

## DAFTAR PUSTAKA

- Abbas, Y.M., Khan, M.I., 2021. Optimization of Arabian-Shield-Based Natural Pozzolan and Silica Fume for High-Performance Concrete Using Statistical Design of Experiments. *Advances in Civil Engineering* 2021. <https://doi.org/10.1155/2021/5512666>
- Abdullah, M.A.H., Rashid, R.S.M., Amran, M., Hejazii, F., Azreen, N.M., Fediuk, R., Voo, Y.L., Vatin, N.I., Idris, M.I., 2022. Recent Trends in Advanced Radiation Shielding Concrete for Construction of Facilities: Materials and Properties. *Polymers (Basel)*. <https://doi.org/10.3390/polym14142830>
- AbuAlRoos, N.J., Baharul Amin, N.A., Zainon, R., 2019. Conventional and new lead-free radiation shielding materials for radiation protection in nuclear medicine: A review. *Radiation Physics and Chemistry*. <https://doi.org/10.1016/j.radphyschem.2019.108439>
- ACI 304.3R-96, 2004. Heavyweight Concrete Measuring, Mixing, Transporting and Placing.
- Akhadi, M., 2000. *Dasar-Dasar Proteksi Radiasi*, 1st Edition. ed. Rineka Cipta, Jakarta.
- Akkurt, I., El-Khayatt, A.M., 2013. The effect of barite proportion on neutron and gamma-ray shielding. *Ann Nucl Energy* 51, 5–9. <https://doi.org/10.1016/j.anucene.2012.08.026>
- Alhadi, A., 2006. *PENGUNAAN POTONGAN BAJA UNTUK BETON BERAT SEBAGAI PERISAI RADIASI SINAR GAMMA*.
- Alhindawy, I.G., Gamal, H., Almuqrin, A.H., Sayyed, M.I., Mahmoud, K.A., 2023. Impacts of the calcination temperature on the structural and radiation shielding properties of the NASICON compound synthesized from zircon minerals. *Nuclear Engineering and Technology* 55, 1885–1891. <https://doi.org/10.1016/j.net.2023.02.014>
- Askin, A., Buddemeier, B., Alai, M., Yu, K., 2017. Centers for Disease Control and Prevention (CDC) Radiation Hazard Scale Data Product Review Feedback Report.
- ASTM C637, 2014. Standard Specification for Aggregates for Radiation-Shielding Concrete. <https://doi.org/10.1520/C0637-14>
- Attia, M.M., Abdelsalam, B.A., Amin, M., Agwa, I.S., Abdelmagied, M.F., 2022. Metal-Nails Waste and Steel Slag Aggregate as Alternative and Eco-Friendly Radiation Shielding Composites. *Buildings* 12. <https://doi.org/10.3390/buildings12081120>



