

## DAFTAR PUSTAKA

- [1] D. Banerjee *dkk.*, “Potential of Metal–Organic Frameworks for Separation of Xenon and Krypton,” *Acc. Chem. Res.*, vol. 48, no. 2, hlm. 211–219, Feb 2015, doi: 10.1021/ar5003126.
- [2] S. U. Nandanwar, K. Coldsnow, V. Utgikar, P. Sabharwall, dan D. Eric Aston, “Capture of harmful radioactive contaminants from off-gas stream using porous solid sorbents for clean environment – A review,” *Chem. Eng. J.*, vol. 306, hlm. 369–381, Des 2016, doi: 10.1016/j.cej.2016.07.073.
- [3] J. Wang dan S. Zhuang, “Cesium separation from radioactive waste by extraction and adsorption based on crown ethers and calixarenes,” *Nucl. Eng. Technol.*, vol. 52, no. 2, hlm. 328–336, Feb 2020, doi: 10.1016/j.net.2019.08.001.
- [4] J. Li *dkk.*, “Metal–organic framework-based materials: superior adsorbents for the capture of toxic and radioactive metal ions,” *Chem. Soc. Rev.*, vol. 47, no. 7, hlm. 2322–2356, Apr 2018, doi: 10.1039/C7CS00543A.
- [5] H. Liu, T. Fu, dan Y. Mao, “Metal–Organic Framework-Based Materials for Adsorption and Detection of Uranium (VI) from Aqueous Solution,” *ACS Omega*, vol. 7, no. 17, hlm. 14430–14456, Mei 2022, doi: 10.1021/acsomega.2c00597.
- [6] M. A. Nasalevich, M. van der Veen, F. Kapteijn, dan J. Gascon, “Metal–organic frameworks as heterogeneous photocatalysts: advantages and challenges,” *CrystEngComm*, vol. 16, no. 23, hlm. 4919–4926, Mei 2014, doi: 10.1039/C4CE00032C.
- [7] L. Zhao *dkk.*, “Adsorption of cerium (III) by HKUST-1 metal-organic framework from aqueous solution,” *J. Colloid Interface Sci.*, vol. 542, Apr 2019, doi: 10.1016/j.jcis.2019.01.117.



- [8] H. F. D. Supratman, “Studi Perubahan Karakteristik  $[\text{Cu}_3(\text{C}_6\text{H}_3(\text{COO})_3)_2(\text{H}_2\text{O})_3]_n$  (HKUST-1) Terhadap Radiasi Menggunakan Metode Iradiasi Gamma,” Universitas Gadjah Mada, Yogyakarta, 2022. Diakses: 27 September 2022. [Daring]. Tersedia pada: [etd.repository.ugm.ac.id/penelitian/detail/210520](http://etd.repository.ugm.ac.id/penelitian/detail/210520)
- [9] R. Ediati, M. Kahardina, dan D. Hartanto, “Pengaruh Perbandingan Pelarut Etanol dan Dimetilformamida pada Sintesis Metal Organik Framework HKUST-1,” *Akta Kim. Indones.*, vol. 1, hlm. 25–33, Nov 2016, doi: 10.12962/j25493736.v1i1.1425.
- [10] M. F. Saifuddin, “Studi Sintesis  $[\text{Cu}_3(\text{C}_6\text{H}_3(\text{COO})_3)_2(\text{H}_2\text{O})_3]_n$  (HKUST-1) menggunakan Metode Solvothermal pada Variasi Fraksi Volume Pelarut N,N-Dimethylformamide sebagai Material Prekursor Sensor Gas,” Universitas Gadjah Mada, 2020. Diakses: 27 September 2022. [Daring]. Tersedia pada: <http://etd.repository.ugm.ac.id/penelitian/detail/189112>
- [11] S. S. Chui, S. M. Lo, J. P. Charmant, A. G. Orpen, dan I. D. Williams, “A chemically functionalizable nanoporous material  $[\text{Cu}_3(\text{TMA})_2(\text{H}_2\text{O})_3]_n$ ,” *Science*, vol. 283, no. 5405, hlm. 1148–1150, Feb 1999, doi: 10.1126/science.283.5405.1148.
- [12] K. Schlichte, T. Kratzke, dan S. Kaskel, “Improved synthesis, thermal stability and catalytic properties of the metal-organic framework compound  $\text{Cu}_3(\text{BTC})_2$ ,” *Microporous Mesoporous Mater.*, vol. 73, hlm. 81–88, Agu 2004, doi: 10.1016/j.micromeso.2003.12.027.
- [13] I. Senkovska dan S. Kaskel, “High pressure methane adsorption in the metal-organic frameworks  $\text{Cu}_3(\text{BTC})_2$ ,  $\text{Zn}_2(\text{bdc})_2\text{dabco}$ , and  $\text{Cr}_3\text{F}(\text{H}_2\text{O})_2\text{O}(\text{bdc})_3$ ,” *Microporous Mesoporous Mater.*, vol. 112, no. 1, hlm. 108–115, Jul 2008, doi: 10.1016/j.micromeso.2007.09.016.



