DAFTAR PUSTAKA

Abubakar, H., Wahyudi, A.T., dan Yuhana, M. 2012. Skrining Bakteri yang Berasosiasi dengan Spons Jaspis sp. Sebagai Penghasil Senyawa Antimikroba, *Ilmu Kelautan. Indonesian Journal of Marine Sciences*. **16** (1): 35-40.

Ahmad, A., Usman, H., Natsir, H., dan Karim, A. 2014. Isolation and characterization of bioactive protein from green algae Halimeda macrobola acting as antioxidant and anticancer agent. *American Journal of Biomedical and Life Sciences*. **2** (5): 134-140

Ahmad, A., Asmi, N., Karim, H., Massi, M.N., Wahid, I., dan Sugrani, A. 2021. Characterization of anti-dengue and cytotoxic activity of protein hydrolysates from the exophytic bacteria of brown algae Sargassum sp. *Journal of Applied Pharmaceutical Science.* **11** (02): 39-46.

Ahmadifard, N., Murueta, J.H.C., Abedian-Kenari, A., Motamedzadegan, A., dan Jamali, H. 2016. Comparison The Effect of Three Commercial Enzymes For Enzymatic Hydrolysis of Two Substrate (Rice Bran Protein Concentrate and Soybean Protein) With SDS PAGE. *Journal of food science and technologies.* **53** (2): 1279-1284.

American Cancer Society (ACS). 2015. *Global Cancer Facts and Figures 3rd Edition, American Cancer Society.* Inc: Atlanta.

American Cancer Society (ACS). 2019. *Causes, Risk Factors, and Prevention, American Cancer Society*. Inc: Atlanta.

Arifudin, Patong, R., dan Ahmad, A. 2001. Penelusuran Protein Bioaktif Dalam Makroalga Sebagai Bahan Antibakteri Dan Antijamur. *Mar. Chim Acta*. **2** (2): 11-18.

Aslam, M.S., Naveed, S., Ahmed, A., Abbas, Z., Gull, I., dan Athar, M.A. 2014. Side Effects of Chemotherapy In Cancer Patients and Evaluation of Patients Opinion About Starvation Based Differential Chemotherapy. *Journal of Cancer Therapy.* **5**: 817-822.

Asmi, N. 2021. *Isolasi Peptida Bioaktif Dari Bakteri Epifit Yang Bersimbion Dengan Alga Cokelat Sargassum sp. Sebagai Agen Antibakteri Dan Antikanker*. Disertasi tidak diterbitkan, Sekolah Pasca Sarjana, Universitas Hasanuddin: Makassar.

Baggesen, C., Gjermansen, C., dan Brandt, A.B. 2014. *A Study of Microalgal Symbiotic Communities With The Aim To Increase Biomass And Biodiesel Production*. Technical University of Denmark, ISBN: 978-87-93054-65-3.

Baharuddin, M. 2016*. Kajian Selulase dari Bakteri Simbion Larva Kupu-kupu (Cossidae): Pemurnian, Karakterisasi dan Aplikasi dalam Hidrolisis Lignoselulosa Jerami.* Disertasi tidak diterbitkan, Sekolah Pasca Sarjana, Universitas Hasanuddin: Makassar.

Bhattacharjee, M.J., Laskar, B.A., Dhar, B., dan Ghosh, S.K., 2015. Identification and re-evaluation of freshwater catfishes through DNA barcoding. *Plos One*. **7** (11): 1-7.

Bailey, W.R., dan Scott, E.G., 1974. *Diagnostic Microbiology; A Textbook for The Isolation and Identification of Pathogenic Microorganisms 4th edition*. Saint Louis: Mosby.

Bollag, D.M., dan Edelstein, S.J. 1991. *Protein Methods*. Switzerland. Wiley-Liss Inc.

Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R.L., Torre, L.A., dan Jemal, A. 2018. Global cancer statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide For 36 Cancers In 185 Countries. *CA Cancer J Clin*. **68**: 394-424.

Carballo, J.L., Hernandes-Inda, Z.L., Perez, P., dan Garcia-Gravalos, M.D. 2002. A Comparison Between Two Brine Shrimp Assays to Detect In-Vitro Cytotoxicity in Marine Natural Products. *BioMed*. **2** (17): 1472-6750.

Chakraborty, K., Thilakan, B., Raola, V.K., dan Joy, M. 2017. Antibacterial Polyketides From Bacillus Amyloliquefaciens Associated With Adible Red Seaweed Laurenciae Papillosa. *Food Chemistry*. **218**: 427-434.

Chen, X., Sun, Y., Liu, H., Liu, S., Qin, Y., dan Li, P. 2019. Advances In Cultivation, Wastewater Treatment Application, Bioactive Components of Caulerpa Lentillifera and Their Biotechnological Applications. *PeerJ*. **7**: 6118.

Cheung, R.C.F., Ng, T.B., dan Wong, J.H. 2015. Marine peptides: Bioactivities and Applications. *Marine drugs.* **13** (7): 4006-4043.

Cruz-Casas, D.E., Aguilar, C.N., Ascacio-Valdés, J.A., Rodríguez-Herrera, R., Chávez-González, M.L., dan Flores-Gallegos, A.C. 2021. Enzymatic Hydrolysis and Microbial Fermentation: The Most Favorable Biotechnological Methods for The Release of Bioactive Peptides. *Food Chemistry: Molecular Sciences.* **3**: 1-12.

Daud, N.A., Babji, A.S., dan Yusop, S.M. 2015. Effects of Enzymatic Hydrolysis on the Antioxidative and Antihypertensive Activities from Red Tilapia Fish Protein. *Journal of Nutrition and Food Sciences*. **5:** 1–5.

Demirhan, E., Apar, D.K., dan Ozbek, B. 2011. A Kinetic Study On Sesame Cake Protein Hydrolysis By Alcalase. *Journal of Food Science*, **76** (1): 64-67.

Drancourt, M., Bollet, C., Carlioz, A., Martelin, R., Gayral, J.P., dan Raoult, D. 2000. 16s Ribosomal Dna Sequence Analysis Of A Large Collection Of Environmental And Clinical Unidentifiable Bacterial Isolates. *Journal of Clinical Microbiology*. **38** (10): 3623-3630.

Eccles, S.A., Aboagye, E.O., Ali, S., Anderson, A.S., Armes, J., Berditchevski, F., dan Blaydes, J.P. 2013. Critical Research Gaps and Translational

Priorities for the Successful Prevention and Treatment of Breast Cancer. *Breast Cancer Research.* **15** (5): R92.

Egan, S., Harder, T., Burke, C., Steinberg, P., Kjelleberg, S., dan Thomas, T. 2013. The Seaweed Holobiont: Understanding Seaweed–Bacteria Interactions. *FEMS Microbiology Reviews*. **37** (3): 462-476.

Eastwood, M. 1999. *Principles of Human Nutrition.* Aspen Publisher, Inc. Maryland.

Estrada, J.L., dan Dionisio-Sese, M.L. 2020. Sea Grapes (Caulerpa spp.) (Chlorophyta: *Caulerpaceae*) from Coron, Northern Palawan, Philippines with Notes on Their Harvest and Production. *Tropical Natural History.* **20** (3): 255–264.

Franks, L.M., dan Teich, N.M. 1998. *Cellular and Molecular Biology of Cancer, Third Edition*. Oxford University Press Inc. New York.

Fretes, H.D., Susanto, A.B., Prasetyo, B., dan Limantara, L. 2012. Karotenoid dari Makroalgae dan Mikroalgae:Potensi Kesehatan Aplikasi Dan Bioteknologi. *Jurnal Teknologi dan Industri Pangan*. **23** (2): 221-228.

Fuentes, J.L., Garbayo, I., Cuaresma, M., Montero, Z., Gonzalezdel-Valle, M., dan Vichez, C. 2016. Impact of Microalgae-Bacteria Interactions On The Production of Algal Biomass and Associated Compounds. *Mar Drugs.* **14** (5): 100.

Galasso, C., Celentano, S., Costantini, M., D'Aniello, S., Ianora, A., Sansone, C., dan Romano, G. 2020. Diatom-Derived Polyunsaturated Aldehydes Activate Similar Cell Death Genes in Two Different Systems: Sea Urchin Embryos and Human Cells. *International Journal of Molecular Sciences*. **21** (5201): 1-17.

Galasso, C., Gentile, A., Orefice, I., Ianora, I., Bruno, A., Noonan, D.M., Sansone, C., Albini, A., dan Brunet, C. 2019. Microalgal Derivatives as Potential Nutraceutical and Food Supplements for Human Health: A Focus on Cancer Prevention and Interception. *Nutrients.* **11:** 1226.

Guiry, M.D., Guiry, G.M., Morrison, L., Rindi, F., Miranda, S.V., Mathienson, A.C., Parker, B.C., Langangen, A., John, D.M., Barbara, I., Carter, C.F., Kuipers, P., dan Garbary, D.J. 2014. AlgaeBase: An On-line Resource for Algae. *Cryptogam, Algologie*. **35** (2): 105-115.

Gutierrez, P.M. 2016. Antimitotic Activity of Carica Papaya Leaf Extract In The In Vitro Development of The Sea Urchin, Tripneustes Gratilla Embryo. Int. Res. *J. Biol. Sci*. **5:** 12–17.

Hanahan, D. dan Weinberg, R.A. 2000. *The Hallmarks of Cancer*, Cell Press.

Harley, J.P. 2005. *Laboratory Exercises in Microbiology, 6th ed.* McGraw-Hill Companies, Inc., New York, USA.

Haslaniza, H., Maskat, M.Y., Wan, A.W.M., dan Mamot, S. 2010. The Effects of Enzyme Concentration, Temperature and Incubation Time On Nitrogen Content and Degree of Hydrolysis of Protein Precitate From Cockle (Anadara Granosa) Meat Wash Water. *International Food Research Journal*. **17**: 147-152.

Haq, S.H., Al-Ruwaished, G., Al-Mutlaq, M.A., Naji, S.A., Al-Mogren, M., Al-Rashed, S., Ain, Q., Al-Amro, A.A., dan Al-Mussallam, A. 2019. Antioxidant, Anticancer Activity and Phytochemical Analysis of Green Algae, *Chaetomorpha* Collected From The Arabian Gulf. *Scientific Reports Nature Research*. 1-7.

Hemraj, V., Diksha, S., dan Avneet, G. 2013. A Review On Commonly Used Biochemical Test For Bacteria. *Innovare Journal of Life Sciences.* **1** (1): 1-7.

Hoppe, B.S., Laser, B., Kowalski, A.V., Fontenla, S.C., Pena-Greenberg, E., dan Yorke, E.D. 2008. Acute Skin Toxicity Following Stereotactic Body Radiation Therapy For Stage I Non-Small-Cell Lung Cancer: Who's At Risk?. *Int J Radiat Oncol Biol Phys*. **72** (5): 1283–6.

Ibrahim dan El Nur. 2015. Cytotoxicity study on *Maerua pseudopetalosa* (Glig and Bened.) De Wolf tuber fractions. *African Journal Plant Science*. **9** (12): 490-497.

Ismail, A., Ktari, L., Ahmed, M., Bolhuis, H., Boudabbous, A., dan Stal, L.J. 2016. Antimicrobial Activities of Bacteria Associated with The Brown Alga Padina Povinca. *Front. Microbiol*. **7**: 1-13.

Jawetz, E. 1989. *Medical Microbiology (Jawetz, Melnick, & Adelberg's Medical Microbiology) 18th edition*. Appleton & Lange. San Mateo.

Jaziri, A. A., Sukoso, Firdaus, M. 2017. Karakteristik Protease dari Ekstrak Kasar Khamir Laut dan Aktivitasnya dalam Menghidrolisis Protein Ikan Rucah. *Journal of Fisheries and Marine Science*. **1** (2): 78-87.

Johannes, E., Syafaraenan, Agus, R. dan Umar, R. 2013. Aktivitas Antimitotik ß-Sitosterol Isolat Dari Hydroid *Aglaophenia cupressina* Lamoureoux Terhadap Pembelahan Awal Sel Zigot Bulubabi *Tripneustus gratilla* Linn. *MANASIR*. **1** (1).

Karami, Z., dan Akbari-Adergani, B. 2019. Bioactive Food Derived Peptides: A Review On Correlation Between Structure of Bioactive Peptides and Their Functional Properties. *J Food Sci Technol*. **56** (2): 535-547.

Kristinsson, H.G., dan Rasco, B.A. 2000. Biochemical and Functional Properties of Atlantic Salmon (Salmo Salar) Muscle Proteins Hydrolyzed With Various Alkaline Proteases. *Journal of Agricultural and Food Chemistry*. **48** (3): 657-666.

Lako, J. 2012. *Value Adding and Supply Chain Development for Fisheries and Aquaculture Products In Fiji, Samoa and Tonga: Sea Grapes Postharvest*

and Value Addition In Fiji. Progress Report: Institute of Marine Resources, FSTE, USP.

Leite, J.C., Junior, C.G., Silva, F.P., Sousa, S.C., Vasconcellos, M.L., dan Marques-Santos, L.F. 2012. Antimitotic Activity On Sea Urchin Embryonic Cells of Seven Antiparasitic Morita-Baylis-Hillman Adducts: A Potential New Class Of Anticancer Drugs. *Med. Chem*. **8:** 1003–1011.

Lodish, H., Berk, A., Matsudaira, P., Kaiser, C.A., Krieger, M., Scott M.P., dan Zipursky, L. 2004. *Molecular cell biology. 5th ed.* W H Freeman & Co. New York.

Lokapirnasari, W.P., Sahidu, A.M., Nurhajati, T., Supranianondo, K., dan Yulianto, A.B. 2017. Sekuensing 16S DNA Bakteri Selulolitik Asal Limbah Cairan Rumen Sapi Peranakan Ongole. *Jurnal Veteriner*. **18** (1): 76-82.

Long, R.A., dan Azam, F. 2001. Antagonistic Interaction Among Marine Pelagic Bacteria. *Applied and Environmental Microbiology*. **67** (11): 4975-4983.

López-Gómez, J. P., dan Pérez-Rivero, C., 2019. *Comprehensive Biotechnology* (Third Edition). Elsevier B.V. Canada.

Lu, Y., dan Yu, J. 2020. A Well-Established Method for the Rapid Assessment of Toxicity Using Artemia spp. Model. *Medical Research Archives.* **6** (2): 1-15.

Luo, Y., Pan, K., dan Zhong, Q. 2014. Physical, Chemical and Biochemical Properties of Casein Hydrolyzed by Three Proteases: Partial Characterizations. *Food Chemistry*. **155**: 146–155.

MacFaddin, J.F. 2000. *Biochemical tests for identification of medical bacteria, 3rd ed*. Lippincott Williams & Wilkins: Philadelphia.

Madan, R., Benson, R., Sharma, D.N., Julka, P.K., dan Rath, G.K. 2015. Radiation Induced Heart Disease: Pathogenesis, Management and Review Literature. *Journal of the Egyptian National Cancer Institute*. **27**: 187-193.

Martinez-Araiza, G., Castano-Tostado, E., Amaya-Llano, S.L., dan Regalado, C. 2012. Modeling of Enzymatic Hydrolysis of Whey Proteins. *Food Bioprocess Technology*. **5** (6): 2596-2601.

Martins, R.M., Nedel, F., Guimarães, V.B.S., da Silva, A.F., Colepicolo, P., de Pereira, C.M.P., dan Lund, R.G. 2018. Macroalgae Extracts From Antarctica Have Antimicrobial and Anticancer Potential. *Front Microbiol*. **9**: 412-422.

