



DAFTAR PUSTAKA

- Acharyya, A., Shin, D., Troxler, T., dan Gai, F., 2020. Can glycine betaine denature proteins? *Physical Chemistry Chemical Physics*, **22**: 7794–7802.
- Adrio, J.-L. dan Demain, A.L., 2010. Recombinant organisms for production of industrial products. *Bioengineered Bugs*, **1**: 116–131.
- Akhtar, H., Akhtar, S., Jan, S.U., Khan, A., Zaidi, N. us S.S., dan Qadri, I., 2013. Over expression of a synthetic gene encoding interferon lambda using relative synonymous codon usage bias in Escherichia coli. *Pakistan Journal of Pharmaceutical Sciences*, **26**: 1181–1188.
- Amarakoon, I.I., Hamilton, C.-L., Mitchell, S.A., Tennant, P.F., dan Roye, M.E., 2017. Chapter 28 - Biotechnology, dalam: Badal, S. dan Delgoda, R. (Editor), *Pharmacognosy*. Academic Press, Boston, hal. 549–563.
- Ammar, E.M., Wang, X., dan Rao, C.V., 2018. Regulation of metabolism in Escherichia coli during growth on mixtures of the non-glucose sugars: arabinose, lactose, and xylose. *Scientific Reports*, **8**: 609.
- Aoki, T., Yoshizawa, H., Yamawaki, K., Yokoo, K., Sato, J., Hisakawa, S., dkk., 2018. Cefiderocol (S-649266), A new siderophore cephalosporin exhibiting potent activities against Pseudomonas aeruginosa and other gram-negative pathogens including multi-drug resistant bacteria: Structure activity relationship. *European Journal of Medicinal Chemistry*, **155**: 847–868.
- Aramori, I., Fukagawa, M., Tsumura, M., Iwami, M., Isogai, T., Ono, H., dkk., 1991a. Cloning and nucleotide sequencing of new glutaryl 7-ACA and cephalosporin C acylase genes from Pseudomonas strains. *Journal of Fermentation and Bioengineering*, **72**: 232–243.
- Aramori, I., Fukagawa, M., Tsumura, M., Iwami, M., Yokota, Y., Kojo, H., dkk., 1991b. Isolation of soil strains producing new cephalosporin acylases. *Journal of Fermentation and Bioengineering*, **72**: 227–231.
- Aretz, W.D. 6233 K. dan Sauber, K.D. 6231 S., 1986. 'New D-amino Acid Transaminase and Their Use', [patent] DE3447023A1.
- Barber, M.S., Giesecke, U., Reichert, A., dan Minas, W., 2004. Industrial enzymatic production of cephalosporin-based beta-lactams. *Advances in Biochemical Engineering/Biotechnology*, **88**: 179–215.
- Bertero, A., Brown, S., dan Vallier, L., 2017. Methods of Cloning, dalam: *Basic Science Methods for Clinical Researchers*. Elsevier, hal. 19–39.
- Bhatwa, A., Wang, W., Hassan, Y.I., Abraham, N., Li, X.-Z., dan Zhou, T., 2021. Challenges Associated With the Formation of Recombinant Protein Inclusion Bodies in Escherichia coli and Strategies to Address Them for Industrial Applications. *Frontiers in Bioengineering and Biotechnology*, **9**: .
- Butler, J.M., 2012. Chapter 4 - PCR Amplification: Capabilities and Cautions, dalam: Butler, J.M. (Editor), *Advanced Topics in Forensic DNA Typing: Methodology*. Academic Press, San Diego, hal. 69–97.
- Carrió, M.M. dan Villaverde, A., 2002. Construction and deconstruction of bacterial inclusion bodies. *Journal of Biotechnology*, **96**: 3–12.
- Carter, M. dan Shieh, J.C., 2010. Chapter 9 - Molecular Cloning and Recombinant DNA Technology, dalam: Carter, M. dan Shieh, J.C. (Editor), *Guide to Research Techniques in Neuroscience*. Academic Press, New York, hal. 207–227.



- Chan, V., Dreolini, L., Flintoff, K., Lloyd, S., dan Mattenley, A., 2022. The Effects of Glycerol, Glucose, Galactose, Lactose and Glucose with Galactose on the Induction of β -galactosidase in Escherichia coli. *Journal of Experimental Microbiology and Immunology (JEMI)*, **2**: 130–137.
