

## DAFTAR PUSTAKA

1. Shi, H.; Zhou, Z.; Li, W.; Fan, Y.; Li, Z.; Wei, J. Hydroxyapatite Based Materials for Bone Tissue Engineering: A Brief and Comprehensive Introduction. *Crystals* 2021, 11 (149), 1–18. <https://doi.org/10.3390/crust11020149>.
2. Momodu, I. I.; Savaliya, V. *Osteomyelitis*. StatPearls [Internet]. <https://www.ncbi.nlm.nih.gov/books/NBK532250/> (accessed 2023-06-19).
3. Bee, S. L.; Hamid, Z. A. A. Characterization of Chicken Bone Waste-Derived Hydroxyapatite and Its Functionality on Chitosan Membrane for Guided Bone Regeneration. *Compos. Part B Eng.* 2019, 163, 562–573. <https://doi.org/10.1016/j.compositesb.2019.01.036>.
4. Arokiasamy, P.; Abdullah, M. M. A. B.; Rahim, S. Z. A.; Luhar, S.; Sandu, A. V.; Jamil, N. H.; Nabialek, M. Synthesis Methods of Hydroxyapatite from Natural Sources: A Review. *Ceram. Int.* 2022, 48 (11), 14959–14979.
5. Cahyaningrum, S. E.; Herdyastuty, N.; Devina, B.; Supangat, D. Synthesis and Characterization of Hydroxyapatite Powder by Wet Precipitation Method. *IOP Conf. Ser. Mater. Sci. Eng.* 2018, 299 (1). <https://doi.org/10.1088/1757-899X/299/1/012039>.
6. Jamarun, N.; Asril, A.; Zilfa; Zulhadjri; Septiani, U. Effect of Hydrothermal Temperature on Synthesis of Hydroxyapatite From Limestone Via Hydrothermal Method. *Int. J. Appl. Pharm.* 2018, 10 (1), 136. <https://doi.org/10.22159/ijap.2018v10i1.23278>.
7. Siregar, A. A.; Jamarun, N.; Putri, Y. E. Modification of Hydroxiapatites With Magnesium Using Calcium From Blood Blood Skin (Tegillarca Granosa) and Test of Antibacy Activity.
8. Jamarun, N.; Miftahurrahmi; Septiani, U. Synthesis of Hydroxyapatite from Halaban Limestone by Sol-Gel Method. *Res. J. Pharm. Biol. Chem. Sci.* 2016, 7 (5), 2956–2961.
9. Burmawi; Jamarun, N.; Arief, S.; Gunawarman. Characterization of Hydroxyapatite from Bovine Bone by Mechanical Combination Method. *Int. J. Eng. Tech.* 2018, 4 (1), 274–279.
10. Henggu, K. U.; Ibrahim, B.; Suptijah, P. Hidroksiapatit Dari Cangkang Sotong Sebagai Sediaan Biomaterial Perancah Tulang. *J. Pengolah. Has. Perikan. Indones.* 2019, 22 (1), 1–13.
11. Silva-Holguín, Nair, P.; Reyes-López, S.Y. Synthesis of Hydroxyapatite-Ag Composite as Antimicrobial Agent. *Dose-Response* 2020, 18 (3), 1–14. <https://doi.org/10.1177/1559325820951342>.
12. Ielo, I.; Calabrese, G.; De Luca, G.; Conoci, S. Recent Advances in Hydroxyapatite-Based Biocomposites for Bone Tissue Regeneration in Orthopedics. *Int. J. Mol. Sci.* 2022, 23 (17). <https://doi.org/10.3390/ijms23179721>.
13. Kim, I. Y.; Seo, S. J.; Moon, H. S.; Yoo, M. K.; Park, I. Y.; Kim, B. C.; Cho, C. S. Chitosan and Its Derivatives for Tissue Engineering Applications. *Biotechnol. Adv.* 2008, 26 (1), 1–21. <https://doi.org/10.1016/j.biotechadv.2007.07.009>.
14. Atay, H. Y. Antibacterial Activity of Chitosan-Based Systems. *Funct. Chitosan* 2019. [https://doi.org/https://doi.org/10.1007/978-981-15-0263-7\\_15](https://doi.org/https://doi.org/10.1007/978-981-15-0263-7_15).
