117**	52	0,118
11	0.129	**32**	**0.117**	53	0,118
12	0.127	**33**	**0.117**	54	0,118
13	0.126	**34**	**0.117**	55	0,118
14	0.125	**35**	**0.117**	56	0,118
15	0.124	**36**	**0.117**	57	0,118
16	0.123	**37**	**0.117**	58	0,118
17	0.122	**38**	**0.117**	59	0,118
18	0.121	**39**	**0.117**	60	0,118
19	0.121	**40**	**0,117**		
20	0.120	41	0,118		

5. Perhitungan IC_{50} resveratrol

$IC_{50} = \frac{y-a}{bx} \ x \ 100$

Keterangan :

y $\qquad$ = $inhibition \ concentration$ 50 (I

a $\qquad$ = intersep $\qquad\qquad$ = $ln22,647$

b $\qquad$ = koefisien regresi/slope $\quad$ = 5,167

$$inhibition \ concentration \ 50 = \frac{50 - 5,167}{ln22,647} x \ 100 = 7,2 \ ppm = 7,2 \ \mu g/ml$$

Lampiran 6. Perhitungan %inhibisi resveratrol

induk	4952
Abs Kontrol	0,910

volume	pengencer	pengenceran
300	10000	27,66
200	10000	54,33
100	10000	106,26
50	10000	211,52
25	10000	422,05
15	10000	667,66

Rep 1		Rep 2		Rep 3		Rep 4	
abs	% inhibisi	abs	% inhibisi	abs	% inhibisi	Abs	% inhibisi
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 (%)						
Rep 1	Rep 2	Rep 3	Rep 4	Konsentrasi	Inhibisi	SD
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

y = 22,647ln(x) + 5,1687
R² = 0,9934

X-axis: konsentrasi µg/ml
Y-axis: inhibisi (%)
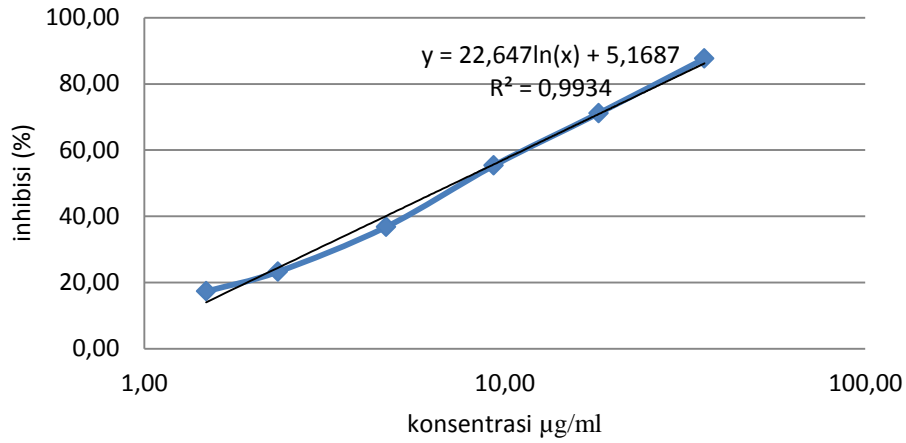
Uji ANOVA IC50

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 = 3.14702061177
COD(R^2) = 0.9981072826829
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 7. Hasil uji aktivitas antioksidan NLC-RSV

Perhitungan %inhibisi NLC-RSV hari ke-1

formula 1	formula 2	formula 3	formula 4	
0,157	0,165	0,160	0,158	
0,160	0,169	0,168	0,164	
0,160	0,172	0,163	0,160	
%inhibisi	%inhibisi	%inhibisi	%inhibisi	
82,658	81,775	82,327	82,548	
82,327	81,333	81,443	81,885	
82,327	81,001	81,996	82,327	
82,437	81,370	81,922	82,253	Rata-rata
0,191	0,388	0,447	0,338	SD

