# BAB V

# KESIMPULAN DAN SARAN

## A. Kesimpulan

Pertama, *gelling agent* kitosan yang memiliki muatan positif memberikan pengaruh yang lebih dominan terhadap respon kumulatif, fluks, dan AUC total daripada *enhancer* Transcutol CG. Interaksi antara muatan *gelling agent* positif yang dimiliki oleh kitosan dan *enhancer* Transcutol CG dapat meningkatkan respon perubahan inhibisi.

Kedua, *nanoemulgel* memiliki daya penetrasi yang baik dengan jumlah kumulatif (Q) yang tinggi yang meningkat, nilai fluks yang rendah dan nilai AUC total yang besar.

Ketiga, minyak Capryol, surfaktan Kollipor EL, dan kosurfaktan PEG 400 terpilih dapat membentu nanoemulsi dengan rasio minyak:surfaktan 4:6, surfaktan:kosurfaktan 2:1.

## B. Saran

Pertama, perlu dilakukan pengkajian *in vivo* dan transport modelling untuk mengetahui kinetika transport secara perkutan.

Kedua, perlu dilakukan studi kadar resveratrol yang tertransport secara farmakokinetik.

Ketiga, perlu dilakukan pengembangan formula berbasis optimasi.

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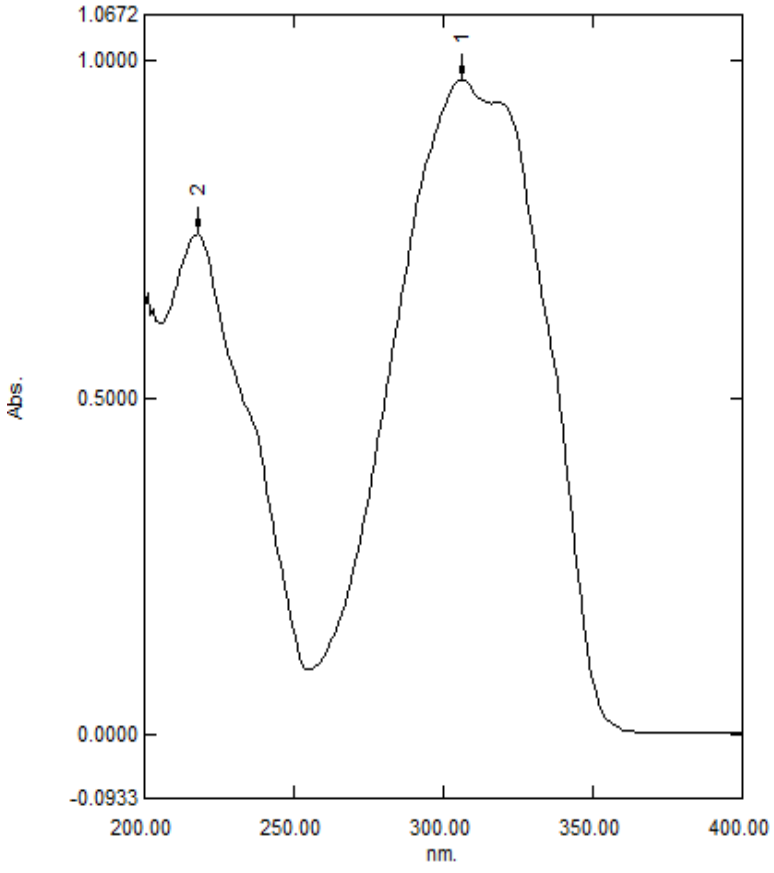
# LAMPIRAN

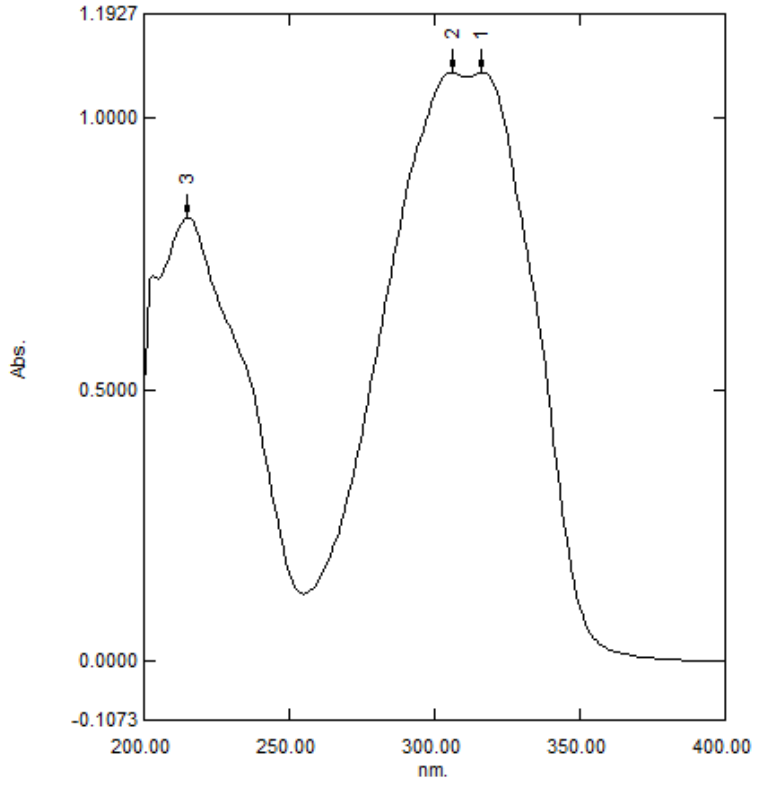
## Lampiran 1. Pengukuran Panjang Gelombang Maksimum

### A. Resveratrol dalam metanol




| No. | P/V | Wavelength nm. | Abs. | Description |
|---|---|---|---|---|
| 1 | ↑ | 306.00 | 0.9705 | |
| 2 | ↑ | 218.00 | 0.7423 | |
| 3 | ↓ | 255.00 | 0.0972 | |

**B. Resveratrol dalam PBS pH 7,4**




| No. | P/V | Wavelength nm. | Abs. | Description |
|---|---|---|---|---|
| 1 | ↑ | 316.00 | 1.0838 | |
| 2 | ↑ | 306.00 | 1.0844 | |
| 3 | ↑ | 215.00 | 0.8176 | |
| 4 | ↓ | 312.00 | 1.0769 | |
| 5 | ↓ | 255.00 | 0.1247 | |

## Lampiran 2. Kurva Baku dan Validasi Metode Analisis

### A. Data kurva baku resveratrol dalam metanol

| Konsentrasi (ppm) | Serapan | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | Rerata |
| 0,63 | 0,076 | 0,076 | 0,074 | 0,072 | 0,075 |
| 0,99 | 0,136 | 0,138 | 0,132 | 0,131 | 0,134 |
| 1,96 | 0,275 | 0,275 | 0,263 | 0,263 | 0,269 |
| 2,92 | 0,403 | 0,403 | 0,433 | 0,432 | 0,418 |
| 3,85 | 0,555 | 0,556 | 0,552 | 0,552 | 0,554 |
| 5,67 | 0,797 | 0,800 | 0,785 | 0,786 | 0,792 |
| 7,43 | 1,033 | 1,030 | 1,044 | 1,045 | 1,038 |

### B. Data kurva baku resveratrol dalam PBS pH 7,4

| Konsentrasi (ppm) | Serapan | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | Rerata |
| 0,49 | 0,076 | 0,078 | 0,065 | 0,066 | 0,071 |
| 0,98 | 0,103 | 0,103 | 0,102 | 0,102 | 0,103 |
| 1,94 | 0,215 | 0,218 | 0,019 | 0,208 | 0,208 |
| 2,91 | 0,340 | 0,340 | 0,337 | 0,339 | 0,339 |
| 3,81 | 0,435 | 0,434 | 0,427 | 0,427 | 0,431 |
| 4,76 | 0,553 | 0,553 | 0,548 | 0,548 | 0,551 |
| 5,65 | 0,648 | 0,647 | 0,651 | 0,650 | 0,649 |
| 6,52 | 0,753 | 0,752 | 0,759 | 0,758 | 0,756 |
| 7,40 | 0,862 | 0,862 | 0,852 | 0,850 | 0,857 |

### C. Perhitungan kurva baku dan linearitas

a. Resveratrol dalam PBS pH 7,4

Penimbangan Resveratrol = 49,52 mg

Larutan Induk = 4952 ppm

Larutan Stok = 99,04 ppm

Perhitungan :

a. Larutan induk

   49,52 mg / 10 ml = **4952 mg/L = 4952 µg/ml (ppm)**

b. Larutan stok

   V1 x C1 = V2 x C2

   V1 x 4952 ppm = 10000 µL x 99,04 ppm

   V1 = 10000 µL x 99,04 ppm / 4952 ppm

   V1 = **200 µL (99,04 ppm)**

c. Seri Konsentrasi

   V1 x C1 = V2 x C2

   V1 x 99,04 ppm = 10000 µL x 0,49 ppm

   V1 = 10000 µL x 0,49 ppm / 99,04 ppm

   V1 = **50 µL (0,49 ppm)**

   V1 x C1 = V2 x C2

   V1 x 99,04 ppm = 10000 µL x 0,98 ppm

   V1 = 10000 µL x 0,98 ppm / 99,04 ppm

   V1 = **99 µL (0,98 ppm)**

   V1 x C1 = V2 x C2

   V1 x 99,04 ppm = 10000 µL x 1,94 ppm

   V1 = 10000 µL x 1,94 ppm / 99,04 ppm

   V1 = **196 µL (1,94 ppm)**

   V1 x C1 = V2 x C2

   V1 x 99,04 ppm = 10000 µL x 4,76 ppm

   V1 = 10000 µL x 4,76 ppm / 99,04 ppm

   V1 = **481 µL (4,76 ppm)**

   V1 x C1 = V2 x C2

   V1 x 99,04 ppm = 10000 µL x 5,65 ppm

   V1 = 10000 µL x 5,65 ppm / 99,04 ppm

   V1 = **570 µL (5,65 ppm)**

   V1 x C1 = V2 x C2

   V1 x 99,04 ppm = 10000 µL x 6,52 ppm

   V1 = 10000 µL x 6,52 ppm / 99,04 ppm

   V1 = **659 µL (6,52 ppm)**

V1 x C1 = V2 x C2

V1 x 99,04 ppm = 10000 µL x 2,91 ppm

V1 = 10000 µL x 2,91 ppm / 99,04 ppm

V1 = **294 µL (2,91 ppm)**

V1 x C1 = V2 x C2

V1 x 99,04 ppm = 10000 µL x 3,81 ppm

V1 = 10000 µL x 3,81 ppm / 99,04 ppm

V1 = **385 µL (3,81 ppm)**

V1 x C1 = V2 x C2

V1 x 99,04 ppm = 10000 µL x 7,40 ppm

V1 = 10000 µL x 7,40 ppm / 99,04 ppm

V1 = **747 µL (7,40 ppm)**

b. Resveratrol dalam PBS pH 7,4

Penimbangan Resveratrol = 52,60 mg

Larutan Induk = 5260 ppm

Larutan Stok = 105,2 ppm

Perhitungan :

a. Larutan induk

52,60 mg / 10 ml = **5260 mg/L = 5260 µg/ml** (**ppm)**

b. Larutan stok

V1 x C1 = V2 x C2

V1 x 5260 ppm = 10000 µL x 105,2 ppm

V1 = 10000 µL x 105,2 ppm / 5260 ppm

V1 = **200 µL (105,2 ppm)**

c. Seri Konsentrasi

V1 x C1 = V2 x C2

V1 x 105,2 ppm = 10000 µL x 0,63 ppm

V1 x C1 = V2 x C2

V1 x 105,2 ppm = 10000 µL x 3,85 ppm

V1 = 10000 µL x 0,63 ppm / 105,2 ppm
V1 = **60 µL (0,63 ppm)**

V1 x C1 = V2 x C2
V1 x 105,2 ppm = 10000 µL x 0,99 ppm
V1 = 10000 µL x 0,99 ppm / 105,2 ppm
V1 = **94 µL (0,99 ppm)**

