



DAFTAR PUSTAKA

- Ainiyah, S., 2018, Imobilisasi Selulase dan Xylanase pada Magnetic Kitosan untuk Produksi Gula Reduksi, *Tesis*, Departemen Teknik Kimia, Institut Teknologi Sepuluh November, Surabaya.
- Alamsyah, G., Albels, V.A., Sahlan, M., dan Hermansyah, H., 2017, Effect of Chitosan's Amino Group in Adsorption-crosslinking Immobilization of Lipase Enzyme on Resin to Catalyze Biodiesel Synthesis, *Energy Procedia*, 136, 47–52.
- Ali, S., Zafar, W., Shafiq, S., dan Manzoor, M., 2017, Enzymes Immobilization: An Overview of Techniques, Support Materials and Its Applications, *Int. J. Sci. Technol. Res.*, 6(7), 64-72.
- Almulaiky, Y.Q., Aqlan, F.M., Aldhahri, M., Baeshen, M., Khan, T.J., Khan, K.A., Afifi, M., Al-Farga, A., Warsi, M.K., Alkhaled, M., dan Alayafi, A.A.M., 2018, α -Amylase Immobilization on Amidoximated Acrylic Microfibres Activated by Cyanuric Chloride, *R. Soc. open sci.*, 5, 1-11.
- Baysal, Z., Bulut, Y., Yavuz, M., dan Aytekin, Ç., 2014, Immobilization of α -Amylase Via Adsorption onto Bentonite/Chitosan Composite: Determination of Equilibrium, Kinetics, and Thermodynamic Parameters, *Starch/Stärke*, 66, 484–490.
- Bernfeld, P., 1951, Enzymes of Starch Degradation and Synthesis, *Adv. Enzymol. Relat. Subj. Biochem.*, 12, 379–428.
- Bertoldo, C. dan Antranikian, G., 2002, Starch-Hydrolyzing Enzymes from Thermophilic Archaea and Bacteria, *Curr. Opin. Chem. Biol.*, 6, 151–160.
- Betancor, L., López Gallego, F., Hidalgo, A., Alonso-Morales, N., Mateo, G.D.-O.C., Fernández-Lafuente, R., dan Guisan, J.M., 2006, Different Mechanisms of Protein Immobilization on Glutaraldehyde Activated Supports: Effect of Support Activation and Immobilization Conditions, *Enzyme Microb. Technol.*, 39, 877–882.
- Bindu, V.U. dan Mohanan, P. V, 2017, Enhanced Stability α -Amylase Via Immobilization onto Chitosan-TiO₂ Nanocomposites, *Nanosci Technol.*, 4, 1-9.
- Brena, B.M. dan Batista-Viera, F., 2006, *Immobilization of Enzymes and Cells*, Humana Press Inc, Totowa.
- Cahyaningrum, S.E., 2009, Peranan Jembatan Kation Logam dalam Imobilisasi Papain Pada Kitosan, *Disertasi*, Jurusan Kimia, FMIPA, Yogyakarta.
- Cahyaningrum, S.E., Narsito, N., Santoso, S.J., dan Agustini, R., 2008, Immobilization Of Papain On Chitosan, *Indones. J. Chem.*, 8, 372–376.
- Carpette, 2005, *An Introduction to Practical Biochemistry*, Mc Graw Hill Book Company, Great Britany.
- Cengiz, S., Çavaş, L., dan Yurdakoç, K., 2012, Bentonite and Sepiolite as Supporting Media: Immobilization of Catalase, *Appl. Clay Sci.*, 65-66,



114–120.