15. Said, H. A.; Noukrati, H.; Youcef, H. Ben; Mahdi, I.; Oudadesse, H.; Barroug, A. In Situ Precipitated Hydroxyapatite-Chitosan Composite Loaded with Ciprofloxacin: Formulation, Mechanical, In Vitro Antibiotic Uptake, Release, and Antibacterial Properties. *Mater. Chem. Phys.* 2022. <https://doi.org/10.1016/j.matchemphys.2022.127008>.
16. López-Ortiz, S.; Mendoza-Anaya, D.; Sánchez-Campos, D.; Fernandez-García,

- M. E.; Salinas-Rodríguez, E.; Reyes-Valderrama, M. I.; Rodríguez-Lugo, V. The PH Effect on the Growth of Hexagonal and Monoclinic Hydroxyapatite Synthesized by the Hydrothermal Method. *J. Nanomater.* 2020, 2020. <https://doi.org/10.1155/2020/5912592>.
17. Meilanti. Isolasi Kalsium Oksida (CaO) Pada Cangkang Sotong (Cuttlefish) Dengan Proses Kalsinasi Menggunakan Asam Nitrat Dalam Pembuatan Precipitated Calcium Carbonat (PCC). *J. Distilasi* 2017, 2 (1), 1–8.
  18. Agustina, S.; Swantara, I. M. D.; Suartha, I. N. Isolasi Kitin, Karakterisasi, Dan Sintesis Kitosan Dari Kulit Udang. *J. Kim.* 2015, 9 (2), 271–278.
  19. Jeong, J.; Kim, J. H.; Shim, J. H.; Hwang, N. S. Bioactive Calcium Phosphate Materials and Applications in Bone Regeneration. *Biomater. Res.* 2019, 23 (4). <https://doi.org/https://doi.org/10.1186/s40824-018-0149-3>.
  20. Mondal, S.; Dorozhkin, S. V.; Pal, U. Recent Progress on Drug Delivery Applications of Nanostructured Hydroxyapatite. *WIREs Nanomed Nanobiotechnol* 2018, 10. <https://doi.org/doi: 10.1002/wnan.1504>.
  21. Suryadi. Sintesis Dan Karakterisasi Biomaterial Hidroksiapatit Dengan Proses Pengendapan Kimia Basah, Universitas Indonesia, 2011.
  22. Saeed, G. K.; Essa, A. F.; Said, S. A. A. Preparation and Characterization of Hydroxyapatite Powder and Study of Hydroxyapatite - Alumina Composite. *J. Phys. Conf. Ser.* 2020, 1591 (1). <https://doi.org/10.1088/1742-6596/1591/1/012006>.
  23. Rivera-Muñoz, E. M. Hydroxyapatite-Based Materials: Synthesis and Characterization. In *Biomedical Engineering - Frontiers and Challenges*; Fazel-Rezai, R., Ed.; IntechOpen Limited, 2011. <https://doi.org/10.5772/1019>.
  24. Szterner, P.; Biernat, M. Effect of Reaction Time, Heating and Stirring Rate on the Morphology of HA Obtained by Hydrothermal Synthesis. *J. Therm. Anal. Calorim.* 2022, 147 (23), 13059–13071. <https://doi.org/10.1007/s10973-022-11564-5>.
  25. Wulandari, W.; Islami, D. M.; Wellia, D. V.; Emriadi, E.; Sisca, V.; Jamarun, N. The Effect of Alginate Concentration on Crystallinity, Morphology, and Thermal Stability Properties of Hydroxyapatite/Alginate Composite. *Polymers (Basel).* 2023, 15 (3). <https://doi.org/10.3390/polym15030614>.
  26. K, M. G. H. K. *A to Z Budidaya Biota Akuatik Untuk Pangan, Kosmetik, Dan Obat-Obatan*, I.; Viva, R., Ed.; Lily Publisher: Yogyakarta, 2010.
  27. Jereb, P.; Roper, C. *CEPHALOPODS OF THE WORLD Volume 1: Chambered Nautiluses and Sepioids*; 2005; Vol. 1.
  28. Darwish, A. S.; Osman, D. I.; Mohammed, H. A.; Attia, S. K. Cuttlefish Bone Biowaste for Production of Holey Aragonitic Sheets and Mesoporous Mayenite-Embedded Ag<sub>2</sub>CO<sub>3</sub> Nanocomposite: Towards Design High-Performance Adsorbents and Visible-Light Photocatalyst for Detoxification of Dyes Wastewater and Waste Oil Recove. *J. Photochem. Photobiol. A Chem.* 2021, 421. <https://doi.org/https://doi.org/10.1016/j.jphotochem.2021.113523>.