V1 x C1 = V2 x C2
V1 x 105,2 ppm = 10000 µL x 1,96 ppm
V1 = 10000 µL x 1,96 ppm / 105,2 ppm
V1 = **186 µL (1,96 ppm)**

V1 x C1 = V2 x C2
V1 x 105,2 ppm = 10000 µL x 2,92 ppm
V1 = 10000 µL x 2,92 ppm / 105,2 ppm
V1 = **277 µL (2,92 ppm)**

V1 = 10000 µL x 3,85 ppm / 105,2 ppm
V1 = **366 µL (3,85 ppm)**

V1 x C1 = V2 x C2
V1 x 105,2 ppm = 10000 µL x 5,67 ppm
V1 = 10000 µL x 5,67 ppm / 105,2 ppm
V1 = **539 µL (5,67 ppm)**

V1 x C1 = V2 x C2
V1 x 105,2 ppm = 10000 µL x 7,43 ppm
V1 = 10000 µL x 7,43 ppm / 105,2 ppm
V1 = **706 µL (7,43 ppm)**

## D. Akurasi resveratrol dalam metanol

| % | Replikasi | Serapan | Konsentrasi (ppm) | Konsentrasi Sebenarnya (ppm) | % Perolehan Kembali |
|---|---|---|---|---|---|
| 80% | 1 | 0,410 | 2,94 | 2,92 | 101% |
| | 2 | 0,415 | 2,97 | 2,92 | 102% |
| | 3 | 0,412 | 2,95 | 2,92 | 101% |
| 100% | 1 | 0,544 | 3,89 | 3,85 | 101% |
| | 2 | 0,546 | 3,90 | 3,85 | 101% |
| | 3 | 0,549 | 3,92 | 3,85 | 102% |
| 120% | 1 | 0,791 | 5,64 | 5,67 | 99% |
| | 2 | 0,789 | 5,62 | 5,67 | 99% |

| | | | | | |
|---|---|---|---|---|---|
| | 3 | 0,793 | 5,65 | 5,67 | 100% |
| X rata-rata ± SD | | | | 100,62% ± 0,01 | |

$$\% \text{ Perolehan Kembali} = \frac{\text{Konsentrasi}}{\text{Konsentrasi sebenarnya}} x100\%$$

## E. Akurasi resveratrol dalam PBS pH 7,4

| % | Replikasi | Serapan | Konsentrasi (ppm) | Konsentrasi Sebenarnya (ppm) | % Perolehan Kembali |
|---|---|---|---|---|---|
| 80% | 1 | 0,547 | 4,79 | 4,76 | 101% |
| | 2 | 0,543 | 4,76 | 4,76 | 100% |
| | 3 | 0,549 | 4,81 | 4,76 | 101% |
| 100% | 1 | 0,643 | 5,63 | 5,65 | 100% |
| | 2 | 0,652 | 5,71 | 5,65 | 101% |
| | 3 | 0,649 | 5,68 | 5,65 | 101% |
| 120% | 1 | 0,759 | 6,64 | 6,52 | 102% |
| | 2 | 0,752 | 6,58 | 6,52 | 101% |
| | 3 | 0,756 | 6,61 | 6,52 | 101% |
| X rata-rata ± SD | | | | 100,77% ± 0,0068 | |

$$\% \text{ Perolehan Kembali} = \frac{\text{Konsentrasi}}{\text{Konsentrasi sebenarnya}} x100\%$$

## F. Presisi resveratrol dalam metanol

| Replikasi | Konsentrasi | Konsentrasi sebenarnya | Absorbansi | %recovery |
|---|---|---|---|---|
| 1 | 3,60 | 3,85 | 0,504 | 93,56% |
| 2 | 3,62 | 3,85 | 0,507 | 94,11% |
| 3 | 3,59 | 3,85 | 0,502 | 93,19% |
| 4 | 3,62 | 3,85 | 0,506 | 93,93% |
| 5 | 3,62 | 3,85 | 0,507 | 94,11% |
| 6 | 3,60 | 3,85 | 0,503 | 93,38% |
| 7 | 3,60 | 3,85 | 0,503 | 93,38% |
| 8 | 3,60 | 3,85 | 0,504 | 93,56% |

| | | | | |
|---|---|---|---|---|
| 9 | 3,62 | 3,85 | 0,506 | 93,93% |
| 10 | 3,60 | 3,85 | 0,503 | 93,38% |
| X rata-rata ± SD | | | 93,65% ± 0,003 | |
| SD | | | 0,014 | |
| RSD (%) | | | 0,40 | |

$$\%\ \text{Recovery} = \frac{\text{SD}}{\text{Rata} - \text{rata}} x100\%$$

**G. Presisi resveratrol dalam PBS pH 7,4**

| Replikasi | Konsentrasi | Konsentrasi sebenarnya | Absorbansi | %recovery |
|---|---|---|---|---|
| 1 | 5,62 | 5,65 | 0,504 | 99,50% |
| 2 | 5,64 | 5,65 | 0,507 | 99,81% |
| 3 | 5,65 | 5,65 | 0,502 | 99,96% |
| 4 | 5,54 | 5,65 | 0,506 | 98,13% |
| 5 | 5,59 | 5,65 | 0,507 | 98,89% |
| 6 | 5,65 | 5,65 | 0,503 | 99,96% |
| 7 | 5,65 | 5,65 | 0,503 | 99,96% |
| 8 | 5,62 | 5,65 | 0,504 | 99,50% |
| 9 | 5,67 | 5,65 | 0,506 | 100,27% |
| 10 | 5,54 | 5,65 | 0,503 | 97,98% |
| X rata-rata ± SD | | | 99,40% ± 0,008 | |
| SD | | | 0,054 | |
| RSD (%) | | | 0,96 | |

$$\%\ \text{Recovery} = \frac{\text{SD}}{\text{Rata} - \text{rata}} x100\%$$

**H. LOD dan LOQ resveratrol dalam metanol**

| Konsentrasi (x) | Absorbansi (y) | y' | y-y' | $(y-y')^2$ |
|---|---|---|---|---|
| 0.63 | 0.075 | 0.084 | -0.009 | 0.00008428 |
| 0.99 | 0.134 | 0.135 | -0.001 | 0.00000182 |
| 1.96 | 0.269 | 0.272 | -0.003 | 0.00001199 |
| 2.92 | 0.418 | 0.407 | 0.011 | 0.00012002 |
| 3.85 | 0.554 | 0.539 | 0.015 | 0.00022015 |
| 5.67 | 0.792 | 0.796 | -0.004 | 0.00001827 |
| 7.43 | 1.038 | 1.044 | -0.006 | 0.00003976 |
| Jumlah $(y-y')^2$ | | | | 0,000496297 |

| SD | 0,00909484 |
|---|---|

$$LOD = \frac{3{,}3 \text{ x } SD}{Slope} \qquad LOQ = \frac{10 \text{ x } SD}{Slope}$$

$$LOD = \frac{3{,}3 \text{ x } 0{,}00909484}{0{,}141152} \qquad LOQ = \frac{10 \text{ x } 0{,}00909484}{0{,}141152}$$

$$LOD = 0{,}212659 \text{ µg/ml} \qquad LOQ = 0{,}644422 \text{ µg/ml}$$

**I. LOD dan LOQ resveratrol dalam PBS pH 7,4**

| Konsentrasi (x) | Absorbansi (y) | y' | y-y' | (y-y') |
|---|---|---|---|---|
| 0.49 | 0.071 | 0.054 | 0.018 | 0.00030682 |
| 0.98 | 0.103 | 0.110 | -0.008 | 0.00006014 |
| 1.94 | 0.208 | 0.222 | -0.014 | 0.00018600 |
| 2.91 | 0.339 | 0.334 | 0.005 | 0.00002959 |
| 3.81 | 0.431 | 0.438 | -0.007 | 0.00005223 |
| 4.76 | 0.551 | 0.548 | 0.002 | 0.00000503 |
| 5.65 | 0.649 | 0.651 | -0.002 | 0.00000509 |
| 6.52 | 0.756 | 0.75233 | 0.003 | 0.00001005 |
| 7.40 | 0.857 | 0.853991 | 0.003 | 0.00000629 |
| Jumlah $(y-y')^2$ | | | | 0,000654942 |
| SD | | | | 0,009672807 |

$$LOQ = \frac{3{,}3 \text{ x } SD}{Slope} \qquad LOQ = \frac{10 \text{ x } SD}{Slope}$$

$$LOQ = \frac{3{,}3 \text{ x } 0{,}009672807}{0{,}115856} \qquad LOQ = \frac{10 \text{ x } 0{,}009672807}{0{,}115856}$$

$$LOQ = 0{,}27551 \text{ µg/ml} \qquad LOQ = 0{,}83488 \text{ µg/ml}$$

**Lampiran 3.** ***Certificate of Analysis*** **Resveratrol**

泽世化学 THANEN CHEMICALS
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 |
| -As | ≤1.0ppm | Complies |
| -Pb | ≤1.5ppm | Complies |
| -Cd | ≤0.5ppm | Complies |
| -Hg | ≤0.1ppm | Complies |
| **Total Plate Count** | ≤1000cfu/g | Complies |
| -Yeast & Mold | ≤100cfu/g | Complies |
| -E.Coli | Negative | Negative |
| -Salmonella | Negative | Negative |
| **Conclusion** | Comply with the specification. | |
| **Storage** | Preserve in tight containers, protected from strong light and high heat. Store in dry cool place. | |

Analyst: QC Manager: QA:

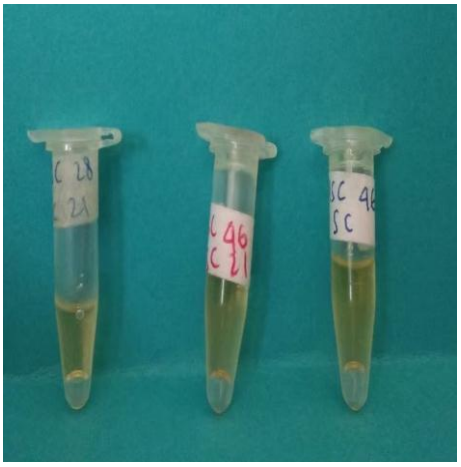
**Lampiran 4. *Drug Loading***

## A. Perhitungan *Drug Loading*

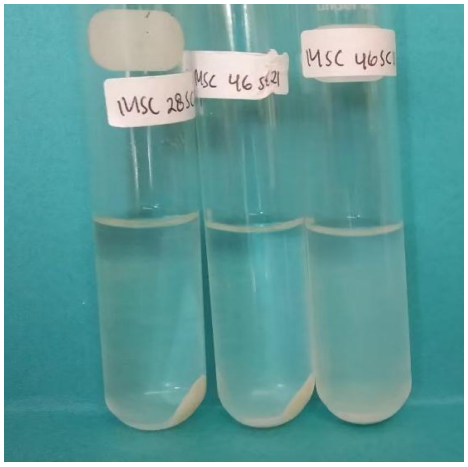
| Rasio | Replikasi | Serapan | Pengenceran | Kadar | Rerata ± SD | Drug Loading (mg/mL) |
|---|---|---|---|---|---|---|
| MSC 46 SC 11 | 1 | 0,421 | 30401 | 3,01 | 2,93 ± 0,08 | 89,11 |
| | 2 | 0,416 | 30401 | 2,98 | | |
| | 3 | 0,397 | 30401 | 2,84 | | |
| | 4 | 0,404 | 30401 | 2,89 | | |
| MSC 46 SC 21 | 1 | 0,361 | 30401 | 2,59 | 2,68 ± 0,08 | 81,36 |
| | 2 | 0,373 | 30401 | 2,67 | | |
| | 3 | 0,373 | 30401 | 2,67 | | |
| | 4 | 0,387 | 30401 | 2,77 | | |
| MSC 28 SC 21 | 1 | 0,495 | 30401 | 3,54 | 3,47 ± 0,12 | 105,38 |
| | 2 | 0,469 | 30401 | 3,35 | | |
| | 3 | 0,472 | 30401 | 3,37 | | |
| | 4 | 0,504 | 30401 | 3,60 | | |