Meyer, B.N., Ferrigini, R.N., Jacobsen, L.B., Nicholas, D.E., dan Mc Laughlin, J.L. 1982. Brine Shrimp: A Convenient General Bioassay For Active Plant Constituents. *Planta Med.* **45**: 31-35.

Naid, T., Kasim, S., Marzuki, A., dan Sumarheni. 2013. Produksi Antibiotika secara Fermentasi dari Biakan Mikroorganisme Simbion Rumput Laut Eucheuma cottoni. *Majalah Farmasi dan Farmakologi.* **17** (3): 61-68.

Najafian, L., dan Babji, A.S. 2014. Production of Bioactive Peptides using Enzymatic Hydrolysis and Identification Antioxidative Peptides from patin (Pangasius sutchi) Sarcoplasmic Protein Hydolysate. *Journal Functional Foods*. **9:** 280-289.

Nelson, D.L., dan Cox, M.M. 2005. *Principles of Biochemistry, 4th Ed*., W. H. Freeman. New York.

Ningsih, Z.A.S. 2012. Cytolytic Peptide Offer A New Hope In Cancer Treatment. *Chemistry Progress*. **5** (1): 7-10.

Nontji, A. 2002. *Laut Nusantara.* Djambatan. Jakarta.

Okumu, M.O., Mbaria, J.M., Gikunju, J.K., Mbuthia, P.G., Madadi, V.O., Ochola, F.O., dan Jepkorir, M.S. 2021. Artemia Salina As An Animal Model for The Preliminary Evaluation of Snake Venom-Induced Toxicity. T*oxicon: X.*

Pagano, G., Guida, M., Trifuoggi, M., Thomas, P., Palumbo, A., Romano, G., dan Oral, R. 2017. Sea Urchin Bioassays in Toxicity Testing: I. Inorganics, Organics, Complex Mixtures and Natural Products. *Expert Opin Environ Biol*. **6** (1).

Pakidi, C.S., dan Hidayat, S.S. 2016. Potensi dan Pemanfaatan Bahan Aktif Alga Coklat Sargassum sp. *Jurnal Ilmu Perikanan Octopus*. **5** (2).

Poedjiadi, A. 1994. *Dasar-Dasar Biokimia.* UI-Press. Jakarta.

Prasetyaningsih, A., dan Rahardjo, D. 2018. Potensi Pemanfaatan Ulva Lactuca dan Sargassum Sp. di Tiga Pantai Kabupaten Gunungkidul. *Seminar Nasional Biologi dan Pendidikan Biologi UKSW*. 130-137.

Prastika, H.H., Ratnayanti, K., Puspawati, N.M., dan Mayun, A.A.I.A. 2019. Penggunaan Enzim Pepsin Untuk Produksi Hidrolisat Protein Kacang Gude (*Cajanus cajan* (L.) *Millsp*.) yang Aktif Antioksidan. *Indonesian E-Journal of Applied Chemistry*. **7** (2): 180-188.

Pringgenies, D. 2010. Karakteristik Senyawa Bioaktif Bakteri Simbion Moluska dengan GC-MS. *Jurnal Ilmu dan Teknologi Kelautan Tropis*. **2** (2): 34-40.

Ramadan, R., 2021*. Isolasi Protein Dan Peptida Bioaktif Dari Bakteri Simbion Alga Merah (Eucheuma spinosum) Dan Potensinya Sebagai Agen Antikanker*. Tesis tidak diterbitkan, Sekolah Pasca Sarjana, Universitas Hasanuddin, Makassar.

Ramanan, R., Kim, B.H., Cho, D.H., Oh, H.M., dan Kim, H.S. 2015 Algae–Bacteria Interactions: Evolution, Ecology and Emerging Applications. *Biotechnol Adv*. **34** (1): 14-29.

Rahmayanti, S., Massinai, A., dan Mashoreng, S. 2019. Kepadatan Bakteri Simbion Rumput Laut (Eucheuma spinosum) yang Berasal dari Perairan Puntondo, Kabupaten Takalar, Sulawesi Selatan. *Prosiding Simposium Nasional Kelautan dan Perikanan VI, Universitas Hasanuddin*, Makassar, 21 Juni 2019, ISBN 978-602- 71759-6-9.

Reha, W., Noor, A., Ahmad, A., Nafie, N.L., dan Salama, D. 2013. Karakterisasi Protein Aktif dari Spons dan Mikroba Simbionnya Sebagai Usaha Awal Menuju Agen Imunostimulan. *Marina Chimica Acta*. **14** (1):1411-2132.

Sajjadi, S.E., Ghanadian, M., Haghighi, M., dan Mouhebat, L. 2015. Cytotoxic Effect of *Cousinia verbascifolia* Bunge against OVCAR-3 and HT-29 Cancer Cells. *J HerbMed Pharmacol.* **4** (1): 15-19.

Samaranayaka, A.G.P., dan Li-Chan, E.C.Y. 2011. Food-Derrived Peptidic Antioxidant: A Riview of Their Production, Assesment, and Potential Application. *Journal Functional Foods*. 3: 229-254.

Sánchez, A. dan Vázquez, A. 2017. Bioactive Peptides: A Review. *Food Quality and Safety*. **1**: 29-46.

Sarmadi, B.H., dan Ismail, A. 2010. Antioxidative Peptides From Food Proteins: A Review. *Peptides.* **31**: 1949-1956.

Sedighi, M., Jalili, H., Siadat, S.O.R., dan Amrane, A. 2016. Potential Health Effects of Enzymatic Protein Hydrolysates From Chlorella Vulgaris. *Appl Food Biotechnol*. **3** (3): 160-169.

Shokry, A., Khalil, M., Ibrahim, H., Soliman, M., dan Ebrahim, S. 2021. Acute Toxicity Assessment of Polyaniline/Ag Nanoparticles/Graphene Oxide Guantum Dots on Cypridopsis Vidua and Artemia Salina. *Scientific Reports Nature Research.* **11** (1): 1-9.

Silvestre, M.P.C., Morais, H.A., dan Silva, V.D.M. 2013. Degree of Hydrolysis and Peptide Profile of Whey Proteins Using Pancreatin. *J. Brazillian Soc. Food Nutr*. **38** (3): 278-290.

Sinha, R., Radha, C., Prakash, J., dan Kaul, P. 2007. Whey Protein Hydrolysate: Functional Properties, Nutritional Quality and Utilization In Beverage Formulation. *Food Chemistry.* **101**: 1484-1491.

Sjafaraenan, S., dan Johannes, E. 2017. Aktivitas Uji Antimitotik Senyawa Asam Heksadekanoat Isolat dari Hydroid Aglaophenia cupressina Lamoureoux Pada Cleavage Bulu Babi *Tripneustes gratilla* Linn. *Jurnal Biologi Makassar*. **1** (1): 24-30.

Soegiarto, A., Sulistijo, W.S., Atmadja, H., dan Mubarak. 1978. *Rumput Laut (Alga) Manfaat, Potensi dan Usaha Budidayanya*. LON-LIPI. Jakarta.

Sousa, L.M.A., Neto, R.L.M., Schmidt, D.F.N., dan Oliveira, M.R. 2009. Anti-mitotic Activity Towards Sea Urchin Eggs of Dichloromethane Fraction Obtained from *Allamanda schottii* Pohl (Apocynaceae). *Brasil: Revista Brasileira de Farmacognosia Brazilian Journal of Parmacognosy*. **19** (2).

Soussain, C., Ricard, D., Fike, J.R., Mazeron, J.J., Psimaras, D., dan Delattre, J.Y. 2009. CNS Complications of Radiotherapy and Chemotherapy. *Lancet*. **374** (9701): 9–51.

Stabili, L., Acquaviva, M.I., Angilè, F., Cavallo, R.A., Cecere, E., Coco, L.D., Fanizzi, F.P., Gerardi, C., Narracci, M., dan Petrocelli, A. 2019. Screening of Chaetomorpha Linum Lipidic Extract As A New Potential Source of Bioactive Compounds. *Mar. Drugs.* **17** (6): 313.

Sugrani, A., 2020*. Isolasi Dan Karakterisasi Peptida Antibakteri Dan Antikanker Dari Hidrolisat Protein Alga Merah Eucheuma Spinosum Dan Bakteri Endofit Simbionnya.* Disertasi tidak diterbitkan, Sekolah Pasca Sarjana, Universitas Hasanuddin, Makassar.

Sujuliyani, Thaib, E.A., Indriati, N., dan Liananda, M., 2019. Antibacterial activity of the symbiotic bacteria of green algae Caulerpa racemosa from Pulau Lima Indonesia. *IOP Conference Series: Earth and Environmental Science.* **278**: 1–6.

Sung, H., Ferlay, J., Siegel, R.L., Laversanne, M., Soerjomataram, I., Jemal, A., dan Bray, F. 2021. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*. **71** (3): 209-249.

Tanna, B., Yadav, S., dan Mishra, A. 2020. Anti‐Proliferative and ROS‐Inhibitory Activities Reveal The Anticancer Potential of *Caulerpa* Species. *Molecular Biology Reports*. 1-9.

Teerasak, E., Thongararm, P., Roytrakul, S., Meesuk, L., dan Chumnanpuen, P. 2016. Prediction of Anticancer Peptides Against MCF-7 Breast Cancer Cells from The Peptidomes of Achatina Fulica Mucus Fractions. *Computational and Structural Biotechnology Journal.* **14**: 49-57.

Trianto, A., Ambariyanto, dan Murwani, R. 2004. Skrining Bahan Anti Kanker pada Berbagai Jenis Sponge dan Gorgonian Terhadap L1210 Cell Line. *Jurnal Ilmu Kelautan*. **9** (3): 120-124.

Tyagi, A., Kapoor, P., Kumar, R., Chaudhary, K., Gautam, A., dan Raghava, G. P.S. 2013. In Silico Models for Designing and Discovering Novel Anticancer Peptides. *Scientific Reports*. **3** (4): 297-304.

Ulagesan, S., Kuppusamy, A., dan Kim, H.J. 2019. Antimicrobial and Antioxidant Activites of Protein Hydrolysate from Terrestial Snail Cryptozona bistrialis. *Journal of Applied Pharmaceutical Science*. **8** (12): 012-019.

Utami, A.W.A, Wahyudi, A.T., dan Batubara, A.I. 2014. Toxicity, Anticancer and Antioxidant Activity of Extract from Marine Bacteria Associated with Sponge *Jaspis* sp. *International Journal of Pharma and Bio Sciences*. **5** (4): 917-923.

Valencia, P., Espinoza, K., Ceballos, A., Pinto, M., dan Almonacid, S. 2015. Novel Modeling Methodology For The Characterization Of Enzymatic Hydrolysis Of Proteins. *Process Biochemistry.* **50:** 580-597.

Vandanjon, L., Johannsson, R., Derouiniot, M., Bourseau, P., dan Jaouen, P. 2007. Concentration and Purification of Blue Whiting Peptide Hydrolysates by Membrane Processes. *Journal of Food Engineering*. **83** (4): 581-589.

Wang, Z., dan Zhang, X. 2015. Inhibitory Effects of Small Molecular Peptides From Spirulina (*Arthrospira*) Platensis On Cancer Cell Growth. *Food & function*. **7** (2): 781-788

Wang, Z., dan Zhang, X. 2016. Isolation and Identification of Anti-Proliferative Peptides From Spirulina Platensis Using Three-Step Hydrolysis. *Journal of The Science Of Food And Agriculture*. **97** (3): 918-922.

WHO. 2020. *Cancers* (online) (http://www.who.int/cancer/en/ diakses 20 Juli 2021).

WHO. 2022. *Cancers* (online) (https://www.who.int/news-room/fact-sheets/detail/cancer diakses 12 Maret 2022).

Widiana, R., Abizar, dan Wahyuni, S. 2011. Jenis-Jenis Alga Epilitik Pada Sumber Air Panas dan Alirannya Di Kawasan Cagar Alam Rimbo Panti Kabupaten Pasaman. *Jurnal Sainstek.* **3** (2): 56-164.

Widyaningsih, S., dan Sa'adah, N. 2018. Bakteri Simbion Karang Lunak *Sinularia* sp. sebagai Antibakteri. *Jurnal Kelautan Tropis*. **1** (21): 61-64.

Wisuthiphaet, N., Kongruang, S., dan Chamcheun, C. 2015. Production of Fish Protein Hydrolysates By Acid and Enzymatic Hydrolysis. *Journal of Medical and Bioengineering.* **4** (6): 466-470.

Xu, Q., Hong, H., Wu, J., dan Yan, X. 2019. Bioavailability of Bioactive Peptides Derived from Food Proteins Across The Intestinal Epithelial Membrane: A Review. *Trends in Food Science and Technology.* **86** : 399-411.

Yao, S., Lyu, S., An, Y., Lu, J., Gjermansen, C., dan Schramm, A. 2019. Microalgae-Bacteria Symbiosis In Microalgal Growth and Biofuel Production: A Review. *J Appl Microbiol*. **126** (2): 359-368.

Yap, W.F., Tay, V., Tan, S.H., Yow, Y.Y., dan Chew, J. 2019. Decoding Antioxidant and Antibacterial Potentials of Malaysian Green Seaweeds: *Caulerpa racemosa* and *Caulerpa lentillifera*. *Antibiotics.* **8** (3): 152.

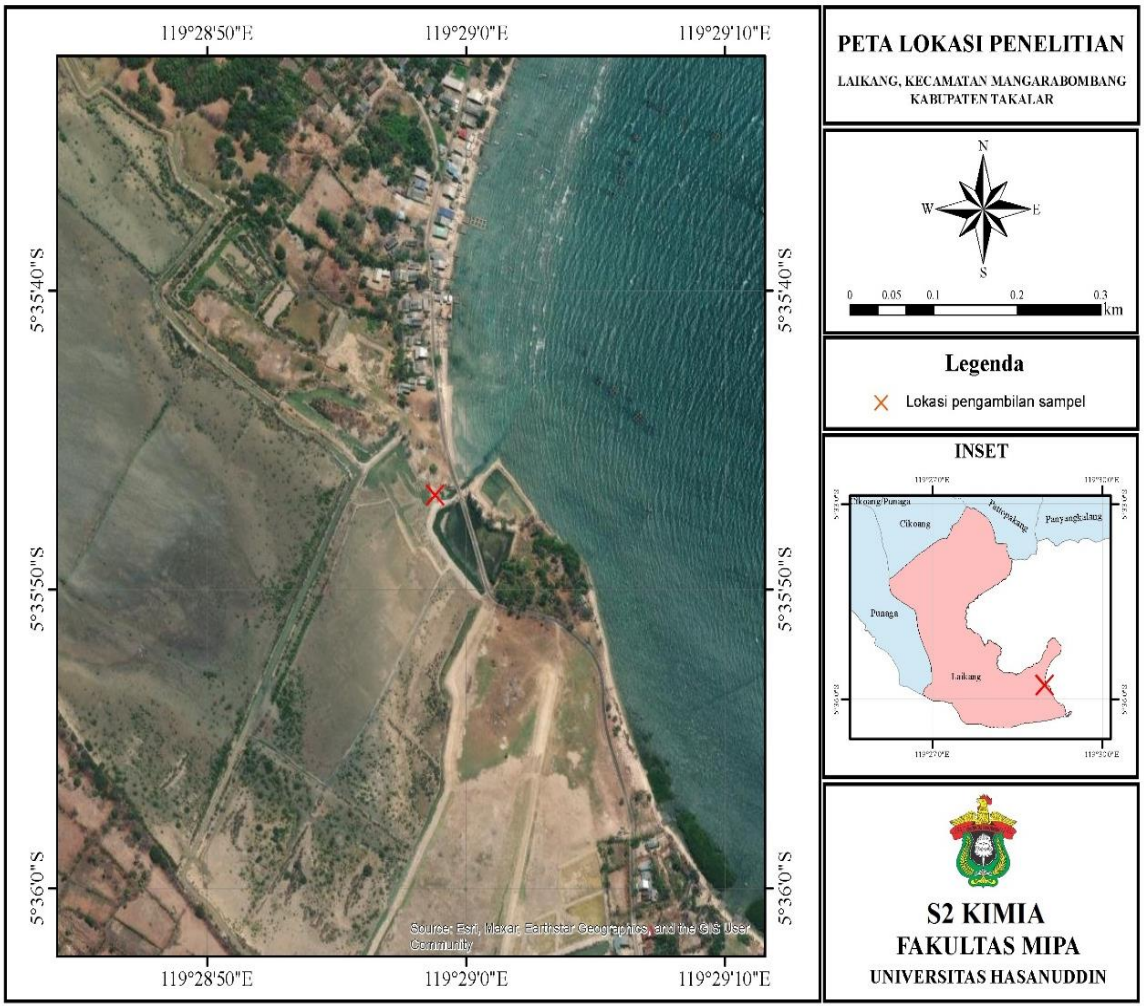
Yusuf, A. 2009. *Analisis Risiko Agens Hayati untuk Pengendalian Patogen pada Tanaman.* Universitas Indonesia. Jakarta.