- Chen, Y., Song, J., Sui, S., dan Wang, D.-N., 2003. DnaK and DnaJ facilitated the folding process and reduced inclusion body formation of magnesium transporter CorA overexpressed in Escherichia coli. *Protein Expression and Purification*, **32**: 221–231.
- Cho, K. dan Kim, K.H., 2013. Cephalosporin Acylase Precursor, Glutaryl-7-aminocephalosporanic Acid Acylase Precursor. *Handbook of Proteolytic Enzymes*, **3**: 3659–3663.
- Dandapat, I., Chatterjee, M., Sarkar, D., Gupta, A., Rabbani, G., dan Minakshi, R., 2017. Bacterial Osmolyte System and Its Physiological Roles, dalam: Rajendrakumar Singh, L. dan Dar, T.A. (Editor), *Cellular Osmolytes: From Chaperoning Protein Folding to Clinical Perspectives*. Springer, Singapore, hal. 229–249.
- de Marco, A., Vigh, L., Diamant, S., dan Goloubinoff, P., 2005. Native folding of aggregation-prone recombinant proteins in Escherichia coli by osmolytes, plasmid- or benzyl alcohol-overexpressed molecular chaperones. *Cell Stress & Chaperones*, **10**: 329–339.
- Demain, A.L. dan Vaishnav, P., 2009. Production of recombinant proteins by microbes and higher organisms. *Biotechnology Advances*, **27**: 297–306.
- Diamant, S., Eliah, N., Rosenthal, D., dan Goloubinoff, P., 2001. Chemical chaperones regulate molecular chaperones in vitro and in cells under combined salt and heat stresses. *The Journal of Biological Chemistry*, **276**: 39586–39591.
- Diamant, S., Rosenthal, D., Azem, A., Eliah, N., Ben-Zvi, A.P., dan Goloubinoff, P., 2003. Dicarboxylic amino acids and glycine-betaine regulate chaperone-mediated protein-disaggregation under stress. *Molecular Microbiology*, **49**: 401–410.
- Duggleby, H.J., Tolley, S.P., Hill, C.P., Dodson, E.J., Dodson, G., dan Moody, P.C., 1995. Penicillin acylase has a single-amino-acid catalytic centre. *Nature*, **373**: 264–268.
- Ernst, O. dan Zor, T., 2010. Linearization of the Bradford Protein Assay. *Journal of Visualized Experiments : JoVE*, 1918.
- Francis, D.M. dan Page, R., 2010. Strategies to Optimize Protein Expression in E. coli. *Current Protocols in Protein Science*, **61**: 5241–52429.
- Fritz-Wolf, K., Koller, K.-P., Lange, G., Liesum, A., Sauber, K., Schreuder, H., dkk., 2002. Structure-based prediction of modifications in glutarylaminidase to allow single-step enzymatic production of 7-aminocephalosporanic acid from cephalosporin C. *Protein science*, **11**: 92–103.
- Gottesman, S., 1996. Proteases and their targets in Escherichia coli. *Annual Review of Genetics*, **30**: 465–506.
- Grodberg, J. dan Dunn, J.J., 1988. ompT encodes the Escherichia coli outer membrane protease that cleaves T7 RNA polymerase during purification. *Journal of Bacteriology*, **170**: 1245–1253.
- Hanahan, D., Jessee, J., dan Bloom, F.R., 1991. Plasmid transformation of Escherichia coli and other bacteria. *Methods in Enzymology*, **204**: 63–113.
- Hartl, F.U. dan Hayer-Hartl, M., 2002. Molecular chaperones in the cytosol: from nascent chain to folded protein. *Science (New York, N.Y.)*, **295**: 1852–1858.
- Hartley, D.L. dan Kane, J.F., 1988. Properties of inclusion bodies from recombinant Escherichia coli. *Biochemical Society Transactions*, **16**: 101–102.



- Isdiyono, B.W., Hardianto, D., dan Ivan, F.X., 2017. PRODUKSI REKOMBINAN SEFALOSPORIN ASILASE SEBAGAI BIOKATALIS UNTUK PRODUKSI ASAM 7-AMINOSEFALOSPORANAT. *Jurnal Bioteknologi & Biosains Indonesia (JBBI)*, **4**: 28–35.