**Perhitungan *Drug Loading***

1. MSC 46 SC 11 = $\frac{\text{Rerata kadar x Pengenceran}}{1000} = \frac{2{,}93 \text{ x } 30401}{1000}$ = 89,11 mg/ml
2. MSC 46 SC 21 = $\frac{\text{Rerata kadar x Pengenceran}}{1000} = \frac{2{,}68\text{x } 30401}{1000}$ = 81,36 mg/ml
3. MSC 28 SC 21 = $\frac{\text{Rerata kadar x Pengenceran}}{1000} = \frac{3{,}47 \text{ x } 30401}{1000}$ = 105,38 mg/ml



*Drug loading*




Kndisi *supersaturable*

**Lampiran 5. Ukuran Partikel**

## Size Distribution Report by Intensity

v2.2

Malvern

**Sample Details**

| | | | |
|---|---|---|---|
| **Sample Name:** | sampel 1 5 | | |
| **SOP Name:** | mansettings.nano | | |
| **General Notes:** | | | |
| **File Name:** | Anisa Devi 2019.dts | **Dispersant Name:** | Water |
| **Record Number:** | 5 | **Dispersant RI:** | 1.330 |
| **Material RI:** | 1.33 | **Viscosity (mPa.s):** | 0.8872 |
| **Material Absorbtion:** | 0.500 | **Measurement Date and Time:** | Friday, June 28, 2019 8:37:... |

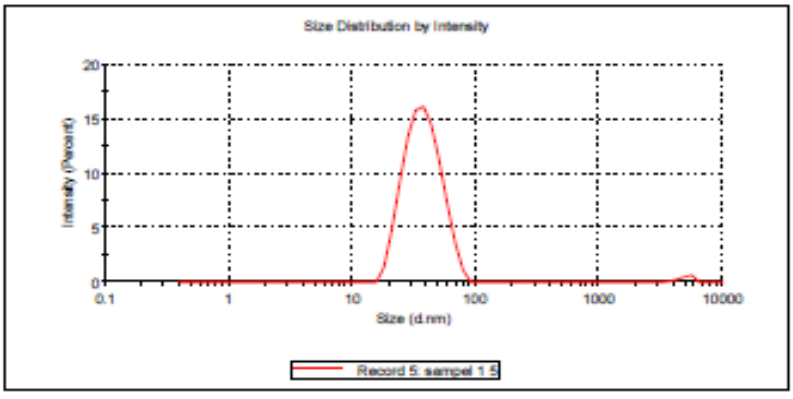
**System**

| | | | |
|---|---|---|---|
| **Temperature (°C):** | 25.0 | **Duration Used (s):** | 60 |
| **Count Rate (kcps):** | 259.7 | **Measurement Position (mm):** | 1.05 |
| **Cell Description:** | Disposable sizing cuvette | **Attenuator:** | 5 |

**Results**

| | | | Size (d.nm... | % Intensity: | St Dev (d.n... |
|---|---|---|---|---|---|
| **Z-Average (d.nm):** | 36.07 | **Peak 1:** | 38.87 | 98.4 | 12.80 |
| **PdI:** | 0.168 | **Peak 2:** | 4942 | 1.6 | 639.9 |
| **Intercept:** | 0.947 | **Peak 3:** | 0.000 | 0.0 | 0.000 |

**Result quality** Good



# Size Distribution Report by Intensity

v2.2

Malvern

## Sample Details

**Sample Name:** sampel 1 1

**SOP Name:** mansettings.nano

**General Notes:**

| | | | |
|---|---|---|---|
| **File Name:** | Anisa Devi 2019.dts | **Dispersant Name:** | Water |
| **Record Number:** | 1 | **Dispersant RI:** | 1.330 |
| **Material RI:** | 1.33 | **Viscosity (mPa.s):** | 0.8872 |
| **Material Absorbtion:** | 0.500 | **Measurement Date and Time:** | Friday, June 28, 2019 8:28:... |

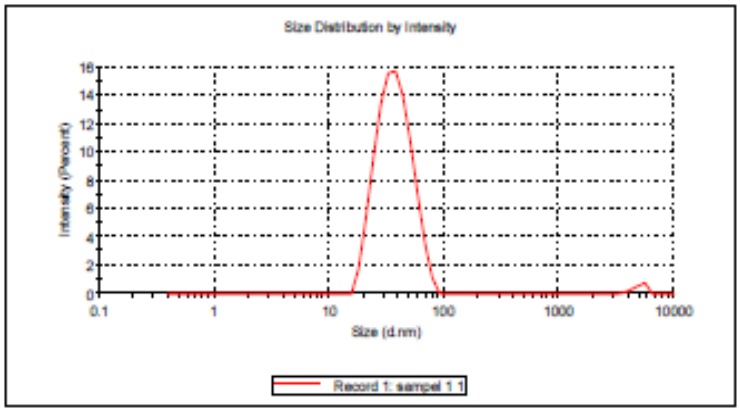
## System

| | | | |
|---|---|---|---|
| **Temperature (°C):** | 25.0 | **Duration Used (s):** | 60 |
| **Count Rate (kcps):** | 262.6 | **Measurement Position (mm):** | 1.05 |
| **Cell Description:** | Disposable sizing cuvette | **Attenuator:** | 5 |

## Results

| | | Size (d.nm... | % Intensity: | St Dev (d.n... |
|---|---|---|---|---|
| **Z-Average (d.nm):** 36.08 | **Peak 1:** | 38.53 | 98.2 | 12.95 |
| **PdI:** 0.165 | **Peak 2:** | 4967 | 1.8 | 623.3 |
| **Intercept:** 0.945 | **Peak 3:** | 0.000 | 0.0 | 0.000 |

**Result quality** Good



# Size Distribution Report by Intensity

v2.2

Malvern

## Sample Details

**Sample Name:** sampel 1 2
**SOP Name:** mansettings.nano
**General Notes:**

**File Name:** Anisa Devi 2019.dts
**Record Number:** 2
**Material RI:** 1.33
**Material Absorbtion:** 0.500
**Dispersant Name:** Water
**Dispersant RI:** 1.330
**Viscosity (mPa.s):** 0.8872
**Measurement Date and Time:** Friday, June 28, 2019 8:30:...

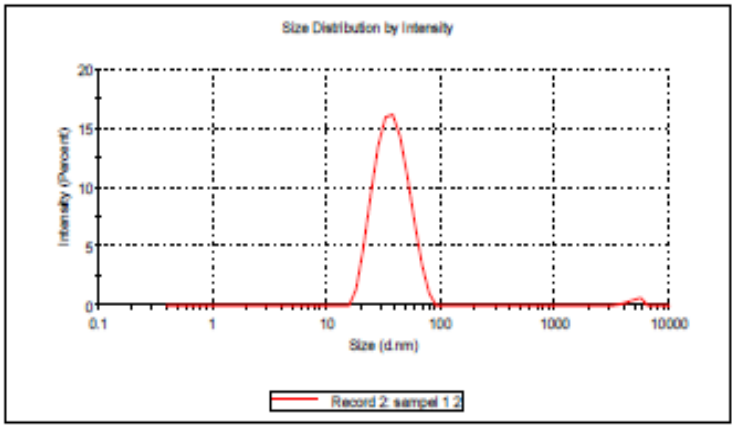
## System

**Temperature (°C):** 25.0
**Count Rate (kcps):** 260.2
**Cell Description:** Disposable sizing cuvette
**Duration Used (s):** 60
**Measurement Position (mm):** 1.05
**Attenuator:** 5

## Results

| | | Size (d.nm... | % Intensity: | St Dev (d.n... |
|---|---|---|---|---|
| Z-Average (d.nm): 36.04 | Peak 1: | 38.61 | 98.3 | 12.65 |
| PdI: 0.159 | Peak 2: | 4875 | 1.7 | 685.1 |
| Intercept: 0.946 | Peak 3: | 0.000 | 0.0 | 0.000 |

**Result quality** Good



# Size Distribution Report by Intensity

v2.2

Malvern

## Sample Details

**Sample Name:** sampel 1 3

**SOP Name:** mansettings.nano

**General Notes:**

| | | | |
|---|---|---|---|
| **File Name:** | Anisa Devi 2019.dts | **Dispersant Name:** | Water |
| **Record Number:** | 3 | **Dispersant RI:** | 1.330 |
| **Material RI:** | 1.33 | **Viscosity (mPa.s):** | 0.8872 |
| **Material Absorbtion:** | 0.500 | **Measurement Date and Time:** | Friday, June 28, 2019 8:32:... |

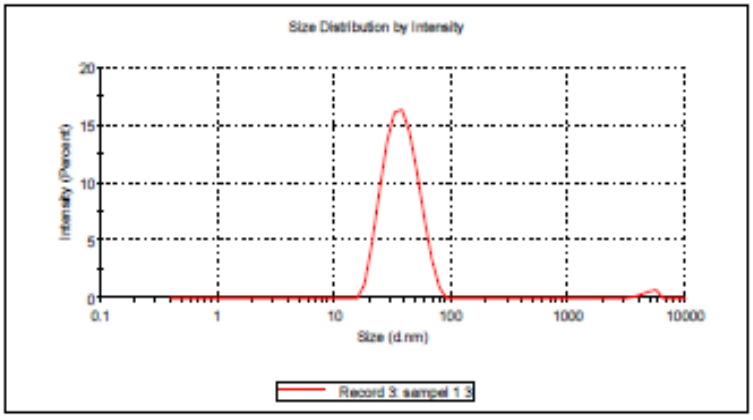
## System

| | | | |
|---|---|---|---|
| **Temperature (°C):** | 25.0 | **Duration Used (s):** | 60 |
| **Count Rate (kcps):** | 258.8 | **Measurement Position (mm):** | 1.05 |
| **Cell Description:** | Disposable sizing cuvette | **Attenuator:** | 5 |

## Results

| | | | Size (d.nm... | % Intensity: | St Dev (d.n... |
|---|---|---|---|---|---|
| **Z-Average (d.nm):** | 36.20 | **Peak 1:** | 38.56 | 98.0 | 12.48 |
| **PdI:** | 0.166 | **Peak 2:** | 4831 | 2.0 | 709.0 |
| **Intercept:** | 0.941 | **Peak 3:** | 0.000 | 0.0 | 0.000 |

**Result quality** Good



**Lampiran 6. Potensial Zeta**

# Zeta Potential Report

*v2.3*

Malvern



## Sample Details

**Sample Name:** sampel 1.4
**SOP Name:** mansettings.nano
**General Notes:**

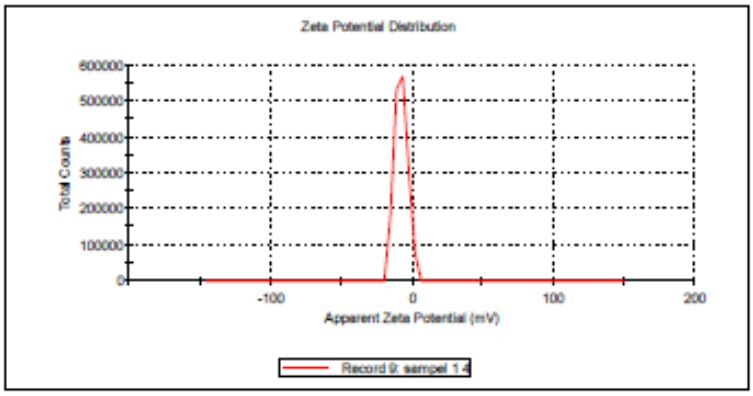
**File Name:** Anisa Devi 2019.dts
**Record Number:** 9
**Date and Time:** Friday, June 28, 2019 8:42:35 ...
**Dispersant Name:** Water
**Dispersant RI:** 1.330
**Viscosity (cP):** 0.8872
**Dispersant Dielectric Constant:** 78.5

