# DAFTAR PUSTAKA


Ahmadi, E. D., Hafeji, S., Khurshid, Z., Imran, E., Zafar, M. S., Saeinasab, M., & Sefat, F. (2022). Biophotonics in Dentistry. In *Applied Sciences (Switzerland)* (Vol. 12, Issue 9). MDPI. https://doi.org/10.3390/app12094254

Arafa, S. H., Elbanna, K., Osman, G. E. H., & Abulreesh, H. H. (2023). Candida diagnostic techniques: a review. *Journal of Umm Al-Qura University for Applied Sciences*. https://doi.org/10.1007/s43994-023-00049-2

Astuti, S. D., Hafidiana, Rulaningtyas, R., Abdurachman, Putra, A. P., Samian, & Arifianto, D. (2020). The efficacy of photodynamic inactivation with laser diode on Staphylococcus aureus biofilm with various ages of biofilm. *Infectious Disease Reports*, *12*(1), 68–74. https://doi.org/10.4081/idr.2020.8736

Astuty, S. D., Suhariningsih, Baktir, A., & Astuti, S. D. (2019). The efficacy of photodynamic inactivation of the diode laser in inactivation of the Candida albicans biofilms with exogenous photosensitizer of papaya leaf chlorophyll. *Journal of Lasers in Medical Sciences*, *10*(3), 215–224. https://doi.org/10.15171/jlms.2019.35

Bayram, C., & Liu, R. (2017). Exploring the Next Phase in Gallium Nitride Photonics: Cubic Phase Light Emitters Heterointegrated on Silicon. In *Semiconductors and Semimetals* (Vol. 96, pp. 411–435). Academic Press Inc. https://doi.org/10.1016/bs.semsem.2016.07.001

Buchovec, I., Vyčaitė, E., Badokas, K., Sužiedelienė, E., & Bagdonas, S. (2023). Application of Antimicrobial Photodynamic Therapy for Inactivation of Acinetobacter baumannii Biofilms. *International Journal of Molecular Sciences*, *24*(1). https://doi.org/10.3390/ijms24010722

Chang-hasnain, C. J., Ieee, F., Forrest, S. R., & Ieee, F. (2012). Optics and Photonics : Key Enabling Technologies. *Proceedings of the IEEE*, *100*, 1604–1643. https://doi.org/10.1109/JPROC.2012.2190174

Cieplik, F., Deng, D., Crielaard, W., Buchalla, W., Hellwig, E., Al-Ahmad, A., & Maisch, T. (2018). Antimicrobial photodynamic therapy–what we know and what we don't. *Critical Reviews in Microbiology*, *44*(5), 571–589. https://doi.org/10.1080/1040841X.2018.1467876

Correia, J. H., Rodrigues, J. A., Pimenta, S., Dong, T., & Yang, Z. (2021). Photodynamic therapy review: Principles, photosensitizers, applications, and future directions. *Pharmaceutics*, *13*(9). https://doi.org/10.3390/pharmaceutics13091332

[illegible]oral, F. V., Monteiro, C. M., Machado, G. B., Gonçalves, J. M. L. [illegible]ates, R. A., Ribeiro, M. S., & Pavani, C. (2022). The importance [illegible]methods to assess Candida albicans biofilms following [illegible]inactivation. *Photodiagnosis and Photodynamic Therapy*, [illegible]021), 1–6. https://doi.org/10.1016/j.pdpdt.2022.102769


Optimization Software:
www.balesio.com

Daniell, M. D., & Hill, J. (1991). A HISTORY OF PHOTODYNAMIC THERAPY. *ANZ Journal of Surgery*, *61*(5), 340–348. https://doi.org/10.1111/j.1445-2197.1991.tb00230.x

Gøtzsche, P. C. (2011). Niels Finsen's treatment for lupus vulgaris. *Journal of the Royal Society of Medicine*, *104*(1), 41–42. https://doi.org/10.1258/jrsm.2010.10k066

Hu, X., Huang, Y., Wang, Y., & Wang, X. (2018). Antimicrobial Photodynamic Therapy to Control Clinically Relevant Biofilm Infections. *Frontiers in Microbiology*, *9*(June), 1–24. https://doi.org/10.3389/fmicb.2018.01299

Indrawati, R., Lolita, A. M., Limantara, L., Kimia, P. S., Jaya, U. P., Cendrawasih, J., & Selatan, T. (2021). REVIEW ARTICLE TERAPI FOTODINAMIK ANTIMIKROBA : PROSPEK BARU DALAM PENANGANAN PANGAN ? Antimicrobial Photodynamic Therapy : A New Prospect in Food Handling ? Review Terapi Fotodinamik Antimikroba : Prospek Baru … ( Renny Indrawati dkk .). *Jurnal Sains Dan Terapan Kimia*, *15*(1), 74–90. https://doi.org/10.20527/jst

Jain, A., Blum, C., & Subramaniam, V. (2008). Fluorescence Lifetime Spectroscopy and Imaging of Visible Fluorescent Proteins. In *Advances in Biomedical Engineering* (pp. 147–176). Elsevier. https://doi.org/10.1016/B978-0-444-53075-2.00004-6

Jao, Y., Ding, S.-J., & Chen, C.-C. (2023). Antimicrobial photodynamic therapy for the treatment of oral infections: A systematic review. *Journal of Dental Sciences*. https://doi.org/10.1016/j.jds.2023.07.002

Jelínková, H. (2013). Introduction: The history of lasers in medicine. In *Lasers for Medical Applications: Diagnostics, Therapy and Surgery* (pp. 1–13). Elsevier Ltd. https://doi.org/10.1533/9780857097545.1