- [14] X. Mu, Y. Chen, E. Lester, dan T. Wu, “Optimized synthesis of nano-scale high quality HKUST-1 under mild conditions and its application in  $\text{CO}_2$  capture,” *Microporous Mesoporous Mater.*, vol. 270, hlm. 249–257, Nov 2018, doi: 10.1016/j.micromeso.2018.05.027.
- [15] J. L. C. Rowsell dan O. M. Yaghi, “Effects of Functionalization, Catenation, and Variation of the Metal Oxide and Organic Linking Units on the Low-Pressure Hydrogen Adsorption Properties of Metal–Organic Frameworks,” *J. Am. Chem. Soc.*, vol. 128, no. 4, hlm. 1304–1315, Feb 2006, doi: 10.1021/ja056639q.
- [16] J. Liu *dkk.*, “Experimental and Theoretical Studies of Gas Adsorption in  $\text{Cu}_3(\text{BTC})_2$ : An Effective Activation Procedure,” *J. Phys. Chem. C*, vol. 111, Jun 2007, doi: 10.1021/jp071449i.
- [17] P. Chowdhury, C. Bikkina, D. Meister, F. Dreisbach, dan S. Gumma, “Comparison of adsorption isotherms on Cu-BTC metal organic frameworks synthesized from different routes,” *Microporous Mesoporous Mater.*, vol. 117, no. 1, hlm. 406–413, Jan 2009, doi: 10.1016/j.micromeso.2008.07.029.
- [18] Y. rahman, “Analisis Adsorpsi Isotermal Stronsium menggunakan Senyawa Metal Organic Frameworks [HKUST-1] Berdasarkan Variasi Suhu Operasi serta Variasi Nilai Konsentrasi Awal Terlarut,” Universitas Gadjah Mada, Yogyakarta, 2018.
- [19] L. He *dkk.*, “Silver nanoparticles prepared by gamma irradiation across metal organic framework templates,” *RSC Adv.*, vol. 5, hlm. 10707–10715, Jan 2015, doi: 10.1039/C4RA10260F.
- [20] C. Volkringer *dkk.*, “Stability of metal-organic frameworks under gamma irradiation,” *Chem. Commun. Camb. Engl.*, vol. 52, Okt 2016, doi: 10.1039/c6cc06878b.



