



## DAFTAR PUSTAKA

- Abdou, A., Elmakssoudi, A., El Amrani, A., JamalEddine, J., and Dakir, M., 2021, Recent advances in chemical reactivity and biological activities of eugenol derivatives, *Med. Chem. Res.*, 30, 1011–1030.
- Aditayarini, D. and Wahyuningsih, T.D., 2015, Acetylation of Eugenol , Isoeugenol and Vanillin by Sonochemistry Method., In, *The 11th International Student Conference*. Ibaraki, pp. 5–6.
- Altahir, B.M., Al-Awadi, A.Q., Shakir, S.M., and abdulazeez, O., 2020, Biological Assessment, Heamatological Study, and Environmental Detection of Eugenol, *Int. J. ChemTech Res.*, 13, 9–17.
- Anbu, N., Nagarjun, N., Jacob, M., Kalaiarasi, J.M.V.K., and Dhakshinamoorthy, A., 2019, Acetylation of Alcohols, Amines, Phenols, Thiols under Catalyst and Solvent-Free Conditions, *Chem.*, 1, 69–79.
- Aprilia, A.C., Rahma Maulida, I., and Hidayati, D.N., 2020, Prosiding Seminar Nasional Teknik Kimia “Kejuangan” Pengujian Karbon Teraktivasi Asam Sulfat (KA-AS) sebagai Katalis pada Reaksi Asetilasi Gliserol Menjadi Triasetin, *Jur. Tek. Kim.*, 14–15.
- Begum, S.N., Ray, A.S., and Rahaman, C.H., 2022, A comprehensive and systematic review on potential anticancer activities of eugenol: From pre-clinical evidence to molecular mechanisms of action, *Phytomedicine*, 107, 154456.
- Cansian, R.L., Vanin, A.B., Orlando, T., Piazza, S.P., Puton, B.M.S., Cardoso, R.I., Gonçalves, I.L., Honaiser, T.C., Paroul, N., and Oliveira, D., 2017, Toxicity of clove essential oil and its ester eugenyl acetate against Artemia salina, *Brazilian J. Biol.*, 77, 155–161.
- Cetin Babaoglu, H., Bayrak, A., Ozdemir, N., and Ozgun, N., 2017, Encapsulation of clove essential oil in hydroxypropyl beta-cyclodextrin for characterization, controlled release, and antioxidant activity, *J. Food Process. Preserv.*, 41, 1–8.
- Chang, R., 2005a, Kimia Dasar, Ketiga. Simarmata,L. (ed) Erlangga, Jakarta.
- Chang, R., 2005b, Physical Chemistry for the Biosciences, University Science Books, United States.
- Connors, K.A., 1990, Chemical Kinetics: The Study of Reaction Rates in Solution, VCH, America.
- Crapse, J., Pappireddi, N., Gupta, M., Shvartsman, S.Y., Wieschaus, E., and Wühr, M., 2021, Evaluating the Arrhenius equation for developmental processes, *Mol. Syst. Biol.*, 17, 1–12.
- Dewati, R. and H, T., 2010, Pengolahan Limbah Pabrik Sabun dari Soap Gliserin Menjadi Triasetin, *Jurnal Ilmiah Teknik Lingkungan*, 2(2), 49–56.
- Dinurrosifa, R.S. and Indriyanti, E., 2022, A Green Synthesis of Acetyl Eugenol by Sonochemical Method and Potential as Anti-Inflammatory In-Vitro, *JKPK (Jurnal Kim. dan Pendidik. Kim.)*, 7, 324.
- Diop, C.I.K., Li, H.L., Xie, B.J., and Shi, J., 2011, Effects of acetic acid/acetic anhydride ratios on the properties of corn starch acetates, *Food Chem.*, 126, 1662–1669.



