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Lampiran 1. Perhitungan Energi Penyinaran

1. LED Merah

❖ Transmitansi dan % serap

$\lambda_{\text{LED merah}}$ = 620 nm
Abs = 0,112
T = $10^{-A}$
= $10^{-(0,112)}$
= 0,773
% serap = (1-T) x 100%
= (1-0,773) x 100%
= 22,7%

❖ Intensitas LED

$I_{LED}$ = 1221 Lux

= 1221 x (1,464 x$10^{-4}$ mW/$cm^2$)

= 0,179 mW/$cm^2$

❖ Intensitas Serap

$I_{serap}$ = % serap x $I_{LED}$
= 22,7% x 0,179 mW/$cm^2$
= 0,041 mW/$cm^2$

a. Untuk t= 120 sekon
E = $I_{serap}$ x t
= 0,041 x 120
= 4,92 mJ/$cm^2$

b. Untuk t= 240 sekon
E = $I_{serap}$ x t
= 0,041 x 240
= 9,84 mJ/$cm^2$

c. Untuk t= 360 sekon
E = $I_{serap}$ x t
= 0,041 x 360
= 14,76 mJ/$cm^2$

d. Untuk t= 480 sekon
E = $I_{serap}$ x t
= 0,041 x 480
= 19,68 mJ/$cm^2$

e. Untuk t= 600 sekon
E = $I_{serap}$ x t
= 0,041 x 600
= 24,60 mJ/$cm^2$

2. LED Biru

❖ Transmitansi dan % serap

$\lambda_{\text{LED biru}}$ = 450 nm

Abs = 1,711

T = $10^{-A}$

= $10^{-(1,711)}$

= 0,019

% serap = (1-T) x 100%

= (1-0,019) x 100%

= 98,1%

- Intensitas LED

$I_{LED}$ = 961 Lux

= 961 x (1,464 x$10^{-4}$ mW/$cm^2$)

= 0,141 mW/$cm^2$

- Intensitas Serap

$I_{serap}$ = % serap x $I_{LED}$

= 98,1% x 0,141 mW/$cm^2$

= 0,138 mW/$cm^2$

a. Untuk t= 120 sekon

E = $I_{serap}$ x t

= 0,138 x 120

= 16,56 mJ/$cm^2$

b. Untuk t= 240 sekon

E = $I_{serap}$ x t

= 0,138 x 240

= 33,12 mJ/$cm^2$

c. Untuk t= 360 sekon

E = $I_{serap}$ x t

= 0,138 x 360

= 49,68 mJ/$cm^2$

d. Untuk t= 480 sekon

E = $I_{serap}$ x t

= 0,138 x 480

= 66,24 mJ/$cm^2$

e. Untuk t= 600 sekon

E = $I_{serap}$ x t

= 0,138 x 600

= 82,80 mJ/$cm^2$

Lampiran 2. Data Mentah *Optical density* (OD) dengan Kode Perlakuan

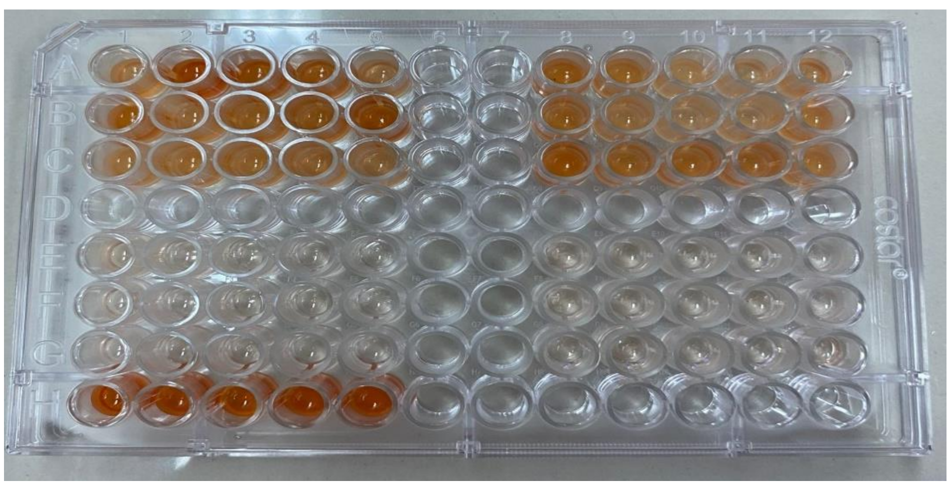
- Nilai Optical Density (OD)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 1.101 | 1.364 | 1.133 | 0.785 | 1.049 | X | X | 1.47 | 1.223 | 1.002 | 0.76 | 0.64 |
| B | 1.203 | 0.859 | 0.9009 | 0.1.169 | 0.912 | X | X | 1.1372 | 0.934 | 0.742 | 1.123 | 1.0346 |
| C | 1.201 | 0.9925 | 0.9523 | 0.793 | 0.6601 | X | X | 1.6451 | 0.958 | 1.087 | 0.881 | 1.0645 |
| D | X | X | X | X | X | X | X | X | X | X | X | X |
| E | 0.1962 | 0.1278 | 0.1553 | 0.0836 | 0.0707 | X | X | 0.186 | 0.1763 | 0.1645 | 0.1429 | 0.1174 |
| F | 0.1451 | 0.1185 | 0.0478 | 0.1164 | 0.0774 | X | X | 0.1911 | 0.1764 | 0.1623 | 0.1761 | 0.1201 |
| G | 0.1331 | 0.1357 | 0.1286 | 0.0785 | 0.0815 | X | X | 0.2014 | 0.1992 | 0.1785 | 0.1552 | 0.1557 |
| H | 1.439 | 1.354 | 1.526 | 1.455 | 1.148 | X | X | X | X | X | X | X |