Jiang, Y., Geng, M., & Bai, L. (2020). Targeting Biofilms Therapy : Current Research Strategies and Development Hurdles. *Microorganisms*, *8*(1222). https://doi.org/10.3390/mikroorganisme8081222

Kim, M. M., & Darafsheh, A. (2020). Light Sources and Dosimetry Techniques for Photodynamic Therapy. *Photochemistry and Photobiology*, *96*(2), 280–294. https://doi.org/10.1111/php.13219

Knap, B., Przystupski, D., Saczko, J., Ewa, K., Knap-czop, K., Kotli, J., Michel, O., Kotowski, K., & Kulbacka, J. (2018). *Biomedicine & Pharmacotherapy Photodynamic therapy – mechanisms , photosensitizers and combinations*. 3–1107. https://doi.org/10.1016/j.biopha.2018.07.049

iej, P., Sawicki, J., Mazur, A., Koziorowska, K., & Aebisher, D. atural Photosensitizers and Their Medicinal Properties for Use namic Therapy. *Molecules*, *27*(1192), 1–19. 0.3390/molecules27041192

Optimization Software:
www.balesio.com

Mahmoudi, H., Bahador, A., Pourhajibagher, M., & Alikhani, M. Y. (2018). Antimicrobial Photodynamic Therapy : An Effective. *Laser Application in Medical Sciences Research Center*, *9*(3), 154–160. https://doi.org/10.15171/jlms.2018.29

Malinovsk, Z., Conkov, E., & Peter, V. (2023). Biofilm Formation in Medically Important Candida Species. *Journal of Fungi*, *9*(955). https://doi.org/10.3390/jof9100955

Martins, T., Barros, A. N., Rosa, E., & Antunes, L. (2023). Enhancing Health Benefits through Chlorophylls and Chlorophyll-Rich Agro-Food: A Comprehensive Review. In *Molecules* (Vol. 28, Issue 14). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/molecules28145344

Parle, M., & Gurditta. (2011). Basketful benefits of papaya. International Research Journal of pharmacy. *International Research Journal of Pharmacy*, *2*(7), 6–12.

Pereira Gonzales, F., & Maisch, T. (2012). Photodynamic inactivation for controlling Candida albicans infections. In *Fungal Biology* (Vol. 116, Issue 1, pp. 1–10). https://doi.org/10.1016/j.funbio.2011.10.001

Piksa, M., Lian, C., Samuel, I. C., Pawlik, K. J., Samuel, I. D. W., & Matczyszyn, K. (2023). The role of the light source in antimicrobial photodynamic therapy. *Chemical Society Reviews*. https://doi.org/10.1039/d0cs01051k

Polat, E., & Kang, K. (2021). *biomedicines Natural Photosensitizers in Antimicrobial Photodynamic Therapy*. https://doi.org/10.3390/biomedicines9060584

Pucelik, B., & Dąbrowski, J. M. (2022). Photodynamic inactivation (PDI) as a promising alternative to current pharmaceuticals for the treatment of resistant microorganisms. In *Advances in Inorganic Chemistry* (Vol. 79, pp. 65–103). Academic Press Inc. https://doi.org/10.1016/bs.adioch.2021.12.003

Raposo, B. L., Souza, S. O., Santana, G. S., Lima, M. T. A., Sarmento-Neto, J. F., Reboucas, J. S., Pereira, G., Santos, B. S., Cabral Filho, P. E., Ribeiro, M. S., & Fontes, A. (2023). A Novel Strategy Based on Zn(II) Porphyrins and Silver Nanoparticles to Photoinactivate Candida albicans. *International Journal of Nanomedicine*, *18*(May), 3007–3020. https://doi.org/10.2147/IJN.S404422

Sonter, S. A., Mishra, S., & Patel, D. K. (2020). Antioxidant , antibacterial activity , and phytochemical characterization of Carica papaya flowers. *Beni-Suef University Journal of Basic and Applied Sciences*, *May*. https://doi.org/10.1186/s43088-020-00048-w

Maxillofacial Surgery, Springer Nature Switzerland (2020). 0.1007/978-3-030-29604-9

ši, M. (2021). Candida albicans — The Virulence Factors and festations of Infection. *Journal of Fungi*, *7*(79). 0.3390/jof7020079

cs, R. (2011). Basic principles of lasers. In *Anaesthesia and*

Optimization Software:
www.balesio.com

*Intensive Care Medicine* (Vol. 12, Issue 12, pp. 574–577). Elsevier Ltd. https://doi.org/10.1016/j.mpaic.2011.09.013

Uliana, M. P., Rodrigues, C., & Ono, B. A. (2022). Photodynamic Inactivation of Microorganisms Using Semisynthetic Chlorophyll a Derivatives as Photosensitizers. *Molecules*, *27*(5769). https://doi.org/10.3390/molecules27185769

Zhang, L., Hu, Q., Zhang, Y., Wang, Y., Liu, N., & Liu, Q. (2023). Rapid Inactivation of mixed biofilms of Candida albicans and Candida tropicalis using antibacterial photodynamic therapy: Based on PAD™ Plus. *Heliyon*, *9*(4), e15396. https://doi.org/10.1016/j.heliyon.2023.e15396