## System

**Temperature (°C):** 25.0
**Count Rate (kcps):** 214.8
**Cell Description:** Zeta dip cell
**Zeta Runs:** 12
**Measurement Position (mm):** 4.50
**Attenuator:** 7

## Results

| | | Mean (mV) | Area (%) | St Dev (mV) |
|---|---|---|---|---|
| Zeta Potential (mV): -7.99 | Peak 1: | -7.99 | 100.0 | 4.46 |
| Zeta Deviation (mV): 4.46 | Peak 2: | 0.00 | 0.0 | 0.00 |
| Conductivity (mS/cm): 0.0975 | Peak 3: | 0.00 | 0.0 | 0.00 |
| Result quality Good | | | | |



# Zeta Potential Report

*v2.3*

Malvern



## Sample Details

**Sample Name:** sampel 1 3
**SOP Name:** mansettings.nano
**General Notes:**

**File Name:** Anisa Devi 2019.dts
**Record Number:** 8
**Date and Time:** Friday, June 28, 2019 8:41:52 ...

**Dispersant Name:** Water
**Dispersant RI:** 1.330
**Viscosity (cP):** 0.8872
**Dispersant Dielectric Constant:** 78.5

## System

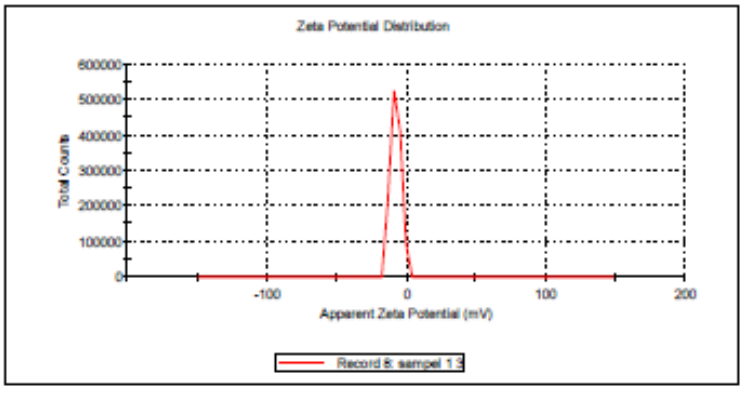
**Temperature (°C):** 25.0
**Count Rate (kcps):** 65.6
**Cell Description:** Zeta dip cell

**Zeta Runs:** 13
**Measurement Position (mm):** 4.50
**Attenuator:** 7

## Results

| | | Mean (mV) | Area (%) | St Dev (mV) |
|---|---|---|---|---|
| **Zeta Potential (mV):** -7.80 | **Peak 1:** | -7.80 | 100.0 | 3.68 |
| **Zeta Deviation (mV):** 3.68 | **Peak 2:** | 0.00 | 0.0 | 0.00 |
| **Conductivity (mS/cm):** 0.0969 | **Peak 3:** | 0.00 | 0.0 | 0.00 |

**Result quality** Good



# Zeta Potential Report

v2.3

Malvern



## Sample Details

**Sample Name:** sampel 1 2
**SOP Name:** mansettings.nano
**General Notes:**

**File Name:** Anisa Devi 2019.dts
**Record Number:** 7
**Date and Time:** Friday, June 28, 2019 8:41:13 ...
**Dispersant Name:** Water
**Dispersant RI:** 1.330
**Viscosity (cP):** 0.8872
**Dispersant Dielectric Constant:** 78.5

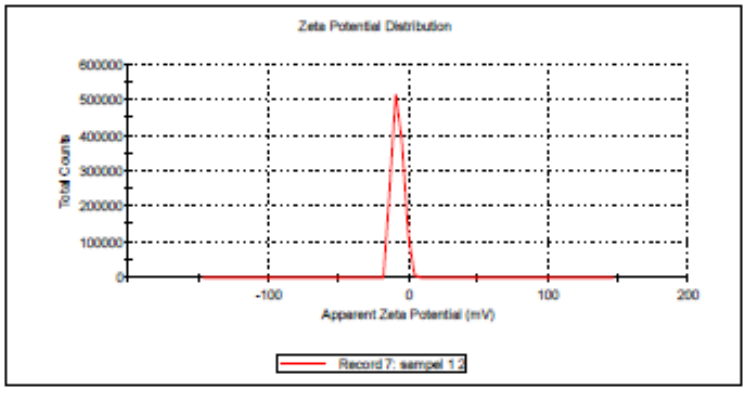
## System

**Temperature (°C):** 25.0
**Count Rate (kcps):** 89.3
**Cell Description:** Zeta dip cell
**Zeta Runs:** 12
**Measurement Position (mm):** 4.50
**Attenuator:** 7

## Results

| | | Mean (mV) | Area (%) | St Dev (mV) |
|---|---|---|---|---|
| **Zeta Potential (mV):** -7.79 | **Peak 1:** | -7.79 | 100.0 | 4.04 |
| **Zeta Deviation (mV):** 4.04 | **Peak 2:** | 0.00 | 0.0 | 0.00 |
| **Conductivity (mS/cm):** 0.0967 | **Peak 3:** | 0.00 | 0.0 | 0.00 |

**Result quality** Good



# Zeta Potential Report

v2.3

Malvern



## Sample Details

**Sample Name:** sampel 1 1
**SOP Name:** mansettings.nano
**General Notes:**

**File Name:** Anisa Devi 2019.dts
**Record Number:** 6
**Date and Time:** Friday, June 28, 2019 8:38:12 ...

**Dispersant Name:** Water
**Dispersant RI:** 1.330
**Viscosity (cP):** 0.8872
**Dispersant Dielectric Constant:** 78.5

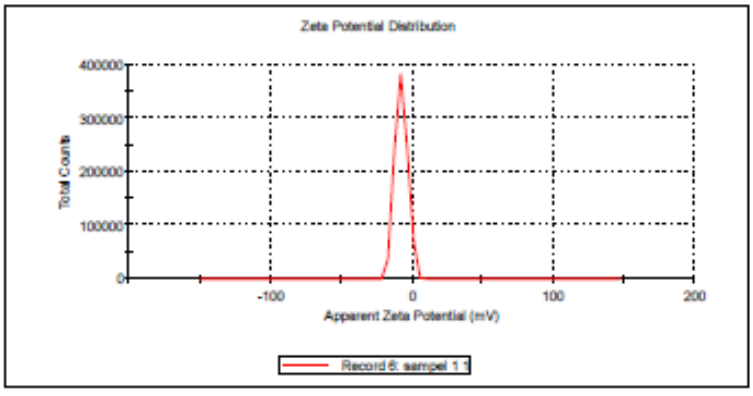
## System

**Temperature (°C):** 25.0
**Count Rate (kcps):** 153.6
**Cell Description:** Zeta dip cell

**Zeta Runs:** 12
**Measurement Position (mm):** 4.50
**Attenuator:** 7

## Results

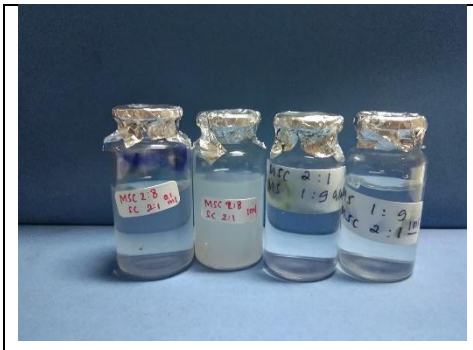
| | | Mean (mV) | Area (%) | St Dev (mV) |
|---|---|---|---|---|
| Zeta Potential (mV): | -7.68 | Peak 1: -7.68 | 100.0 | 4.43 |
| Zeta Deviation (mV): | 4.43 | Peak 2: 0.00 | 0.0 | 0.00 |
| Conductivity (mS/cm): | 0.0960 | Peak 3: 0.00 | 0.0 | 0.00 |
| Result quality | Good | | | |

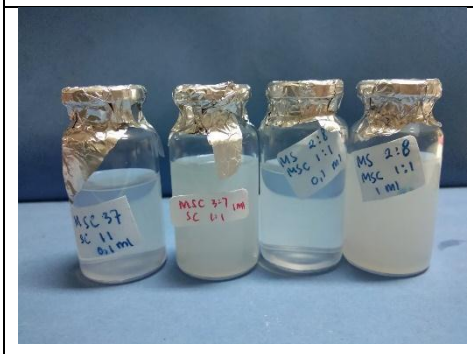
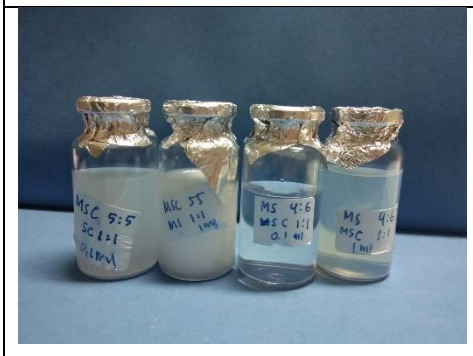
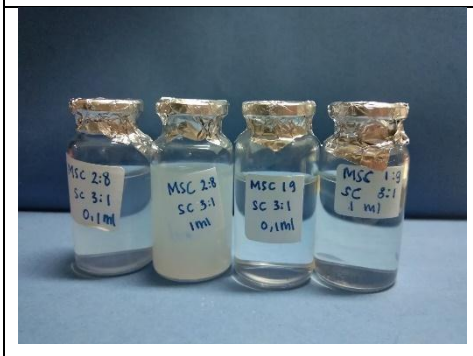


**Lampiran 7. Nanoemulgel Resveratrol**

| | |
|---|---|
|  | Nanoemulgel resveratrol |

**Lampiran 8. Skrining dan Pembentukan nanoemulsi**

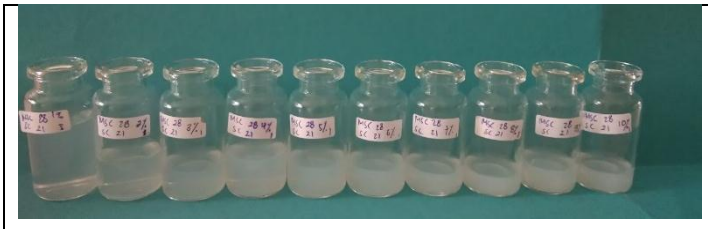
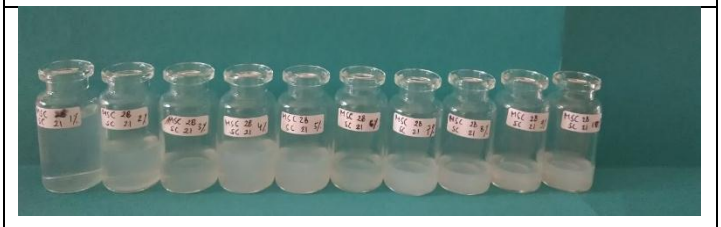
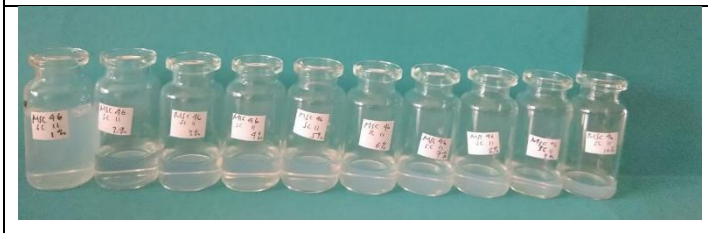
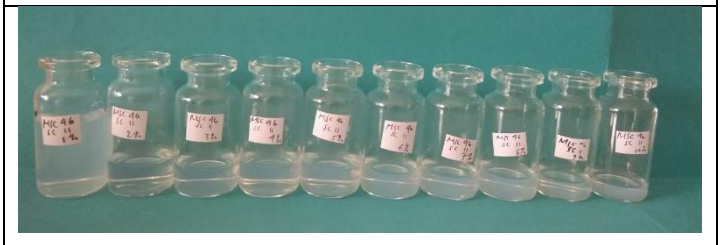
| | |
|---|---|
|  | Minyak : Smix 2:8, Smix 2:1<br>Minyak : Smix 1:9, Smix 2:1 |
|  | Minyak : Smix 4:6, Smix 2:1<br>Minyak : Smix 3:7, Smix 2:1 |