- Kode Perlakuan

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| L1B | L2B | L3B | L4B | L5B | X | X | L1M | L2M | L3M | L4M | L5M |
| L1B | L2B | L3B | L4B | L5B | X | X | L1M | L2M | L3M | L4M | L5M |
| L1B | L2B | L3B | L4B | L5B | X | X | L1M | L2M | L3M | L4M | L5M |
| X | X | X | X | X | X | X | X | X | X | X | X |
| CL1B | CL2B | CL3B | CL4B | CL5B | X | X | CL1M | CL2M | CL3M | CL4M | CL5M |
| CL1B | CL2B | CL3B | CL4B | CL5B | X | X | CL1M | CL2M | CL3M | CL4M | CL5M |
| CL1B | CL2B | CL3B | CL4B | CL5B | X | X | CL1M | CL2M | CL3M | CL4M | CL5M |
| C- | C- | C- | C- | C- | X | X | X | X | X | X | X |

- Gambar Sampel



Lampiran 3. Perhitungan % Inhibition.

| Kelompok Perlakuan | OD (λ=490) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LED Biru | | | | | LED Merah | | | | |
| | 1 | 2 | 3 | Rerata | SD | 1 | 2 | 3 | Rerata | SD |
| C- | 1.439 | 1.354 | 1.526 | 1.440 | 0.086 | 1.439 | 1.354 | 1.526 | 1.440 | 0.086 |
| C+ | 0.312 | 0.313 | 0.414 | 0.346 | 0.059 | 0.312 | 0.313 | 0.414 | 0.346 | 0.059 |
| $L_1$ | 1.101 | 1.203 | 1.201 | 1.168 | 0.058 | 1.470 | 1.137 | 1.6451 | 1.417 | 0.257 |
| $L_2$ | 1.364 | 0.859 | 0.992 | 1.072 | 0.262 | 1.223 | 0.934 | 0.958 | 1.038 | 0.161 |
| $L_3$ | 1.133 | 0.9 | 0.952 | 0.995 | 0.122 | 1.002 | 0.742 | 1.087 | 0.943 | 0.180 |
| $L_4$ | 0.785 | 1.169 | 0.793 | 0.916 | 0.219 | 0.760 | 1.123 | 0.881 | 0.921 | 0.184 |
| $L_5$ | 1.049 | 0.912 | 0.66 | 0.874 | 0.197 | 0.640 | 1.035 | 1.064 | 0.913 | 0.236 |
| $CL_1$ | 0.196 | 0.145 | 0.133 | 0.158 | 0.033 | 0.186 | 0.191 | 0.201 | 0.193 | 0.008 |
| $CL_2$ | 0.127 | 0.118 | 0.135 | 0.127 | 0.008 | 0.176 | 0.176 | 0.199 | 0.184 | 0.013 |
| $CL_3$ | 0.155 | 0.047 | 0.128 | 0.11 | 0.055 | 0.164 | 0.162 | 0.179 | 0.168 | 0.009 |
| $CL_4$ | 0.083 | 0.116 | 0.078 | 0.092 | 0.020 | 0.143 | 0.176 | 0.155 | 0.158 | 0.017 |
| $CL_5$ | 0.070 | 0.077 | 0.081 | 0.077 | 0.005 | 0.117 | 0.120 | 0.156 | 0.131 | 0.021 |

$$\%\ \text{inaktivasi} = \left|\frac{\text{OD}_{\text{kontrol}} - \text{OD}_{\text{perlakuan}}}{\text{OD}_{\text{kontrol}}}\right| \times 100\%$$