- Aygun, B., 2019. Neutron and gamma radiation shielding properties of high-temperature-resistant heavy concretes including chromite and wolframite. *J Radiat Res Appl Sci* 12, 352–359. <https://doi.org/10.1080/16878507.2019.1672312>
- Azeez, M.O., Ahmad, S., Al-Dulaijan, S.U., Maslehuddin, M., Abbas Naqvi, A., 2019. Radiation shielding performance of heavy-weight concrete mixtures. *Constr Build Mater* 224, 284–291. <https://doi.org/10.1016/j.conbuildmat.2019.07.077>
- Azreen, N.M., Rashid, R.S.M., Mugahed Amran, Y.H., Voo, Y.L., Haniza, M., Hairie, M., Alyousef, R., Alabduljabbar, H., 2020. Simulation of ultra-high-performance concrete mixed with hematite and barite aggregates using Monte Carlo for dry cask storage. *Constr Build Mater* 263. <https://doi.org/10.1016/j.conbuildmat.2020.120161>
- Baalamurugan, J., Kumar, V.G., Chandrasekaran, S., Balasundar, S., Venkatraman, B., Padmapriya, R., Raja, V.K.B., 2021. Recycling of steel slag aggregates for the development of high density concrete: Alternative & environment-friendly radiation shielding composite. *Compos B Eng* 216. <https://doi.org/10.1016/j.compositesb.2021.108885>
- Brandt, A.M., 2013. Application of concrete as a material for anti-radiation shielding-a review.
- Chang, L., Zhang, Y., Liu, Y., Fang, J., Luan, W., Yang, X., Zhang, W., 2015. Preparation and characterization of tungsten/epoxy composites for  $\gamma$ -rays radiation shielding. *Nucl Instrum Methods Phys Res B* 356–357, 88–93. <https://doi.org/10.1016/j.nimb.2015.04.062>
- Chen, Y., 2021. Research on the influence of ultrafine sand on concrete performance, dalam: *IOP Conference Series: Earth and Environmental Science*. IOP Publishing Ltd. <https://doi.org/10.1088/1755-1315/647/1/012072>
- Dahlan, K., Haryati, E., Aninam, Y.S., 2018. The use of Papuan iron sand and river sand for fine aggregate in mortar for nuclear radiation shield application, dalam: *Journal of Physics: Conference Series*. Institute of Physics Publishing. <https://doi.org/10.1088/1742-6596/997/1/012023>
- Djepaze, Y.I., Pagna Kagonbé, B., Madi Balo, A., Kamseu, E., Edgar Ntamack, G., 2020. Influence Of The Fineness Modulus Of Sand On The Compressive Strength Of Its Corresponding Mortar: A Mathematical Model Proposal 4.



- Duran, A., Hian, S.K., Miller, D.L., Le Heron, J., Padovani, R., Vano, E., 2013. Recommendations for occupational radiation protection in interventional cardiology. Catheterization and Cardiovascular Interventions 82, 29–42. <https://doi.org/10.1002/ccd.24694>
- Eid, A., Zawia, N., 2016. Consequences of lead exposure, and it's emerging role as an epigenetic modifier in the aging brain. Neurotoxicology 56, 254–261. <https://doi.org/10.1016/j.neuro.2016.04.006>
- Esen, Y., Doğan, Z.M., 2017. Evaluation of physical and mechanical characteristics of siderite concrete to be used as heavy-weight concrete. Cem Concr Compos 82, 117–127. <https://doi.org/10.1016/j.cemconcomp.2017.05.009>
- Gencel, O., Bozkurt, A., Kam, E., Korkut, T., 2011. Determination and calculation of gamma and neutron shielding characteristics of concretes containing different hematite proportions. Ann Nucl Energy 38, 2719–2723. <https://doi.org/10.1016/j.anucene.2011.08.010>
- Gholamzadeh, L., AsariShik, N., 2024. X-ray radiation shielding material. Advanced Radiation Shielding Materials: Radiation and Radiological Protection 45–73. <https://doi.org/10.1016/B978-0-323-95387-0.00003-0>
- Gökçe, H.S., Andiç-Çakır, Ö., 2019. Bleeding characteristics of high consistency heavyweight concrete mixtures. Constr Build Mater 194, 153–160. <https://doi.org/10.1016/j.conbuildmat.2018.11.029>
- Gökçe, H.S., Öztürk, B.C., Çam, N.F., Andiç-Çakır, Ö., 2018. Gamma-ray attenuation coefficients and transmission thickness of high consistency heavyweight concrete containing mineral admixture. Cem Concr Compos 92, 56–69. <https://doi.org/10.1016/j.cemconcomp.2018.05.015>
- Gunoglu, K., Akkurt, İ., 2021. Radiation shielding properties of concrete containing magnetite. Progress in Nuclear Energy 137. <https://doi.org/10.1016/j.pnucene.2021.103776>
- Gyawali, T.R., 2020. Development of heavyweight concrete with 2n mixing theory for shielding application. Progress in Nuclear Energy 128. <https://doi.org/10.1016/j.pnucene.2020.103465>