PDF
Optimization Software:
www.balesio.com

# LAMPIRAN

1. Proses Ekstraksi Daun Pepaya

**2.** Proses Penumbuhan Biofilm Dan Perlakuan Fotoinaktivasi

Optimization Software:
www.balesio.com

**3.** Desain Kelompok Perlakuan Pada *Microplate*

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | C- | C- | C- | C- | C- | | | L5 | L4 | L3 | L2 | L1 |
| B | C1+ | C1+ | C1+ | C1+ | C1+ | | | L5 | L4 | L3 | L2 | L1 |
| C | C2+ | C2+ | C2+ | C2+ | C2+ | | | | | | | |
| D | L5 | L4 | L3 | L2 | L1 | | | L5F1 | L4F1 | L3F1 | L2F1 | L1F1 |
| E | | | | | | | | L5F1 | L4F1 | L3F1 | L2F1 | L1F1 |
| F | | | | | | | | | | | | |
| G | L5F1 | L4F1 | L3F1 | L2F1 | L1F1 | | | L5F2 | L4F2 | L3F2 | L2F2 | L1F2 |
| H | L5F2 | L4F2 | L3F2 | L2F2 | L1F2 | | | L5F2 | L4F2 | L3F2 | L2F2 | L1F2 |

**4.** Perhitungan Tingkat Inaktivasi

| Kelompok Perlakuan | Tingkat Inaktivasi (%) | | | Rata-rata |
|---|---|---|---|---|
| | 1 | 2 | 3 | |
| C- | 1.478 | 1.386 | 1.377 | 1.414 |
| $C_1^+$ | 19.689 | 13.853 | 15.468 | 16.337 |
| $C_2^+$ | 24.425 | 18.831 | 20.334 | 21.197 |
| L1 | 32.544 | 29.870 | 32.099 | 31.504 |
| L2 | 39.445 | 40.115 | 37.981 | 39.181 |
| L3 | 43.843 | 44.300 | 44.444 | 44.196 |
| L4 | 63.058 | 60.317 | 57.516 | 60.297 |
| L5 | 67.118 | 66.162 | 64.125 | 65.801 |
| L1F1 | 75.913 | 76.912 | 77.923 | 76.916 |
| L2F1 | 81.800 | 78.571 | 78.359 | 79.577 |
| L3F1 | 80.853 | 80.447 | 79.739 | 80.346 |
| L4F1 | 84.235 | 83.045 | 82.643 | 83.308 |
| L5F1 | 83.762 | 83.694 | 84.096 | 83.851 |
| L1F2 | 81.529 | 79.004 | 78.286 | 79.607 |
| L2F2 | 82.206 | 79.004 | 78.649 | 79.953 |
| L3F2 | 81.529 | 81.313 | 80.755 | 81.199 |
| | 84.371 | 83.550 | 82.934 | 83.618 |
| | 85.724 | 84.199 | 92.229 | 87.384 |

PDF
Optimization Software:
www.balesio.com

**5.** Data Pengukuran Spektrum Klrofil Ekstrak Daun Pepaya

| *No* | *Panjang gelombang* | *absorbansi* |
|---|---|---|
| *1* | 350 | 0.589 |
| *2* | 360 | 1.085 |
| *3* | 370 | 1.420 |
| *4* | 380 | 1.680 |
| *5* | 392 | 1.861 |
| *6* | 400 | 1.961 |
| *7* | 414 | 2.014 |
| *8* | 420 | 1.923 |
| *9* | 430 | 1.713 |
| *10* | 440 | 1.512 |
| *11* | 450 | 1.312 |
| *12* | 460 | 1.095 |
| *13* | 470 | 0.997 |
| *14* | 480 | 0.880 |
| *15* | 490 | 0.801 |
| *16* | 500 | 0.719 |
| *17* | 520 | 0.657 |
| *18* | 525 | 0.612 |
| *19* | 530 | 0.593 |
| *20* | 536 | 0.601 |
| *21* | 540 | 0.577 |
| *22* | 550 | 0.561 |
| *23* | 560 | 0.552 |
| *24* | 565 | 0.549 |
| *25* | 570 | 0.559 |
| *26* | 580 | 0.558 |
| *27* | 591 | 0.550 |
| *28* | 626 | 0.614 |
| *29* | 630 | 0.719 |
| *30* | 640 | 0.825 |
| *31* | 650 | 0.938 |
| *32* | 660 | 1.041 |
| *33* | 665 | 1.112 |
| *34* | 670 | 1.133 |
| *35* | 680 | 1.017 |
| *36* | 690 | 0.701 |
| *37* | 700 | 0.386 |

PDF
Optimization Software:
www.balesio.com

**6.** Data Uji Stabilitas Keluaran Laser Menggunakan Daya 288 mW

| Waktu | Daya Laser | Tegangan | Arus |
|---|---|---|---|
| **0** | 288.0 | 1.42 | 202.5 |
| **10** | 284.4 | 1.43 | 198.5 |
| **20** | 283.8 | 1.44 | 197.7 |
| **30** | 289.2 | 1.43 | 206.9 |
| **40** | 287.2 | 1.43 | 201.3 |
| **50** | 284.2 | 1.42 | 199.7 |
| **60** | 285.1 | 1.45 | 197.0 |
| **70** | 283.7 | 1.43 | 198.1 |
| **80** | 284.6 | 1.43 | 199.0 |
| **90** | 288.3 | 1.42 | 206.8 |
| **100** | 286.7 | 1.44 | 199.4 |
| **110** | 290.2 | 1.43 | 202.9 |
| **120** | 283.0 | 1.45 | 195.8 |
| **130** | 283.8 | 1.42 | 199.4 |
| **140** | 292.0 | 1.42 | 207.6 |
| **150** | 287.9 | 1.42 | 202.5 |
| **160** | 287.4 | 1.41 | 203.7 |
| **170** | 290.5 | 1.42 | 205.3 |
| **180** | 286.2 | 1.41 | 202.7 |
| **190** | 282.7 | 1.42 | 199.5 |
| **200** | 282.9 | 1.42 | 199.9 |
| **210** | 285.4 | 1.42 | 201.0 |
| **220** | 290.2 | 1.41 | 207.1 |
| **230** | 285.4 | 1.42 | 201.0 |
| **240** | 287.3 | 1.43 | 201.4 |
| **250** | 285.9 | 1.41 | 202.7 |
| **260** | 289.8 | 1.42 | 204.1 |
| **270** | 287.4 | 1.42 | 202.4 |
| **280** | 285.6 | 1.42 | 200.6 |
| **290** | 288.4 | 1.43 | 202.2 |
| | 287.3 | 1.43 | 200.8 |
| | 288.3 | 1.42 | 202.9 |
| | 287.9 | 1.43 | 200.9 |
| | 287.0 | 1.43 | 201.3 |
| | 288.5 | 1.43 | 202.3 |
| | 284.7 | 1.43 | 199.7 |