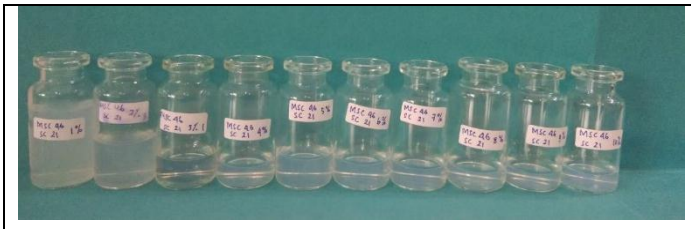
| | |
|---|---|
|  | Minyak : Smix 1:9, Smix 1:1<br>Minyak : Smix 5:5, Smix 2:1 |
|  | Minyak : Smix 3:7, Smix 1:1<br>Minyak : Smix 2:8, Smix 1:1 |
|  | Minyak : Smix 5:5, Smix 1:1<br>Minyak : Smix 4:6, Smix 1:1 |
|  | Minyak : Smix 2:8, Smix 3:1<br>Minyak : Smix 1:9, Smix 3:1 |

| | |
|---|---|
|  | Minyak : Smix 5:5, Smix 1:1<br>Minyak : Smix 4:6, Smix 3:1<br>Minyak : Smix 3:7, Smix 3:1 |

**Lampiran 9. Persen Transmittan**

**A. Visual**

| | |
|---|---|
|  | Minyak : Smix 2:8, Smix 1:1 konsentrasi 1-10% |
|  | |
|  | Minyak : Smix 4:6, Smix 1:1 konsentrasi 1-10% |
|  | |

| | |
|---|---|
|   | Minyak : Smix 4:6, Smix 2:1 konsentrasi 1-10% |

**B. Hasil Persen Transmittan**

**1. Minyak : Smix 2:8, Smix 2:1**

| Konsentrasi A | Konsentrasi B | % Transmittan A | | % Transmittan B | |
|---|---|---|---|---|---|
| | | I | II | I | II |
| 1,02 | 1,01 | 79,1 | 78,9 | 81 | 80,6 |
| 1,96 | 1,96 | 56 | 55,5 | 49,7 | 49,8 |
| 2,92 | 2,93 | 36,6 | 36 | 35,4 | 35,3 |
| 3,95 | 4,10 | 23,7 | 23 | 29 | 28,9 |
| 5,14 | 4,87 | 21,2 | 20,5 | 17,5 | 17,3 |
| 6,25 | 5,91 | 17,3 | 17 | 17,5 | 17,4 |
| 6,89 | 6,89 | 13,1 | 12,6 | 19,2 | 18,2 |
| 7,62 | 8,05 | 12 | 11,6 | 16,1 | 16 |
| 8,76 | 9,00 | 16,9 | 16,6 | 15,7 | 15,6 |
| 10,49 | 10,12 | 18,7 | 18 | 12,6 | 12,5 |

**2. Minyak : Smix 4:6. Smix 2:1**

| Konsentrasi A | Konsentrasi B | % Transmittan A | | % Transmittan B | |
|---|---|---|---|---|---|
| | | I | II | I | II |
| 1,01 | 1,01 | 76 | 76,1 | 76,1 | 76,2 |
| 2,06 | 2,01 | 86,4 | 86,3 | 82,1 | 82,2 |
| 3,88 | 3.06 | 82,1 | 82,2 | 88,1 | 88,2 |
| 5,25 | 4,21 | 83 | 83 | 88,7 | 88,7 |
| 5,62 | 5,02 | 86,7 | 86,7 | 89,8 | 89,9 |
| 6,25 | 6,16 | 87,8 | 87,8 | 87,4 | 87,4 |
| 7,04 | 7,22 | 87 | 87,1 | 86,6 | 85,5 |
| 8,45 | 8,56 | 85,4 | 85,5 | 84,3 | 84,4 |
| 9,11 | 8,98 | 85,3 | 85,3 | 86,3 | 86,3 |
| 10,45 | 10,09 | 83,6 | 83,6 | 85,5 | 85,4 |

**3. Minyak : Smix 4:6. Smix 1:1**

| Konsentrasi A | Konsentrasi B | % Transmittan A | | % Transmittan B | |
|---|---|---|---|---|---|
| | | I | II | I | II |
| 1,10 | 1,01 | 90,5 | 89,9 | 90,1 | 90,3 |
| 2,09 | 2,04 | 89 | 88,4 | 88,3 | 87,9 |
| 3,09 | 3,03 | 85,6 | 84,4 | 85,2 | 84,5 |
| 4,21 | 4,22 | 83,4 | 83 | 81,8 | 81,8 |
| 5,19 | 5,10 | 82 | 81,2 | 80,9 | 80,6 |
| 6,29 | 6,08 | 78,1 | 77,4 | 77,2 | 77,2 |
| 7,10 | 6,24 | 76,6 | 76,7 | 75,5 | 76,3 |
| 8,07 | 7,77 | 75,6 | 75,7 | 74,5 | 74 |
| 9,51 | 9,13 | 72,4 | 73,2 | 73,3 | 73,5 |
| 10,07 | 10,02 | 58,4 | 58,7 | 58,1 | 58,2 |

**Lampiran 10. Perhitungan *Gelling Agent***

**A. Carbopol**

| Konsentrasi (%) | Viskositas | | | Rata-rata |
|---|---|---|---|---|
| | I | II | III | |
| 1,012 | 130 | 130 | 130 | 130 |
| 1,506 | 170 | 170 | 160 | 166,67 |
| 2,006 | 250 | 250 | 250 | 250 |
| 2,504 | 350 | 350 | 350 | 350 |
| 3,054 | 390 | 400 | 390 | 393,33 |
| Persamaan regresi linear | Y=bx+a | | Y= 139,52x -23,37 | |

Perhitungan konsentrasi:

Kertas kosong = 0,282 g
Kertas + zat = 0,788 g
Zat = **0,506 g**
Konsentrasi = 0,506 x 2 x 100%
Konsentrasi = **1,012%**

Kertas kosong = 0,272 g
Kertas + zat = 1,025 g
Zat = **0,753 g**
Konsentrasi = 0,753 x 2 x 100%
Konsentrasi = **1,506%**

Kertas kosong = 0,285 g
Kertas + zat = 1,288 g
Zat = **1,003 g**
Konsentrasi = 1,003 x 2 x 100%
Konsentrasi = **2,006%**

Kertas kosong = 0,283 g
Kertas + zat = 1,535 g
Zat = **1,252 g**
Konsentrasi = 1,252 x 2 x 100%
Konsentrasi = **2,504%**

Kertas kosong = 0,270 g
Kertas + zat = 1,797 g
Zat = **1,5272 g**
Konsentrasi = 1,5272 x 2 x 100%
Konsentrasi = **3,054%**

**Viskositas 200 dPas**

Y= 139,52x -23,37
200 = 139,52x -23,37
X = 200-23,37 / 139,52
X = **1,60**

**B. Kitosan**

| Konsentrasi (%) | Viskositas | | | Rata-rata |
|---|---|---|---|---|
| | I | II | III | |
| 5,012 | 110 | 110 | 110 | 110 |
| 5,500 | 170 | 170 | 150 | 163 |
| 6,018 | 250 | 240 | 250 | 247 |
| 6,500 | 300 | 300 | 300 | 300 |
| 7,096 | 470 | 470 | 470 | 470 |
| Persamaan regresi linear | | Y=bx+a | | Y= 167,02x -748,35 |

Perhitungan konsentrasi:

Kertas kosong = 1,088 g
Kertas + zat = 3,594 g
Zat = **2,506 g**
Konsentrasi = 2,506 x 2 x 100%
Konsentrasi = **5,012%**

Kertas kosong = 0,284 g
Kertas + zat = 3,034 g
Zat = **2,75 g**
Konsentrasi = 2,75 x 2 x 100%
Konsentrasi = **5,500%**

Kertas kosong = 0,285 g
Kertas + zat = 3,294 g
Zat = **3,009 g**
Konsentrasi = 3,009 x 2 x 100%
Konsentrasi = **6,018%**

Kertas kosong = 0,281 g
Kertas + zat = 3,531 g
Zat = **3,25 g**
Konsentrasi = 3,25 x 2 x 100%
Konsentrasi = **6,5%**

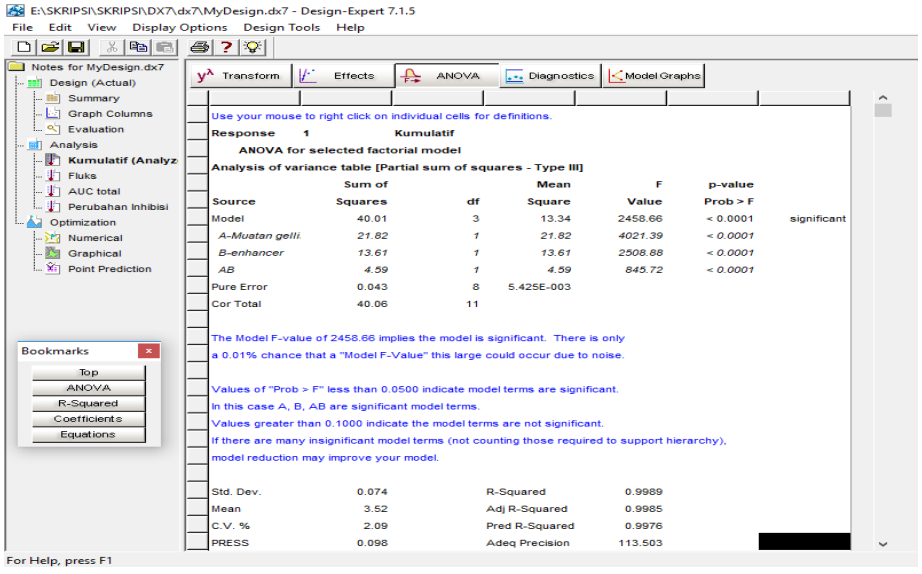
Kertas kosong = 0,272 g
Kertas + zat = 3,820 g
Zat = **3,548 g**
Konsentrasi = 3,548 x 2 x 100%
Konsentrasi = **7,096%**