Zhang, B., dan Zhang, X. 2013. Separation and Nanoencapsulation Of Antitumor Polypeptide from Spirulina Platensis. *Biotechnology Progress*. **29** (5): 1230-1238.

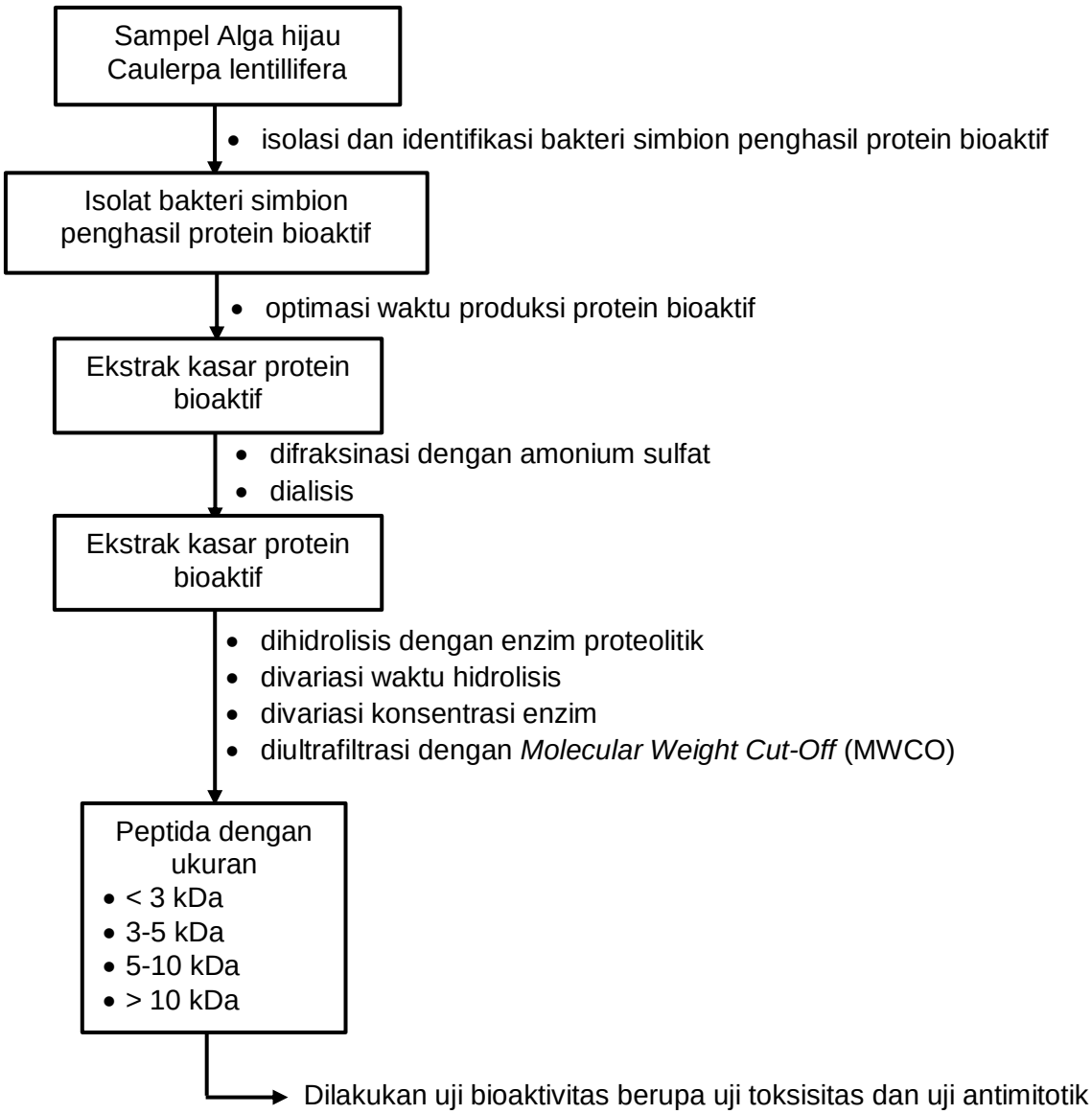
Zhang, M., Ma, Y., Che, X., Huang, Z., Chen, P., Xia, G., dan Zhao, M. 2020. Comparative Analysis of Nutrient Composition of Caulerpa lentillifera from Different Regions. *J. Ocean Univ. China (Oceanic and Coastal Sea Research)*. **19** (2) : 1-7

Zimbro, M.J., Power, D.A., Miller, S.M., Wilson, G.E., dan Johnson, J.A. 2009. *Difco^{TM} & BBL^{TM} Manual Manual of Microbiological Culture Media Second Edition*. Becton, Dickinson and Company, Maryland.

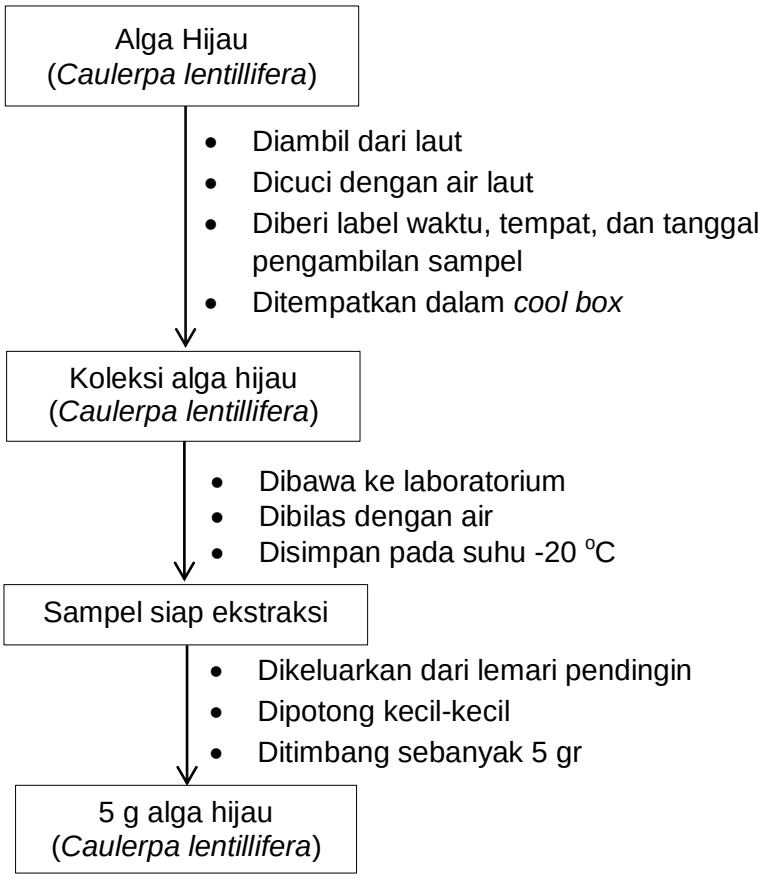
Lampiran 1. Lokasi pengambilan sampel alga hijau *C. lentillifera*



Lampiran 2. Diagram Alur Penelitian



Lampiran 3. Skema kerja pengambilan sampel



Lampiran 4. Hasil uji identifikasi spesies alga C. lentillifera

LABORATORIUM PRODUKTIVITAS & KUALITAS PERAIRAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN
Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp./ Fax. +62-0411-586025, email : fikp@unhas.ac.id, website :http://fikp.unhas.ac.id

Nomor	: 11.UM/Lab.Air/VI/2022
Pemilik Sampel	: Siti Khairunnur, S.Si
Tanggal Terima Sampel	: 21 Juni 2022
Jumlah Sampel	: 1
Jenis Sampel	: Alga
Asal Sampel	: Kab. Takalar
Kegiatan	: Penelitian S3

DATA HASIL IDENTIFIKASI

Kalsifikasi	Sampel Uji
Kingdom	Plantae
Divisio	Chlorophyta
Classis	Ulvophyceae
Ordo	Bryopsidales
Familia	Caulerpaceae
Genus	Caulerpa
Species	Caulerpa lentillifera

Sumber pustaka :

Gavino C. Trono. 1988. Philippine Seaweeds. Penerbit National book store. ISBN 9710839365. Hal 330p.

World Register Of Marine Species

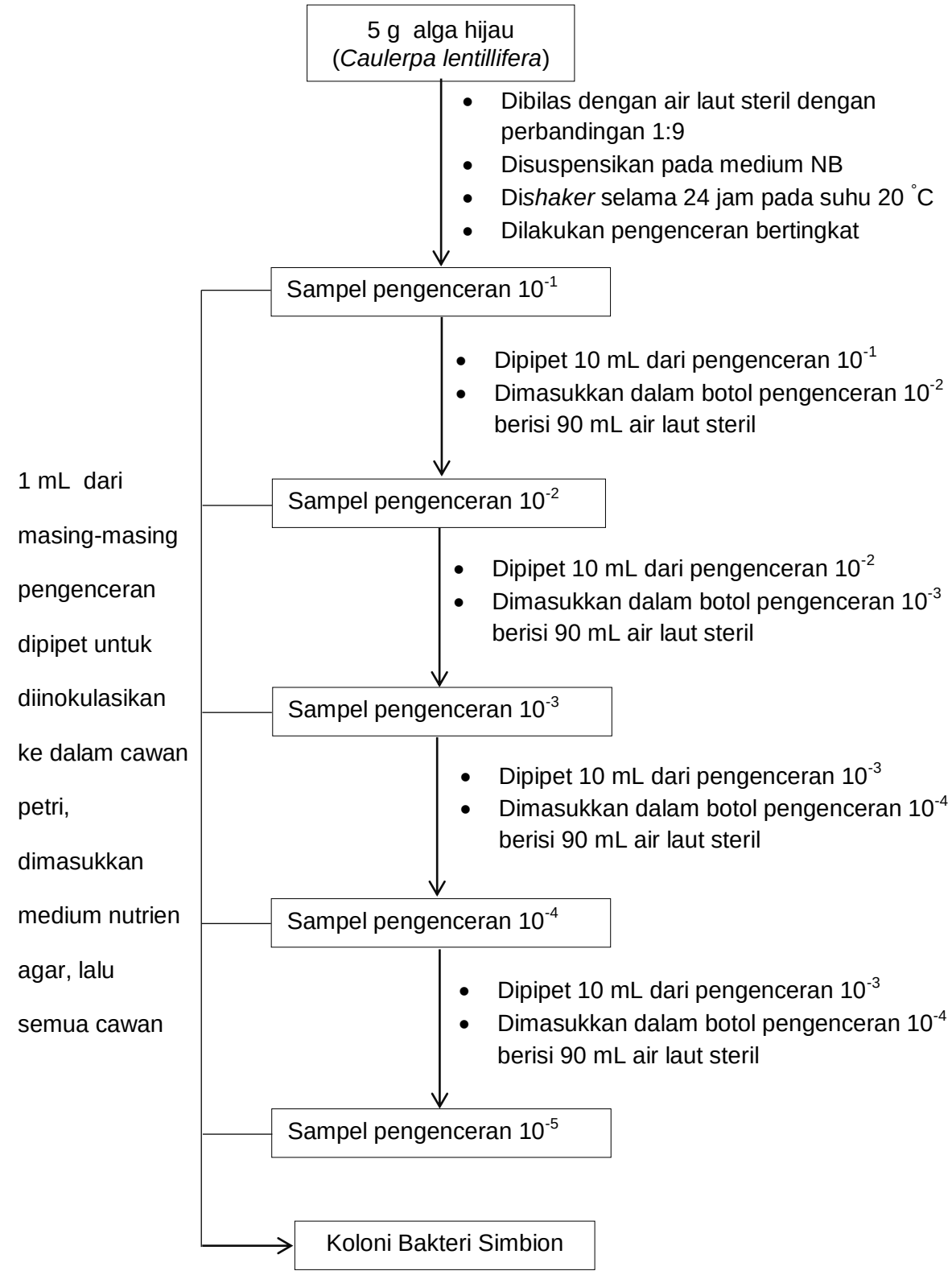
Pranata Lab. Pendidikan (PLP)