Optimization Software:
www.balesio.com

| | | | |
|---|---|---|---|
| **360** | 288.4 | 1.43 | 202.4 |
| **370** | 286.9 | 1.43 | 200.2 |
| **380** | 284.8 | 1.44 | 198.4 |
| **390** | 290.1 | 1.42 | 205.2 |
| **400** | 289.5 | 1.42 | 203.5 |
| **410** | 284.7 | 1.42 | 200.9 |
| **420** | 287.7 | 1.43 | 201.0 |
| **430** | 288.8 | 1.42 | 203.0 |
| **440** | 288.5 | 1.42 | 202.6 |
| **450** | 289.2 | 1.42 | 203.8 |
| **460** | 286.0 | 1.43 | 200.3 |
| **470** | 288.2 | 1.42 | 202.2 |
| **480** | 287.6 | 1.43 | 200.8 |
| **490** | 287.7 | 1.43 | 201.0 |
| **500** | 289.3 | 1.42 | 204.0 |
| **510** | 286.3 | 1.43 | 200.0 |
| **520** | 289.5 | 1.43 | 202.0 |
| **530** | 290.2 | 1.43 | 202.8 |
| **540** | 288.2 | 1.43 | 202.2 |
| **550** | 285.1 | 1.43 | 199.1 |
| **560** | 287.2 | 1.44 | 200.1 |
| **570** | 290.6 | 1.42 | 206.9 |
| **580** | 288.7 | 1.43 | 201.9 |
| **590** | 290.8 | 1.42 | 204.1 |
| **600** | 286.5 | 1.43 | 199.8 |
| **610** | 286.9 | 1.42 | 202.1 |
| **620** | 285.6 | 1.43 | 199.4 |
| **630** | 287.6 | 1.44 | 200.2 |
| **640** | 286.7 | 1.42 | 202.2 |
| **650** | 289.0 | 1.43 | 202.6 |
| **660** | 287.4 | 1.43 | 201.0 |
| **670** | 286.8 | 1.42 | 202.1 |
| **680** | 284.2 | 1.43 | 199.2 |
| | 289.0 | 1.42 | 203.5 |
| | 286.6 | 1.43 | 200.4 |
| | 292.5 | 1.44 | 203.7 |
| | 283.2 | 1.44 | 196.5 |
| | 285.6 | 1.44 | 192.8 |

| | | | |
|---|---|---|---|
| **740** | 290.2 | 1.42 | 204.9 |
| **750** | 288.3 | 1.44 | 200.6 |
| **760** | 288.4 | 1.42 | 202.4 |
| **770** | 290.2 | 1.43 | 202.9 |
| **780** | 282.6 | 1.44 | 196.1 |
| **790** | 288.5 | 1.44 | 200.6 |
| **800** | 289.0 | 1.41 | 205.3 |
| **810** | 290.3 | 1.43 | 204.6 |
| **820** | 287.7 | 1.43 | 203.6 |
| **830** | 286.7 | 1.43 | 201.0 |
| **840** | 285.8 | 1.42 | 200.6 |
| **850** | 290.7 | 1.43 | 203.0 |
| **860** | 290.6 | 1.44 | 202.1 |
| **870** | 287.3 | 1.44 | 200.0 |
| **880** | 288.3 | 1.43 | 201.7 |
| **890** | 286.2 | 1.44 | 199.3 |
| **900** | 289.9 | 1.43 | 195.1 |
| **910** | 285.6 | 1.43 | 199.6 |
| **920** | 286.0 | 1.44 | 199.2 |
| **930** | 290.7 | 1.44 | 202.0 |
| **940** | 285.4 | 1.43 | 204.5 |
| **950** | 283.2 | 1.44 | 196.9 |
| **960** | 288.1 | 1.42 | 202.4 |
| **970** | 287.1 | 1.43 | 200.4 |
| **980** | 286.1 | 1.42 | 207.3 |
| **990** | 286.5 | 1.42 | 204.4 |
| **1000** | 290.6 | 1.43 | 203.7 |
| **1010** | 285.4 | 1.44 | 197.9 |
| **1020** | 284.6 | 1.44 | 197.6 |
| **1030** | 287.4 | 1.44 | 199.9 |
| **1040** | 287.1 | 1.43 | 200.3 |
| **1050** | 282.7 | 1.45 | 195.4 |
| **1060** | 286.2 | 1.45 | 197.7 |
| | 285.7 | 1.44 | 197.8 |
| | 289.4 | 1.43 | 205.7 |
| | 286.4 | 1.43 | 199.8 |
| | 287.8 | 1.43 | 200.6 |
| | 287.8 | 1.43 | 200.6 |