- Hassan, H.E., Badran, H.M., Aydarous, A., Sharshar, T., 2015. Studying the effect of nano lead compounds additives on the concrete shielding properties for  $\gamma$ -rays. Nucl Instrum Methods Phys Res B 360, 81–89. <https://doi.org/10.1016/j.nimb.2015.07.126>
- Heniegal, A.M., Amin, M., Nagib, S.H., Youssef, H., Agwa, I.S., 2022. Effect of nano ferrosilicon and heavyweight fine aggregates on the properties and radiation shielding of ultra-high performance heavyweight concrete. Case Studies in Construction Materials 17. <https://doi.org/10.1016/j.cscm.2022.e01543>
- Horszczaruk, E., Brzozowski, P., 2019. Investigation of gamma ray shielding efficiency and physicomechanical performances of heavyweight concrete subjected to high temperature. Constr Build Mater 195, 574–582. <https://doi.org/10.1016/j.conbuildmat.2018.09.113>
- Hubbell, J.H., 1982. Photon Mass Attenuation and Energy-absorption Coefficients from 1 keV to 20 MeV. Int. J. Appl. Radiat. Isot 33, 1269–1290.
- Hulbert, S.M., Carlson, K.A., 2009. Is lead dust within nuclear medicine departments a hazard to pediatric patients? J Nucl Med Technol 37, 170–172. <https://doi.org/10.2967/jnmt.109.062281>
- ICRP, 2018. Annals of the ICRP ICRP Publication 139 Occupational Radiological Protection in Interventional Procedures.
- Jaafar, M.J., Johari, M.A.M., Hashim, S.F.S., 2017. Cementitious grout for preplaced aggregate concrete: A review, dalam: AIP Conference Proceedings. American Institute of Physics Inc. <https://doi.org/10.1063/1.5005660>
- Kazjonovs, J., Bajare, D., Korjamins, A., 2010. DESIGNING OF HIGH DENSITY CONCRETE BY USING STEEL TREATMENT WASTE, dalam: 10th International Conference Modern Building Materials, Structures and Techniques. Vilnius, hlm. 138–142.
- Khan, I.U., Shoaib, M., Malik, A.H., Khan, M.N.A., 2023. Development and evaluation of grit iron scale-MgO heavy density concrete for moderate-temperature radiation shielding. Constr Build Mater 408. <https://doi.org/10.1016/j.conbuildmat.2023.133567>
- Kierans, C., Takahashi, T., Kanbach, G., 2022. Compton Telescopes for Gamma-ray Astrophysics. [https://doi.org/10.1007/978-981-16-4544-0\\_46-1](https://doi.org/10.1007/978-981-16-4544-0_46-1)