- [21] S. Elsaïdi *dkk.*, “Radiation-resistant metal-organic framework enables efficient separation of krypton fission gas from spent nuclear fuel,” *Nat. Commun.*, vol. 11, Jun 2020, doi: 10.1038/s41467-020-16647-1.
- [22] S. Gadipelli dan Z. Guo, “Postsynthesis Annealing of MOF-5 Remarkably Enhances the Framework Structural Stability and  $\text{CO}_2$  Uptake,” *Chem. Mater.*, vol. 26, no. 22, hlm. 6333–6338, Nov 2014, doi: 10.1021/cm502399q.
- [23] P. D. Patil *dkk.*, “Effect of annealing temperature on morphologies of metal organic framework derived  $\text{NiFe}_2\text{O}_4$  for supercapacitor application,” *J. Energy Storage*, vol. 40, hlm. 102821, Agustus 2021, doi: 10.1016/j.est.2021.102821.
- [24] C. Koroni, T. Olsen, J. P. Wharry, dan H. Xiong, “Irradiation-Induced Amorphous-to-Crystalline Phase Transformations in Ceramic Materials,” *Materials*, vol. 15, no. 17, hlm. 5924, Agu 2022, doi: 10.3390/ma15175924.
- [25] L. Jiao, J. Y. R. Seow, W. S. Skinner, Z. U. Wang, dan H.-L. Jiang, “Metal–organic frameworks: Structures and functional applications,” *Mater. Today*, vol. 27, hlm. 43–68, Jul 2019, doi: 10.1016/j.mattod.2018.10.038.
- [26] Hong-Cai “Joe” Zhou dan S. Kitagawa, “Metal–Organic Frameworks (MOFs),” *Chem. Soc. Rev.*, vol. 43, no. 16, hlm. 5415–5418, 2014, doi: 10.1039/C4CS90059F.
- [27] S. Soni, P. Bajpai, dan C. Arora, “A review on metal-organic framework: synthesis, properties and application,” *Charact. Appl. Nanomater.*, vol. 2, Sep 2018, doi: 10.24294/can.v2i2.551.
- [28] A. Silva *dkk.*, “The Chemistry and Applications of Metal–Organic Frameworks (MOFs) as Industrial Enzyme Immobilization Systems,” *Molecules*, vol. 27, hlm. 4529, Jul 2022, doi: 10.3390/molecules27144529.



- [29] “Introduction to Metal–Organic Frameworks,” *Chem. Rev.*, vol. 112, no. 2, hlm. 673–674, Feb 2012, doi: 10.1021/cr300014x.
- [30] M. Carboni, C. W. Abney, S. Liu, dan W. Lin, “Highly porous and stable metal–organic frameworks for uranium extraction,” *Chem. Sci.*, vol. 4, no. 6, hlm. 2396–2402, Mei 2013, doi: 10.1039/C3SC50230A.
- [31] B. Zornoza, C. Tellez, J. Coronas, J. Gascon, dan F. Kapteijn, “Metal organic framework based mixed matrix membranes: An increasingly important field of research with a large application potential,” *Microporous Mesoporous Mater.*, vol. 166, hlm. 67–78, Jan 2013, doi: 10.1016/j.micromeso.2012.03.012.
- [32] S. Qiu, M. Xue, dan G. Zhu, “Metal–organic framework membranes: from synthesis to separation application,” *Chem. Soc. Rev.*, vol. 43, no. 16, hlm. 6116–6140, Jul 2014, doi: 10.1039/C4CS00159A.
- [33] S. L. James, “Metal-organic frameworks,” *Chem. Soc. Rev.*, vol. 32, no. 5, hlm. 276–288, Agu 2003, doi: 10.1039/B200393G.
- [34] J. Kim, H. Cho, dan W. Ahn, “Synthesis and Adsorption/Catalytic Properties of the Metal Organic Framework CuBTC,” *Catal. Surv. Asia*, vol. 16, Jun 2012, doi: 10.1007/s10563-012-9135-2.
- [35] Y.-R. Lee, J. Kim, dan W.-S. Ahn, “Synthesis of metal-organic frameworks: A mini review,” *Korean J. Chem. Eng.*, vol. 30, no. 9, hlm. 1667–1680, Sep 2013, doi: 10.1007/s11814-013-0140-6.
- [36] Chui, S.S.-Y., Lo, S.M.-F., Charmant, J.P.H., Orpen, A.G., dan Williams, I.D., “CCDC 112954: Experimental Crystal Structure Determination.” Cambridge Crystallographic Data Centre, 1999. doi: 10.5517/CC3SJP2.
- [37] I. Majchrzak-Kuceba dan A. Ściubidło, “Shaping metal–organic framework (MOF) powder materials for CO<sub>2</sub> capture applications—a thermogravimetric