| | | | |
|---|---|---|---|
| **1120** | 287.4 | 1.43 | 201.0 |
| **1130** | 288.9 | 1.43 | 203.8 |
| **1140** | 290.6 | 1.43 | 203.5 |
| **1150** | 289.5 | 1.44 | 200.1 |
| **1160** | 288.1 | 1.43 | 201.7 |
| **1170** | 285.7 | 1.44 | 199.0 |
| **1180** | 289.0 | 1.43 | 202.6 |
| **1190** | 290.3 | 1.43 | 204.7 |
| **1200** | 290.6 | 1.44 | 201.4 |
| **1210** | 289.2 | 1.43 | 204.5 |
| **1220** | 288.4 | 1.43 | 201.3 |
| **1230** | 290.9 | 1.43 | 202.8 |
| **1240** | 287.9 | 1.44 | 200.2 |
| **1250** | 289.5 | 1.44 | 200.6 |
| **1260** | 289.6 | 1.42 | 203.8 |
| **1270** | 286.3 | 1.44 | 198.9 |
| **1280** | 288.2 | 1.43 | 201.6 |
| **1290** | 285.6 | 1.43 | 200.3 |
| **1300** | 287.6 | 1.44 | 200.4 |
| **1310** | 285.1 | 1.44 | 198.2 |
| **1320** | 288.3 | 1.43 | 205.0 |
| **1330** | 287.2 | 1.44 | 206.1 |
| **1340** | 282.7 | 1.44 | 196.0 |
| **1350** | 289.6 | 1.43 | 202.3 |
| **1360** | 289.7 | 1.43 | 202.3 |
| **1370** | 288.8 | 1.44 | 200.8 |
| **1380** | 284.6 | 1.44 | 198.1 |
| **1390** | 290.8 | 1.42 | 205.5 |
| **1400** | 289.2 | 1.42 | 205.4 |
| **1410** | 285.5 | 1.43 | 199.4 |
| **1420** | 287.3 | 1.43 | 200.4 |
| **1430** | 287.3 | 1.44 | 199.8 |
| **1440** | 291.4 | 1.43 | 204.3 |
| | 286.1 | 1.44 | 198.6 |
| | 289.5 | 1.44 | 201.5 |
| | 288.8 | 1.43 | 202.0 |
| | 283.0 | 1.44 | 196.0 |
| | 288.8 | 1.43 | 201.5 |

| | | | |
|---|---|---|---|
| **1500** | 290.1 | 1.43 | 203.1 |
| **1510** | 289.2 | 1.45 | 199.9 |
| **1520** | 285.4 | 1.44 | 198.8 |
| **1530** | 284.6 | 1.45 | 196.1 |
| **1540** | 283.1 | 1.44 | 196.2 |
| **1550** | 288.7 | 1.43 | 201.5 |
| **1560** | 289.2 | 1.44 | 200.6 |
| **1570** | 287.5 | 1.45 | 198.9 |
| **1580** | 288.2 | 1.44 | 200.1 |
| **1590** | 290.6 | 1.43 | 202.6 |
| **1600** | 290.3 | 1.43 | 204.0 |
| **1610** | 289.7 | 1.43 | 201.9 |
| **1620** | 288.0 | 1.45 | 198.9 |
| **1630** | 286.8 | 1.44 | 198.7 |
| **1640** | 286.7 | 1.44 | 198.5 |
| **1650** | 289.4 | 1.45 | 199.4 |
| **1660** | 280.9 | 1.44 | 194.6 |
| **1670** | 287.4 | 1.44 | 199.0 |
| **1680** | 290.4 | 1.45 | 200.7 |
| **1690** | 288.3 | 1.45 | 199.3 |
| **1700** | 286.7 | 1.44 | 199.2 |
| **1710** | 290.1 | 1.44 | 203.3 |
| **1720** | 284.6 | 1.44 | 197.5 |
| **1730** | 287.8 | 1.45 | 199.0 |
| **1740** | 288.5 | 1.44 | 200.2 |
| **1750** | 285.9 | 1.44 | 198.4 |
| **1760** | 286.1 | 1.45 | 197.5 |
| **1770** | 287.1 | 1.44 | 198.9 |
| **1780** | 290.5 | 1.44 | 201.9 |
| **1790** | 289.3 | 1.45 | 199.4 |
| **1800** | 286.6 | 1.45 | 197.8 |
| **1810** | 289.2 | 1.44 | 200.8 |
| **1820** | 288.4 | 1.44 | 199.8 |
| | 285.8 | 1.44 | 199.0 |
| | 289.2 | 1.43 | 202.4 |
| | 283.7 | 1.45 | 196.3 |
| | 285.9 | 1.44 | 196.9 |
| | 288.3 | 1.44 | 200.2 |