lar. Dpph	Kadar	absorbansi
	40 ppm	0,902
		0,903
		0,911
	rata-rata	0,905

Perhitungan %inhibisi

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

Formula 1

$$Replikasi\ 1\ : \frac{0,905 - 0,157}{0,905}\ x\ 100\% = 82,658\%$$

$$Replikasi\ 2\ : \frac{0,905 - 0,160}{0,905}\ x\ 100\% = 82,327\%$$

$$Replikasi\ 3\ : \frac{0,905 - 0,160}{0,905}\ x\ 100\% = 82,327\%$$

Formula 2

$$Replikasi\ 1\ : \frac{0,905 - 0,165}{0,905}\ x\ 100\% = 81,775\%$$

$$Replikasi\ 2\ : \frac{0,905 - 0,169}{0,905}\ x\ 100\% = 81,333\%$$

$$Replikasi\ 3\ : \frac{0,905 - 0,172}{0,905}\ x\ 100\% = 81,001\%$$

Formula 3

$$\text{Replikasi 1} : \frac{0,905 - 0,160}{0,905} \ x \ 100\% = 82,327\%$$

$$\text{Replikasi 2} : \frac{0,905 - 0,168}{0,905} \ x \ 100\% = 81,443\%$$

$$\text{Replikasi 3} : \frac{0,905 - 0,163}{0,905} \ x \ 100\% = 81,996\%$$

Formula 4

$$\text{Replikasi 1} : \frac{0,905 - 0,158}{0,905} \ x \ 100\% = 82,548\%$$

$$\text{Replikasi 2} : \frac{0,905 - 0,164}{0,905} \ x \ 100\% = 81,885\%$$

$$\text{Replikasi 3} : \frac{0,905 - 0,160}{0,905} \ x \ 100\% = 82,327\%$$

Perhitungan %inhibisi NLC-RSV hari ke-30

formula 1	formula 2	formula 3	formula 4	
0,180	0,183	0,177	0,176	
0,179	0,180	0,177	0,179	
0,182	0,183	0,176	0,179	
%inhibisi	%inhibisi	%inhibisi	%inhibisi	
81,073	80,757	81,388	81,493	
81,178	81,073	81,388	81,178	
80,862	80,757	81,493	81,178	
81,038	80,862	81,423	81,283	rata-rata
0,161	0,182	0,061	0,182	SD

Larutan DPPH	kadar	Absorbansi
	40 ppm	0,974
		0,903
		0,976
	rata-rata	0,951

Perhitungan %inhibisi

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

Formula 1

$$\text{Replikasi 1}: \frac{0,951-0,180}{0,951} \; x \; 100\% = 81,073\%$$

$$\text{Replikasi 2}: \frac{0,951-0,179}{0,951} \; x \; 100\% = 81,178\%$$

$$\text{Replikasi 3}: \frac{0,951-0,182}{0,951} \; x \; 100\% = 80,862\%$$

Formula 2

$$\text{Replikasi 1}: \frac{0,951-0,183}{0,951} \; x \; 100\% = 80,757\%$$

$$\text{Replikasi 2}: \frac{0,951-0,180}{0,951} \; x \; 100\% = 81,073\%$$

$$\text{Replikasi 3}: \frac{0,951-0,183}{0,951} \; x \; 100\% = 80,757\%$$

Formula 3

$$\text{Replikasi 1}: \frac{0,951-0,177}{0,951} \; x \; 100\% = 81,388\%$$

$$\text{Replikasi 2}: \frac{0,951-0,177}{0,951} \; x \; 100\% = 81,388\%$$

$$\text{Replikasi 3}: \frac{0,951-0,176}{0,951} \; x \; 100\% = 81,493\%$$

Formula 4

$$\text{Replikasi 1}: \frac{0,951-0,176}{0,951} \; x \; 100\% = 81,493\%$$

$$\text{Replikasi 2}: \frac{0,951-0,179}{0,951} \; x \; 100\% = 81,178\%$$

$$\text{Replikasi 3}: \frac{0,951-0,179}{0,951} \; x \; 100\% = 81,178\%$$

Perhitungan %perubahan aktivitas antioksidan

Rep	%Per.AA			
1	1,918	1,245	1,141	1,278
2	1,396	0,320	0,068	0,863
3	1,779	0,301	0,613	1,396
rata2	1,698	0,622	0,607	1,179
SD	0,270	0,540	0,537	0,280

Rumus : $\dfrac{\%inhibisi\ hari\ ke\ 1 - \%inhibisi\ hari\ ke\ 30}{\%inhibisi\ hari\ ke\ 1} \ x\ 100\%$

Formula 1

$$\text{Replikasi 1 : } \frac{82{,}658 - 81{,}073}{82{,}658} \ x \ 100\% = 1{,}918\%$$

$$\text{Replikasi 2 : } \frac{82{,}327 - 81{,}178}{82{,}327} \ x \ 100\% = 1{,}396\%$$

$$\text{Replikasi 3 : } \frac{82{,}327 - 80{,}862}{82{,}327} \ x \ 100\% = 1{,}779\%$$

Formula 2

$$\text{Replikasi 1 : } \frac{81{,}775 - 80{,}757}{81{,}775} \ x \ 100\% = 1{,}245\%$$

$$\text{Replikasi 2 : } \frac{81{,}333 - 81{,}073}{81{,}333} \ x \ 100\% = 0{,}320\%$$

$$\text{Replikasi 3 : } \frac{81{,}001 - 80{,}757}{81{,}001} \ x \ 100\% = 0{,}301\%$$

Formula 3

$$\text{Replikasi 1 : } \frac{82{,}327 - 81{,}388}{82{,}327} \ x \ 100\% = 1{,}141\%$$

$$\text{Replikasi 2 : } \frac{81{,}443 - 81{,}388}{81{,}443} \ x \ 100\% = 0{,}068\%$$

$$\text{Replikasi 3 : } \frac{81{,}996 - 81{,}493}{81{,}996} \ x \ 100\% = 0{,}613\%$$

Formula 4

$$\text{Replikasi 1} : \frac{82{,}548 - 81{,}493}{82{,}548} \; x \; 100\% = 1{,}278\%$$

$$\text{Replikasi 2} : \frac{81{,}885 - 81{,}178}{81{,}885} \; x \; 100\% = 0{,}863\%$$

$$\text{Replikasi 3} : \frac{82{,}327 - 81{,}178}{82{,}327} \; x \; 100\% = 1{,}396\%$$