Fitriyani, S.Si., M.K.M
NIP 19771012 200112 2 001

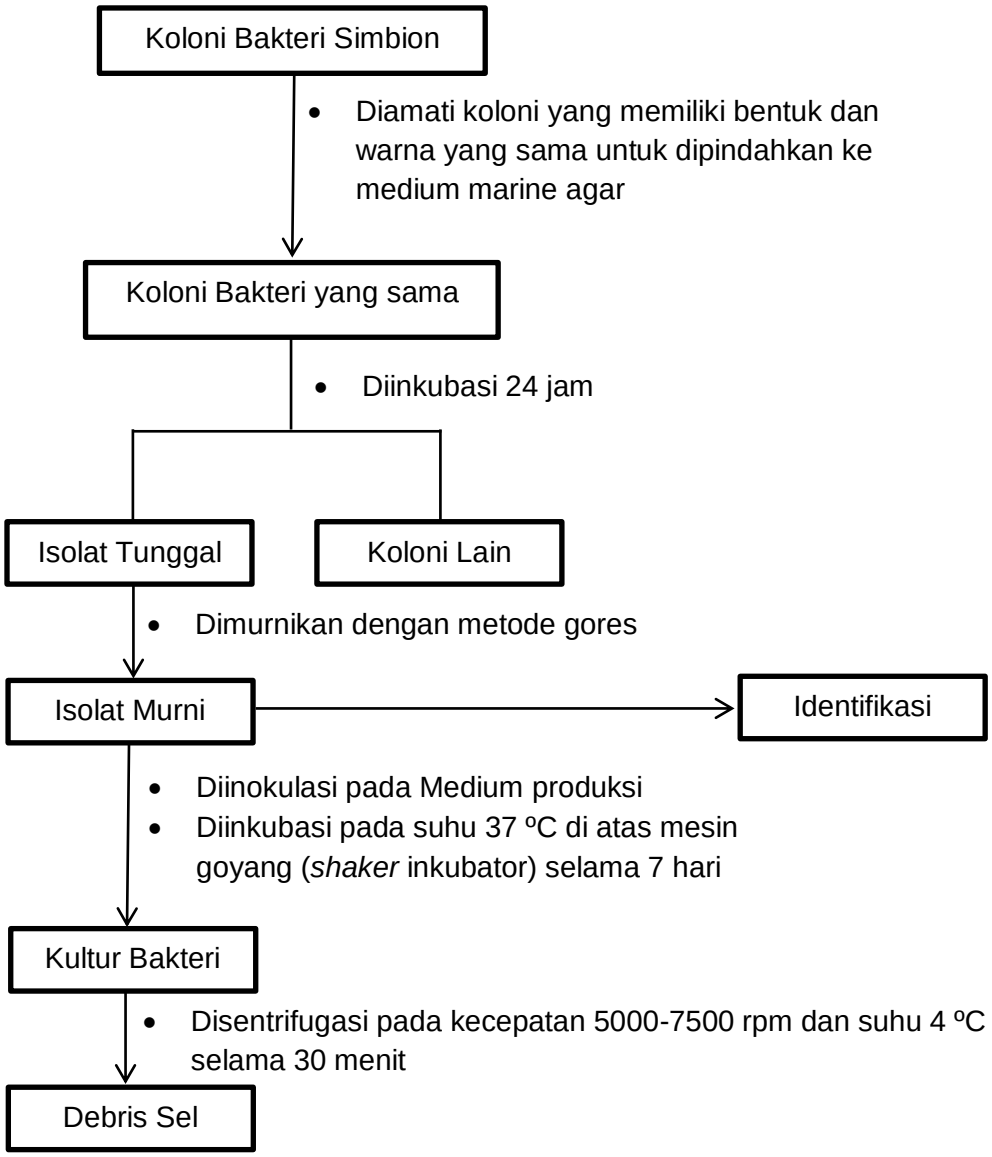
Makassar, 23 Juni 2022
Kepala Lab,

Dr. Ir. Badraeni, MP
NIP 19651023 199103 2 001

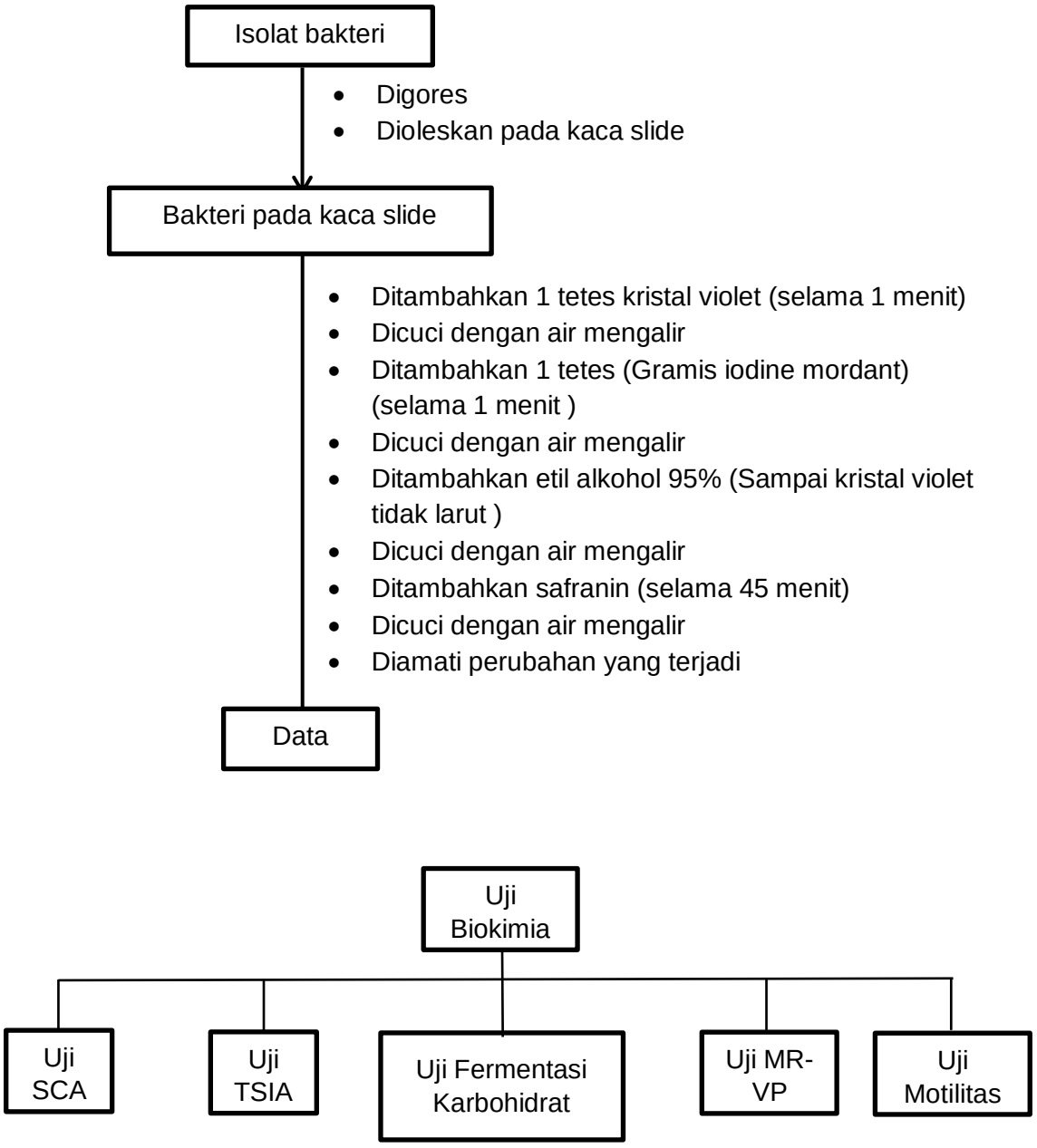
Lampiran 5. Skema kerja isolasi bakteri simbion alga hijau (*Caulerpa lentillifera*)



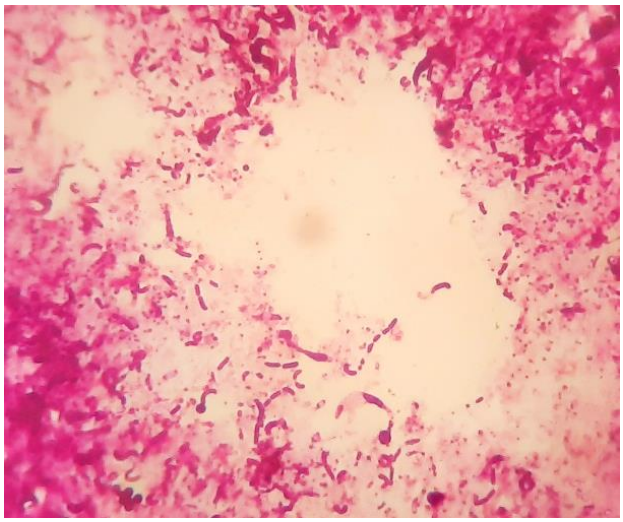
Lampiran 6. Skema kerja purifikasi bakteri



Lampiran 7. Identifikasi bakteri



Lampiran 8. Hasil Pewarnaan Gram dan Uji Biokimia Sederhana dari Isolat CL_2-2



Isolat bakteri CL_2-2 secara morfologi di bawah mikroskop dengan pembesaran 100x

Uji TSIA, SIM, MR-VP, sitrat, Urea, dan uji karbohidrat

Lampiran 9. Hasil Analisis Sekuens Nukleotida 16s rRNA

```
Query  10    AGCTTGCTAGAAGGCGTCGAGCGGCGGACGGGTGAGTAATGCATGGGAATCTGCCCGATA  69
Sbjct  57    AGCTTGCTAGAAGGCGTCGAGCGGCGGACGGGTGAGTAATGCATGGGAATCTGCCCGATA  116
Query  70    GTGGGGGACAACCTGGGGAAACTCAGGCTAATACCGCATACGTCCTACGGGAGAAAGCAG  129
Sbjct  117   GTGGGGGACAACCTGGGGAAACTCAGGCTAATACCGCATACGTCCTACGGGAGAAAGCAG  176
Query  130   GGGATCTTCGGACCTTGCGCTATCGGATGAGCCCATGTCGGATTAGCTTGTTGGTGAGGT  189
Sbjct  177   GGGATCTTCGGACCTTGCGCTATCGGATGAGCCCATGTCGGATTAGCTTGTTGGTGAGGT  236
Query  190   AACGGCTCACCAAGGCGACGATCCGTAGCTGGTCTGAGAGGATGATCAGCCACACTGGGA  249
Sbjct  237   AACGGCTCACCAAGGCGACGATCCGTAGCTGGTCTGAGAGGATGATCAGCCACACTGGGA  296
Query  250   CTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATGGGCGA  309
Sbjct  297   CTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATGGGCGA  356
Query  310   AAGCCTGATCCAGCCATGCCGCGTGTGTGAAGAAGGCCTTCGGGTTGTAAAGCACTTTCA  369
Sbjct  357   AAGCCTGATCCAGCCATGCCGCGTGTGTGAAGAAGGCCTTCGGGTTGTAAAGCACTTTCA  416
Query  370   GCGAGGAAGAACGCCTCGGGATTAATACTCCCGAGGAAAGACATCACTCGCAGAAGAAGC  429
Sbjct  417   GCGAGGAAGAACGCCTCGGGATTAATACTCCCGAGGAAAGACATCACTCGCAGAAGAAGC  476
Query  430   ACCGGCTAACTCCGTGCCAGCAGCCGCGGTAATACGGAGGGTGCAAGCGTTAATCGGAAT  489
Sbjct  477   ACCGGCTAACTCCGTGCCAGCAGCCGCGGTAATACGGAGGGTGCAAGCGTTAATCGGAAT  536
Query  490   TACTGGGCGTAAAGCGCGCGTAGGTGGCTAAGTCAGCCAGGTGTGAAAGCCCCGGGCTCA  549
Sbjct  537   TACTGGGCGTAAAGCGCGCGTAGGTGGCTAAGTCAGCCAGGTGTGAAAGCCCCGGGCTCA  596
Query  550   ACCTGGGAACGGCATCTGGAACTGCTTGGCTAGAGTGCAGGAGAGGAAGGTAGAATTCCC  609
Sbjct  597   ACCTGGGAACGGCATCTGGAACTGCTTGGCTAGAGTGCAGGAGAGGAAGGTAGAATTCCC  656
Query  610   GGTGTAGCGGTGAAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAAGGCGGCCTTCTG  669
Sbjct  657   GGTGTAGCGGTGAAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAAGGCGGCCTTCTG  716
Query  670   GACTGACACTGACACTGAGGTGCGAAAGCGTGGGTAGCAAACAGGATTAGATACCCTGGT  729
Sbjct  717   GACTGACACTGACACTGAGGTGCGAAAGCGTGGGTAGCAAACAGGATTAGATACCCTGGT  776
Query  730   AGTCCACGCCGTAAACGATGTCAACTAGCCGTTGGGTCCCTTGAGGACTTAGTGGCGCAG  789
Sbjct  777   AGTCCACGCCGTAAACGATGTCAACTAGCCGTTGGGTCCCTTGAGGACTTAGTGGCGCAG  836
Query  790   CTAACGCAATAAGTTGACCGCCTGGGGAGTACGGCCGCAAGGTTAGAACTCACATGAATT  849
Sbjct  837   CTAACGCAATAAGTTGACCGCCTGGGGAGTACGGCCGCAAGGTTAAAACTCAAATGAATT  896
Query  850   GACGGGGGCCCGCACAAGCGGTGGAGCATGTGGTTTAATTCGATGCAACGCGAAGAACCT  909
Sbjct  897   GACGGGGGCCCGCACAAGCGGTGGAGCATGTGGTTTAATTCGATGCAACGCGAAGAACCT  956
Query  910   TACCTACCCTTGACATCCAGAGGACTTTCCAGAGATGGATTGGTGCCTTCGGGAACTCTG  969
Sbjct  957   TACCTACCCTTGACATCCAGAGGACTTTCCAGAGATGGATTGGTGCCTTCGGGAACTCTG  1016
Query  970   AGACAGGTGCTGCATGGCTGTCGTCAGCTCGTTTTGTGAAATGTTGGGTTAAGTCCCGTA  1029
Sbjct  1017  AGACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTTGTGAAATGTTGGGTTAAGTCCCGTA  1076
Query  1030  ACNAGCGCAACCCCTATCCTTATTTGCCAGCCAGTAATGTCGGGAACTNTAAGGAAACTG  1089
Sbjct  1077  ACGAGCGCAACCCCTATCCTTATTTGCCAGCGAGTAATGTCGGGAACTCTAAGGAGACTG  1136
Query  1090  CCGGTGACAAACCGAAGAAAGGTGGGGACAACGTCA-GTCATNAGGNCCCTTACGG  1144
Sbjct  1137  CCGGTGACAAACCGGAGGAAGGTGGGGACGACGTCAAGTCATCATGGCCCTTACGG  1192
```

Lampiran 10. Klasifikasi Bakteri *Cobetia marina* strain CL_2-2

Kingdom : Bacteria

Phylum : Protobacteria

Class : Gammaprotobacteria

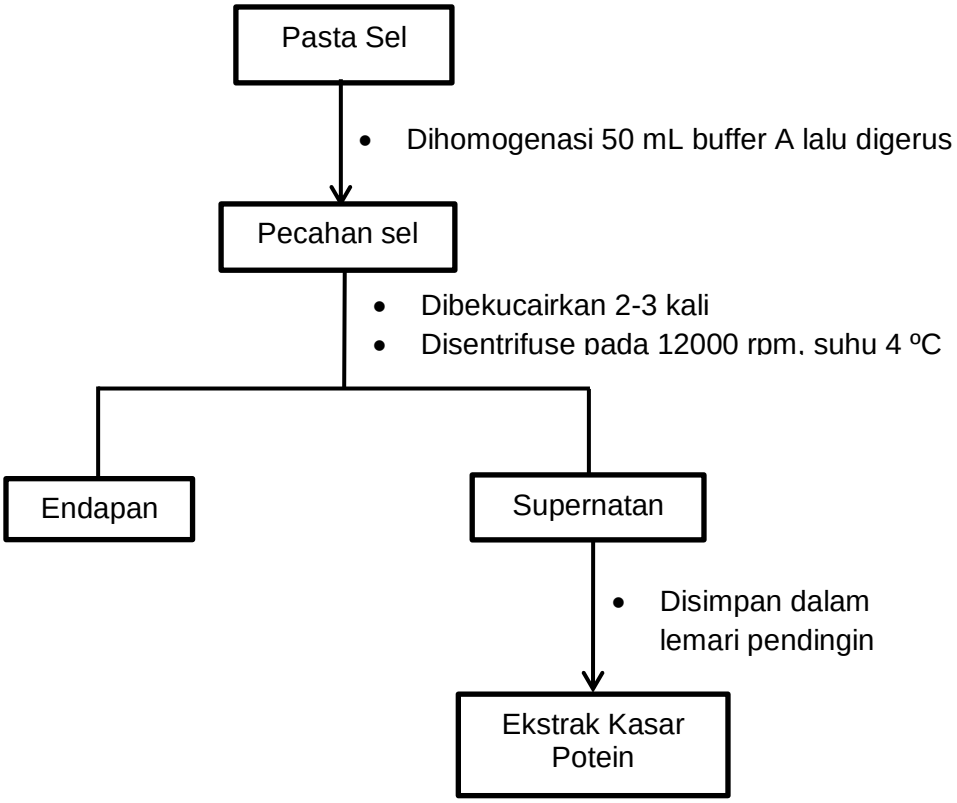
Order : Oceanospirillales

Family : Halomonadaceae

Genus : Cobetia

Species : *Cobetia marina*

Lampiran 11. Skema kerja isolasi protein



Lampiran 12. Skema kerja penentuan kadar protein

Pereaksi:

1. Pereaksi Lowry A

Lowry A dibuat dari campuran antara follin ciocalteus dan akuades dengan perbandingan 1 : 1.