| | | | |
|---|---|---|---|
| **1880** | 290.3 | 1.44 | 202.4 |
| **1890** | 284.3 | 1.45 | 194.7 |
| **1900** | 290.7 | 1.43 | 203.9 |
| **1910** | 286.1 | 1.45 | 197.5 |
| **1920** | 290.2 | 1.44 | 203.0 |
| **1930** | 285.3 | 1.46 | 196.0 |
| **1940** | 288.7 | 1.44 | 199.9 |
| **1950** | 288.0 | 1.44 | 200.2 |
| **1960** | 284.6 | 1.45 | 196.6 |
| **1970** | 286.0 | 1.43 | 199.7 |
| **1980** | 290.1 | 1.43 | 202.2 |
| **1990** | 286.7 | 1.44 | 199.5 |
| **2000** | 290.6 | 1.44 | 202.2 |
| **2010** | 289.6 | 1.45 | 200.3 |
| **2020** | 285.5 | 1.44 | 198.2 |
| **2030** | 286.8 | 1.45 | 198.1 |
| **2040** | 286.2 | 1.45 | 197.7 |
| **2050** | 287.2 | 1.44 | 199.7 |
| **2060** | 290.0 | 1.44 | 201.5 |
| **2070** | 285.1 | 1.45 | 196.2 |
| **2080** | 286.6 | 1.44 | 198.3 |
| **2090** | 284.3 | 1.45 | 196.7 |
| **2100** | 285.2 | 1.45 | 197.1 |
| **2110** | 289.4 | 1.44 | 200.7 |
| **2120** | 286.8 | 1.43 | 200.1 |
| **2130** | 290.2 | 1.44 | 201.4 |
| **2140** | 286.6 | 1.45 | 198.0 |
| **2150** | 288.9 | 1.45 | 199.4 |
| **2160** | 288.7 | 1.43 | 201.3 |
| **2170** | 290.6 | 1.44 | 201.8 |
| **2180** | 286.6 | 1.45 | 197.0 |
| **2190** | 290.3 | 1.44 | 201.9 |
| **2200** | 289.0 | 1.45 | 199.2 |
| | 288.1 | 1.45 | 198.9 |
| | 286.0 | 1.44 | 198.5 |
| | 286.9 | 1.44 | 198.7 |
| | 284.5 | 1.46 | 195.4 |
| | 290.1 | 1.44 | 203.1 |

| | | | |
|---|---|---|---|
| **2260** | 287.5 | 1.44 | 199.4 |
| **2270** | 285.6 | 1.45 | 197.5 |
| **2280** | 287.1 | 1.44 | 199.0 |
| **2290** | 288.0 | 1.44 | 200.0 |
| **2300** | 286.1 | 1.43 | 199.5 |
| **2310** | 285.4 | 1.45 | 196.6 |
| **2320** | 285.5 | 1.44 | 197.9 |
| **2330** | 288.6 | 1.44 | 199.8 |
| **2340** | 286.8 | 1.44 | 198.7 |
| **2350** | 290.2 | 1.44 | 202.1 |
| **2360** | 284.3 | 1.45 | 196.0 |
| **2370** | 289.7 | 1.44 | 201.0 |
| **2380** | 288.1 | 1.45 | 198.5 |
| **2390** | 284.6 | 1.45 | 197.7 |
| **2400** | 288.7 | 1.45 | 199.4 |
| **2410** | 290.5 | 1.45 | 201.7 |
| **2420** | 285.3 | 1.46 | 196.0 |
| **2430** | 290.9 | 1.44 | 201.4 |
| **2440** | 286.4 | 1.44 | 198.6 |
| **2450** | 286.1 | 1.44 | 198.3 |
| **2460** | 287.4 | 1.45 | 198.2 |
| **2470** | 285.0 | 1.45 | 196.9 |
| **2480** | 286.5 | 1.45 | 197.8 |
| **2490** | 283.8 | 1.45 | 195.3 |
| **2500** | 284.7 | 1.43 | 198.6 |
| **2510** | 283.5 | 1.46 | 194.6 |
| **2520** | 282.6 | 1.46 | 193.4 |
| **2530** | 282.6 | 1.45 | 195.3 |
| **2540** | 286.3 | 1.45 | 197.5 |
| **2550** | 290.2 | 1.45 | 201.2 |
| **2560** | 291.9 | 1.43 | 203.9 |
| **2570** | 287.5 | 1.44 | 199.4 |
| **2580** | 285.2 | 1.45 | 197.3 |
| | 284.2 | 1.45 | 195.4 |
| | 288.0 | 1.45 | 197.9 |
| | 289.5 | 1.46 | 198.3 |
| | 290.2 | 1.44 | 206.3 |
| | 288.1 | 1.44 | 205.5 |

| | | | |
|---|---|---|---|
| **2640** | 290.5 | 1.45 | 200.1 |
| **2650** | 290.2 | 1.44 | 201.9 |
| **2660** | 287.6 | 1.45 | 198.7 |
| **2670** | 282.2 | 1.46 | 193.5 |
| **2680** | 285.3 | 1.46 | 195.5 |
| **2690** | 284.7 | 1.44 | 202.0 |
| **2700** | 290.6 | 1.45 | 200.6 |
| **2710** | 289.6 | 1.44 | 202.4 |
| **2720** | 288.8 | 1.45 | 199.4 |
| **2730** | 286.5 | 1.45 | 197.1 |
| **2740** | 285.9 | 1.45 | 196.7 |
| **2750** | 288.1 | 1.44 | 200.2 |
| **2760** | 287.7 | 1.45 | 198.2 |
| **2770** | 288.9 | 1.45 | 199.4 |
| **2780** | 286.9 | 1.45 | 197.5 |
| **2790** | 285.6 | 1.46 | 196.1 |
| **2800** | 284.4 | 1.45 | 195.7 |
| **2810** | 290.3 | 1.45 | 201.6 |
| **2820** | 289.2 | 1.45 | 201.7 |
| **2830** | 289.4 | 1.46 | 195.7 |
| **2840** | 288.9 | 1.45 | 199.2 |
| **2850** | 288.8 | 1.45 | 198.6 |
| **2860** | 286.5 | 1.44 | 198.5 |
| **2870** | 287.8 | 1.45 | 196.3 |
| **2880** | 290.0 | 1.45 | 200.6 |
| **2890** | 288.7 | 1.46 | 196.9 |
| **2900** | 286.4 | 1.45 | 197.4 |
| **2910** | 287.0 | 1.45 | 197.5 |
| **2920** | 284.7 | 1.45 | 196.3 |
| **2930** | 289.2 | 1.45 | 199.7 |
| **2940** | 285.8 | 1.46 | 195.8 |
| **2950** | 286.1 | 1.45 | 197.7 |
| **2960** | 289.3 | 1.46 | 198.8 |
| | 290.7 | 1.44 | 204.4 |
| | 286.6 | 1.46 | 196.5 |
| | 287.7 | 1.44 | 199.2 |
| | 285.8 | 1.46 | 195.1 |
| | 290.1 | 1.45 | 201.8 |

