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- [NREL] *National Renewable Energy Laboratory*. 2004a. Determination of Ash in Biomass. *Biomass Analysis Technology Team Laboratory Analytical Procedure*, 1–6.
- _____. 2004b. Determination of Structural Carbohydrates and Lignin in Biomass. *Biomass Analysis Technology Team Laboratory Analytical Procedure*, 1–14.
- _____. 2008. Determination of Total Solids in Biomass and Total Dissolved Solids in Liquid Process Samples. *Biomass Analysis Technology Team Laboratory Analytical Procedure*, 1-15.
- Avci, U. (2022). Trafficking of Xylan to Plant Cell Walls. *Biomass*, 2(3), 188–194. <https://doi.org/10.3390/biomass2030012>
- Bajpai, P. (2018a). Pulp Bleaching. *Biermann's Handbook of Pulp and Paper*, 465–491. <https://doi.org/10.1016/b978-0-12-814240-0.00019-7>
- Bajpai, P. (2018b). Pulping Fundamentals. In *Biermann's Handbook of Pulp and Paper*. <https://doi.org/10.1016/b978-0-12-814240-0.00012-4>
- da Silva, S. H. F., Gordobil, O., & Labidi, J. (2020). Organic acids as a greener alternative for the precipitation of hardwood kraft lignins from the industrial black liquor. *International Journal of Biological Macromolecules*, 142, 583–591. <https://doi.org/10.1016/j.ijbiomac.2019.09.133>
- Deju, R., Mazilu, C., Stanculescu, I., & Tuca, C. (2020). Fourier transform infrared spectroscopic characterization of thermal treated kaolin. *Romanian Reports in Physics*, 72(3), 1–11.
- Fernández-Rodríguez, J., Erdocia, X., Hernández-Ramos, F., Alriols, M. G., & Labid, J. (2018). Lignin separation and fractionation by ultrafiltration. In *Separation of Functional Molecules in Food by Membrane Technology*.

<https://doi.org/10.1016/B978-0-12-815056-6.00007-3>

- Gao, M. R., Xu, Q. Da, He, Q., Sun, Q., & Zeng, W. C. (2019). A theoretical and experimental study: the influence of different standards on the determination of total phenol content in the Folin–Ciocalteu assay. *Journal of Food Measurement and Characterization*, 13(2), 1349–1356. <https://doi.org/10.1007/s11694-019-00050-6>
- García-Fuentevilla, L., Rubio-Valle, J. F., Martín-Sampedro, R., Valencia, C., Eugenio, M. E., & Ibarra, D. (2022). Different Kraft lignin sources for electrospun nanostructures production: Influence of chemical structure and composition. *International Journal of Biological Macromolecules*, 214(March), 554–567. <https://doi.org/10.1016/j.ijbiomac.2022.06.121>
- García, A., González Alriols, M., Spigno, G., & Labidi, J. (2012). Lignin as natural radical scavenger. Effect of the obtaining and purification processes on the antioxidant behaviour of lignin. *Biochemical Engineering Journal*, 67, 173–185. <https://doi.org/10.1016/j.bej.2012.06.013>
- Gaudenzi, E., Cardone, F., Lu, X., & Canestrari, F. (2023). The use of lignin for sustainable asphalt pavements: A literature review. *Construction and Building Materials*, 362(November 2022), 129773. <https://doi.org/10.1016/j.conbuildmat.2022.129773>
- Gordobil, O., Moriana, R., Zhang, L., Labidi, J., & Sevastyanova, O. (2016). Assessment of technical lignins for uses in biofuels and biomaterials: Structure-related properties, proximate analysis and chemical modification. *Industrial Crops and Products*, 83, 155–165. <https://doi.org/10.1016/j.indcrop.2015.12.048>
- Helander, M., Theliander, H., Lawoko, M., Henriksson, G., Zhang, L., & Lindström, M. E. (2013). Fractionation of technical lignin: Molecular mass and pH effects. *BioResources*, 8(2), 2270–2282. <https://doi.org/10.15376/biores.8.2.2270-2282>