- Chang, M.-Y., Kao, H.-C., dan Juang, R.-S., 2008, Thermal Inactivation and Reactivity of β -Glucosidase Immobilized on Chitosan–Clay Composite, *Int. J. Biol. Macromol.*, 43, 48–53.
- Chibata, I., 1978, *Immobilized Enzymes, Research and Development*, Kodansha, Michigan.
- Chiou, S.-H. and Wu, W.-T., 2004, Immobilization of Candida Rugosa Lipase on Chitosan with Activation of the Hydroxyl Groups, *Biomaterials*, 25, 197–204.
- Christidis, G.E., 1998, Physical and Chemical Properties of Some Bentonite Deposits of Kimolos Island, Greece, *Appl. Clay Sci.*, 13, 79–98.
- D'souza, S.F., 1999, Immobilized Enzymes in Bioprocess, *Curr. Sci.*, 69–79.
- Dai, D. and Xia, L., 2006, Effect of Lipase Immobilization on Resolution of (R, S)-2-Octanol in Nonaqueous Media Using Modified Ultrastable-Y Molecular Sieve As Support, *Appl. Biochem. Biotechnol.*, 134, 39–50.
- Fang, S., Chang, J., Lee, Y.-S., Hwang, E.-J., Heo, J.B., and Choi, Y.-L., 2016, Immobilization of α -Amylase from Exiguobacterium sp. DAU5 on Chitosan and Chitosan-Carbon Bead: Its Properties, *J. Appl. Biol. Chem.*, 59(1), 75–81.
- Febrina, L., 2012, Pengaruh Derajat Deasetilasi terhadap Efektivitas Kitosan Bead sebagai Padatan Pendukung Imobilisasi Lipase dengan Teknik Pengikatan Silang, *Tesis*, Jurusan Kimia, FMIPA, UGM, Yogyakarta.
- Fuwa, H., 1954, A New Method for Microdetermination of Amylase Activity by the Use of Amylose as the Substrate, *The Journal of Biochemistry*, 41(5), 583–603.
- Gomes-Ruffi, C.R., da Cunha, R.H., Almeida, E.L., Chang, Y.K., dan Steel, C.J., 2012, Effect of the Emulsifier Sodium Stearyl Lactylate and of the Enzyme Maltogenic Amylase on the Quality of Pan Bread During Storage, *LWT*, 49(1), 96–101.
- Horváthová, V., Janecek, S., dan Sturdík, E., 2000, Amylolysis Enzymes: Their Specificities, Origins and Properties, *Biologia-Bratislava*, 55 (6), 605–616.
- Jegannathan, K.R., Jun-Yee, L., Chan, E.-S., dan Ravindra, P., 2010, Production of Biodiesel from Palm Oil Using Liquid Core Lipase Encapsulated in K-Carrageenan, *Fuel*, 89, 2272–2277.
- Kaushal, J., Singh, G., dan Arya, S.K., 2018, Immobilization Of Catalase onto Chitosan and Chitosan–Bentonite Complex: A Comparative Study, *Biotechnol. Reports*, 18, e00258.
- Khasanah, S.I., 2015, Optimasi Imobilisasi Lipase pada Kitosan Bead dengan Teknik Taut Silang dan Studi Penggunaannya sebagai Biokatalis Reaksi Transesterifikasi dalam Sistem Pelarut t-butanol, *Tesis*, Jurusan Kimia, FMIPA, Yogyakarta.
- Krajewska, B., 2004, Application of Chitin-And Chitosan-Based Materials For