- Ginting, M., Surbakti, D., and Triana, N., 2019, Synthesis of 2-(4-Allyl-2-Methoxy Phenoxy)-*N,N*-Bis(2- Hydroxyethyl) Acetamide from the Transformation of Eugenol Isolated from Clove Oil, *J. Chem. Nat. Resour.*, 1, 31–39.
- Harahap, I.S., Wahyuningsih, P., and Amri, Y., 2020, Analisa Kandungan Beta Karoten Pada Cpo (Crude Palm Oil) Di Pusat Penelitian Kelapa Sawit (Ppks) Medan Menggunakan Spektrofotometri Uv-Vis, *Quim. J. Kim. Sains dan Terap.*, 2, 9–13.
- Harahap, S.N., 2021, Identifikasi Senyawa Eugenol Pada Buah Jambu Bij Merah (*Psidium guajava* L.) Dengan Kromatografi Gas (GC-MS), *Pros. Semin. Nas. Sains dan Teknol. Terap.*, 4, 395–406.
- Haro-González, J.N., Castillo-Herrera, G.A., Martínez-Velázquez, M., and Espinosa-Andrews, H., 2021, Clove essential oil (*Syzygium aromaticum* l. *myrtaceae*): Extraction, chemical composition, food applications, and essential bioactivity for human health, *Molecules*, 26, 6387-6411.
- Hill, L.E., Gomes, C., and Taylor, T.M., 2013, Characterization of beta-cyclodextrin inclusion complexes containing essential oils (trans-cinnamaldehyde, eugenol, cinnamon bark, and clove bud extracts) for antimicrobial delivery applications, *LWT*, 51, 86–93.
- Jameel, M.S., Aziz, A.A., and Dheyab, M.A., 2020, Comparative analysis of platinum nanoparticles synthesized using sonochemical-assisted and conventional green methods, *Nano-Structures and Nano-Objects*, 23, 100484.
- Jassem, A.S., Muallah, S.K., and Mohammed, A.H., 2020, Cellulose Acetate Production by Acetylation of Cellulose Derived from Date Palm Fronds, *Iraqi J. Agric. Sci.*, 51, 967–975.
- Kainat, R., Mushtaq, Z., and Nadeem, F., 2019, Derivatization of essential oil of eucalyptus to obtain valuable market products – A comprehensive review, *Int. J. Chem. Biochem. Sci.*, 15, 58–68.
- Kaur, K., Kaushal, S., and Rani, R., 2019, Chemical Composition, Antioxidant and Antifungal Potential of Clove (*Syzygium aromaticum*) Essential Oil, its Major Compound and its Derivatives, *J. Essent. Oil-Bearing Plants*, 22, 1195–1217.
- Kavitha, S. and Kurian, M., 2023, Acetylation of glycerol for triacetin production over metal/non-metal doped cobalt ferrite nanocatalysts, *Brazilian J. Chem. Eng.*, 1-9.
- Machado, J.R., Pereira, G.N., dos Santos de Oliveira, P., Zenevicz, M.C., Lerin, L., dos Reis Barreto de Oliveira, R., Cabral de Holanda Cavalcanti, S., Ninow, J.L., and de Oliveira, D., 2017, Synthesis of eugenyl acetate by immobilized lipase in a packed bed reactor and evaluation of its larvicidal activity, *Process Biochem.*, 58, 114–119.
- McKetta, J.J. and Cunningham, W.A., 1977, Encyclopedia of Chemical Processing and Design vol 2, Marcel Dekker, Inc, New York.
- Min, H.J., Lee, T.S., and Bae, Y.S., 2014, Structure determination of sucrose by acetylation and acid hydrolysis, *J. Korean Wood Sci. Technol.*, 42, 183–192.
- Morales-Cerrada, R., Molina-Gutierrez, S., Lacroix-Desmazes, P., and Caillol, S.,



- 2021, Eugenol, a Promising Building Block for Biobased Polymers with Cutting-Edge Properties, *Biomacromolecules*, 22, 3625–3648.
- Musthafa, K.S., Hmoteh, J., Thamjarungwong, B., and Voravuthikunchai, S.P., 2016, Antifungal potential of eugenyl acetate against clinical isolates of *Candida* species, *Microb. Pathog.*, 99, 19–29.
- Nda-Umar, U.I., Ramli, I.B., Muhamad, E.N., Azri, N., Amadi, U.F., and Taufiq-Yap, Y.H., 2020, Influence of heterogeneous catalysts and reaction parameters on the acetylation of glycerol to acetin: A review, *Appl. Sci.*, 10, 1–34.
- Obi, A.I., Ajiwe, V.I.E., Anekwe, O.J., Ezeudu, E.C., and Aduaka, C.N., 2023, Kinetics and Thermodynamic Study of the Acetylation of *Cucumeropsis mannii* Seed Shell, *Sci. J. Chem.*, 11, 45–50.
- de Oliveira, A. de N., Lima, E.T.L., de Oliveira, D.T., Angélica, R.S., Andrade, E.H. de A., Filho, G.N. da R., da Costa, C.E.F., Costa, F.F., Luque, R., and do Nascimento, L.A.S., 2019, Acetylation of eugenol over 12-molybdophosphoric acid anchored in mesoporous silicate support synthesized from flint kaolin, *Materials (Basel)*, 12, 2995–3027.
- de Oliveira, A. de N., de Oliveira, D.T., Angélica, R.S., Andrade, E.H. de A., da Silva, J.K. do R., Rocha Filho, G.N. da, Coral, N., Pires, L.H. de O., Luque, R., and do Nascimento, L.A.S., 2020, Efficient esterification of eugenol using a microwave-activated waste kaolin, *React. Kinet. Mech. Catal.*, 130, 633–653.
- Østergaard, J., 2016, UV/Vis Spectrophotometry and UV Imaging BT - Analytical Techniques in the Pharmaceutical Sciences,. In, Müllertz, A., Perrie, Y., and Rades, T. (eds). Springer New York, New York, NY, pp. 3–27.
- Penner, M.H., 2017, Ultraviolet, Visible, and Fluorescence Spectroscopy BT - Food Analysis,. In, Nielsen,S.S. (ed). Springer International Publishing, Cham, pp. 89–106.
- Pratiwi, R.A., Bayu, A., and Nandiyanto, D., 2021, Indonesian Journal of Educational Research and Technology How to Read and Interpret UV-VIS Spectrophotometric Results in Determining the Structure of Chemical Compounds, *Indones. J. Educ. Res. Technol.*, 2, 1–20.
- Rahmayanti, M., 2020, Sintesis dan Karakterisasi Magnetit ( $Fe_3O_4$ ): Studi Komparasi Metode Konvensional dan Metode Sonokimia, *Al Ulum J. Sains Dan Teknol.*, 6, 26.
- Sandra, L., Rantesalu, A., Sunartaty, R., Asrori, M.R., Toepak, E.P., Samsuar, Sernita, Amin, I.I., Susanti, L., S, A.A., and Setiawan, J., 2022, Kimia Dasar, Sari,M. and Wahyuni,T.P. (eds) PT GLOBAL EKSEKUTIF TEKNOLOGI, Padang.
- Santolin, L., Fiametti, K.G., da Silva Lobo, V., Wancura, J.H.C., and Oliveira, J.V., 2021, Enzymatic Synthesis of Eugenyl Acetate from Essential Oil of Clove Using Lipases in Liquid Formulation as Biocatalyst, *Appl. Biochem. Biotechnol.*, 193, 3512–3527.
- Saraphanchotiwitthaya, A., Khorana, N., and Sripalakit, P., 2019, Comparative anti-inflammatory activity of eugenol and eugenyl acetate on the murine