- **Untuk LED Biru**

a. Fotosensitizer + LED 2 menit

$$\%\ \text{inaktivasi} = \left|\frac{1.440 - 0.158}{1.440}\right| \times 100\%$$

$$= 89{,}03\ \%$$

b. Fotosensitizer + LED 4 menit

$$\%\ \text{inaktivasi} = \left|\frac{1.440 - 0.127}{1.440}\right| \times 100\%$$

$= 91{,}18\%$

c. Fotosensitizer + LED 6 menit

$$\% \text{ inaktivasi} = \left|\frac{1.440 - 0.110}{1.440}\right| \times 100\%$$

$= 92{,}36\ \%$

d. Fotosensitizer + LED 8 menit

$$\% \text{ inaktivasi} = \left|\frac{1.440 - 0.092}{1.440}\right| \times 100\%$$

$= 93{,}61\ \%$

e. Fotosensitizer + LED 10 menit

$$\% \text{ inaktivasi} = \left|\frac{1.440 - 0.077}{1.440}\right| \times 100\%$$

$= 94{,}65\%$

❖ **Untuk LED Merah**

a. Fotosensitizer + LED 2 menit

$$\% \text{ inaktivasi} = \left|\frac{1.440 - 0.193}{1.440}\right| \times 100\%$$

$= 86{,}60\ \%$

b. Fotosensitizer + LED 4 menit

$$\% \text{ inaktivasi} = \left|\frac{1.440 - 0.184}{1.440}\right| \times 100\%$$

$= 87{,}20\ \%$

c. Fotosensitizer + LED 6 menit

$$\% \text{ inaktivasi} = \left|\frac{1.440 - 0.168}{1.440}\right| \times 100\%$$

$= 88{,}30\ \%$

d. Fotosensitizer + LED 8 menit

$$\% \text{ inaktivasi} = \left|\frac{1.440 - 0.158}{1.440}\right| \times 100\%$$

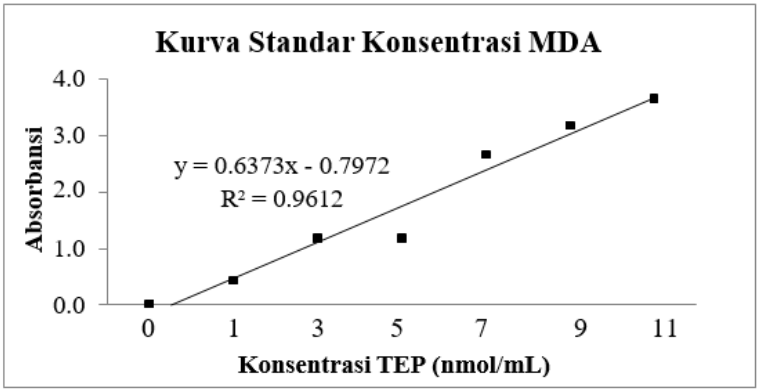
$= 89{,}03\%$

e. Fotosensitizer + LED 10 menit

$$\% \text{ inaktivasi} = \left|\frac{1.440 - 0.131}{1.440}\right| \times 100\%$$

$$= 90{,}90\ \%$$

Lampiran 4. Perhitungan Kadar MDA




Persamaan yang diperoleh:

$$y = 0.6373x - 0.7972$$

$$x = \frac{y + 0.7972}{0.6373}$$

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{y + 0.7972}{0.6373}$$

- Untuk Perlakuan Kontrol (C-)

  Nilai absorbansi = 0,014

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0{,}014 + 0.7972}{0.6373}$$

$$= 1{,}272 \text{ nmol/mL}$$

- Untuk Perlakuan Kontrol (C+)