- Enzyme Immobilizations: a review, *Enzyme Microb. Technol.*, 35, 126–139.
- Kumar, A.G., Perinbam, K., Kamatchi, P., Nagesh, N., dan Sekaran, G., 2010, In Situ Immobilization of Acid Protease on Mesoporous Activated Carbon Packed Column for the Production of Protein Hydrolysates, *Bioresour. Technol.*, 101, 1377–1379.
- Kumar, M.N.V.R., 2000, A Review of Chitin and Chitosan Applications, *React. Funct. Polym.*, 46, 1–27.
- Kumar, S., Kumar, V., Rana, M., dan Kumar, D., 2012, Enzymes Inhibitors from Plants: an Alternate Approach to Treat Diabetes, *Pharmacogn. Commun.*, 2, 18–33.
- Kusmiati dan Agustini, N.W.S., 2010, Pemanfaatan Limbah Onggok untuk Produksi Asam Sitrat dengan Penambahan Mineral Fe dan Mg pada Substrat Menggunakan Kapang Trichoderma Sp dan Aspergillus Niger, *Seminar Nasional Biologi*, Fakultas Biologi, UGM, 856–866.
- Lee, Ja Hyun, Lee, Ju Hun, Kim, D.S., Yoo, H.Y., Park, C., dan Kim, S.W., 2019, Biodiesel Production by Lipases Co-Immobilized on the Functionalized Activated Carbon, *Bioresour. Technol. Reports*, 7, 1–8.
- Lehninger, A.L., 1993, *Dasar-Dasar Biokimia*, Jilid 1, Alih bahasa oleh Thenawidjaja, M., Erlangga, Jakarta.
- Lorenz, M.G., 1959, Use of Dinitrosalicylic Acid Reagent for Determination of Reducing Sugar, *Anal. Chem.*, 31, 426–428.
- Van Der Maarel, M.J.E.C., Van der Veen, B., Uitdehaag, J.C.M., Leemhuis, H., dan Dijkhuizen, L., 2002, Properties and Applications of Starch-Converting Enzymes of the α -amylase Family, *J. Biotechnol.*, 94, 137–155.
- Mahargyani, W., 2015, Imobilisasi Lipase pada Kitosan Serbuk dengan Metode Pengikatan Silang dan Uji Aktivitasnya pada Transesterifikasi Trigliserida, *Tesis*, Jurusan Kimia, FMIPA, Yogyakarta.
- Mardani, T., Khiabani, M.S., Mokarram, R.R., dan Hamishehkar, H., 2018, Immobilization of α -Amylase on Chitosan-Montmorillonite Nanocomposite Beads, *Int. J. Biol. Macromol.*, 120, 354–360.
- Montgomery, R., Conway, T.W., dan Spector, A.A., 1993, *Biokimia Berorientasi pada Kasus Klinik*, Alih bahasa oleh Staf Pengajar FKUI, Bina Rupa Aksara, Jakarta.
- Nasratun, M., Said, H.A., Noraziah, A., dan Alla, A.N.A., 2009, Immobilization of lipase from Candida rugosa on Chitosan Beads for Transesterification Reaction, *Am. J. Appl. Sci.*, 6, 1653–1657.
- Ompusunggu, H.E.S. dan Silaban, R., 2013, Kajian Biomedik Enzim Amilase dan Pemanfaatannya Dalam Industri, *J. Pendidik. Kim.*, 5, .
- Pereira, E.B., Zanin, G.M., dan Castro, H.F., 2003, Immobilization and Catalytic Properties of Lipase on Chitosan for Hydrolysis and Esterification Reactions, *Brazilian J. Chem. Eng.*, 20, 343–355.
- Primadevi, S., 2013, Imobilisasi Lipase pada Kitosan Bead dengan Teknik



Pengikatan Silang: Pengaruh pH dan Konsentrasi Kitosan terhadap Aktivitas Transesterase.