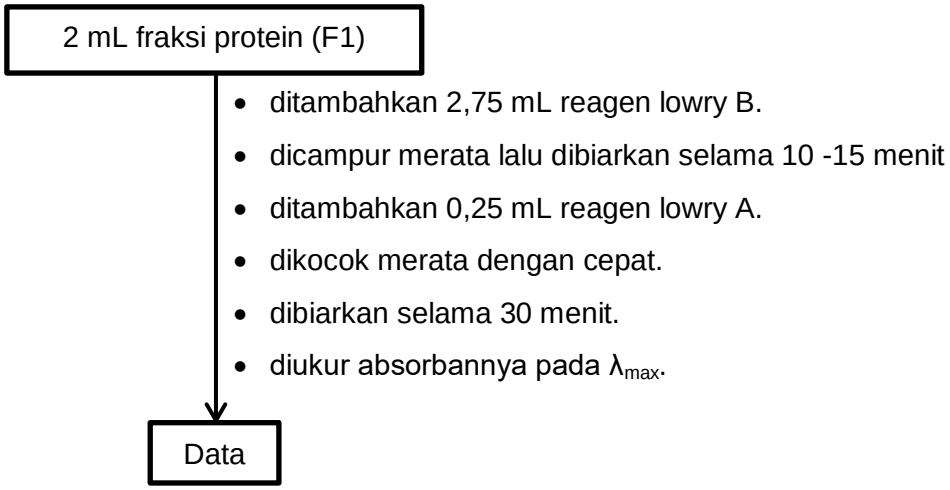
2. Pereaksi Lowry B

Lowry B dibuat dengan pencampuran antara Na_2CO_3 2 % dalam NaOH 0,1 N, Na-K-Tartat 2 %, $CuSO_4.5H_2O$ 1 % perbandingan 100 : 1 : 1, di mana diambil larutan Na_2CO_3 2 % dalam NaOH 0,1 N sebanyak 100 mL, Na-K-Tartat 2 % sebanyak 1 mL, dan $CuSO_4$. 5 H_2O 1 % 1 mL.

3. Larutan Baku

Bovine Serum Albumin ditimbang dengan teliti untuk membuat sediaan 1 mg/mL dan diencerkan dengan variasi konsentrasi: 0,02; 0,04; 0,08; 0,16 dan 0,32 mg/mL.

Analisis kadar protein

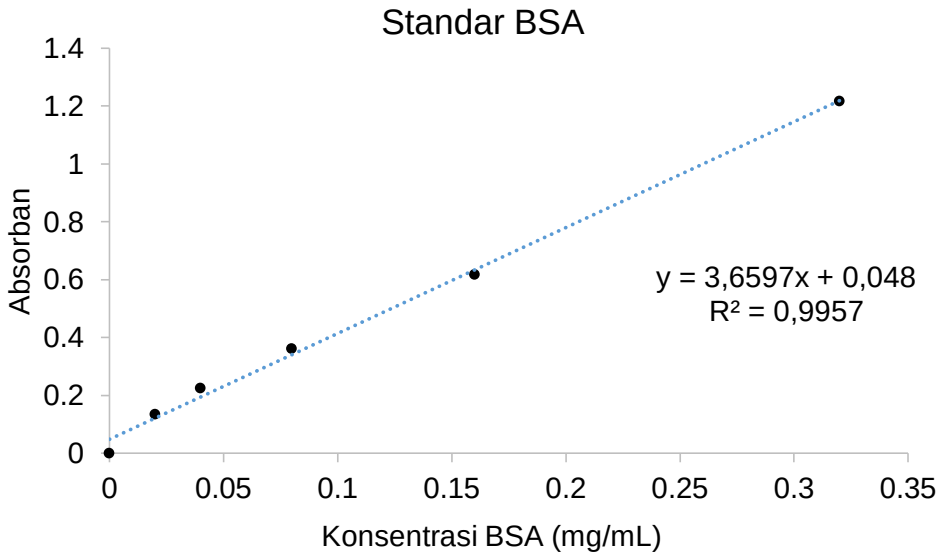


Catatan :

Hal yang sama dilakukan untuk fraksi protein (F2, F3, F4, EK), larutan baku, larutan blanko

Lampiran 13. Kurva Standar Bovin Serum Albumin pada λ 660 nm

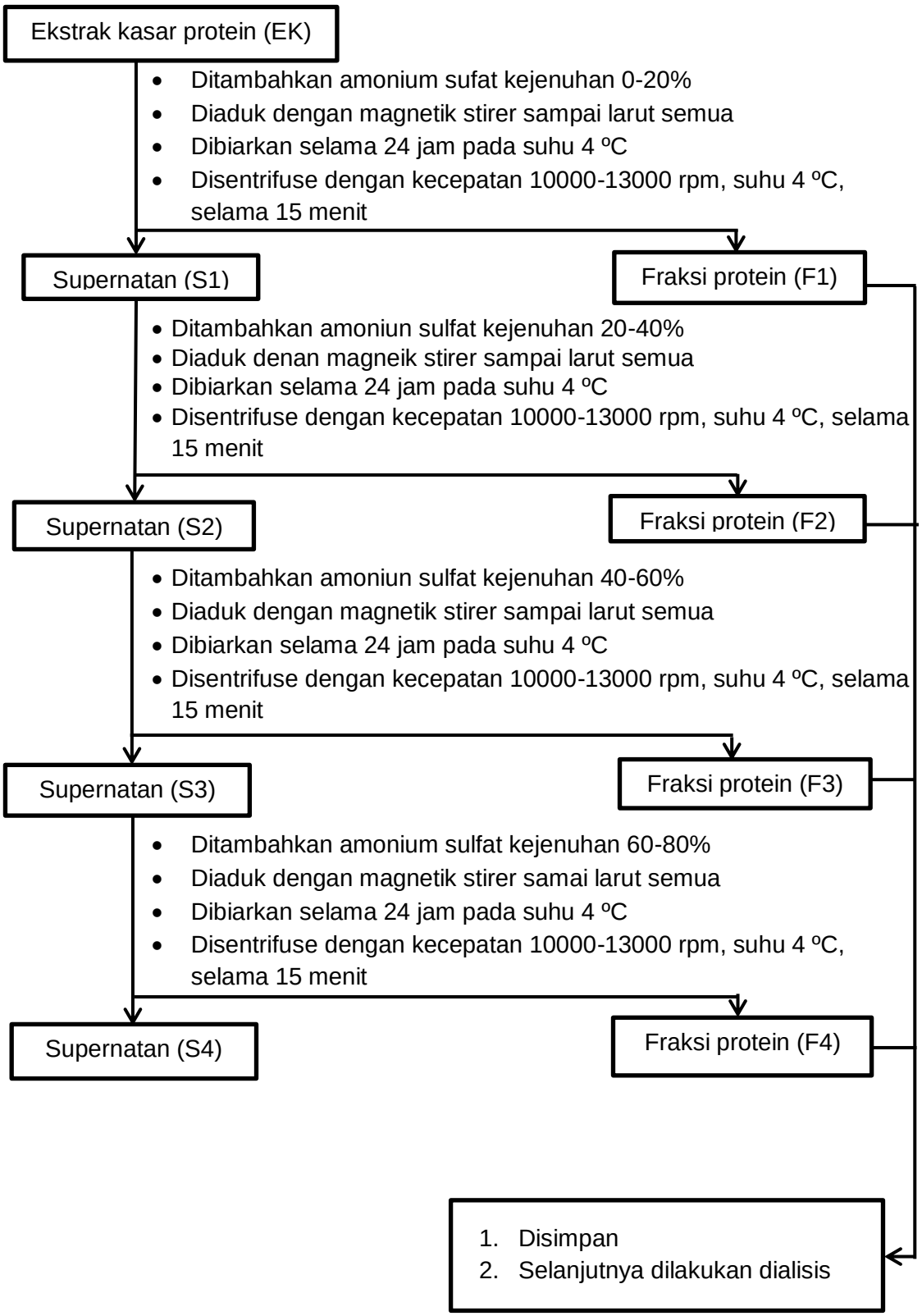
No	Konsentrasi BSA	Absorbansi
1	0	0
2	0,02	0,135
3	0,04	0,226
4	0,08	0,361
5	0,16	0,618
6	0,32	1,217



Lampiran 14. Data hasil penentuan waktu produksi optimum protein dari bakteri *C. marina* strain CL_2-2 dan optical density (OD)

No	Waktu Fermentasi (jam)	OD	Kadar Protein (mg/mL)
1	0	0,744	0,6449
2	6	1,121	1,1504
3	12	1,318	1,1367
4	18	1,7	1,7788
5	24	1,738	1,8471
6	**30**	**1,781**	**1,9155**
7	36	1,209	1,6695
8	42	1,058	1,3143
9	48	0,926	1,0411

Lampiran 15. Skema kerja fraksinasi protein dengan ammonium sulfat



Konsentrasi awal dari amonium sulfat (% kejenuhan pada 0°C)	% Kejenuhanpada 0°C																
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	Penambahan amonium sulfat kristal (gram) untuk pada 1 liter larutan																
0	106	134	164	194	226	258	291	326	361	398	436	476	516	559	603	650	697
5	79	108	137	166	197	229	262	296	331	368	405	444	484	526	570	615	662
10	53	81	109	139	169	200	233	266	301	337	374	412	452	493	536	581	627
15	26	54	82	111	141	172	204	237	271	306	343	381	420	460	503	547	592
20	0	27	55	83	113	143	175	207	241	276	312	349	387	427	469	512	557
25		0	27	56	84	115	146	179	211	245	280	317	355	395	436	478	522
30			0	28	56	86	117	148	181	214	249	285	323	362	402	445	488
35				0	28	57	87	118	151	184	218	254	291	329	369	410	453
40					0	29	58	89	120	153	187	222	258	296	335	376	418
45						0	29	59	90	123	156	190	226	263	302	342	383
50							0	30	60	92	125	159	194	230	268	308	348
55								0	30	61	93	127	161	197	235	273	313
60									0	31	62	95	129	164	201	239	279
65										0	31	63	97	132	168	205	244
70											0	32	65	99	134	171	209
75												0	32	66	101	137	174
80													0	33	67	103	139
85														0	34	68	105
90															0	34	70

Lampiran 16. Tabel kejenuhan amonium sulfat

Lampiran 17. Jumlah Amonium Sulfat yang Ditambahkan pada Fraksinasi berbagai Tingkat Kejenuhan

Fraksi Protein	Bobot Amonium Sulfat (gram)
0-20 %	104,94
20-40 %	110,175
40-60 %	112,8
60-80 %	123,195

Penambahan Amonium sulfat:

Protein

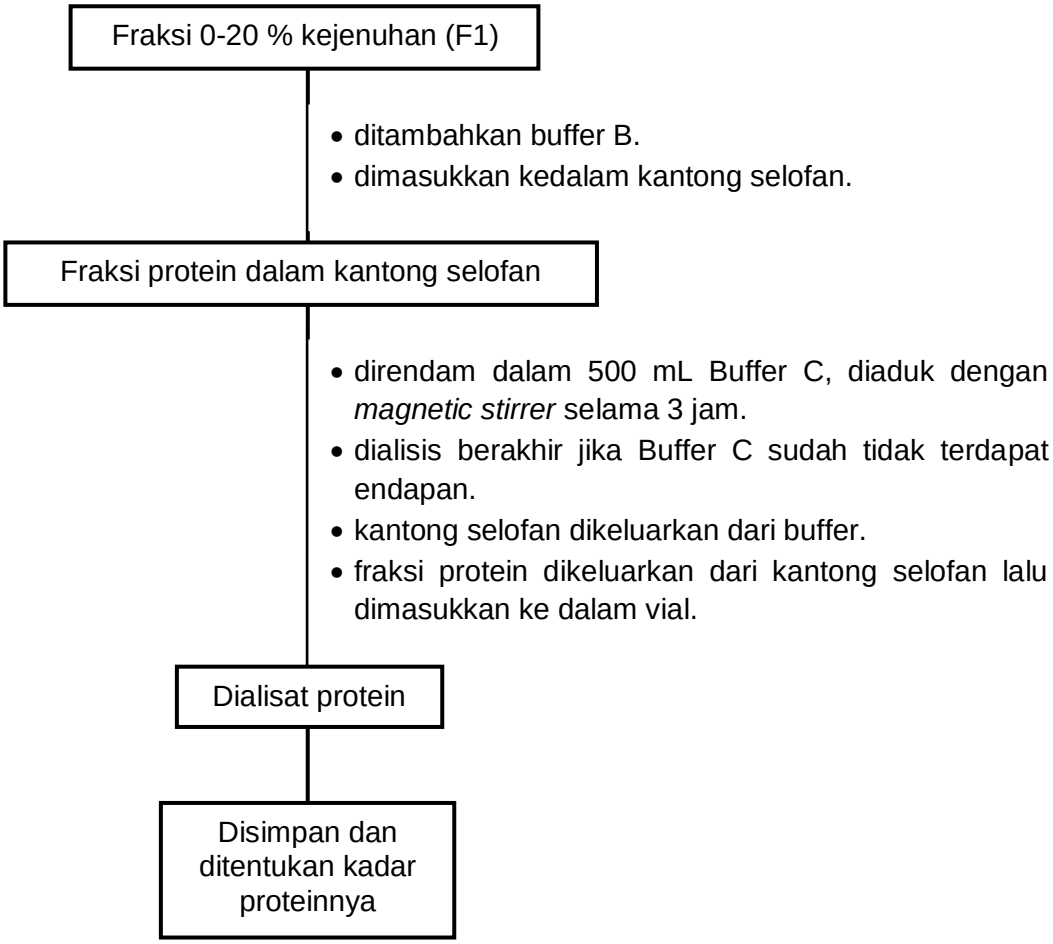
0-20 % = $\frac{990\ mL}{1000\ mL}$ x 106 gram = 104,94 gram

20-40 % = $\frac{975 mL}{1000\ mL}$ x 113 gram = 110,175 gram

40-60 % = $\frac{940\ mL}{1000\ mL}$ x 120 gram = 112,8 gram

60-80 % = $\frac{955\ mL}{1000\ mL}$ x 129 gram = 123,195 gram

Lampiran 18. Skema kerja dialisis protein



Catatan:

Perlakuan yang sama untuk fraksi F2, F3, F4, dan EK

Lampiran 19. Pengukuran Kadar Protein pada Setiap Tahap Pemurnian Fraksi Protein

Fraksi Protein	Absorban	Faktor Pengenceran	Kadar Protein (mg/mL)
0-20 %	0,764	50	9,782
20-40 %	0,624	50	7,87
40-60 %	0,836	50	10,77
60-80 %	0,592	50	7,43