  29. Checa, A. G.; Cartwright, J. H. E.; Sánchez-Almazo, I.; Andrade, J. P.; Ruiz-Raya, F. The Cuttlefish *Sepia Officinalis* (Sepiidae, Cephalopoda) Constructs Cuttlebone from a Liquid-Crystal Precursor. *Sci. Rep.* 2015, 5, 1–13. <https://doi.org/10.1038/srep11513>.
  30. Younes, I.; Rinaudo, M. Chitin and Chitosan Preparation from Marine Sources. Structure, Properties and Applications. *Mar. Drugs* 2015, 13 (3), 1133–1174. <https://doi.org/10.3390/md13031133>.
  31. Fitri, N. L. E.; Rusmini. Characterization of Chitosan from Simping Shells (Placuna Placenta) Waste. *UNESA J. Chem.* 2016, 5 (3), 109–113.
  32. Ardean, C.; Davidescu, C. M.; Nemeş, N. S.; Negrea, A.; Ciopec, M.; Duteanu,

- N.; Negrea, P.; Duda-seiman, D.; Musta, V. Factors Influencing the Antibacterial Activity of Chitosan and Chitosan Modified by Functionalization. *Int. J. Mol. Sci.* 2021, 22 (14). <https://doi.org/10.3390/ijms22147449>.
33. Kravanja, G.; Primožic, M.; Knez, Z.; Leitgeb, M. Chitosan-Based (Nano)Materials for Novel Biomedical Applications. *Molecules* 2019, 24. <https://doi.org/10.3390/molecules24101960>.
34. Badan Pusat Statistik. *Produksi Perikanan Tangkap di Laut Menurut Komoditas Utama (Ton), 2019-2021*. Badan Pusat Statistik.
35. Afriani, Y.; Fadli, A.; Maulana, S.; Karina, I. Sintesis , Kinetika Reaksi Dan Aplikasi Kitin Dari Cangkang Udang : Review. *J. Bioprocess, Chem. Environ. Eng. Sci.* 2016, No. October, 1–2.
36. Nurhikmawati, F.; Manurung, M.; Laksmiwati, A. A. I. A. M. Penggunaan Kitosan Dari Limbah Kulit Udang Sebagai Inhibitor Keasaman Tuak. *J. Kim.* 2014, 8 (2), 191–197.
37. Widi, R. K. *Pemanfaatan Material Anorganik: Pengenalan Dan Beberapa Inovasi Di Bidang Penelitian*, 1st ed.; Deepublish: Yogyakarta, 2018.
38. Tjahjanti, P. H. Buku Ajar Teori Dan Aplikasi Material Komposit Dan Polimer. *Buku Ajar Teor. Dan Apl. Mater. Komposit Dan Polim.* 2018. <https://doi.org/10.21070/2019/978-602-5914-27-0>.
39. Soriente, A.; Fasolino, I.; Gomez-Sánchez, A.; Prokhorov, E.; Buonocore, G. G.; Luna-Barcenas, G.; Luigi Ambrosio, M. G. R. Chitosan/Hydroxyapatite Nanocomposite Scaffolds to Modulate Osteogenic and Inflammatory Response. *J. Biomed. Mater. Res. Part A* 2021, 110 (2). <https://doi.org/https://doi.org/10.1002/jbm.a.37283>.
40. Encyclopaedia Britannica. *Science & Tech pH*. Britannica. <https://www.britannica.com/science/pH> (accessed 2023-07-11).
41. Irwansyah, F. S.; Yusuf, A.; Eddy, D. R.; Risdiana, R.; Noviyanti, A. R. Effect of Sensitive PH on Hydroxyapatite Properties Synthesized from Chicken Eggshell. *Indones. J. Chem.* 2022, 22 (5). <https://doi.org/10.22146/ijc.72959>.
42. Wang, P.; Li, C.; Gong, H.; Jiang, X.; Wang, H.; Li, K. Effects of Synthesis Conditions on the Morphology of Hydroxyapatite Nanoparticles Produced by Wet Chemical Process. *Powder Technol.* 2010, 203 (2), 315–321. <https://doi.org/10.1016/j.powtec.2010.05.023>.