- Purwanto, M.G.M., 2014, Perbandingan Analisa Kadar Protein Terlarut dengan berbagai Metode Spektroskopi UV-Visible, *J. Ilm. Sains Teknol.*, 7, 64–71.
- Rao, C.S., Sathish, T., Ravichandra, P., dan Prakasham, R.S., 2009, Characterization of Thermo and Detergent Stable Serine Protease from Isolated Bacillus Circulans and Evaluation of Eco-Friendly Applications, *Process Biochem.*, 44, 262–268.
- Samui, A. dan Sahu, S.K., 2020, Integration of α -Amylase into Covalent Organic Framework for Highly Efficient Biocatalyst, *Microporous Mesoporous Mater.*, 291, 1-9.
- Sardar, M., Roy, I., dan Gupta, M.N., 2000, Simultaneous Purification and Immobilization of Aspergillus Niger Xylanase on the Reversibly Soluble Polymer Eudragittm L-100, *Enzyme Microb. Technol.*, 27, 672–679.
- Sassolas, A., Blum, L.J., dan Leca-Bouvier, B.D., 2009, New Electrochemiluminescent Biosensors Combining Polyluminol and An Enzymatic Matrix, *Anal. Bioanal. Chem.*, 394, 971–980.
- Senanayake, S.P.J.N. dan Shahidi, F., 1999, Enzymatic Incorporation of Docosahexaenoic Acid Into Borage Oil, *J. Am. Oil Chem. Soc.*, 76, 1009–1015.
- Shi, C., Zhu, Y., Ran, X., Wang, M., Su, Y., dan Cheng, T., 2006, Therapeutic Potential of Chitosan and Its Derivatives in Regenerative Medicine, *J. Surg. Res.*, 133, 185–192.
- Smaali, I., Rémond, C., Skhiri, Y., dan O'Donohue, M.J., 2009, Biocatalytic Conversion of Wheat Bran Hydrolysate Using an Immobilized GH43 β -Xylosidase, *Bioresour. Technol.*, 100, 338–344.
- Souza, P.M. de dan Magalhães, P. de O., 2010, Application of Microbial α -Amylase in Industry-A review, *Brazilian J. Microbiol.*, 41, 850–861.
- Sukadarti, S. dan Murni, W. Sri, 2001, Studi Hidrolisis Ampas Tahu Menjadi Glukosa dengan Katalisator Enzim Glukoamilase, *Prosiding Seminar Nasional Kejuangan Teknik Kimia*.
- Sumner, J.B. dan Myrbäck, K., 1950, *The Enzymes: Chemistry and Mechanism of Action*, Academic Press Inc. Publisher, New York.
- Tan, T., Lu, J., Nie, K., Deng, L., dan Wang, F., 2010, Biodiesel Production With Immobilized Lipase: A Review, *Biotechnol. Adv.*, 28, 628–634.
- Tonini, D. dan Astrup, T., 2012, Life-cycle Assessment of a Waste Refinery Process For Enzymatic Treatment of Municipal Solid Waste, *Waste Manag.*, 32, 165–176.
- Wang, Z.-G., Wan, L.-S., Liu, Z.-M., Huang, X.-J., dan Xu, Z.-K., 2009, Enzyme Immobilization on Electrospun Polymer Nanofibers: An Overview, *J. Mol. Catal. B Enzym.*, 56, 189–195.
- Wardoyo, F.A., 2013, Imobilisasi Lipase dengan Teknik Taut Silang pada Kitosan



Serbuk dan Uji Aktivitas Hidrolisisnya terhadap Minyak Kelapa Sawit,
Tesis, Jurusan Kimia FMIPA, Yogyakarta.

- Xiao, Z., Storms, R., dan Tsang, A., 2006, A Quantitative Starch-Iodine Method for Measuring Alpha-Amylase and Glucoamylase Activities, *Anal. Biochem.*, 351, 146–148.
- Yandri, Suhartati, T., Yuwono, S.D., Qudus, H.I., Tiarsa, E.R., dan Hadi, S., 2018, Immobilization of α -Amylase From *Bacillus Subtilis Itbccb148* Using Bentonit, 20, 487–492.
- Yeşiloğlu, Y., 2005, Utilization of Bentonite As a Support Material For Immobilization of *Candida Rugosa* Lipase, *Process Biochem.*, 40, 2155–2159.
- Zeng, F. dan Cohen, A.L., 2000, Partial Characterization of α -Amylase in the Salivary Glands of *Lygus hesperus* and *L. lineolaris*, *Comp. Biochem. Physiol.*, 126, 9-16.