- Hermiati, E., Risanto, L., Lubis, M. A. R., Laksana, R. P. B., & Dewi, A. R. (2017). Chemical characterization of lignin from kraft pulping black liquor of *Acacia mangium*. *AIP Conference Proceedings*, 1803(January).
<https://doi.org/10.1063/1.4973132>
- Hidayati, S., Satyajaya, W., & Fudholi, A. (2020). Lignin isolation from black liquor from oil palm empty fruit bunch using acid. *Journal of Materials Research and Technology*, 9(5), 11382–11391. <https://doi.org/10.1016/j.jmrt.2020.08.023>
- Huang, J., Fu, S., & Gan, L. (2019). Structure and Characteristics of Lignin. *Lignin Chemistry and Applications*, 25–50. <https://doi.org/10.1016/b978-0-12-813941-7.00002-3>
- Hubbe, M. A., Alén, R., Paleologou, M., & Kannangara, M. (2019). Lignin Recovery from Spent Alkaline Pulping Liquors Using Acidification, Membrane Separation, and Related Processing Steps: A Review. *Bioresource*, 14(1), 2300–2351.
- Isaac, E., Samson, A., & Adeosun, O. (2019). *Sustainable Lignin for Carbon Fibers: Principles, Techniques, and Applications* (E. I. Akpan & S. O. Adeosun (eds.)). Springer. <https://doi.org/10.1007/978-3-030-18792-7>
- Jardim, J. M., Hart, P. W., Lucia, L. A., Jameel, H., & Chang, H. M. (2022). The Effect of the Kraft Pulping Process, Wood Species, and pH on Lignin Recovery from Black Liquor. *Fibers*, 10(2). <https://doi.org/10.3390/fib10020016>
- Kai, D., Tan, M. J., Chee, P. L., Chua, Y. K., Yap, Y. L., & Loh, X. J. (2016). Towards lignin-based functional materials in a sustainable world. *Green Chemistry*, 18(5), 1175–1200. <https://doi.org/10.1039/c5gc02616d>
- Kienberger, M., Maitz, S., Pichler, T., & Demmelmayer, P. (2021). Systematic review on isolation processes for technical lignin. *Processes*, 9(5).
<https://doi.org/10.3390/pr9050804>

- Kumar, R., Gupta, A., Chawla, M., Aadil, K. R., Dutt, S., Kumar, V. B., & Chaudhary, A. (2020). *Lignin Biosynthesis and Transformation for Industrial Applications* (S. Sharma & A. Kumar (eds.)). Springer.
https://doi.org/10.1007/978-3-030-40663-9_7
- Li, J. (2011). *Isolation of lignin from wood* [SAIMAA UNIVERSITY OF APPLIED SCIENCES]. <https://theseus17-kk.lib.helsinki.fi/handle/10024/37903>
- Liao, J. J., Latif, N. H. A., Trache, D., Brosse, N., & Hussin, M. H. (2020). Current advancement on the isolation, characterization and application of lignin. *International Journal of Biological Macromolecules*, *162*, 985–1024.
<https://doi.org/10.1016/j.ijbiomac.2020.06.168>
- Lourençon, T. V., de Lima, G. G., Ribeiro, C. S. P., Hansel, F. A., Maciel, G. M., da Silva, K., Winnischofer, S. M. B., de Muniz, G. I. B., & Magalhães, W. L. E. (2021). Antioxidant, antibacterial and antitumoural activities of kraft lignin from hardwood fractionated by acid precipitation. *International Journal of Biological Macromolecules*, *166*, 1535–1542.
<https://doi.org/10.1016/j.ijbiomac.2020.11.033>
- Lu, X., Gu, X., & Shi, Y. (2022). A review on lignin antioxidants: Their sources, isolations, antioxidant activities and various applications. *International Journal of Biological Macromolecules*, *210*(May), 716–741.
<https://doi.org/10.1016/j.ijbiomac.2022.04.228>
- Manuel Pais-Chanfrau, J., Núñez-Pérez, J., del Carmen Espin-Valladares, R., Vinicio Lara-Fiallos, M., & Enrique Trujillo-Toledo, L. (2020). Bioconversion of Lactose from Cheese Whey to Organic Acids. *Lactose and Lactose Derivatives*, 11–13. <https://doi.org/10.5772/intechopen.92766>
- Mardiyati, Y., Tarigan, E. Y., Prawisudha, P., Shoimah, S. M., Rizkiansyah, R. R., & Steven, S. (2021). Binderless, all-lignin briquette from black liquor waste: Isolation, purification, and characterization. *Molecules*, *26*(3).