Optimization Software:
www.balesio.com

| | | | |
|---|---|---|---|
| **3020** | 285.6 | 1.45 | 196.5 |
| **3030** | 284.0 | 1.45 | 195.7 |
| **3040** | 286.6 | 1.44 | 204.0 |
| **3050** | 287.0 | 1.45 | 198.6 |
| **3060** | 282.9 | 1.46 | 193.7 |
| **3070** | 285.5 | 1.46 | 195.1 |
| **3080** | 289.0 | 1.45 | 199.2 |
| **3090** | 284.5 | 1.45 | 196.1 |
| **3100** | 287.8 | 1.46 | 197.6 |
| **3110** | 288.8 | 1.45 | 199.6 |
| **3120** | 282.6 | 1.45 | 194.4 |
| **3130** | 285.1 | 1.46 | 195.3 |
| **3140** | 286.7 | 1.45 | 197.0 |
| **3150** | 286.0 | 1.46 | 196.1 |
| **3160** | 286.7 | 1.45 | 197.1 |
| **3170** | 289.8 | 1.46 | 198.3 |
| **3180** | 286.6 | 1.45 | 198.1 |
| **3190** | 290.5 | 1.45 | 201.9 |
| **3200** | 285.0 | 1.45 | 196.4 |
| **3210** | 285.5 | 1.45 | 196.2 |
| **3220** | 287.9 | 1.46 | 197.6 |
| **3230** | 288.8 | 1.46 | 197.0 |
| **3240** | 290.5 | 1.44 | 201.5 |
| **3250** | 284.5 | 1.46 | 194.3 |
| **3260** | 286.9 | 1.45 | 197.4 |
| **3270** | 290.5 | 1.45 | 199.8 |
| **3280** | 284.0 | 1.45 | 195.6 |
| **3290** | 288.8 | 1.46 | 197.8 |
| **3300** | 285.8 | 1.45 | 197.7 |
| **3310** | 285.6 | 1.47 | 194.8 |
| **3320** | 286.6 | 1.45 | 197.9 |
| **3330** | 285.4 | 1.46 | 195.9 |
| **3340** | 288.2 | 1.45 | 198.3 |
| | 291.7 | 1.45 | 201.1 |
| | 290.2 | 1.45 | 200.3 |
| | 289.4 | 1.44 | 201.0 |
| | 287.9 | 1.45 | 198.8 |
| | 289.2 | 1.46 | 198.2 |

| | | | |
|---|---|---|---|
| **3400** | 286.5 | 1.46 | 196.5 |
| **3410** | 287.3 | 1.45 | 197.1 |
| **3420** | 287.4 | 1.46 | 196.3 |
| **3430** | 286.2 | 1.46 | 195.6 |
| **3440** | 282.8 | 1.45 | 194.9 |
| **3450** | 286.8 | 1.47 | 195.7 |
| **3460** | 287.3 | 1.45 | 197.9 |
| **3470** | 290.1 | 1.44 | 202.3 |
| **3480** | 284.5 | 1.47 | 194.2 |
| **3490** | 287.2 | 1.46 | 197.4 |
| **3500** | 286.3 | 1.46 | 196.3 |
| **3510** | 288.5 | 1.45 | 199.0 |
| **3520** | 290.0 | 1.46 | 200.9 |
| **3530** | 287.8 | 1.45 | 199.1 |
| **3540** | 289.5 | 1.45 | 199.7 |
| **3550** | 288.5 | 1.45 | 199.5 |
| **3560** | 287.3 | 1.45 | 198.5 |
| **3570** | 290.1 | 1.45 | 199.7 |
| **3580** | 285.9 | 1.45 | 197.3 |
| **3590** | 283.9 | 1.45 | 195.9 |
| **3600** | 289.0 | 1.45 | 199.0 |
| **Rata-rata** | **287.4** | **1.44** | **199.8** |

**7.** Data Hasil Uji Anova

**Tests of Normality**

| Perlakuan | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| C- | .356 | 3 | . | .816 | 3 | .154 |
| C1+ | .280 | 3 | . | .938 | 3 | .518 |
| C2+ | .284 | 3 | . | .933 | 3 | .502 |
| L1 | .328 | 3 | . | .871 | 3 | .298 |
| L2 | .262 | 3 | . | .956 | 3 | .596 |
| L3 | .297 | 3 | . | .917 | 3 | .442 |
| L4 | .176 | 3 | . | 1.000 | 3 | .988 |
| L5 | .260 | 3 | . | .958 | 3 | .607 |
| L1F1 | .175 | 3 | . | 1.000 | 3 | .993 |
| L1F2 | .312 | 3 | . | .896 | 3 | .372 |
| L2F1 | .369 | 3 | . | .789 | 3 | .087 |
| L2F2 | .353 | 3 | . | .824 | 3 | .173 |
| L3F1 | .238 | 3 | . | .976 | 3 | .703 |
| L3F2 | .279 | 3 | . | .939 | 3 | .523 |
| L4F1 | .291 | 3 | . | .924 | 3 | .468 |
| L4F2 | .204 | 3 | . | .993 | 3 | .843 |
| L5F1 | .327 | 3 | . | .873 | 3 | .303 |
| L5F2 | .318 | 3 | . | .886 | 3 | .343 |