- immune response in vitro, *Songklanakarin J. Sci. Technol.*, 41, 641–648.
- Shallenberger, R.S., 1993, Taste Chemistry, First Edit. Chapman & Hall, London.
- Skoog, D., West, D.M., Holler, F.J., and Crouch, S.R., 2016, Principles of Instrumental Analysis, Cengage Learning, USA.
- Steinfield, J.I., Francisco, J.S., and Hase, W.L., 1998, Chemical Kinetics and Dynamics, 2nd Editio. Pearson Education, New Jersey.
- Syarif, T., Sulistyo, H., Budi Sediawan, W., and Budhijanto, B., 2018, The Effect Of Temperature and Addition of CaO to Hydrogen Production from Pattuku Coal Char Gasification, *J. Bahan Alam Terbarukan*, 6, 198–204.
- Thao, N.X., 2020, A new correlation coefficient of the Pythagorean fuzzy sets and its applications, *Soft Comput.*, 24, 9467–9478.
- Tischer, J.S., Possan, H., Luiz, J., Malagutti, N.B., Martello, R., Valério, A., Dalmagro, J., de Oliveira, D., and Oliveira, J.V., 2019, Synthesis of eugenyl acetate through heterogeneous catalysis, *J. Essent. Oil Res.*, 31, 312–318.
- Ulanowska, M. and Olas, B., 2021, Biological properties and prospects for the application of eugenol—a review, *Int. J. Mol. Sci.*, 22, 3671-3703.
- Vitalini, S., Orlando, F., and Iriti, M., 2022, Selective phytotoxic activity of eugenol towards monocot and dicot target species, *Nat. Prod. Res.*, 36, 1659–1662.
- Windrianto, I. and Satriadi, H., 2012, Produksi Triacetin Denga Proses Esterifikasi Gliserol dan Asam Asetat Menggunakan Katalis Asam Sulfat, *J. Teknol. Kim. dan Indstri*, 1, 508–512.
- Yap, Y.H., Azmi, A.A., Mohd, N.K., Yong, F.S.J., Kan, S.Y., Thirmizir, M.Z.A., and Chia, P.W., 2020, Green Synthesis of Silver Nanoparticle Using Water Extract of Onion Peel and Application in the Acetylation Reaction, *Arab. J. Sci. Eng.*, 45, 4797–4807.
- Zakiah, Patmawati, N., Aprilia, A.C., Maulida, I.R., and Hidayati, N., 2020, Pengaruh Perbedaan Rasio Mol Gliserol dengan Asam Asetat dan Jumlah Katalis terhadap Konversi Reaksi Asetilasi Gliserol Menggunakan Katalis Karbon Teraktifasi-Asam Sulfat,. In, *Prosiding Seminar Nasional Teknik Kimia “Kejuangan.”* Yogyakarta, p. E2 1-E2 8.
- Zhao, X., Zhang, Y., Wei, L., Hu, H., Huang, Z., Yang, M., Huang, A., Wu, J., and Feng, Z., 2017, Esterification mechanism of lignin with different catalysts based on lignin model compounds by mechanical activation-assisted solid-phase synthesis, *RSC Adv.*, 7, 52382–52390.