- study,” *J. Therm. Anal. Calorim.*, vol. 138, no. 6, hlm. 4139–4144, Des 2019, doi: 10.1007/s10973-019-08314-5.
- [38] C. H. Hendon dan A. Walsh, “Chemical principles underpinning the performance of the metal–organic framework HKUST-1,” *Chem. Sci.*, vol. 6, no. 7, hlm. 3674–3683, 2015, doi: 10.1039/C5SC01489A.
- [39] R. Chang, *General chemistry: the essential concepts*, 5th ed. Boston: McGraw-Hill, 2008.
- [40] “HKUST-1 Metal Organic Framework,” *ChemTube3D*. <https://www.chemtube3d.com/mof-hkust-1-2/> (diakses 10 Juni 2023).
- [41] T. Wang, H. Zhu, Q. Zeng, dan D. Liu, “Strategies for Overcoming Defects of HKUST-1 and Its Relevant Applications,” *Adv. Mater. Interfaces*, vol. 6, no. 13, hlm. 1900423, 2019, doi: 10.1002/admi.201900423.
- [42] S. B. Peh dan D. Zhao, “1 - Synthesis and development of metal–organic frameworks,” dalam *Nanoporous Materials for Molecule Separation and Conversion*, J. Liu dan F. Ding, Ed., dalam Micro and Nano Technologies. Elsevier, 2020, hlm. 3–43. doi: 10.1016/B978-0-12-818487-5.00001-7.
- [43] G. Demazeau, “Review. Solvothermal Processes: Definition, Key Factors Governing the Involved Chemical Reactions and New Trends,” *Z. Für Naturforschung B*, vol. 65, Jun 2014, doi: 10.1515/znb-2010-0805.
- [44] G. Tunell, E. Posnjak, dan C. J. Ksanda, “Geometrical and Optical Properties, and Crystal Structure of Tenorite,” *Z. Für Krist. - Cryst. Mater.*, vol. 90, no. 1–6, hlm. 120–142, Okt 1935, doi: <https://doi.org/10.1524/zkri.1935.90.1.120>.
- [45] A. Kirfel dan K. Eichhorn, “Accurate structure analysis with synchrotron radiation the electron density in  $\text{Al}_2\text{O}_3$  and  $\text{Cu}_2\text{O}$ ,” *Acta Crystallogr. A*, vol. 46, no. 4, hlm. 271–284, Apr 1990.



- [46] N. J. Tro, *Introductory chemistry*, 4th ed. Boston: Prentice Hall, 2011.
- [47] R. C. Bauer, J. P. Birk, dan P. Marks, *Introduction to chemistry*, Fifth edition. New York, NY: McGraw-Hill Education, 2019.
- [48] B. A. Averill, *Map: General Chemistry: Principles, Patterns, and Applications*. LibreText, 2021.
- [49] C. Nunes, A. Mahendrasingam, dan R. Suryanarayanan, “Quantification of Crystallinity in Substantially Amorphous Materials by Synchrotron X-ray Powder Diffractometry,” *Pharm. Res.*, vol. 22, hlm. 1942–53, Des 2005, doi: 10.1007/s11095-005-7626-9.
- [50] P. W. Atkins, *Shriver & Atkins’ inorganic chemistry*, 5th ed. Oxford: Oxford University Press, 2010. Diakses: 13 Maret 2023. [Daring]. Tersedia pada: <http://www.oxfordtextbooks.co.uk/orc/ichem5e/>
- [51] D. Kim dkk., “Recent Technologies for Amorphization of Poorly Water-Soluble Drugs,” *Pharmaceutics*, vol. 13, no. 8, hlm. 1318, Agu 2021, doi: 10.3390/pharmaceutics13081318.
- [52] J. Šesták, J. J. Mareš, dan P. Hubík, Ed., *Glassy, Amorphous and Nano-Crystalline Materials*, vol. 8. dalam Hot Topics in Thermal Analysis and Calorimetry, vol. 8. Dordrecht: Springer Netherlands, 2011. doi: 10.1007/978-90-481-2882-2.
- [53] S. J. Zinkle, H. Tanigawa, dan B. D. Wirth, “Chapter 5 - Radiation and Thermomechanical Degradation Effects in Reactor Structural Alloys,” dalam *Structural Alloys for Nuclear Energy Applications*, G. R. Odette dan S. J. Zinkle, Ed., Boston: Elsevier, 2019, hlm. 163–210. doi: 10.1016/B978-0-12-397046-6.00005-8.
- [54] K. B. Abdan, S. C. Yong, E. C. W. Chiang, R. A. Talib, T. C. Hui, dan L. C. Hao, “Chapter 6 - Barrier properties, antimicrobial and antifungal activities of





chitin and chitosan-based IPNs, gels, blends, composites, and nanocomposites,” dalam *Handbook of Chitin and Chitosan*, S. Gopi, S. Thomas, dan A. Pius, Ed., Elsevier, 2020, hlm. 175–227. doi: 10.1016/B978-0-12-817968-0.00006-8.