43. Palanivelu, R.; Saral, A. M.; Kumar, A. R. Nanocrystalline Hydroxyapatite Prepared Under Various PH Conditions. *Spectrochim. Acta Part A Mol. Biomol. Spectrosc.* 2014, 131, 37–41. <https://doi.org/http://dx.doi.org/http://dx.doi.org/10.1016/j.saa.2014.04.014>.
44. Hutabarat, G. S.; Qodir, D. T.; Setiawan, H.; Akbar, N.; Noviyanti, A. R. Sintesis Komposit Hidroksiapatit-Lantanum Oksida (HA-La<sub>2</sub>O<sub>3</sub>) Dengan Metode Hidrotermal Secara In-Situ Dan Ex-Situ. *ALCHEMY J. Penelit. Kim.* 2019, 15 (2), 287. <https://doi.org/10.20961/alchemy.15.2.32062.287-301>.
45. R.M. aikin, J. The Mechanical Properties of Ln-Situ Composites. *J. Miner.* 1997, 49 (8), 35–39. <https://doi.org/https://doi.org/10.1007/BF02914400>.
46. CLSI. *Performance Standards for Antimicrobial Susceptibility Testing*, 30th ed.; Clinical and Laboratory Standards Institute: Wayne, Pennsylvania, USA, 2020.
47. SHARMA, P. C.; JAIN, A.; JAIN, S. Fluoroquinolone Antibacterials: A Review On Chemistry, Microbiology and Therapeutic Prospects. *Acta Pol. Pharm. - Drug Res.* 2009, 66 (6), 587–604.
48. McGregor, R.; Graziani, A.; Esterhai, J. Ciprofloxacin Oral Untuk Osteomyelitis. *Orthopedics* 1990, 13 (1), 55–60. <https://doi.org/doi:10.3928/0147-7447-19900101-10>.
49. Jamaludin, A.; Adiantoro, D. Analisis Kerusakan X-Ray Fluorescence (XRF).

- Batan 2012, 5, 19–28.
50. Sani, R. A. *Karakterisasi Material*, 1st ed.; Hastuti, S. B., Ed.; PT Bumi Aksara: Jakarta, 2019.
  51. Yusuf, Y.; Almukarrama; Permatasari, H. A.; Januariyasa, I. komang; Muarif, M. F.; Anggraini, R. M.; Wati, R. *Karbonat Hidroksiapatit Dari Bahan Alam Pengertian, Karakterisasi, Dan Aplikasi*; Mouldvi, Ed.; Gadjah Mada University Press: Yogyakarta, 2021.
  52. Hartati; Prasetyoko, D. *Katalis Berbasis Aluminiosilikat*; Airlangga University Press: Surabaya, 2023.
  53. Mulyani, R.; Mulyadi, D.; Yusuf, N. Preparation and Characterization of Chitosan Membranes from Crab Shells (*Scylla Olivacea*) for Beverage Preservative. *J. Kim. Val.* 2019, 5 (2), 242–247. <https://doi.org/10.15408/jkv.v5i2.10637>.
  54. Hisham, F.; Akmal, M. H. M.; Ahmad, F. B.; Ahmad, K. Facile Extraction of Chitin and Chitosan from Shrimp Shell. *Mater. Today Proc.* 2021, 42, 2369–2373. <https://doi.org/10.1016/j.matpr.2020.12.329>.
  55. Isnawati, N.; Wahyuningsih; Adlhani, E. Pembuatan Kitosaan Dari Kulit Udang Putih (*Penaeus Merguiensis*) Dan Aplikasinya Sebagai Pengawet Alami Untuk Udang Segar. *J. Teknol. Agro-Industri* 2015, 2 (2), 1–7.
  56. Ersal, F. M.; Nurlely; Sari, Y. W. Synthesis and Characterization of Hydroxyapatite-Chitosan Composite In Situ by Microwave Irradiation Method. *J. Phys. Conf. Ser.* 2019, 1248 (1). <https://doi.org/10.1088/1742-6596/1248/1/012080>.
  57. Izudin, I.; Regar, R.; Wahyuningsih, A.; Hanifa, I.; Nurrosyidah. Daya Hambat Lactobacillus Reuteri Terhadap Escherichia Coli Dan Staphylococcus Aureus Secara In Vitro. *J. Pharm. Care Anwar Med.* 2020, 2 (2).