Dari hasil regresi kurva larutan standar diperoleh persamaan garis: y = 3,6597x + 0,048, Maka data pada tabel di atas diperoleh dengan cara:

Fraksi Protein

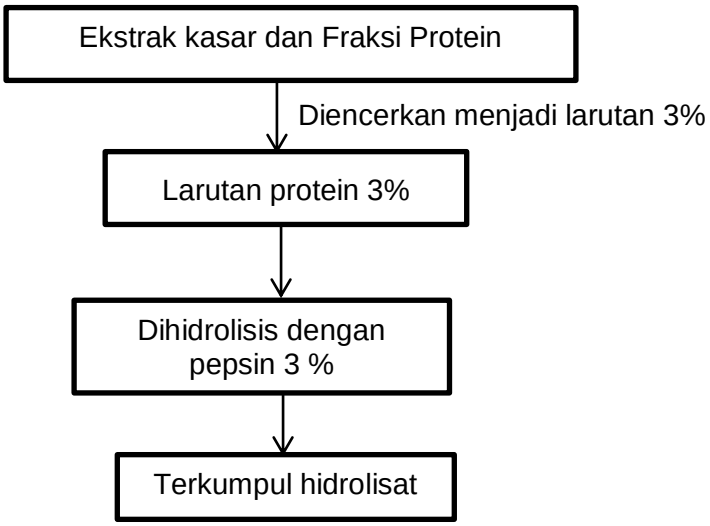
$$X_1 = \frac{y - 0{,}048}{3{,}6597} = \frac{0{,}564 - 0{,}048}{3{,}6597} = 0{,}2009 \text{ mg/mL}$$

$$X_2 = \frac{y - 0{,}048}{3{,}6597} = \frac{0{,}526 - 0{,}048}{3{,}6597} = 0{,}1871 \text{ mg/mL}$$

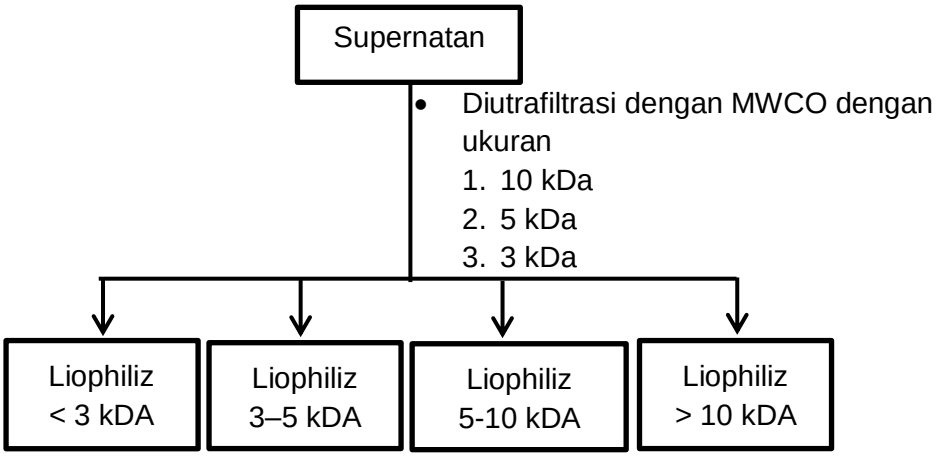
$$X_3 = \frac{y - 0{,}048}{3{,}6597} = \frac{0{,}492 - 0{,}048}{3{,}6597} = 0{,}1748 \text{ mg/mL}$$

$$X_4 = \frac{y - 0{,}048}{3{,}6597} = \frac{0{,}420 - 0{,}048}{3{,}6597} = 0{,}1487 \text{ mg/mL}$$

Lampiran 20. Skema kerja hidrolisis protein

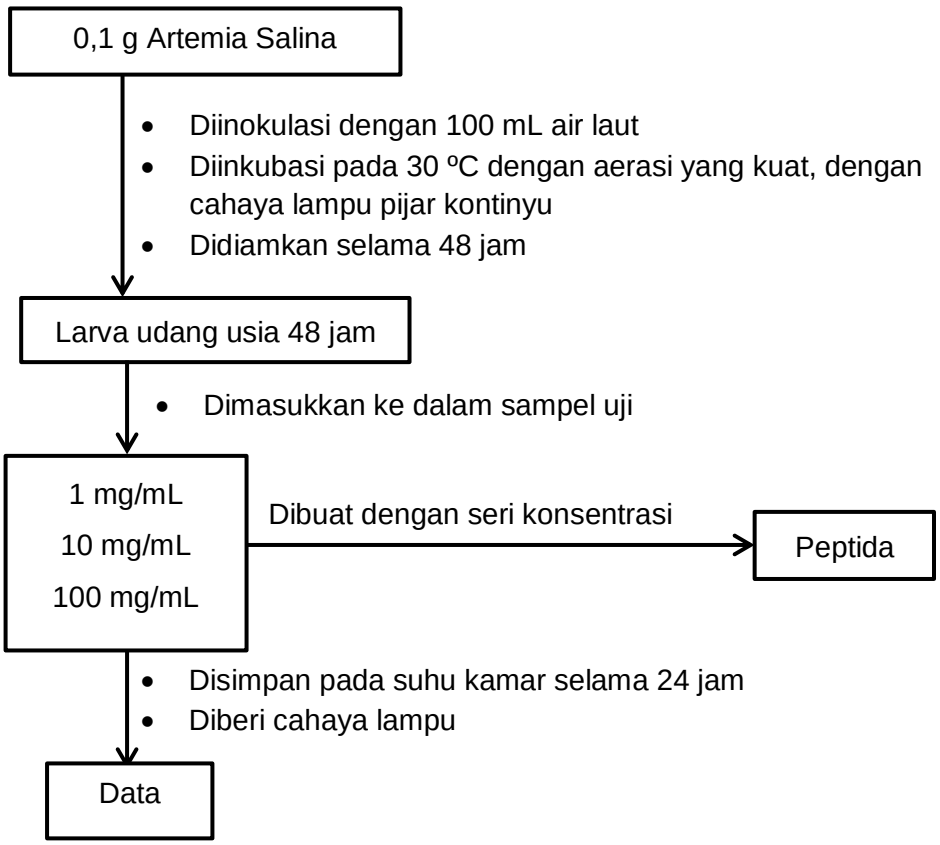


Lampiran 21. Skema kerja ultrafiltrasi hidrolisat protein



Liophyiz yang didapatkan dikumpulkan dan disimpan pada suhu -20 ºC

Lampiran 22. Skema kerja uji toksisitas BSLT



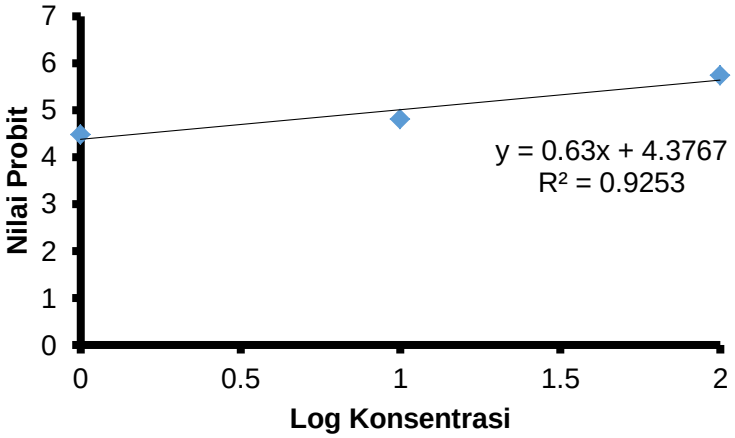
Lampiran 23. Tabel Nilai Probit

Persentase	Probit									
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
0	-	2,67	2,95	3,12	3,25	3,36	3,45	3,52	3,59	3,66
10	3,72	3,77	3,82	3,87	3,93	3,95	4,01	4,05	4,08	4,12
20	4,17	4,19	4,23	4,26	4,29	4,33	4,36	4,39	4,42	4,45
30	4,48	4,50	4,53	4,56	4,59	4,61	4,64	4,67	4,69	4,72
40	4,75	4,77	4,80	4,82	4,85	4,87	4,90	4,92	4,95	4,97
50	5,00	5,03	5,05	5,08	5,10	5,13	5,15	5,18	5,20	5,23
60	5,25	5,28	5,31	5,33	5,36	5,39	5,41	5,44	5,47	5,50
70	5,52	5,55	5,58	5,61	5,64	5,67	5,71	5,74	5,77	5,81
80	5,84	5,88	5,92	5,95	5,99	6,04	6,08	6,13	6,18	6,23
90	6,28	6,34	6,41	6,48	6,55	6,64	6,75	6,88	7,05	7,33
-	**0,0**	**0,1**	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**
99	7,33	7,37	7,41	7,46	7,51	7,55	7,66	7,75	7,88	8,09

Lampiran 24. Data Toksisitas Isolat Bakteri Simbion

Perhitungan LC_{50} CL_1-1

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	**30**	**4,48**
1	**43**	**4,8**
2	**77**	**5,74**



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,63x + 4,3767

Y = 0,63x + 4,3767

5 = 0,63x + 4,3767

X = 0,9894

Jadi, log X = 0,9894

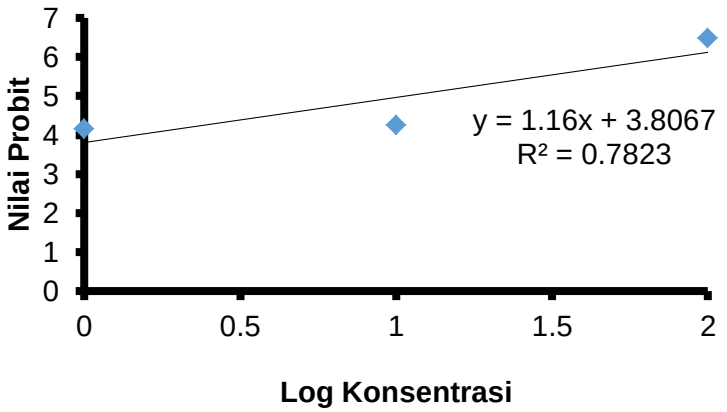
X = antilog 0,9894

= 9,758 µg/mL

LC_{50} CL_1-1 adalah = 9,758 µg/mL

Perhitungan LC_{50} CL_1-2

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	**20**	**4,16**
1	**23**	**4,26**
2	**93**	**6,48**



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,16x + 3,8067

Y = 1,16x + 3,8067

5 = 1,16x + 3,8067

X = 1,028707

Jadi, log X = 1,028707

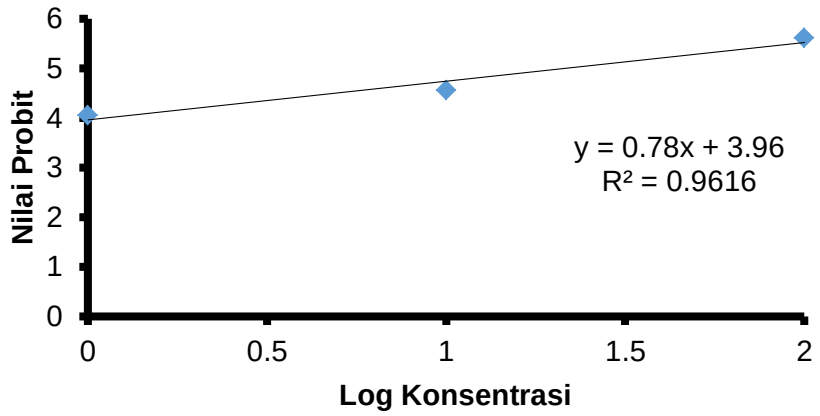
X = antilog 1,028707

= 10,683 µg/mL

LC_{50} CL_1-2 adalah = 10,683 µg/mL

Perhitungan LC_{50} CL_2-1

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	**17**	**4,05**
1	**33**	**4,56**
2	**73**	**5,61**



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,78x + 3,96

Y = 0,78x + 3,96

5 = 0,78x + 3,96

X = 1,33333

Jadi, log X = 1,33333

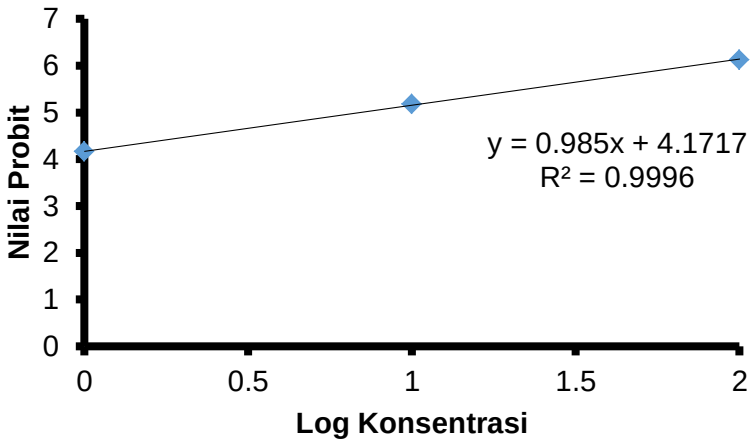
X = antilog 1,33333

= 22 µg/mL

LC_{50} CL_2-1 adalah = 22 µg/mL

Perhitungan LC_{50} CL_2-2

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	**20**	**4,16**
1	**57**	**5,18**
2	**87**	**6,13**



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,985x + 4,1717

Y = 0,985x + 4,1717

5 = 0,985x + 4,1717

X = 0,845

Jadi, log X = 0,845

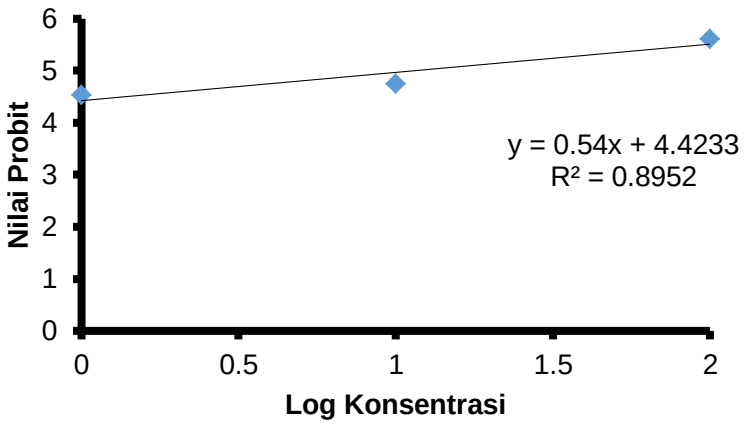
X = antilog 0,845

= 7,002 µg/mL

LC_{50} CL_2-2 adalah = 7,002 µg/mL

Perhitungan LC_{50} CL_3-1

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	**33**	**4,53**
1	**40**	**4,75**
2	**73**	**5,61**