- Jobanputra, A.H. dan Vasait, R.D., 2015. Cephalosporin C acylase from Pseudomonas species: Production and enhancement of its activity by optimization of process parameters. *Biocatalysis and Agricultural Biotechnology*, **4**: 465–470.
- Kato, Y., 2020. Extremely Low Leakage Expression Systems Using Dual Transcriptional-Translational Control for Toxic Protein Production. *International Journal of Molecular Sciences*, **21**: 705.
- Kawashima, H., Horii, T., Ogawa, T., dan Ogawa, H., 1984. Functional domains of *Escherichia coli* recA protein deduced from the mutational sites in the gene. *Molecular & general genetics: MGG*, **193**: 288–292.
- Kielkopf, C.L., Bauer, W., dan Urbatsch, I.L., 2020. Bradford Assay for Determining Protein Concentration. *Cold Spring Harbor Protocols*, **2020**: 102269.
- Kim, D.-W. dan Yoon, K.-H., 2001. Cloning and high expression of glutaryl 7-aminocephalosporanic acid acylase gene from *Pseudomonas diminuta*. *Biotechnology Letters*, **23**: 1067–1071.
- Kim, J.K., Yang, I.S., Rhee, S., Dauter, Z., Lee, Y.S., Park, S.S., dkk., 2003. Crystal structures of glutaryl 7-aminocephalosporanic acid acylase: insight into autoproteolytic activation. *Biochemistry*, **42**: 4084–4093.
- Kim, J.K., Yang, I.S., Shin, H.J., Cho, K.J., Ryu, E.K., Kim, S.H., dkk., 2006. Insight into autoproteolytic activation from the structure of cephalosporin acylase: a protein with two proteolytic chemistries. *Proceedings of the National Academy of Sciences of the United States of America*, **103**: 1732–1737.
- Kim, Y. dan Hol, W.G., 2001. Structure of cephalosporin acylase in complex with glutaryl-7-aminocephalosporanic acid and glutarate: insight into the basis of its substrate specificity. *Chemistry & Biology*, **8**: 1253–1264.
- Kim, Y., Kim, S., Earnest, T.N., dan Hol, W.G.J., 2002. Precursor structure of cephalosporin acylase. Insights into autoproteolytic activation in a new N-terminal hydrolase family. *The Journal of Biological Chemistry*, **277**: 2823–2829.
- Kopp, J., Slouka, C., Ulonska, S., Kager, J., Fricke, J., Spadiut, O., dkk., 2017. Impact of Glycerol as Carbon Source onto Specific Sugar and Inducer Uptake Rates and Inclusion Body Productivity in *E. coli* BL21(DE3). *Bioengineering*, **5**: 1.
- Lee, S.Y., 1996. High cell-density culture of *Escherichia coli*. *Trends in Biotechnology*, **14**: 98–105.
- Lin, C.-H., Chen, Y.-C., dan Pan, T.-M., 2011. Quantification bias caused by plasmid DNA conformation in quantitative real-time PCR assay. *PloS One*, **6**: e29101.
- Lodish, H.F., 2000. *Molecular Cell Biology*. W.H. Freeman.
- Lucht, J.M. dan Bremer, E., 1994. Adaptation of *Escherichia coli* to high osmolarity environments: osmoregulation of the high-affinity glycine betaine transport system proU. *FEMS microbiology reviews*, **14**: 3–20.
- Martius, E., Wibisana, A., dan Ardiyani, Y., n.d. The Optimization of Soluble Cephalosporin C Acylase Expression in *E. coli*.
- Matsuda, A., Matsuyama, K., Yamamoto, K., Ichikawa, S., dan Komatsu, K., 1987a. Cloning and characterization of the genes for two distinct cephalosporin acylases from a *Pseudomonas* strain. *Journal of Bacteriology*, **169**: 5815–5820.
- Matsuda, A., Toma, K., dan Komatsu, K., 1987b. Nucleotide sequences of the genes for two distinct cephalosporin acylases from a *Pseudomonas* strain. *Journal of Bacteriology*, **169**: 5821–5826.