- [55] L. McKeen, “Introduction to the Physical, Mechanical, and Thermal Properties of Plastics and Elastomers,” dalam *The Effect of Sterilization on Plastics and Elastomers*, Elsevier, 2012, hlm. 57–84. doi: 10.1016/B978-1-4557-2598-4.00003-4.
- [56] S. Kavesh dan J. M. Schultz, “Meaning and measurement of crystallinity in polymers: A Review,” *Polym. Eng. Sci.*, vol. 9, no. 5, hlm. 331–338, Sep 1969, doi: 10.1002/pen.760090504.
- [57] A. Sami, E. David, dan M. Fréchet, “Procedure for evaluating the crystallinity from X-ray diffraction scans of high and low density polyethylene/SiO<sub>2</sub> composites,” dalam *2010 Annual Report Conference on Electrical Insulation and Dielectric Phenomena*, Okt 2010, hlm. 1–4. doi: 10.1109/CEIDP.2010.5724069.
- [58] V. P. Guinn, “Radioactivity,” dalam *Encyclopedia of Physical Science and Technology (Third Edition)*, R. A. Meyers, Ed., New York: Academic Press, 2003, hlm. 661–674. doi: 10.1016/B0-12-227410-5/00643-8.
- [59] G. F. Knoll, *Radiation detection and measurement*, 4th ed. Hoboken, N.J: John Wiley, 2010.
- [60] K. A. Strohfeldt, *Essentials of Inorganic Chemistry: For Students of Pharmacy, Pharmaceutical Sciences and Medicinal Chemistry*, 1 ed. Wiley, 2015. doi: 10.1002/9781118695425.
- [61] N. Tsoulfanidis dan S. Landsberger, *Measurement and Detection of Radiation*. CRC Press, Taylor & Francis Group, 2015.





- [62] J. Nriagu, *Encyclopedia of Environmental Health*, 2 ed. Elsevier, 2019.  
Diakses: 18 Maret 2023. [Daring]. Tersedia pada:  
<https://www.elsevier.com/books/encyclopedia-of-environmental-health/nriagu/978-0-444-63951-6>
- [63] G. Petrangeli, “The Dispersion of Radioactivity Releases,” dalam *Nuclear Safety*, Elsevier, 2020, hlm. 85–102. doi: 10.1016/B978-0-12-818326-7.00006-8.
- [64] G. Petrangeli, “Inventory and Localization of Radioactive Products in the Plant,” dalam *Nuclear Safety*, Elsevier, 2020, hlm. 19–22. doi: 10.1016/B978-0-12-818326-7.00002-0.
- [65] T. H. Pigford, “Environmental Aspects of Nuclear Energy Production,” *Annu. Rev. Nucl. Sci.*, vol. 24, no. 1, hlm. 515–560, Des 1974, doi: 10.1146/annurev.ns.24.120174.002503.
- [66] B. Sa, “Iodine-129 uptake and effects of lifetime feeding in rats,” *Health Phys.*, vol. 45, no. 1, Jul 1983, doi: 10.1097/00004032-198307000-00006.
- [67] G. R. Choppin, G. R. Choppin, J.-O. Liljenzin, dan J. Rydberg, *Radiochemistry and nuclear chemistry*, 3rd ed. Woburn, MA: Butterworth-Heinemann, 2002.
- [68] I. Obodovskiy, “Chapter 2 - Nuclei and Nuclear Radiations,” dalam *Radiation*, I. Obodovskiy, Ed., Elsevier, 2019, hlm. 41–62. doi: 10.1016/B978-0-444-63979-0.00002-1.
- [69] H. Murshed, Ed., *Fundamentals of radiation oncology: physical, biological, and clinical aspects*, Third edition. London; San Diego, CA: Academic Press is an imprint of Elsevier, 2019.