a. Lilliefors Significance Correction

**Tests of Homogeneity of Variances**

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| pengukuran | Based on Mean | 3.635 | 17 | 36 | <.001 |
| | Based on Median | .797 | 17 | 36 | .685 |
| | Median and ed df | .797 | 17 | 12.507 | .674 |
| | rimmed mean | 3.312 | 17 | 36 | .001 |

Optimization Software:
www.balesio.com

**ANOVA**

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 39320.523 | 17 | 2312.972 | 646.401 | <.001 |
| Within Groups | 128.816 | 36 | 3.578 | | |
| Total | 39449.339 | 53 | | | |

**Multiple Comparisons**

Dependent Variable: pengukuran

Bonferroni

| (I) Perlakuan | (J) Perlakuan | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|
| C- | C1+ | -14.923000* | 1.544502 | <.001 | -21.05830 | -8.78770 |
| | C2+ | -19.783000* | 1.544502 | <.001 | -25.91830 | -13.64770 |
| | L1 | -30.090667* | 1.544502 | <.001 | -36.22597 | -23.95536 |
| | L2 | -37.766667* | 1.544502 | <.001 | -43.90197 | -31.63136 |
| | L3 | -42.782000* | 1.544502 | <.001 | -48.91730 | -36.64670 |
| | L4 | -58.883333* | 1.544502 | <.001 | -65.01864 | -52.74803 |
| | L5 | -64.388000* | 1.544502 | <.001 | -70.52330 | -58.25270 |
| | L1F1 | -75.502333* | 1.544502 | <.001 | -81.63764 | -69.36703 |
| | L1F2 | -78.283000* | 1.544502 | <.001 | -84.41830 | -72.14770 |
| | L2F1 | -78.388333* | 1.544502 | <.001 | -84.52364 | -72.25303 |
| | L2F2 | -78.539333* | 1.544502 | <.001 | -84.67464 | -72.40403 |
| | L3F1 | -78.932667* | 1.544502 | <.001 | -85.06797 | -72.79736 |
| | L3F2 | -79.785333* | 1.544502 | <.001 | -85.92064 | -73.65003 |
| | L4F1 | -81.894000* | 1.544502 | <.001 | -88.02930 | -75.75870 |
| | L4F2 | -82.204667* | 1.544502 | <.001 | -88.33997 | -76.06936 |
| | L5F1 | -82.437000* | 1.544502 | <.001 | -88.57230 | -76.30170 |
| | L5F2 | -85.970333* | 1.544502 | <.001 | -92.10564 | -79.83503 |

*. significant at the 0.05 level.

PDF
Optimization Software:
www.balesio.com

**Lampiran 8.** Surat Penugasan Dosen Pembimbing dan Penguji

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET DAN TEKNOLOGI
UNIVERSITAS HASANUDDIN
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
Kampus Tamalanrea Km. 10 Makassar, 90245, Sulawesi Selatan TELP. 0411-586016 Fax(0411)586551 email: fmipaph@unhas.ac.id

# SURAT PENUGASAN

NOMOR : 28485/UN4.11/TA.00.01/2023

Berdasarkan Surat Ketua Departemen Fisika Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Alam Hasanuddin Nomor: 28436/UN4.11.7/TD.05/2023, Tanggal 14 November 2023, Perihal usulan Tim **Panitia Seminar Hasil dan Penitia Ujian Sarjana**, maka perlu diterbitkan surat penugasan bagi mahasiswa dibawah ini:

| | |
|---|---|
| Nama Mahasiswa | : **Rismayani Abdullah** |
| Nomor Pokok | : **H021191082** |
| Departemen | : **Fisika** |
| Program Studi | : **Fisika** |
| Judul | : |

**Pengaruh Energi Penyerapan Laser Hijau Berdasarkan Energi Serapan Optimum Ekstrak Daun Pepaya Terhadap Kematian Sel Candida Albicans**

Dengan susunan panitia sebagai berikut:

| | |
|---|---|
| Ketua | : **Dr. Sri Dewi Astuty, S.Si, M.Si** |
| Sekretaris | : **Prof. Dr. Ir. Bidayatul Arminah, MT.** |
| Anggota | : **1. Bannu, S.Si,M.Si** |
| | **2. Prof. Dr. rer-nat Wira Bahari Nurdin,** |

Demikian surat penugasan ini dibuat untuk dilaksanakan dengan sebaik-baiknya, dengan ketentuan apabila dikemudian hari terdapat kekeliruan akan dilakukan perbaikan sebagaimana mestinya.

Dikeluarkan di : Makassar
Pada Tanggal : 15 November 2023
a.n. Dekan,
Wakil Dekan Bidang Akademik dan Kemahasiswaan Fakultas MIPA,

**Dr. Khaeruddin, M.Sc**
NIP. 19650914 199103 1 003

**Tembusan Kepada Yth. :**
1. Dekan FMIPA Unhas (Sebagai laporan)
2. Ketua Departemen Fisika FMIPA-UNHAS

Quality ISO 9001

PDF
Optimization Software:
www.balesio.com