- Mojtabavi, S., Samadi, N., dan Faramarzi, M.A., 2019. Osmolyte-Induced Folding and Stability of Proteins: Concepts and Characterization. *Iranian Journal of Pharmaceutical Research : IJPR*, **18**: 13–30.
- Morin, R.B., Jackson, B.G., Flynn, E.H., Roeske, R.W., dan Andrews, S.L., 1969. Chemistry of cephalosporin antibiotics. XIV. The reaction of cephalosporin C with nitrosyl chloride. *Journal of the American Chemical Society*, **91**: 1396–1400.
- Murzin, A.G., Brenner, S.E., Hubbard, T., dan Chothia, C., 1995. SCOP: a structural classification of proteins database for the investigation of sequences and structures. *Journal of Molecular Biology*, **247**: 536–540.
- Nam, S.W. dan Park, Y.H., 1991. Effect of IPTG Induction on Production of β -Galactosidase-PreS2 Fusion Protein in Recombinant Escherichia coli **1**: 274–280.
- Narayanan, N., Hsieh, M.-Y., Xu, Y., dan Chou, C.P., 2006. Arabinose-induction of lac-derived promoter systems for penicillin acylase production in Escherichia coli. *Biotechnology Progress*, **22**: 617–625.
- Nielsen, B.L., Willis, V.C., dan Lin, C.-Y., 2007. Western blot analysis to illustrate relative control levels of the lac and ara promoters in Escherichia coli. *Biochemistry and Molecular Biology Education: A Bimonthly Publication of the International Union of Biochemistry and Molecular Biology*, **35**: 133–137.
- Novagen, 2006. pET System Manual TB055 11th Edition.
- Novy, R. dan Morris, B., n.d. Use of glucose to control basal expression in the pET System. *Novagen. Inc.*.
- 'pET-28b(+) - EcoliWiki', , n.d. URL: [https://ecoliwiki.org/colipedia/index.php/pET-28b\(%2B\)](https://ecoliwiki.org/colipedia/index.php/pET-28b(%2B)) (diakses tanggal 27/5/2023).
- Pollegioni, L., Lorenzi, S., Rosini, E., Marcone, G.L., Molla, G., Verga, R., dkk., 2005. Evolution of an acylase active on cephalosporin C. *Protein Science : A Publication of the Protein Society*, **14**: 3064–3076.
- Pollegioni, L., Rosini, E., dan Molla, G., 2013. Cephalosporin C acylase: dream and(/or) reality. *Applied Microbiology and Biotechnology*, **97**: 2341–2355.
- Pope, B. dan Kent, H.M., 1996. High efficiency 5 min transformation of Escherichia coli. *Nucleic Acids Research*, **24**: 536–537.
- Rahimzadeh, M., Sadeghzadeh, M., Najafi, F., Arab, S., dan Mobasher, H., 2016. Impact of heat shock step on bacterial transformation efficiency. *Molecular Biology Research Communications*, **5**: 257–261.
- Rasyidah, M., Sismindari, dan Purwanto, 2020. 'ANALISIS REKOMBINAN KLON GEN PENYANDI PENISILIN G-ASILASE DARI ESCHERICHIA COLI DALAM INANG ESCHERICHIA COLI DH5ALFA'. Universitas Gadjah Mada.
- Rosano, G.L. dan Ceccarelli, E.A., 2014. Recombinant protein expression in Escherichia coli: advances and challenges. *Frontiers in Microbiology*, **5**:
- Sahdev, S., Khattar, S.K., dan Saini, K.S., 2008. Production of active eukaryotic proteins through bacterial expression systems: a review of the existing biotechnology strategies. *Molecular and Cellular Biochemistry*, **307**: 249–264.
- Sambrook, J. dan Russell, D.W., 2001. *Molecular Cloning: A Laboratory Manual*, 3rd ed. Cold Spring Harbor Laboratory Press, New York.
- Sezonov, G., Joseleau-Petit, D., dan D'Ari, R., 2007. Escherichia coli Physiology in Luria-Bertani Broth. *Journal of Bacteriology*, **189**: 8746–8749.
- Shiloach, J. dan Fass, R., 2005. Growing E. coli to high cell density--a historical perspective on method development. *Biotechnology Advances*, **23**: 345–357.