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,54x + 4,4233

Y = 0,54x + 4,4233

5 = 0,54x + 4,4233

X = 1,06796

Jadi, log X = 1, 06796

X = antilog 1,06796

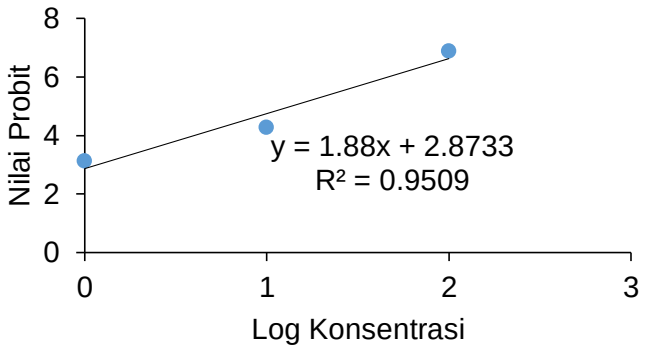
= 11,694 µg/mL

LC_{50} CL_3-1 adalah = 11,694 µg/mL

Lampiran 25. Data Toksisitas Fraksi Protein

Perhitungan LC_{50} F1

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	**3**	**3,12**
1	**23**	**4,26**
2	**97**	**6,88**



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,88x + 2,8733

Y = 1,88x + 2,8733

5 = 1,88x + 2,8733

X = 1,1312

Jadi, log X = 1,1312

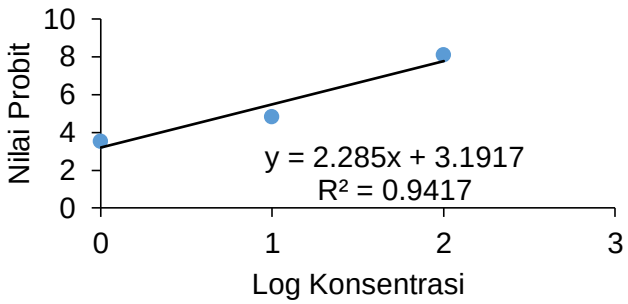
X = antilog 11,1312

= 13,528 µg/mL

LC_{50} F1 adalah = 13,528 µg/mL

Perhitungan LC_{50} Fraksi F2

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	**7**	**3,52**
1	**43**	**4,26**
2	**100**	**6,88**



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 2,285x + 3,1917

Y = 2,285x + 3,1917

5 = 2,285x + 3,1917

X = 0,7914

Jadi, log X = 0,7914

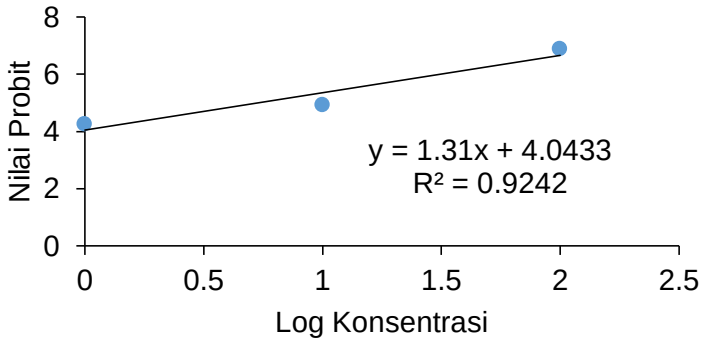
X = antilog 0,7914

= 6,186 µg/mL

LC_{50} Fraksi F2 adalah = 6,186 µg/mL

Perhitungan LC_{50} Fraksi F3

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	23	3,52
1	47	4,82
2	97	8,09



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,31x + 4,0433

Y = 1,31x + 4,0433

5 = 1,31x + 4,0433

X = 0,7303

Jadi, log X = 0,7303

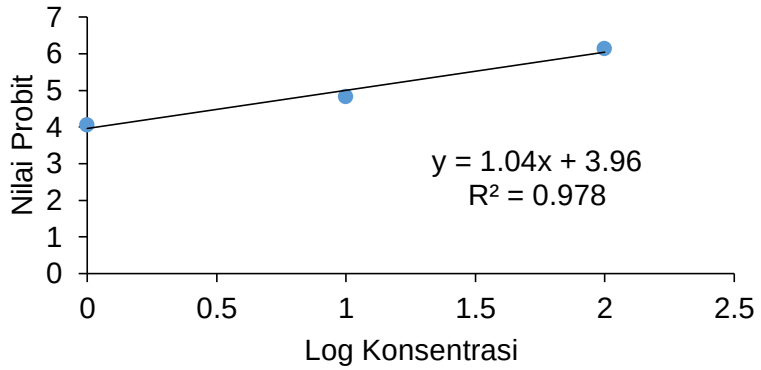
X = antilog 0,7303

= 5,374 µg/mL

LC_{50} F3 adalah = 5,374 µg/mL

Perhitungan LC_{50} Fraksi F4

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	17	4,05
1	43	4,82
2	87	6,13



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,04x + 3,96

Y = 1,04x + 3,96

5 = 1,04x + 3,96

X = 1

Jadi, log X = 1

X = antilog 1

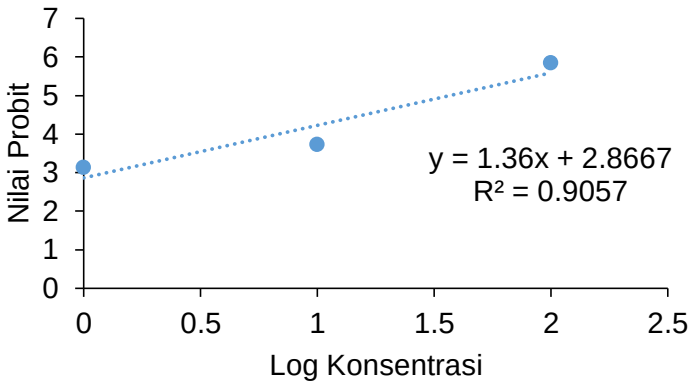
= 10 µg/mL

LC_{50} F4 adalah = 10 µg/mL

Lampiran 26. Penentuan Nilai LC_{50} Fraksi Hidrolisat Protein

Perhitungan LC_{50} waktu inkubasi 0 menit

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	3	3,12
1	10	3,72
2	80	5,84



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,36x + 2,8667

Y = 1,36x + 2,8667

5 = 1,36x + 2,8667

X = 1,5686

Jadi, log X = 1,5686

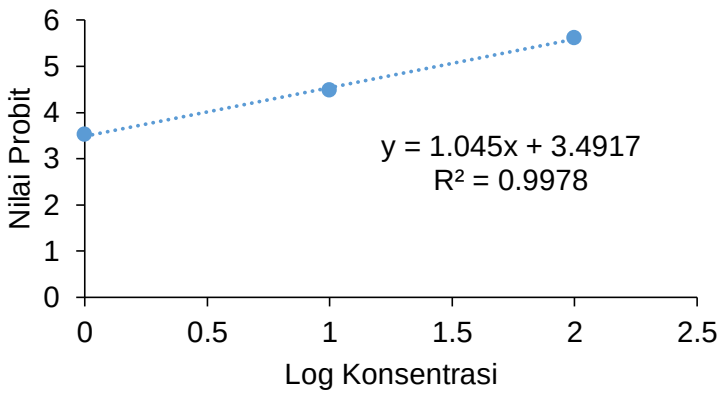
X = antilog 1,5686

= 37,034 µg/mL

LC_{50} waktu inkubasi 0 menit = 37,034 µg/mL

Perhitungan LC_{50} waktu inkubasi 30 menit

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	7	3,52
1	30	4,48
2	73	5,61



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,045x + 3,4917

Y = 1,045x + 3,4917

5 = 1,045x + 3,4917

X = 1,4433

Jadi, log X = 1,4433

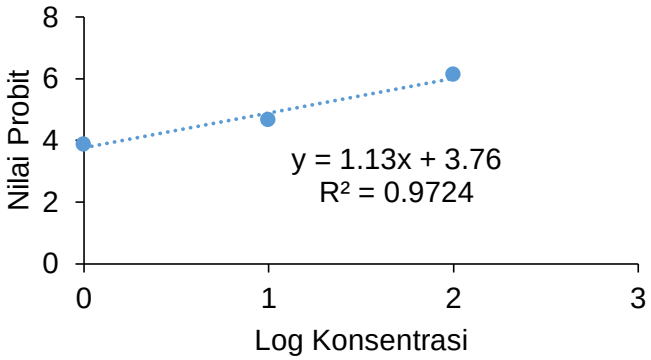
X = antilog 1,4433

= 27,756 µg/mL

LC_{50} waktu inkubasi 30 menit adalah = 27,756 µg/mL

Perhitungan LC_{50} waktu inkubasi 60 menit

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	13	3,87
1	37	4,67
2	87	6,13



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,13x + 3,76

Y = 1,13x + 3,76

5 = 1,13x + 3,76

X = 1,0973

Jadi, log X = 1,0973

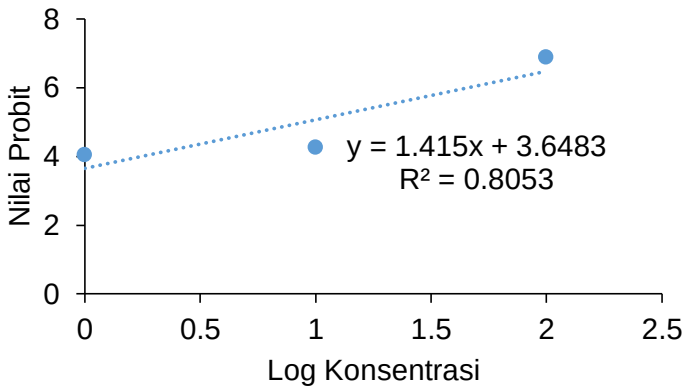
X = antilog 1,0973

= 12,513 µg/mL

LC_{50} waktu inkubasi 60 menit adalah = 12,513 µg/mL

Perhitungan LC_{50} waktu inkubasi 90 menit

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	17	4,05
1	23	4,26
2	97	6,88



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,415x + 3,6483

Y = 1,415x + 3,6483

5 = 1,415x + 3,6483

X = 0,9623

Jadi, log X = 0,9623

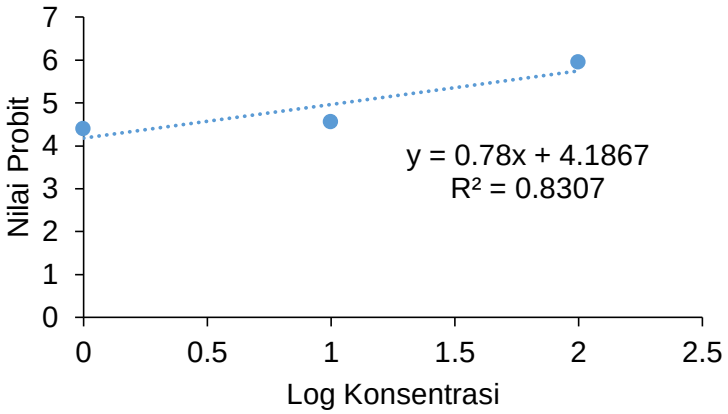
X = antilog 0,9623

= 9,169 µg/mL

LC_{50} waktu inkubasi 90 menit adalah = 9,169 µg/mL

Perhitungan LC_{50} waktu inkubasi 120 menit

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	27	4,39
1	33	4,56
2	83	5,95



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,78x + 4,1867

Y = 0,78x + 4,1867

5 = 0,78x + 4,1867

X = 1,0427

Jadi, log X = 1,0427

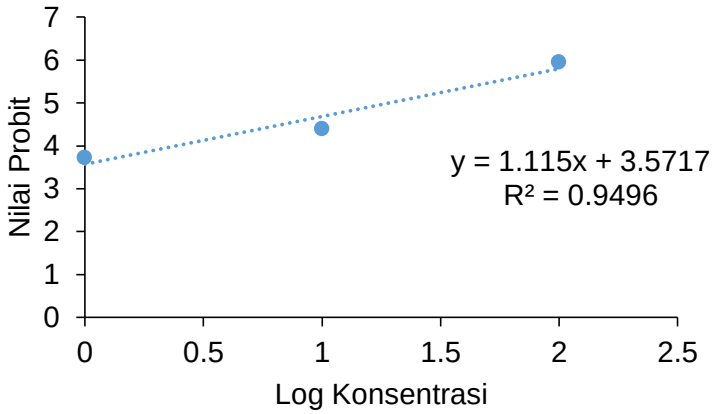
X = antilog 1,0427

= 11,033 µg/mL

LC_{50} waktu inkubasi 120 menit adalah = 11,033 µg/mL

Perhitungan LC_{50} waktu inkubasi 150 menit

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	10	3,72
1	27	4,39
2	83	5,95



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,115x + 3,5717

Y = 1,115x + 3,5717

5 = 1,115x + 3,5717

X = 1,2810

Jadi, log X = 1,2810

X = antilog 1,2810

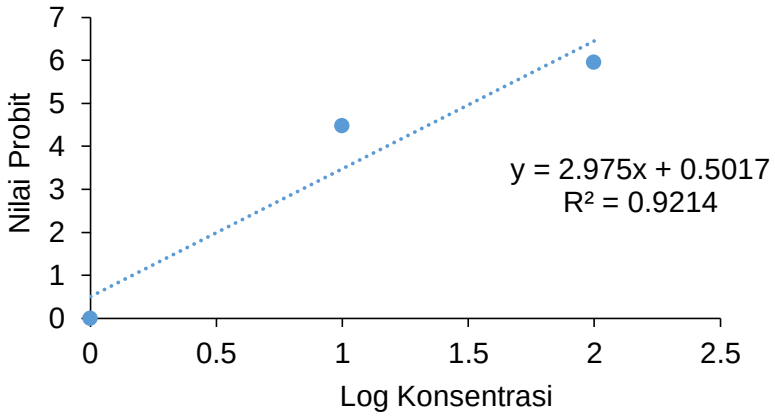
= 19,098 µg/mL

LC_{50} waktu inkubasi 150 menit adalah = 19,098 µg/mL

Lampiran 27. Penentuan Nilai LC_{50} Fraksi Peptida

Perhitungan LC_{50} peptida > 10 kDa

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	0	0
1	30	4,48
2	83	5,92



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 2,975x + 0,5017

Y = 2,975x + 0,5017

5 = 2,975x + 0,5017

X = 1,5146

Jadi, log X = 1,5146

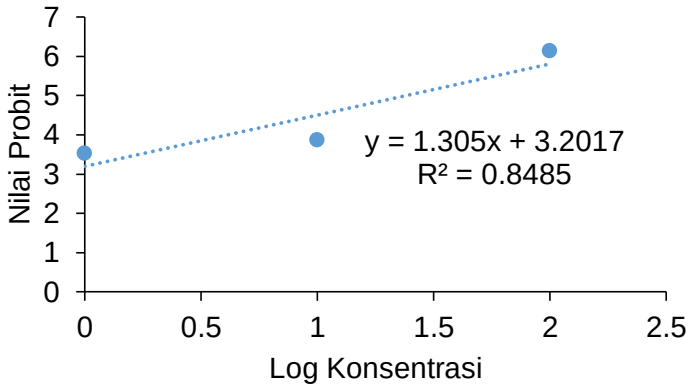
X = antilog 1,5146

= 32,702 µg/mL

LC_{50} peptida > 10 kDa adalah = 32,702 µg/mL

Perhitungan LC_{50} peptida 5 - 10 kDa

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	7	3,52
1	13	3,87
2	87	6,13



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,305x + 3,2017

Y = 1,305x + 3,2017

5 = 1,305x + 3,2017

X = 1,3780

Jadi, log X = 1,3780

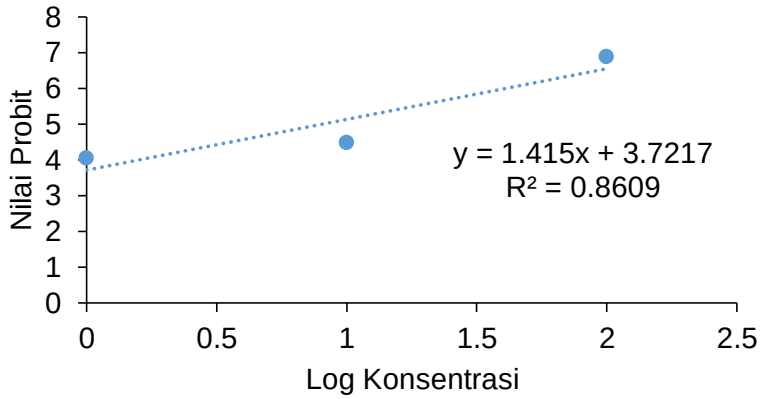
X = antilog 1,3780

= 23,879 µg/mL

LC_{50} peptida 5 - 10 kDa adalah = 23,879 µg/mL

Perhitungan LC_{50} peptida 3 - 5 kDa

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	17	4,05
1	30	4,48
2	97	6,88