**Viskositas 200 dPas**

Y= 167,02x -748,35
X = 200-748,35 / 167,02
X = **5,68%**

## Lampiran 11. Uji ANOVA Design Expert

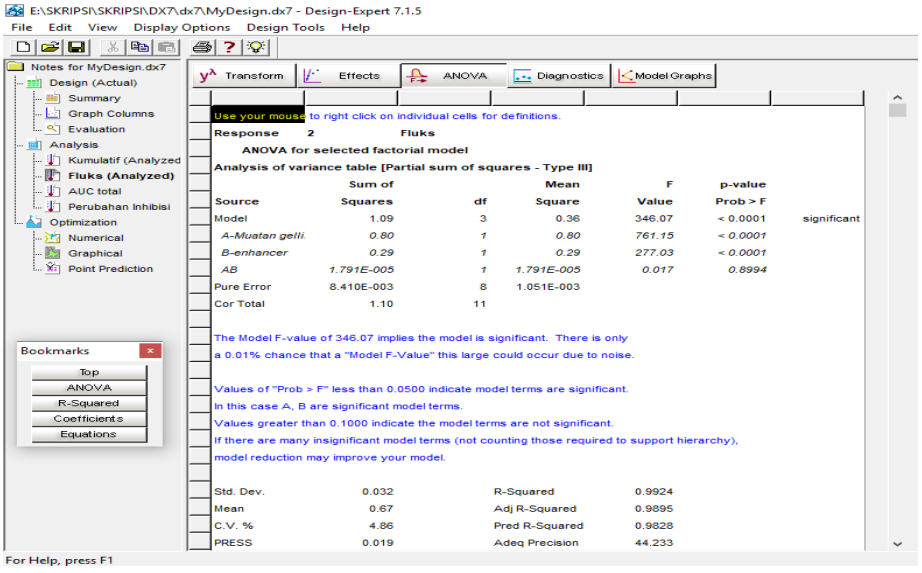
## A. Kumulatif




**Final Equation in Terms of Coded Factors:**

Kumulatif =
+3.52
+1.35 * A
+1.07 * B
+0.62 * A * B

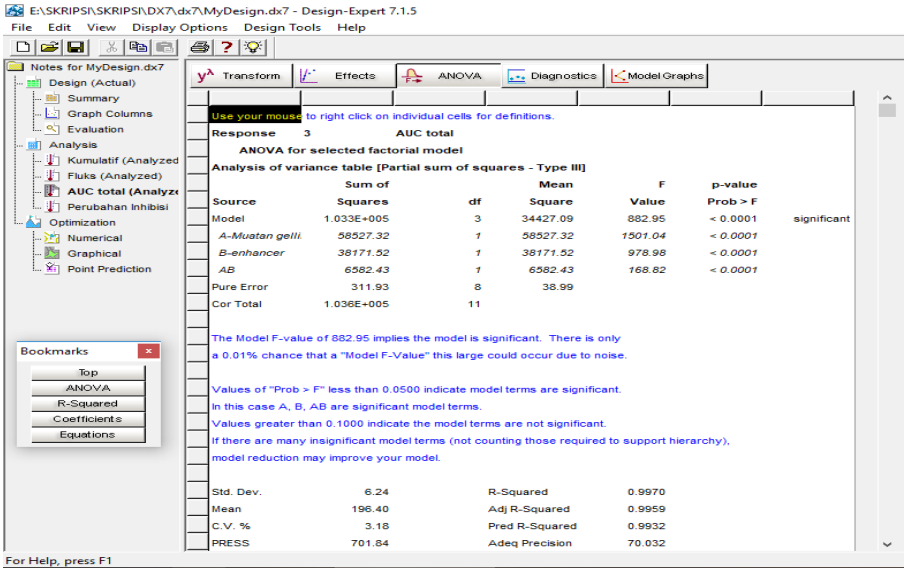
## B. Fluks



**Final Equation in Terms of Coded Factors:**

Fluks =
+0.67
-0.26 * A
-0.16 * B
-1.222E-003 * A * B

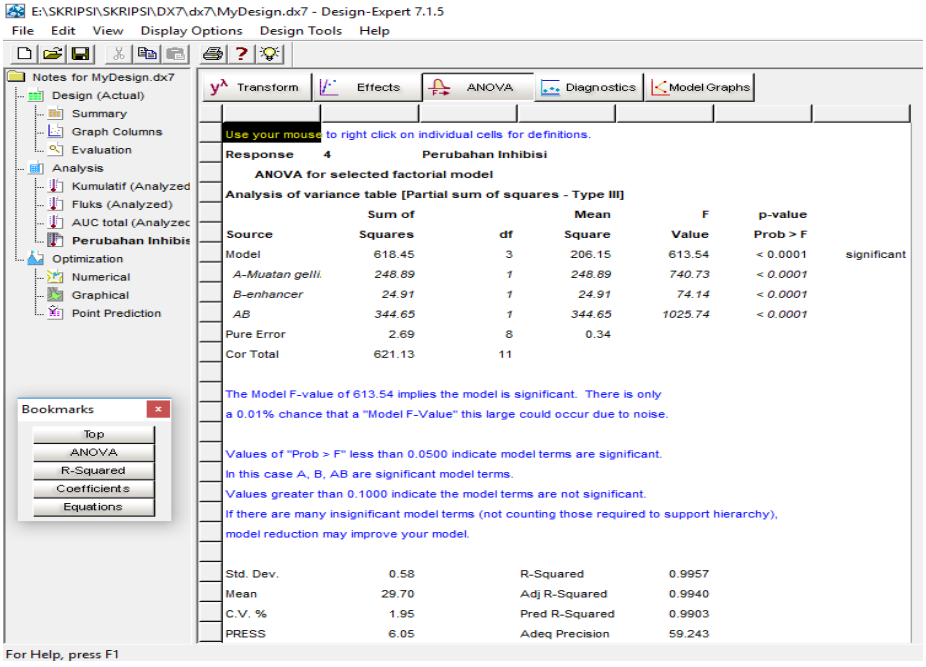
## C. AUC total




**Final Equation in Terms of Coded Factors:**

AUC total =
+196.40
+69.84 * A
+56.40 * B
+23.42 * A * B

D. Perubahan Inhibisi

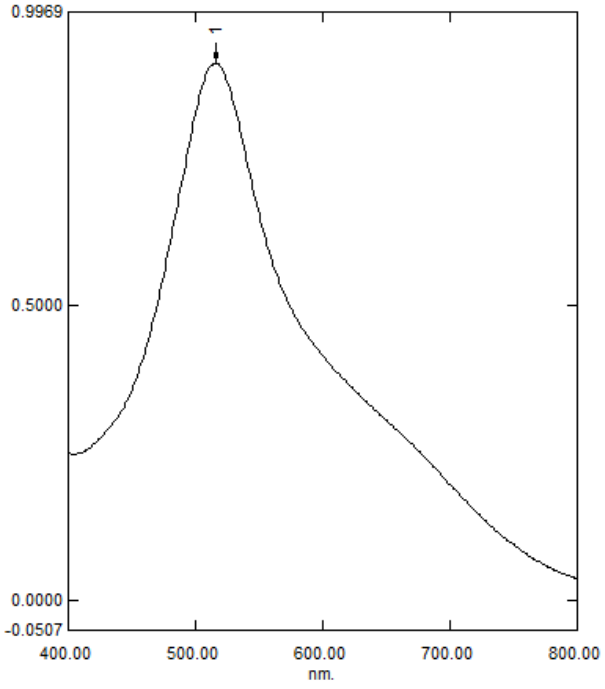



**Final Equation in Terms of Coded Factors:**

Perubahan Inhibisi =
+29.70
+4.55 * A
+1.44 * B
+5.36 * A * B

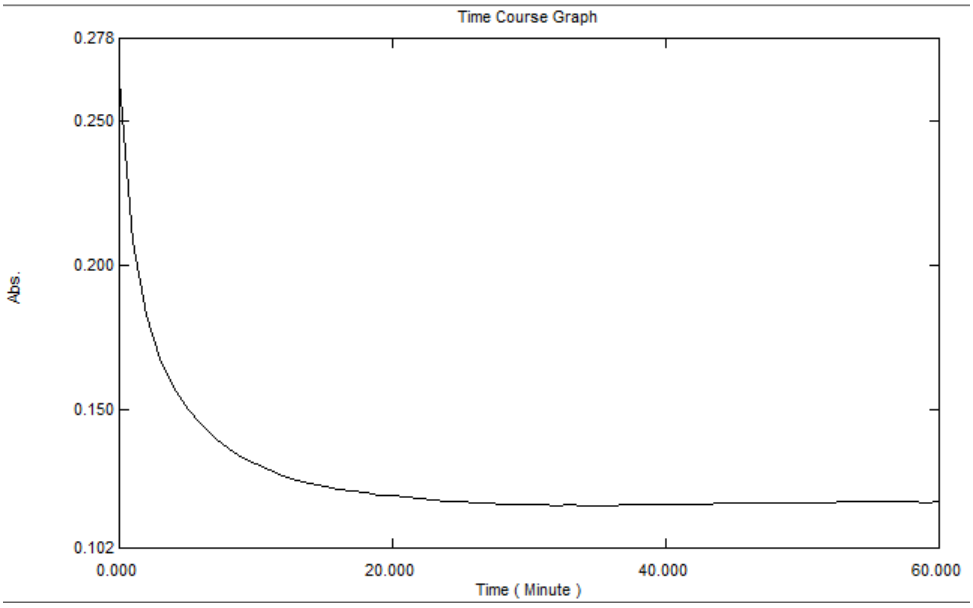
**Lampiran 12. Uji aktivitas antioksidan resveratrol dan *nanoemulgel*.**

## A. Penentuan panjang gelombang maksimum DPPH




| No. | P/V | Wavelength nm. | Abs. | Description |
|---|---|---|---|---|
| 1 | | 516.00 | 0.9096 | |
| 2 | | 405.00 | 0.2479 | |

## B. Penentuan *operating time*




| 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 |

## C. Perhitungan Aktivitas Antioksidan Resveratrol

a. Penimbangan resveratrol = 49,52 mg
   Konsentrasi induk = 4952 ppm

b. Penimbangan DPPH = 15,7 mg
   Konsentrasi DPPH = 0,4 mM dalam 100 ml
   Serapan kontrol DPPH = 0,910

c. Inhibisi

| Konsentrasi (ppm) | Replikasi 1 | | Replikasi 2 | |
|---|---|---|---|---|
| | Serapan | Inhibisi (%) | Serapan | Inhibisi (%) |
| **129,18** | 0,054 | **94,06** | 0,055 | **93,95** |
| **69,10** | 0,091 | **90,00** | 0,091 | **90,00** |
| **35,80** | 0,118 | **87,03** | 0,117 | **87,14** |
| **18,23** | 0,260 | **71,42** | 0,260 | **71,42** |
| **9,32** | 0,452 | **50,31** | 0,452 | **50,31** |
| **4,68** | 0,594 | **34,70** | 0,594 | **34,70** |
| **2,35** | 0,703 | **22,71** | 0,704 | **22,60** |
| **1,48** | 0,771 | **15,94** | 0,772 | **15,13** |

| Replikasi 3 | | Replikasi 4 | | |
|---|---|---|---|---|
| Serapan | Inhibisi (%) | Serapan | Inhibisi (%) | Rerata Inhibisi (%) |
| 0,054 | **94,06** | 0,054 | **94,06** | **94,04** |
| 0,097 | **89,34** | 0,095 | **89,56** | **89,72** |
| 0,109 | **88,02** | 0,107 | **88,24** | **87,60** |
| 0,265 | **70,87** | 0,265 | **70,87** | **71,14** |
| 0,361 | **60,31** | 0,360 | **60,92** | **55,34** |
| 0,556 | **38,87** | 0,555 | **38,98** | **35,81** |
| 0,692 | **23,92** | 0,692 | **23,92** | **23,29** |
| 0,732 | **19,53** | 0,732 | **19,53** | **17,35** |

a. Perhitungan (%) Inhibisi

Rumus = $\frac{\text{Serapan DPPH} - \text{serapan sampel}}{\text{serapan sampel}}$ x 100%