- Shin, Y.C., Jeon, J.Y.J., Jung, K.H., Park, M.R., dan Kim, Y., 2009. 'Cephalosporin C acylase mutant and method for preparing 7-ACA using same', [patent] US7592168B2.



- Singh, A., Upadhyay, V., Upadhyay, A.K., Singh, S.M., dan Panda, A.K., 2015. Protein recovery from inclusion bodies of *Escherichia coli* using mild solubilization process. *Microbial Cell Factories*, **14**: 41.
- Sowjanya, G. dan Kommoju, M., 2019. Colorimetric Approaches To Drug Analysis And Applications -A Review. *American Journal of PharmTech Research*, **9**: 14–37.
- Spiestersbach, A., Kubicek, J., Schäfer, F., Block, H., dan Maertens, B., 2015. Purification of His-Tagged Proteins. *Methods in Enzymology*, **559**: 1–15.
- Stasiulewicz, M., Panuszko, A., Bruździak, P., dan Stangret, J., 2022. Mechanism of Osmolyte Stabilization–Destabilization of Proteins: Experimental Evidence. *The Journal of Physical Chemistry B*, **126**: 2990–2999.
- Stewart, E.J., Aslund, F., dan Beckwith, J., 1998. Disulfide bond formation in the *Escherichia coli* cytoplasm: an in vivo role reversal for the thioredoxins. *The EMBO Journal*, **17**: 5543–5550.
- Sun, H., Liu, T., Luo, H., Nie, Z., Chang, Y., Yu, H., dkk., 2021. Optimization of Cephalosporin C Acylase Expression in *Escherichia coli* by High-Throughput Screening a Constitutive Promoter Mutant library. *Applied Biochemistry and Biotechnology*, **193**: 1056–1071.
- Tahara, N., Tachibana, I., Takeo, K., Yamashita, S., Shimada, A., Hashimoto, M., dkk., 2020. Boosting Auto-Induction of Recombinant Proteins in *Escherichia coli* with Glucose and Lactose Additives. *Protein and Peptide Letters*, **28**: 1180–1190.
- Tan, Q., Qiu, J., Luo, X., Zhang, Y., Liu, Y., Chen, Y., dkk., 2018. Progress in One-pot Bioconversion of Cephalosporin C to 7-Aminocephalosporanic Acid. *Current Pharmaceutical Biotechnology*, **19**: 30–42.
- Tan, Q., Zhang, Y., Song, Q., dan Wei, D., 2010. Single-pot conversion of cephalosporin C to 7-aminocephalosporanic acid in the absence of hydrogen peroxide. *World Journal of Microbiology and Biotechnology*, **26**: 145–152.
- Taylor, R.G., Walker, D.C., dan McInnes, R.R., 1993. *E. coli* host strains significantly affect the quality of small scale plasmid DNA preparations used for sequencing. *Nucleic Acids Research*, **21**: 1677–1678.
- Tirabassi, R., 2021. 'Supercoiled Plasmid DNA on Agarose Gel: Secret of 3 Bands', . URL: <https://bitesizebio.com/13524/how-to-identify-supercoils-nicks-and-circles-in-plasmid-preps/> (diakses tanggal 8/7/2024).
- Wang, S., Fang, Y., Wang, Z., Zhang, S., Wang, L., Guo, Y., dkk., 2021. Improving l-threonine production in *Escherichia coli* by elimination of transporters ProP and ProVWX. *Microbial Cell Factories*, **20**: 58.
- Wang, Y., Yu, H., Song, W., An, M., Zhang, J., Luo, H., dkk., 2012. Overexpression of synthesized cephalosporin C acylase containing mutations in the substrate transport tunnel. *Journal of Bioscience and Bioengineering*, **113**: 36–41.
- Wilfinger, W.W., Mackey, K., dan Chomczynski, P., 1997. Effect of pH and ionic strength on the spectrophotometric assessment of nucleic acid purity. *BioTechniques*, **22**: 474–476, 478–481.
- World Health Organization, 2019. *Critically Important Antimicrobials for Human Medicine*, 6th rev. ed. World Health Organization, Geneva.
- Yanisch-Perron, C., Vieira, J., dan Messing, J., 1985. Improved M13 phage cloning vectors and host strains: nucleotide sequences of the M13mp18 and pUC19 vectors. *Gene*, **33**: 103–119.