<https://doi.org/10.3390/molecules26030650>

Mastrolitti, S., Borsella, E., Guiliano, A., Petrone, M. T., De Bari, I., Gosselink, R., Van Erven, G., Annevelink, E., Triantafyllidis, K. S., & Stichnothe, H. (2021). *Sustainable lignin valorization*. *October*, 1–193.
https://www.ieabioenergy.com/wp-content/uploads/2021/11/Sustainable-Lignin-Valorization_rev22-11-2021.pdf

Michelin, M., Liebentritt, S., Vicente, A. A., & Teixeira, J. A. (2018). Lignin from an integrated process consisting of liquid hot water and ethanol organosolv: Physicochemical and antioxidant properties. *International Journal of Biological Macromolecules*, *120*, 159–169. <https://doi.org/10.1016/j.ijbiomac.2018.08.046>

Morya, R., Kumar, M., Tyagi, I., Kumar Pandey, A., Park, J., Raj, T., Sirohi, R., Kumar, V., & Kim, S. H. (2022). Recent advances in black liquor valorization. *Bioresource Technology*, *350*(January), 126916.
<https://doi.org/10.1016/j.biortech.2022.126916>

Namane, M., José García-Mateos, F., Sithole, B., Ramjugernath, D., Rodríguez-Mirasol, J., & Cordero, T. (2016). Characteristics of Lignin Precipitated With Organic Acids As a Source for Valorisation of Carbon Products. *CELLULOSE CHEMISTRY AND TECHNOLOGY Cellulose Chem. Technol*, *50*, 3–4.

Parmar, K. (2017). Biomass- An Overview on Composition Characteristics and Properties. *IRA-International Journal of Applied Sciences (ISSN 2455-4499)*, *7*(1), 42. <https://doi.org/10.21013/jas.v7.n1.p4>

Rani, S., Kumar, M., Garg, R., Sharma, S., & Kumar, D. (2016). Amide Functionalized Graphene Oxide Thin Films for Hydrogen Sulfide Gas Sensing Applications. *IEEE Sensors Journal*, *16*(9), 2929–2934.
<https://doi.org/10.1109/JSEN.2016.2524204>