Contoh perhitungan = $\frac{0{,}910 - 0{,}054}{0{,}910}$ x 100% = 94,06%

b. Perhitungan IC 50

Persamaan regresi linear IC 50

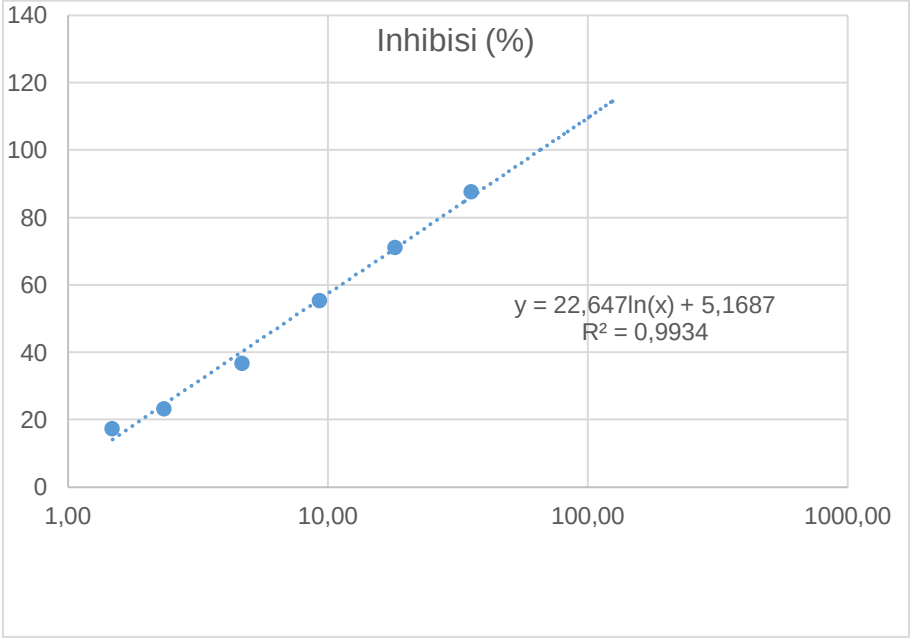
Y = bx + a

Y (IC 50) = 22,647ln(x) + 5,1687

IC 50 = ln (x) = $\frac{50 - 5{,}1687}{22{,}647}$

x = 7,24 µg/mL

d. Kurva uji DPPH Resveratrol



e. Uji ANOVA

*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*

f. Perhitungan (%) Inhibisi *nanoemulgel* resveratrol

Perhitungan (%) inhibisi hari ke-7

| Sampel | Replikasi 1 | | Replikasi 2 | | Replikasi 3 | |
|---|---|---|---|---|---|---|
| | Serapan | Inhibisi (%) | Serapan | Inhibisi (%) | Serapan | Inhibisi (%) |
| F1 | 0,524 | **36,87** | 0,520 | **37,35** | 0,523 | **36,99** |
| F2 | 0,514 | **38,07** | 0,515 | **37,95** | 0,517 | **37,71** |
| F3 | 0,487 | **41,33** | 0,490 | **40,96** | 0,488 | **41,20** |
| F4 | 0,578 | **30,36** | 0,570 | **31,33** | 0,575 | **30,72** |

Konsentrasi sediaan = 8 ppm

Perhitungan Inhibisi (%) :

Serapan DPPH = 0,830

Rumus = $\frac{\text{Serapan DPPH} - \text{serapan sampel}}{\text{serapan sampel}}$ x 100%

| | Replikasi 1 | Replikasi 2 | Replikasi 3 |
|---|---|---|---|
| F1 | $\frac{0,830-0,524}{0,830}$ x 100% = 36,87% | $\frac{0,830-0,520}{0,830}$ x 100% = 37,35% | $\frac{0,830-0,523}{0,830}$ x 100% = 36,99% |
| F2 | $\frac{0,830-0,514}{0,830}$ x 100% = 38,07% | $\frac{0,830-0,515}{0,830}$ x 100% = 37,95% | $\frac{0,830-0,517}{0,830}$ x 100% = 37,71% |
| F3 | $\frac{0,830-0,487}{0,830}$ x 100% = 41,33% | $\frac{0,830-0,490}{0,830}$ x 100% = 40,96% | $\frac{0,830-0,488}{0,830}$ x 100% = 41,20% |
| F4 | $\frac{0,830-0,578}{0,830}$ x 100% = 30,36% | $\frac{0,830-0,570}{0,830}$ x 100% = 31,33% | $\frac{0,830-0,575}{0,830}$ x 100% = 30,72% |

Perhitungan perubahan inhibisi :

Inhibisi (%) hari ke 1 = 52,26 %

Rumus : $\frac{\%inhibisi\ hari\ ke\ 1 - \%inhibisi\ hari\ ke\ 7}{\%inhibisi\ hari\ ke\ 1}\ x\ 100\%$

| | Replikasi 1 | Replikasi 2 | Replikasi 3 |
|---|---|---|---|
| F1 | $\frac{52,26-36,87}{52,26}$ x 100% = 29,45% | $\frac{52,26-37,35}{52,26}$ x 100% = 28,53% | $\frac{52,26-36,99}{52,26}$ x 100% = 29,22% |
| F2 | $\frac{52,26-38,07}{52,26}$ x 100% = 27,15% | $\frac{52,26-37,95}{52,26}$ x 100% = 27,38% | $\frac{52,26-37,71}{52,26}$ x 100% = 27,84% |
| F3 | $\frac{52,26-41,33}{52,26}$ x 100% = 20,92% | $\frac{52,26-40,96}{52,26}$ x 100% = 21,62% | $\frac{52,26-41,20}{52,26}$ x 100% = 21,15% |
| F4 | $\frac{52,26-30,36}{52,26}$ x 100% = 41,9% | $\frac{52,26-31,33}{52,26}$ x 100% = 40,06% | $\frac{52,26-30,72}{52,26}$ x 100% = 41,21% |

**Lampiran 13. Perhitungan Jumlah Kumulatif (Q), Fluks, AUC total**

| | |
|---|---|
| a = -0,0034 | Volume Sampling = 3 ml |
| b = 0,1159 | Luas Area = 5,7 $cm^2$ |
| Volume difusi = 15 ml | Waktu sampling = 90 menit (1,5 jam) |
| Jari-jari = 1,35 cm | |

A. Formula 1

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,012 | 1 | 0,13 | 1,994 |
| 0,17 | 0,014 | 1 | 0,15 | 2,253 |
| 0,25 | 0,018 | 1 | 0,18 | 2,771 |
| 0,50 | 0,021 | 1 | 0,21 | 3,159 |
| 0,75 | 0,023 | 1 | 0,23 | 3,418 |
| 1,00 | 0,03 | 1 | 0,29 | 4,324 |
| 1,5 | 0,041 | 1 | 0,38 | 5,748 |

| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
|---|---|---|---|---|
| 0,00 | 0 | 1,994 | 0,35 | 1,134268 |
| 0,40 | 0,40 | 2,651 | 0,46 | |
| 0,45 | 0,85 | 3,620 | 0,63 | |
| 0,55 | 1,40 | 4,562 | 0,80 | |
| 0,63 | 2,04 | 5,453 | 0,95 | |
| 0,68 | 2,72 | 7,043 | 1,23 | |

| | | | | |
|---|---|---|---|---|
| 0,86 | 3,58 | 9,332 | 1,63 | |

Replikasi 2

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,014 | 1 | 0,15 | 2,253 |
| 0,17 | 0,016 | 1 | 0,17 | 2,512 |
| 0,25 | 0,019 | 1 | 0,19 | 2,900 |
| 0,50 | 0,024 | 1 | 0,24 | 3,547 |
| 0,75 | 0,030 | 1 | 0,29 | 4,324 |
| 1,00 | 0,033 | 1 | 0,31 | 4,713 |
| 1,5 | 0,045 | 1 | 0,42 | 6,266 |
| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
| 0,00 | 0,00 | 2,253 | 0,39 | 1,017757 |
| 0,45 | 0,45 | 2,962 | 0,52 | |
| 0,50 | 0,95 | 3,853 | 0,67 | |
| 0,58 | 1,33 | 5,080 | 0,89 | |
| 0,71 | 2,24 | 6,567 | 1,15 | |
| 0,86 | 3,11 | 7,820 | 1,37 | |
| 0,94 | 4,05 | 10,316 | 1,80 | |

Replikasi 3

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,012 | 1 | 0,13 | 1,994 |
| 0,17 | 0,015 | 1 | 0,16 | 2,382 |

| | | | | |
|---|---|---|---|---|
| 0,25 | 0,018 | 1 | 0,18 | 2,771 |
| 0,50 | 0,023 | 1 | 0,23 | 3,418 |
| 0,75 | 0,027 | 1 | 0,26 | 3,936 |
| 1,00 | 0,03 | 1 | 0,29 | 4,324 |
| 1,5 | 0,042 | 1 | 0,39 | 5,878 |
| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
| 0,00 | 0,00 | 1,994 | 0,35 | 1,088519 |
| 0,40 | 0,40 | 2,781 | 0,49 | |
| 0,48 | 0,88 | 3,646 | 0,64 | |
| 0,55 | 1,43 | 4,847 | 0,85 | |
| 0,68 | 2,11 | 6,049 | 1,06 | |
| 0,79 | 2,90 | 7,224 | 1,26 | |
| 0,86 | 3,76 | 9,743 | 1,69 | |

Formula 2

Replikasi 1

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,028 | 1 | 0,27 | 4,065 |
| 0,17 | 0,033 | 1 | 0,31 | 4,713 |
| 0,25 | 0,042 | 1 | 0,39 | 5,878 |
| 0,50 | 0,048 | 1 | 0,44 | 6,655 |
| 0,75 | 0,057 | 1 | 0,52 | 7,820 |
| 1,00 | 0,065 | 1 | 0,59 | 8,856 |
| 1,5 | 0,078 | 1 | 0,70 | 10,539 |
| Koreksi | Koreksi | Total | Q/A | Fluks |

| | Kumulatif | | (µg/ $cm^2$) | (µg/$cm^2$/jam) |
|---|---|---|---|---|
| 000 | 0,00 | 4,065 | 0,71 | 0,574736 |
| 0,81 | 0,81 | 5,526 | 0,97 | |
| 1,76 | 1,76 | 7,633 | 1,33 | |
| 2,93 | 2,93 | 9,586 | 1,68 | |
| 4,26 | 4,26 | 12,082 | 2,11 | |
| 5,83 | 5,83 | 14,682 | 2,57 | |
| 7,60 | 7,60 | 18,136 | 3,17 | |

Replikasi 2

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,027 | 1 | 0,26 | 3,936 |
| 0,17 | 0,033 | 1 | 0,31 | 4,713 |
| 0,25 | 0,040 | 1 | 0,37 | 5,619 |
| 0,50 | 0,048 | 1 | 0,44 | 6,655 |
| 0,75 | 0,060 | 1 | 0,55 | 8,208 |
| 1,00 | 0,067 | 1 | 0,61 | 9,114 |
| 1,5 | 0,075 | 1 | 0,68 | 10,150 |
| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
| 0,00 | 0,00 | 3,936 | 0,69 | 0,568861 |
| 0,79 | 0,79 | 5,500 | 0,96 | |
| 0,94 | 1,73 | 7,349 | 1,28 | |
| 1,12 | 2,85 | 9,508 | 1,66 | |
| 1,33 | 4,18 | 12,393 | 2,17 | |

| | | | | |
|---|---|---|---|---|
| 1,64 | 5,83 | 14,940 | 2,61 | |
| 1,82 | 7,65 | 17,799 | 3,11 | |