- Kim, S.C., Choi, J.R., Jeon, B.K., 2016. Physical analysis of the shielding capacity for a lightweight apron designed for shielding low intensity scattering X-rays. *Sci Rep* 6. <https://doi.org/10.1038/srep27721>
- Lai, M.H., Wu, K.J., Cheng, X., Ho, J.C.M., Wu, J.P., Chen, J.H., Zhang, A.J., 2022. Effect of fillers on the behaviour of heavy-weight concrete made by iron sand. *Constr Build Mater* 332. <https://doi.org/10.1016/j.conbuildmat.2022.127357>
- Leroy, C., Rancoita, P.-G., 2009. *RADIATION-INTERACTION-IN-MATTER-AND-DETECTION*, 2nd Edition. ed. World Scientific Publishing Co. Pte. Ltd.
- Li, Z., Zhou, X., Ma, H., Hou, D., 2023. *Advanced Concrete Technology*, 2nd Edition. ed. John Wiley & Sons, Inc., Hoboken, New Jersey.
- Lotfi-Omran, O., Sadrmomtazi, A., Nikbin, I.M., 2019. A comprehensive study on the effect of water to cement ratio on the mechanical and radiation shielding properties of heavyweight concrete. *Constr Build Mater* 229. <https://doi.org/10.1016/j.conbuildmat.2019.116905>
- Lowe, D., Roy, L., Tabocchini, M.A., Rühm, W., Wakeford, R., Woloschak, G.E., Laurier, D., 2022. Radiation dose rate effects: what is new and what is needed? *Radiat Environ Biophys* 61, 507–543. <https://doi.org/10.1007/s00411-022-00996-0>
- Lu, L., Sun, M., Lu, Q., Wu, T., Huang, B., 2021. High energy X-ray radiation sensitive scintillating materials for medical imaging, cancer diagnosis and therapy. *Nano Energy* 79. <https://doi.org/10.1016/j.nanoen.2020.105437>
- Luković, J., Babić, B., Bučevac, D., Prekajski, M., Pantić, J., Bašćarević, Z., Matović, B., 2015. Synthesis and characterization of tungsten carbide fine powders. *Ceram Int* 41, 1271–1277. <https://doi.org/10.1016/j.ceramint.2014.09.057>
- Manninen, A.-Leena., 2014. Clinical applications of radiophotoluminescence (RPL) dosimetry in evaluation of patient radiation exposure in radiology : determination of absorbed and effective dose. University of Oulu.
- Maslehuddin, M., Naqvi, A.A., Ibrahim, M., Kalakada, Z., 2013. Radiation shielding properties of concrete with electric arc furnace slag aggregates and steel shots. *Ann Nucl Energy* 53, 192–196. <https://doi.org/10.1016/j.anucene.2012.09.006>



- Najjar, M.F., Soliman, A.M., Nehdi, M.L., 2014. Critical overview of two-stage concrete: Properties and applications. *Constr Build Mater.* <https://doi.org/10.1016/j.conbuildmat.2014.03.021>
- Nanda Karmaker, Kazi M. Maraz, Farhana Islam, Md. Marjanul Haque, Md. Razzak, M.Z.I. Mollah, M. R. I. Faruque, Ruhul A. Khan, 2021. Fundamental characteristics and application of radiation. *GSC Advanced Research and Reviews* 7, 064–072. <https://doi.org/10.30574/gscarr.2021.7.1.0043>
- Ogawa, M., Nakajima, Y., Kubota, R., Endo, Y., 2008. Two cases of acute lead poisoning due to occupational exposure to lead. *Clin Toxicol* 46, 332–335. <https://doi.org/10.1080/15563650701816448>
- Ouda, A.S., 2015. Development of high-performance heavy density concrete using different aggregates for gamma-ray shielding. *Progress in Nuclear Energy* 79, 48–55. <https://doi.org/10.1016/j.pnucene.2014.11.009>
- Ouda, A.S., Abdelgader, H.S., 2019. Assessing the physical, mechanical properties, and  $\gamma$ -ray attenuation of heavy density concrete for radiation shielding purposes. *Geosystem Engineering* 22, 72–80. <https://doi.org/10.1080/12269328.2018.1469434>
- Pansare, G.R., More, S.S., Pandit, T.P., Papat, S.R., 2015. Mass Absorption Coefficient of Gamma Radiations for Aluminum, Copper, Lead and Plastic (LDPE) Material. *International Journal of Chemical and Physical Sciences* 4.
- Papachristoforou, M., Papayianni, I., 2018. Radiation shielding and mechanical properties of steel fiber reinforced concrete (SFRC) produced with EAF slag aggregates. *Radiation Physics and Chemistry* 149, 26–32. <https://doi.org/10.1016/j.radphyschem.2018.03.010>
- Profio, A.E., 1979. Radiation shielding and dosimetry. John Wiley and Sons, New York.
- Rashid, M.A., Mansur, M.A., 2009. Considerations in producing high strength concrete. *Journal of Civil Engineering (IEB)* 37, 53–63.
- Rashid, R.S.M., Salem, S.M., Azreen, N.M., Voo, Y.L., Haniza, M., Shukri, A.A., Yahya, M.S., 2020. Effect of elevated temperature to radiation shielding of ultra-high performance concrete with silica sand or magnetite. *Constr Build Mater* 262. <https://doi.org/10.1016/j.conbuildmat.2020.120567>