  Nilai absorbansi = 0,048

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0{,}048 + 0.7972}{0.6373}$$

$$= 1{,}326 \text{ nmol/mL}$$

A. LED Merah

- Untuk LED saja 2 Menit

Nilai absorbansi = 0,055

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0,055 +\ 0.7972}{0.6373}$$

$$=\ 1,337\ \text{nmol/mL}$$

- Untuk LED saja 4 Menit

Nilai absorbansi = 0,057

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0,057 +\ 0.7972}{0.6373}$$

$$=\ 1,340\ \text{nmol/mL}$$

- Untuk LED saja 6 Menit

Nilai absorbansi = 0,060

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0,060 +\ 0.7972}{0.6373}$$

$$=\ 1,345\ \text{nmol/mL}$$

- Untuk LED saja 8 Menit

Nilai absorbansi = 0,062

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0,062 +\ 0.7972}{0.6373}$$

$$=\ 1,348\ \text{nmol/mL}$$

- Untuk LED saja 10 Menit

Nilai absorbansi = 0,064

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0,064 +\ 0.7972}{0.6373}$$

$$=\ 1,351\text{nmol/mL}$$

- Untuk LED saja 2 Menit Kombinasi AgNPs

Nilai absorbansi = 0,203

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0{,}203\ +\ 0.7972}{0.6373}$$

$$=\ 1{,}569\ \text{nmol/mL}$$

- ❖ Untuk LED saja 4 Menit Kombinasi AgNPs

Nilai absorbansi = 0,230

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0{,}230\ +\ 0.7972}{0.6373}$$

$$=\ 1{,}611\ \text{nmol/mL}$$

- ❖ Untuk LED saja 6 Menit Kombinasi AgNPs

Nilai absorbansi = 0,278

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0{,}278\ +\ 0.7972}{0.6373}$$

$$=\ 1{,}687\ \text{nmol/mL}$$

- ❖ Untuk LED saja 8 Menit Kombinasi AgNPs

Nilai absorbansi = 0,309

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0{,}309\ +\ 0.7972}{0.6373}$$

$$=\ 1{,}735\ \text{nmol/mL}$$

- ❖ Untuk LED saja 10 Menit Kombinasi AgNPs

Nilai absorbansi = 0,353

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0{,}353\ +\ 0.7972}{0.6373}$$

$$=\ 1{,}804\ \text{nmol/mL}$$

B. LED Biru

- ❖ Untuk LED saja 2 Menit

Nilai absorbansi = 0,061

$$Kadar\ MDA\ (\frac{nmol}{mL})\ =\ \frac{0{,}061\ +\ 0.7972}{0.6373}$$

$= 1{,}346$ nmol/mL

❖ Untuk LED saja 4 Menit

Nilai absorbansi = 0,063

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0{,}063 + 0.7972}{0.6373}$$

$= 1{,}350$ nmol/mL

❖ Untuk LED saja 6 Menit

Nilai absorbansi = 0,064

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0{,}064 + 0.7972}{0.6373}$$

$= 1{,}351$ nmol/mL

❖ Untuk LED saja 8 Menit

Nilai absorbansi = 0,067

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0{,}067 + 0.7972}{0.6373}$$

$= 1{,}356$ nmol/mL

❖ Untuk LED saja 10 Menit

Nilai absorbansi = 0,069

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0{,}064 + 0.7972}{0.6373}$$

$= 1{,}359$ nmol/mL

❖ Untuk LED saja 2 Menit Kombinasi AgNPs

Nilai absorbansi = 0,281

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0{,}281 + 0.7972}{0.6373}$$

$= 1{,}692$ nmol/mL

❖ Untuk LED saja 4 Menit Kombinasi AgNPs

Nilai absorbansi = 0,333

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0,333 + 0.7972}{0.6373}$$

$$= 1,773 \text{ nmol/mL}$$

❖ Untuk LED saja 6 Menit Kombinasi AgNPs

Nilai absorbansi = 0,365

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0,365 + 0.7972}{0.6373}$$

$$= 1,823 \text{ nmol/mL}$$

❖ Untuk LED saja 8 Menit Kombinasi AgNPs

Nilai absorbansi = 0,377

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0,377 + 0.7972}{0.6373}$$

$$= 1,842 \text{ nmol/mL}$$

C. Untuk LED saja 10 Menit Kombinasi AgNPs

Nilai absorbansi = 0,380

$$Kadar\ MDA\ (\frac{nmol}{mL}) = \frac{0,380 + 0.7972}{0.6373}$$

$$= 1,847 \text{ nmol/mL}$$

Lampiran 5. Dokumentasi Penelitian