Reena, R., Sindhu, R., Athiyaman Balakumaran, P., Pandey, A., Awasthi, M. K., &

- Binod, P. (2022). Insight into citric acid: A versatile organic acid. *Fuel*, 327(July), 125181. <https://doi.org/10.1016/j.fuel.2022.125181>
- Sameni, J., Krigstin, S., Rosa, D. dos S., Leao, A., & Sain, M. (2014). Thermal characteristics of lignin residue from industrial processes. *BioResources*, 9(1), 725–737. <https://doi.org/10.15376/biores.9.1.725-737>
- Santoso, E. B. (2020). *Isolasi dan Karakterisasi Lignin dari Lindi Hitam Pabrik Pulp*. Institut Pertanian Bogor.
- Scherer, R., & Godoy, H. T. (2009). Antioxidant activity index (AAI) by the 2,2-diphenyl-1-picrylhydrazyl method. *Food Chemistry*, 112(3), 654–658. <https://doi.org/10.1016/j.foodchem.2008.06.026>
- Sewring, T., Durruty, J., Schneider, L., Schneider, H., Mattsson, T., & Theliander, H. (2019). Acid Precipitation of Kraft Lignin from Aqueous Solutions: The Influence of pH, Temperature, and Xylan. *Journal of Wood Chemistry and Technology*, 39(1), 1–13. <https://doi.org/10.1080/02773813.2018.1488870>
- Sheng, Y., Ma, Z., Wang, X., & Han, Y. (2022). Ethanol organosolv lignin from different agricultural residues: Toward basic structural units and antioxidant activity. *Food Chemistry*, 376(November 2021), 131895. <https://doi.org/10.1016/j.foodchem.2021.131895>
- Solihat, N. N., Santoso, E. B., Karimah, A., Madyaratri, E. W., Sari, F. P., Falah, F., Iswanto, A. H., Ismayati, M., Lubis, M. A. R., Fatriasari, W., Antov, P., Savov, V., Gajtanska, M., & Syafii, W. (2022). Physical and Chemical Properties of Acacia mangium Lignin Isolated from Pulp Mill Byproduct for Potential Application in Wood Composites. *Polymers*, 14(3). <https://doi.org/10.3390/polym14030491>
- Speight, J. G. (2019). Upgrading by Gasification. In *Heavy Oil Recovery and Upgrading*. <https://doi.org/10.1016/b978-0-12-813025-4.00013-1>

- Stark, N. M., Yelle, D. J., & Agarwal, U. P. (2016). Techniques for Characterizing Lignin. *Lignin in Polymer Composites*, 49–66. <https://doi.org/10.1016/B978-0-323-35565-0.00004-7>
- Susilo, N. A., & Chaniago, R. D. (2020). Comparison study of lignin-kraft extraction process from black liquor using centrifuge and thermal acid hydrolysis methods. *Journal of Physics: Conference Series*, 1456(1). <https://doi.org/10.1088/1742-6596/1456/1/012004>
- Varrica, D., Tamburo, E., Vultaggio, M., & Di Carlo, I. (2019). ATR–FTIR spectral analysis and soluble components of PM10 and PM2.5 particulate matter over the urban area of palermo (Italy) during normal days and saharan events. *International Journal of Environmental Research and Public Health*, 16(14). <https://doi.org/10.3390/ijerph16142507>
- Xiao, L., Liu, W., Huang, J., Lou, H., & Qiu, X. (2021). Study on the Antioxidant Activity of Lignin and Its Application Performance in SBS Elastomer. *Industrial and Engineering Chemistry Research*, 60(1), 790–797. <https://doi.org/10.1021/acs.iecr.0c04699>
- Yiin, C. L., Yap, K. L., Fui Chin, B. L., & Mun Lock, S. S. (2023). Insights into the Lignin Dissolution Mechanism of Water Content Tailored-choline Chloride (ChCl) Based Green Solvents for Biomass Pretreatment. *Physical Chemistry Research*, 11(3), 605–614. <https://doi.org/10.22036/pcr.2022.350557.2131>
- Zhu, W. (2013). *Equilibrium of Lignin Precipitation The Effects of pH, Temperature, Ion Strength and Wood Origins Equilibrium of Lignin Precipitation* (Vol. 46, Issue 0). Chalmers University of Technology.
- Zhu, W. (2015). Precipitation of Kraft Lignin Yield and Equilibrium, PhD Thesis. In *Thesises*. <http://publications.lib.chalmers.se/records/fulltext/216246/216246.pdf>
- Zhu, W., Westman, G., & Theliander, H. (2014). Investigation and characterization of

lignin precipitation in the lignoboost process. *Journal of Wood Chemistry and Technology*, 34(2), 77–97. <https://doi.org/10.1080/02773813.2013.838267>