Replikasi 3

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,030 | 1 | 0,29 | 4,324 |
| 0,17 | 0,034 | 1 | 0,32 | 4,842 |
| 0,25 | 0,044 | 1 | 0,41 | 6,137 |
| 0,50 | 0,05 | 1 | 0,46 | 6,914 |
| 0,75 | 0,059 | 1 | 0,54 | 8,079 |
| 1,00 | 0,069 | 1 | 0,62 | 9,373 |
| 1,5 | 0,08 | 1 | 0,72 | 10,798 |

| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
|---|---|---|---|---|
| 0,00 | 0,00 | 4,324 | 0,76 | 0,554969 |
| 0,86 | 0,86 | 5,707 | 1,00 | |
| 0,97 | 1,83 | 7,970 | 1,39 | |
| 1,23 | 3,06 | 9,974 | 1,74 | |
| 1,38 | 4,44 | 12,522 | 2,19 | |
| 1,62 | 6,06 | 15,432 | 2,70 | |
| 1,87 | 7,93 | 18,731 | 3,27 | |

Formula 3

Replikasi 1

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,030 | 1 | 0,29 | 4,324 |
| 0,17 | 0,033 | 1 | 0,31 | 4,713 |
| 0,25 | 0,037 | 1 | 0,35 | 5,230 |
| 0,50 | 0,04 | 1 | 0,37 | 5,619 |
| 0,75 | 0,044 | 1 | 0,41 | 6,137 |
| 1,00 | 0,05 | 1 | 0,46 | 6,914 |
| 1,5 | 0,056 | 1 | 0,53 | 7,949 |
| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
| 0,00 | 0,00 | 4,324 | 0,76 | 0,79755 |
| 0,86 | 0,86 | 5,577 | 0,97 | |
| 0,94 | 1,81 | 7,038 | 1,23 | |
| 1,05 | 2,85 | 8,472 | 1,48 | |
| 1,12 | 3,98 | 10,114 | 1,77 | |
| 1,23 | 5,20 | 12,118 | 2,12 | |
| 1,38 | 6,59 | 14,537 | 2,54 | |

Replikasi 2

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,031 | 1 | 0,30 | 4,454 |
| 0,17 | 0,035 | 1 | 0,33 | 4,972 |
| 0,25 | 0,039 | 1 | 0,37 | 5,489 |
| 0,50 | 0,042 | 1 | 0,39 | 5,878 |

| | | | | |
|---|---|---|---|---|
| 0,75 | 0,046 | 1 | 0,43 | 6,396 |
| 1,00 | 0,052 | 1 | 0,48 | 7,127 |
| 1,5 | 0,060 | 1 | 0,55 | 8,208 |
| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
| 0,00 | 0,00 | 4,454 | 0,78 | 0,768191 |
| 0,89 | 0,89 | 5,682 | 1,02 | |
| 0,99 | 1,89 | 7,374 | 1,29 | |
| 1,10 | 2,98 | 8,861 | 1,55 | |
| 1,18 | 4,16 | 10,554 | 1,84 | |
| 1.28 | 5,44 | 12,610 | 2,20 | |
| 1,43 | 6,87 | 15,080 | 2,64 | |

Replikasi 3

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,030 | 1 | 0,29 | 4,324 |
| 0,17 | 0,034 | 1 | 0,32 | 4,842 |
| 0,25 | 0,038 | 1 | 0,36 | 5,360 |
| 0,50 | 0,041 | 1 | 0,38 | 5,748 |
| 0,75 | 0,046 | 1 | 0,43 | 6,396 |
| 1,00 | 0,053 | 1 | 0,49 | 7,302 |
| 1,5 | 0,062 | 1 | 0,56 | 8,467 |
| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |

| | | | | |
|---|---|---|---|---|
| 0,00 | 0,76 | 4,314 | 0,76 | 0,747447 |
| 0,86 | 1,00 | 5,707 | 1,00 | |
| 0,97 | 1,26 | 7,193 | 1,26 | |
| 1,07 | 1,51 | 8,654 | 1,51 | |
| 1,15 | 1,83 | 10,451 | 1,83 | |
| 1,28 | 2,21 | 12,636 | 2,21 | |
| 1,46 | 2,67 | 15,262 | 2,67 | |

Formula 4

Replikasi 1

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,40 | 1 | 0,37 | 5,619 |
| 0,17 | 0,049 | 1 | 0,44 | 6,655 |
| 0,25 | 0,062 | 1 | 0,56 | 8,467 |
| 0,50 | 0,094 | 1 | 0,84 | 12,610 |
| 0,75 | 0,112 | 1 | 1,00 | 14,940 |
| 1,00 | 0,134 | 1 | 1,19 | 17,789 |
| 1,5 | 0,182 | 1 | 1,60 | 24,003 |

| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
|---|---|---|---|---|
| 0,00 | 0,00 | 5,619 | 0,98 | 0.2568 |
| 1,12 | 1,12 | 7,778 | 1,36 | |
| 1,33 | 2,45 | 10,922 | 1,91 | |
| 1,69 | 4,15 | 16,758 | 2,93 | |
| 2,52 | 6,67 | 21,611 | 3,78 | |
| 2,99 | 9,66 | 27,447 | 4,80 | |

| | | | | |
|---|---|---|---|---|
| 3,56 | 13,22 | 37,219 | 6,50 | |

Replikasi 2

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|
| 0,08 | 0,041 | 1 | 0,38 | 5,748 |
| 0,17 | 0,047 | 1 | 0,44 | 6,525 |
| 0,25 | 0,063 | 1 | 0,57 | 8,597 |
| 0,50 | 0,099 | 1 | 0,88 | 13,257 |
| 0,75 | 0,117 | 1 | 1,04 | 15,588 |
| 1,00 | 0,140 | 1 | 1,24 | 18,566 |
| 1,5 | 0,179 | 1 | 1,57 | 23,615 |
| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
| 0,00 | 0,00 | 5,748 | 1,00 | 0,2524 |
| 1,15 | 1,15 | 7,675 | 1,34 | |
| 1,31 | 2,45 | 11,051 | 1,93 | |
| 1,72 | 4,17 | 17,431 | 3,05 | |
| 2,65 | 6,83 | 22,431 | 3,92 | |
| 3,12 | 9,94 | 28,509 | 4,98 | |
| 3,71 | 13,66 | 37,271 | 6,51 | |

Replikasi 3

| Menit ke- | Serapan | Pengenceran | Kadar | Kumulatif (µg) |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 0,08 | 0,040 | 1 | 0,37 | 5,619 |
| 0,17 | 0,05 | 1 | 0,46 | 6,914 |
| 0,25 | 0,063 | 1 | 0,57 | 8,597 |
| 0,50 | 0,098 | 1 | 0,88 | 13,128 |
| 0,75 | 0,120 | 1 | 1,07 | 15,976 |
| 1,00 | 0,143 | 1 | 1,26 | 18,954 |
| 1,5 | 0,183 | 1 | 1,61 | 24,133 |
| Koreksi | Koreksi Kumulatif | Total | Q/A (µg/ $cm^2$) | Fluks (µg/$cm^2$/jam) |
| 0,00 | 0,00 | 5,619 | 0,98 | 0,2473 |
| 1,12 | 1,12 | 8,037 | 1,40 | |
| 1,38 | 2,51 | 11,103 | 1,94 | |
| 1,72 | 4,23 | 17,354 | 3,03 | |
| 2,63 | 6,65 | 22,828 | 3,99 | |
| 3,20 | 10,05 | 29,001 | 5,07 | |
| 3,79 | 13,84 | 37,970 | 6,64 | |

B. AUC Total

Replikasi 1

| Waktu | F1 | F2 | F3 | F4 |
|---|---|---|---|---|

| (menit) | | | | |
|---|---|---|---|---|
| | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) |
| 0 | 0 | 0 | 0 | 0 |
| 5 | 0,35 | 0,71 | 0,76 | 0,98 |
| 10 | 0,46 | 0,97 | 0,97 | 1,36 |
| 15 | 0,63 | 1,33 | 1,23 | 1,91 |
| 30 | 0,80 | 1,68 | 1,48 | 2,93 |
| 45 | 0,95 | 2,11 | 1,77 | 3,78 |
| 60 | 1,23 | 2,57 | 2,12 | 4,80 |
| 90 | 1,63 | 3,17 | 2,54 | 6,50 |
| Slope | 0,0145 | 0,0283 | 0,0203 | 0,0645 |
| 5 | 0,875 | 1,775 | 1,9 | 2,45 |
| 10 | 2,025 | 4,2 | 5,325 | 5,85 |
| 15 | 2,725 | 5,75 | 5,5 | 8,175 |
| 30 | 10,725 | 22,575 | 20,325 | 36,3 |
| 45 | 13,125 | 28,425 | 24,375 | 50,325 |
| 60 | 16,35 | 35,1 | 29,175 | 64,35 |
| 90 | 42,9 | 86,1 | 69,9 | 169,5 |
| **AUC total** | **88,725** | **183,925** | **155,5** | **336,95** |
| AUC 15 | 0,9673 | 0,9675 | 0,9599 | 0,9753 |

Replikasi 2

| Waktu (menit) | F1 | F2 | F3 | F4 |
|---|---|---|---|---|

| | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 5 | 0,39 | 0,69 | 0,78 | 1,00 |
| 10 | 0,52 | 0,96 | 1,02 | 1,34 |
| 15 | 0,67 | 1,28 | 1,29 | 1,93 |
| 30 | 0,89 | 1,66 | 1,55 | 3,05 |
| 45 | 1,15 | 2,17 | 1,84 | 3,92 |
| 60 | 1,37 | 2,61 | 2,20 | 4,98 |
| 90 | 1,80 | 3,11 | 2,64 | 6,51 |
| Slope | 0,0163 | 0,0284 | 0,0211 | 0,0654 |
| 5 | 0,975 | 1,725 | 1,95 | 2,5 |
| 10 | 2,275 | 4,125 | 4,5 | 5,85 |
| 15 | 2,975 | 5,6 | 5,775 | 8,175 |
| 30 | 11,7 | 22,05 | 21,3 | 37,35 |
| 45 | 15,3 | 28,725 | 25,425 | 52,275 |
| 60 | 18,9 | 35,85 | 30,3 | 66,35 |
| 90 | 47,55 | 85,8 | 72,6 | 172,35 |
| **AUC total** | **99,675** | **183,975** | **161,85** | **345,25** |
| AUC 15 | 0,9674 | 0,9681 | 0,9601 | 0,9581 |

Replikasi 3

| Waktu (menit) | F1 | F2 | F3 | F4 |
|---|---|---|---|---|

| | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) | Q/A ($\mu g/cm^2$) |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 5 | 0,35 | 0,76 | 0,76 | 0,98 |
| 10 | 0,49 | 1,00 | 1,00 | 1,40 |
| 15 | 0,64 | 1,39 | 1,26 | 1,94 |
| 30 | 0,85 | 1,74 | 1,52 | 3,03 |
| 45 | 1,06 | 2,19 | 1,83 | 3,99 |
| 60 | 1,26 | 2,70 | 2,21 | 5,07 |
| 90 | 1,69 | 3,27 | 2,67 | 7,02 |
| Slope | 0,0152 | 0,02925 | 0,0217 | 0,0705 |
| 5 | 0,875 | 1,9 | 1,9 | 2,45 |
| 10 | 2,1 | 4,4 | 4,4 | 5,95 |
| 15 | 2,825 | 5,975 | 5,65 | 8,35 |
| 30 | 11,175 | 23,475 | 20,775 | 37,275 |
| 45 | 14,325 | 29,475 | 25,05 | 52,65 |
| 60 | 17,4 | 36,675 | 30,3 | 67,95 |
| 90 | 44,25 | 89,55 | 73,2 | 181,35 |
| **AUC total** | **92,95** | **191,45** | **161,275** | **355,975** |
| AUC 15 | 0,9679 | 0,9671 | 0,9609 | 0,9764 |