- [70] C. Mauro, “Safety Issues for Musculoskeletal Allografts,” dalam *Clinical Sports Medicine*, Elsevier, 2006, hlm. 111–116. doi: 10.1016/B978-032302588-1.50015-4.
- [71] F. J. Humphreys dan M. Hatherly, *Recrystallization and related annealing phenomena*, 2nd ed. Amsterdam; Boston: Elsevier, 2004.
- [72] A. Setiabudi, R. Hardian, dan A. Muzakir, “Prinsip dan Aplikasinya dalam Penelitian Kimia”.
- [73] K. Akhtar, S. A. Khan, S. B. Khan, dan A. M. Asiri, “Scanning Electron Microscopy: Principle and Applications in Nanomaterials Characterization,” dalam *Handbook of Materials Characterization*, S. K. Sharma, Ed., Cham: Springer International Publishing, 2018, hlm. 113–145. doi: 10.1007/978-3-319-92955-2\_4.
- [74] A. Abdullah dan A. Mohammed, “Scanning Electron Microscopy (SEM): A Review,” Jan 2019.
- [75] I. Z. Jenei, “Scanning electron microscopy (SEM) analysis of tribofilms enhanced by fullerene-like nanoparticles,” Stockholm University, Stockholm, 2012. Diakses: 9 Maret 2023. [Daring]. Tersedia pada: <http://su.diva-portal.org/smash/record.jsf?pid=diva2%3A565698&dswid=5704>
- [76] A. A. Bunaciu, E. Udriștioiu, dan H. Aboul-Enein, “X-Ray Diffraction: Instrumentation and Applications,” *Crit. Rev. Anal. Chem. CRC*, vol. 45, Apr 2015, doi: 10.1080/10408347.2014.949616.
- [77] C. J. Wijaya, S. Ismadji, H. W. Aparamarta, dan S. Gunawan, “Statistically Optimum HKUST-1 Synthesized by Room Temperature Coordination Modulation Method for the Adsorption of Crystal Violet Dye,” *Molecules*, vol. 26, no. 21, Art. no. 21, Jan 2021, doi: 10.3390/molecules26216430.



- [78] Y. Leng, *Materials Characterization: Introduction to Microscopic and Spectroscopic Methods*. Weinheim, Germany: Wiley-VCH Verlag GmbH & Co. KGaA, 2013. doi: 10.1002/9783527670772.
- [79] J. U. Keller dan R. Staudt, *Gas adsorption equilibria: experimental methods and adsorptive isotherms*. New York: Springer, 2005.
- [80] P. S. Liu dan G. F. Chen, “Chapter Nine - Characterization Methods: Basic Factors,” dalam *Porous Materials*, P. S. Liu dan G. F. Chen, Ed., Boston: Butterworth-Heinemann, 2014, hlm. 411–492. doi: 10.1016/B978-0-12-407788-1.00009-5.
- [81] F. Fu, L. Lin, dan E. Xu, “4 - Functional pretreatments of natural raw materials,” dalam *Advanced High Strength Natural Fibre Composites in Construction*, M. Fan dan F. Fu, Ed., Woodhead Publishing, 2017, hlm. 87–114. doi: 10.1016/B978-0-08-100411-1.00004-2.
- [82] K. Sing, “The use of nitrogen adsorption for the characterisation of porous materials,” *Colloids Surf. Physicochem. Eng. Asp.*, vol. 187–188, hlm. 3–9, Agu 2001, doi: 10.1016/S0927-7757(01)00612-4.
- [83] M. Thommes *dkk.*, “Physisorption of gases, with special reference to the evaluation of surface area and pore size distribution (IUPAC Technical Report),” *Pure Appl. Chem.*, vol. 87, no. 9–10, hlm. 1051–1069, Okt 2015, doi: 10.1515/pac-2014-1117.
- [84] Z. Yang, H. Peng, W. Wang, dan T. Liu, “Crystallization behavior of poly( $\epsilon$ -caprolactone)/layered double hydroxide nanocomposites,” *J. Appl. Polym. Sci.*, hlm. NA-NA, 2010, doi: 10.1002/app.31787.
- [85] V. Kutarov dan E. Schieferstein, “Analytical equation for the mesopore size distribution function of open cylindrical capillaries,” *Adsorpt. Sci. Technol.*, vol. 37, no. 5–6, hlm. 468–479, Jul 2019, doi: 10.1177/0263617419846000.