- Ryan, J.L., 2012. Ionizing radiation: The good, the bad, and the ugly. *Journal of Investigative Dermatology* 132, 985–993. <https://doi.org/10.1038/jid.2011.411>
- Sarker, D., Biswas, A., Rahman, M., Mehedi, M.M., 2016. Optimization of radiation shielding concrete for radiotherapy treatment room at bangabandhu sheikh mujib medical university, dalam: *Key Engineering Materials*. Trans Tech Publications Ltd, hlm. 338–344. <https://doi.org/10.4028/www.scientific.net/KEM.705.338>
- Satyarno, I., Solehudin, A.P., Meyarto, C., Hadiyatmoko, D., Muhammad, P., Afnan, R., 2014. Practical method for mix design of cement-based grout, dalam: *Procedia Engineering*. Elsevier Ltd, hlm. 356–365. <https://doi.org/10.1016/j.proeng.2014.12.194>
- Singh, V.P., Badiger, N.M., Chanthima, N., Kaewkhao, J., 2014. Evaluation of gamma-ray exposure buildup factors and neutron shielding for bismuth borosilicate glasses. *Radiation Physics and Chemistry* 98, 14–21. <https://doi.org/10.1016/j.radphyschem.2013.12.029>
- SNI 03-2834, 2000. Tata Cara Pembuatan Rencana Campuran Beton Normal.
- Stabin, M.G., 2007. *Radiation protection and dosimetry: an introduction to health physics*. Springer.
- Sumarni, S., 2006. PENGGUNAAN PASIR BESI DAN BARIT UNTUK BETON BERAT SEBAGAI PERISAI RADIASI SINAR GAMMA.
- Topçu, I.B., 2003. Properties of heavyweight concrete produced with barite. *Cem Concr Res* 33, 815–822. [https://doi.org/10.1016/S0008-8846\(02\)01063-3](https://doi.org/10.1016/S0008-8846(02)01063-3)
- Vandhiyan, R., Vijay, T.J., Manoj Kumar, M., 2020. Effect of fine aggregate properties on cement mortar strength, dalam: *Materials Today: Proceedings*. Elsevier Ltd, hlm. 2019–2026. <https://doi.org/10.1016/j.matpr.2020.07.498>
- Wulandary, I.A., Satyarno, I., Sulisty, D., Budhie Wijatna, A., 2024. Proporsi Mix design Beton Berat Geopolymer Menggunakan Fly ash Kelas C dan Ground Granulated Blast Furnace Slag (GGBFS). *Simposium Nasional Teknologi Infrastruktur*, Yogyakarta.
- Yilmaz, E., Baltas, H., Kiriş, E., Ustabas, I., Cevik, U., El-Khayatt, A.M., 2011. Gamma ray and neutron shielding properties of some concrete materials. *Ann Nucl Energy* 38, 2204–2212. <https://doi.org/10.1016/j.anucene.2011.06.011>



- Zalegowski, K., Piotrowski, T., Garbacz, A., Adamczewski, G., 2020. Relation between microstructure, technical properties and neutron radiation shielding efficiency of concrete. Constr Build Mater 235. <https://doi.org/10.1016/j.conbuildmat.2019.117389>
- Zheng, K., Zhu, X., Guo, S., Zhang, X., 2023. Gamma-ray-responsive drug delivery systems for radiation protection. Chemical Engineering Journal 463. <https://doi.org/10.1016/j.cej.2023.142522>