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 1,415x + 3,7217

Y = 1,415x + 3,7217

5 = 1,415x + 3,7217

X = 0,9034

Jadi, log X = 0,9034

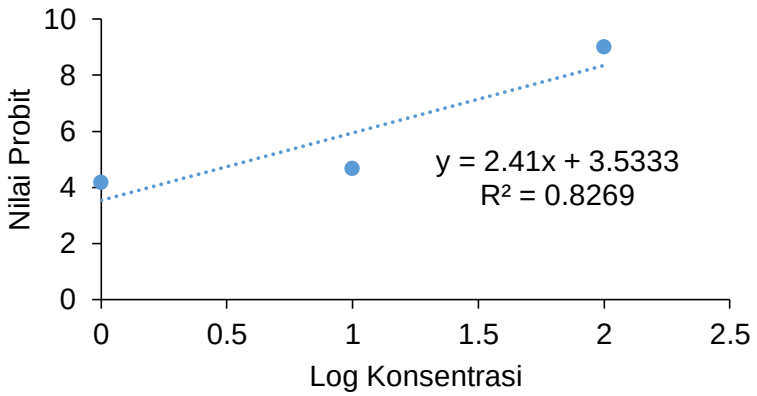
X = antilog 0,9034

= 8,006 µg/mL

LC_{50} peptida 3 - 5 kDa adalah = 8,006 µg/mL

Perhitungan LC_{50} peptida < 3 kDa

Log Konsentrasi (X)	% Kematian	Nilai Probit (Y)
0	20	4,17
1	37	4,67
2	100	8,99



Untuk LC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 2,41x + 3,5333

Y = 2,41x + 3,5333

5 = 2,41x + 3,5333

X = 0,6086

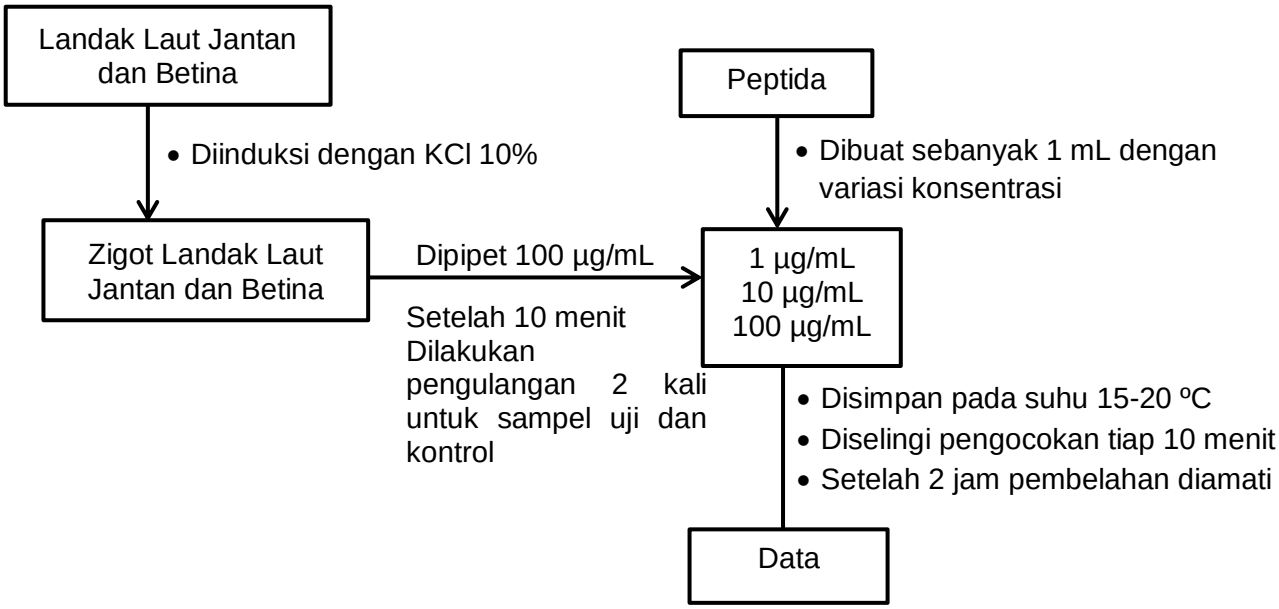
Jadi, log X = 0,6086

X = antilog 0,6086

= 4,061 µg/mL

LC_{50} peptida < 3 kDa adalah = 4,061 µg/mL

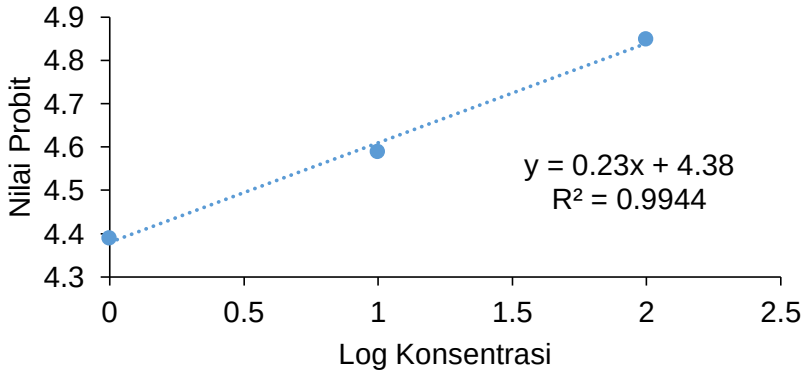
Lampiran 28. Skema kerja uji antimitosis sel landak laut



Lampiran 29. Penentuan Nilai IC_{50} Fraksi Peptida

Perhitungan IC_{50} peptida > 10 kDa

Log Konsentrasi (X)	% Inhibisi	Nilai Probit (Y)
0	27	4,39
1	34	4,59
2	44	4,85



Untuk IC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,23x + 4,38

Y = 0,23x + 4,38

5 = 0,23x + 4,38

X = 2,6957

Jadi, log X = 2,6957

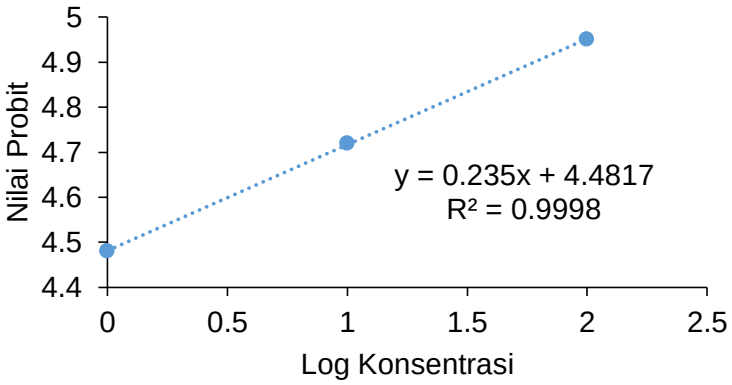
X = antilog 2,6957

= 496,195 µg/mL

IC_{50} peptida > 10 kDa adalah = 496,195 µg/mL

Perhitungan IC_{50} peptida 5 - 10 kDa

Log Konsentrasi (X)	% Inhibisi	Nilai Probit (Y)
0	30	4,48
1	39	4,72
2	48	4,95



Untuk IC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,235x + 4,4817

Y = 0,235x + 4,4817

5 = 0,235x + 4,4817

X = 2,2055

Jadi, log X = 2,2055

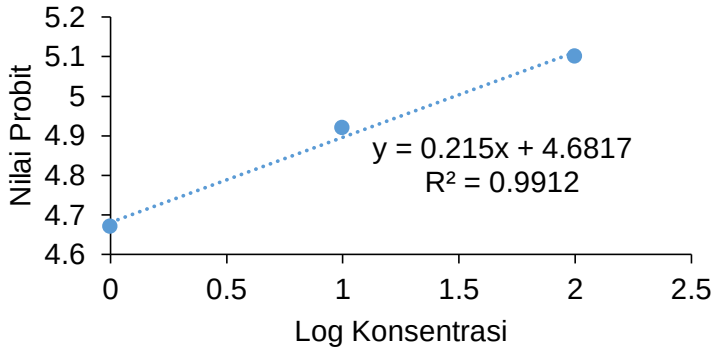
X = antilog 2,2055

= 160,521 µg/mL

IC_{50} peptida 5 - 10 kDa adalah = 160,521 µg/mL

Perhitungan IC_{50} peptida 3 - 5 kDa

Log Konsentrasi (X)	% Inhibisi	Nilai Probit (Y)
0	37	4,67
1	47	4,92
2	54	5,10



Untuk IC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,215x + 4,6817

Y = 0,215x + 4,6817

5 = 0,215x + 4,6817

X = 1,4805

Jadi, log X = 1,4805

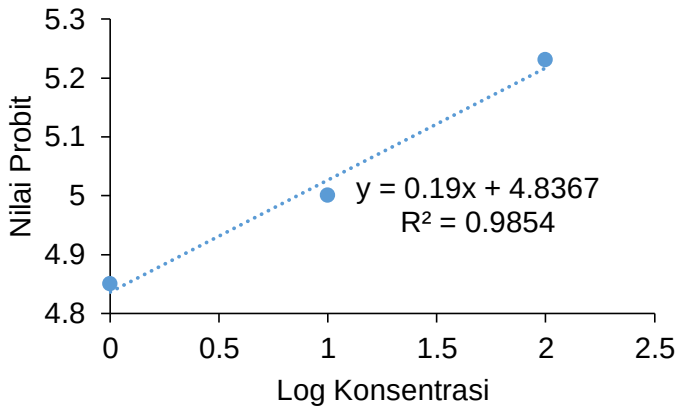
X = antilog 1,4805

= 30,232 µg/mL

IC_{50} peptida 3 - 5 kDa adalah = 30,232 µg/mL

Perhitungan IC_{50} peptida < 3 kDa

Log Konsentrasi (X)	% Inhibisi	Nilai Probit (Y)
0	44	4,85
1	50	5
2	59	5,23



Untuk IC_{50}, nilai probit adalah 5, dimasukkan ke persamaan regresi Y = 0,19x + 4,8367

Y = 0,19x + 4,8367

5 = 0,19x + 4,8367

X = 0,8595

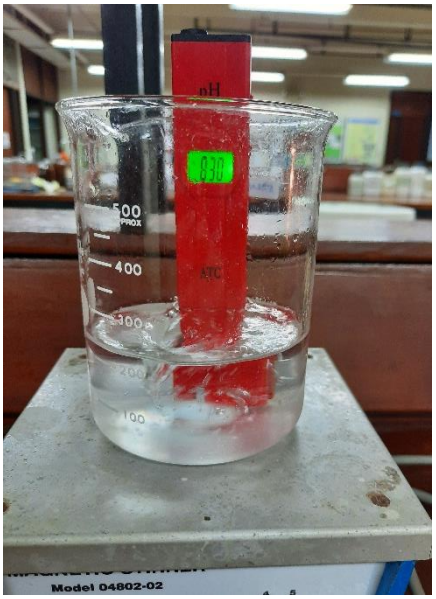
Jadi, log X = 0,8595

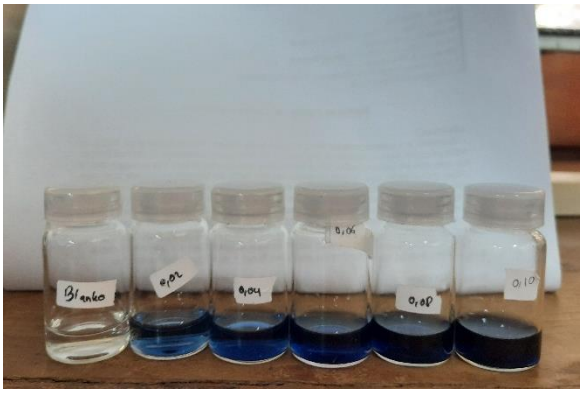
X = antilog 0,8595

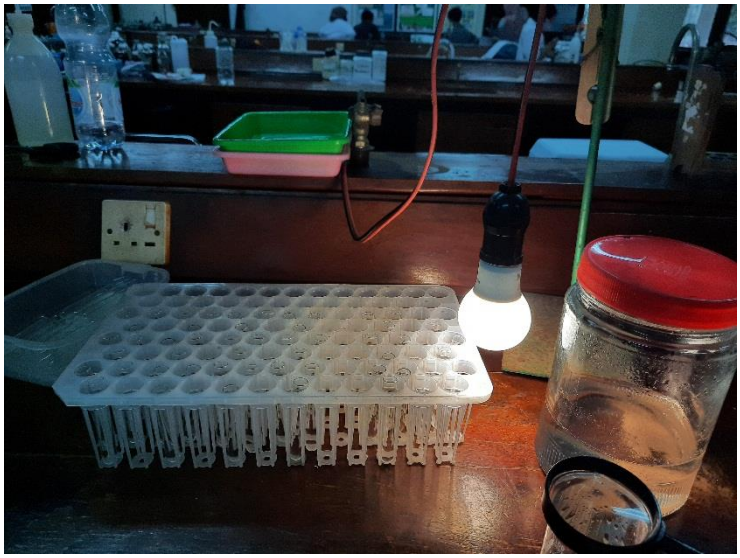
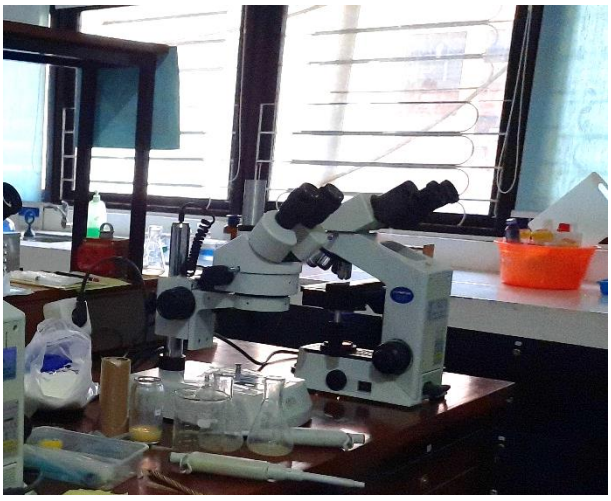
= 7,236 µg/mL

IC_{50} peptida < 3 kDa adalah = 7,236 µg/mL

Lampiran 30. Dokumentasi

Proses inkubasi media agar	
Pembuatan Buffer	
Proses shaker media produksi	

Sentrifugasi hasil shaker	
Pengukuran kadar protein	
Dialisis	

Hidrolisis protein	
Uji BSLT	
Uji Mitotik	

Pengambilan sel zigot landak laut