  58. Elma, M. *Proses Sol Gel: Analisis, Fundamental, Dan Aplikasi*, 1st ed.; Lambung Mangkurat University Press: Banjarmasin, 2018.
  59. Muliati. Sintesis Dan Karakterisasi Hidroksiapatit Dari Tulang Ikan Tuna (*Thunus Sp*) Dengan Metode Sol-Gel, Universitas Islam Negeri Alauddin, 2016.
  60. Dompeipen, E. J.; Kaimudin, M.; Dewa, R. P. Isolasi Kitin Dan Kitosan Dari Limbah Kulit Udang. *Maj. Biam* 2016, 12 (01), 32–39.
  61. Hanafi, M.; Aiman, S.; D, E.; Suwandi, B. Pemanfaatan Kulit Udang Untuk Pembuatan Kitosan Dan Glukosamin. *JKTI* 2000, 10 (1–2), 17–21.
  62. Azizati, Z. Pembuatan Dan Karakterisasi Kitosan Kulit Udang Galah. *Walisongo J. Chem.* 2019, 2 (1), 10. <https://doi.org/10.21580/wjc.v3i1.3878>.
  63. Hartatiek; Rohmawati, N.; Worowati, D.; Nasikhudin; Yudyanto; Kurniawan, R.; Utomo, J.; Lestari, U. The Influence of Chitosan on Crystal Size and Microstructure of Nano-Hydroxyapatite from Cuttlefish Bone-Chitosan Composites. *Mater. Today Proc.* 2019, 13, 30–35. <https://doi.org/10.1016/j.matpr.2019.03.182>.
  64. Rodríguez-Lugo, V.; Karthik, T. V. K.; Mendoza-Anaya, D.; Rubio-Rosas3, E.; Cero'n, L. S. V.; Reyes-Valderrama, M. I.; Salinas-Rodríguez, E. Wet Chemical Synthesis of Nanocrystalline Hydroxyapatite Flakes : Effect of PH and Sintering Temperature on Structural and Morphological Properties. *R. Soc. Open Sci.* 2018, 5. <https://doi.org/. http://dx.doi.org/10.1098/rsos.180962>.
  65. Susilowati, E.; Mahatmanti, F. W.; Haryani, S. Sintesis Kitosan-Silika Bead Sebagai Pengadsorpsi Ion Logam Pb(II) Pada Limbah Cair Batik. *Indones. J. Chem. Sci.* 2018, 7 (2).
  66. Sirait, M.; Sinulingga, K.; Siregar, N.; Doloksaribu, M. E.; Amelia. Characterization of Hydroxyapatite by Cytotoxicity Test and Bending Test. *J. Phys. Conf. Ser.* 2022, 2193 (1). <https://doi.org/10.1088/1742-6596/2193/1/012080>.

- 6596/2193/1/012039.
- 67. Roslan, M. R.; Nasir, N. F. M.; Khalid, M. F. A.; Mohammad, N. F.; Meng, C. E.; Hashim, N. N. N.; You, B. C.; Majid, M. S. A.; Amin, N. A. M. The Optimization of the Hydroxyapatite (HA) Material Characteristics Produced from Corbiculacea (Etok) Shells. *J. Phys. Conf. Ser.* 2019, 1372 (1). <https://doi.org/10.1088/1742-6596/1372/1/012077>.
  - 68. Sopyan, I. PREPARATION OF HYDROXYAPATITE POWDERS FOR MEDICAL APPLICATIONS VIA SOL-GEL TECHNIQUE Preparation of the Stoichiometric Hydroxyapatite Powder. *J. Sains Mater. Indones.* 2003, 4 (2), 46–51.
  - 69. Tenover, F. C. Antimicrobial Susceptibility Testing. *Encycl. Microbiol.* 2019, 25 (5), 166–175. <https://doi.org/10.1016/B978-0-12-801238-3.02486-7>.
  - 70. Hosseinnejad, M.; Jafari, S. M. Evaluation of Different Factors Affecting Antimicrobial Properties of Chitosan. *Int. J. Biol. Macromol.* 2016, 85, 467–475. <https://doi.org/10.1016/j.ijbiomac.2016.01.022>.

