

DAFTAR PUSTAKA

- Alothman, Z. A. (2012). A Review : Fundamental Aspects of Silicate Mesoporous Materials. *Materials*. 5(12). 2874–2902.
- Aminullah, Etika, S. B., & Amelia, F. (2021). Optimasi Kecepatan Pengadukan dan Waktu Kontak Zat Warna Metanil Yellow Terhadap C-cinamalkaliks[4]resorsinarena (CSKR). *Periodic*. 10(1). 7–11.
- Anwar, C., Jumina, Siswanta, D., Santosa, S. J., Dewi, R. K., & Mardjan, M. I. D. (2016). Adsorption Study of Pb (II), Cd (II), Hg (II) and Cr (III) Onto Calix[4]resorcinarrene Derivative. *Oriental Journal of Chemistry*. 32(6). 2881–2887.
- Atkins, P.W. (1999). *Kimia Fisika Jilid II*. Jakarta: Erlangga.
- Badri, A. F., Palapa, N. R., Mohadi, R., Mardiyanto & Lesbani, A. (2020). Mg-Cr Layered Double Hydroxide with Intercalated Oxalic Anion for Removal Cationic Dyes Rhodamine B and Methylene Blue. *Journal of Environmental Treatment Techniques*. 9(1). 85–94.
- Budavari, S. 1996. *The Merck Index 12th edition*. WhiteHouse USA: Merck & Co. Inc.
- Buhani, Suharso, & Sumadi. (2010). Adsorption Kinetics and Isotherm of Cd(II) Ion on Nannochloropsis sp Biomass Imprinted Ionic Polymer. *Desalination*. 259(1–3). 140–146.
- Buraen, Y. E., Ola, P. D., & Lerrick, R. I. (2019). Sintesis Senyawa C-2,8,14,20-tetra-2,4,5-trimetoksi)fenilkaliks[4]resorsinarena dari Senyawa 2,4,5-trimetoksibenzaldehida. *Jurnal Saintek Lahan Kering*. 2(2). 46–48.
- Crawford, C. B., & Quinn, B. (2017). The Interactions of Microplastics and Chemical Pollutants. *Microplastic Pollutants*, 131–157.
- Echigo, M. & Oguro, D. (2009). Development of New Phenylcalix[4]resorcinarrene: Its Application to Positive-Tone Molecular Resist for EB and EUV Lithography. *Advances in Resist Materials and Processing Technology XXVI*. 7273. 72732Q-1-12.
- Eddaif, L., Trif, L., Telegdi, J., Egyed, O., & Shaban, A. (2019). Calix[4]resorcinarrene Macrocycles: Synthesis, Thermal Behavior and Crystalline Characterization. *Journal of Thermal Analysis and Calorimetry*. 137(2). 529–541.
- Etika, S. B., Nasra, E., & Rilaztika, I. (2018). Synthesis and Characterization of C-cinamalkaliks[4]resorsinarena from Cinnamon Oil Waste West Sumatra. *IOP Conference Series: Materials Science and Engineering*. 335(1). 1–8.
- Etika, S. B., Nasra, E., Hafids, A., & Sari, T. K. (2020). Utilization of C-cinamalkaliks[4]resorcinarrene as Adsorbent for Rhodamin B and Methanil Yellow. *Advances in Biological Science Research*. 10. 234–237.

- Ewing, G. W. (1997). *Analytical Instrumentation Handbook 2nd edition*. USA: CRS Press.
- Gandjar, I. G., & Rohman, A. (2012). *Analisis Obat Secara Spektrofotometri dan Kromatografi*. Yogyakarta: Pustaka Pelajar.
- Ghaedi, M., Karami, B., Ehsani, S., Marahel, F., & Soylak, M. (2009). Preconcentration-Separation of Co^{2+} , Ni^{2+} , Cu^{2+} and Cd^{2+} in Real Samples by Solid Phase Extraction of a Calix[4]resorcinarene Modified Amberlite XAD-16 Resin. *Journal of Hazardous Materials*. 172(2–3). 802–808.
- Goto, Y., Nema, Y., & Matsuoka, K. (2020). Removal of Zwitterionic Rhodamine B Using Foam Separation. *Journal of Oleo Science*. 69(6). 563–567.
- Gregg, S. J., & Sing, K. S. W. (1982). *Adsorption, Surface Area, and Porosity*. London: Academic Press.
- Gritter, R.J, Bobbitt, J.N., & Schwarting, A.E. (1991). *Pengantar Kromatografi*. diterjemahkan oleh Kosasih Padmawinata. Edisi II. Bandung: ITB Press Bandung.
- Gutsche, C. D. (1981). Properties of the Calixarenes from p-tert-butylphenol. *Journal of the American Chemical Society*. (8). 3782–3792.
- Gutsche, C. (1989). *Calixarenes, Royal Society of Chemistry*. Cambridge : Royal Society of Chemistry.
- Handayani, S. N., Jumina, Mustofa, & Swasono, D. R. T. (2016). Antioxidant Assay of C-2-hydroxyphenylcalix[4]resorcinarene Using DPPH Method. *International Journal of ChemTech Research*. 9(2). 278–283.
- Handayani, S. N., Irmanto, & Indriyani, N. N. (2020). Removal of Rhodamine B Using 4-hydroxy-3-methoxyphenyl-calix[4]resorcinarene. *Journal of Physics: Conference Series*. 1–11.
- Harjito. (2019). Perbandingan Metode Kurva Kalibrasi / Standar dan Metode Adisi Standar pada Pengujian Chrom Total dalam Bahan Makanan Menggunakan Spektrometri Serapan Atom (SSA). *Jurnal Inovasi Dan Pengelolaan Laboratorium*. 1(1). 26–30.
- Hart, H., Craine, L., & Hart, D. (2003). *Kimia Organik*. Jakarta: Erlangga.
- Hasan, A., Yerizam, M., & Yahya, M. H. (2021). Mekanisme Adsorben Zeolit dan Manganese Zeolit Terhadap Logam Besi (Fe). *Jurnal Kinetika*. 12(1). 9–17.
- Heaton, A. (1994). *The Chemical Industry 2th edition*. London: Blackie Academic and Profesional, Chapman & Hal London.
- Hedidi, M., Hamdi S. M., Mazari T., Boutemour B., Rabia C., Chemat F., & Hamdi M. (2006). Microwave-Assisted Synthesis of Calix[4]resorcinarenes. *Tetrahedron*. 62(24). 5652-5655.
- Heo, K. S., & Ryoo, J. J. (2020). Synthesis and Application of New Calix[4]arenes-Containing (R)-phenylglycinol Chiral Stationary Phases for

- Enantioseparation. *Bulletin of the Korean Chemical Society*. 41(7). 753–758.
- Hindryawati, N. (2020). *Fotokatalis dalam Pengolahan Limbah Tekstil*. Yogyakarta: Budi Utama.
- Ho, Y. S. (2006). Review of Second-order Models for Adsorption Systems. *Journal of Hazardous Materials*. 136(3). 681–689.
- Hunger, K. (2003). *Industrial Dyes: Chemistry, Properties, Applications*. German: Wiley-vch.
- Husin, H. & Rosnelly, C. M. (2007). Studi Kinetika Adsorpsi Larutan Logam Timbal (Pb) Menggunakan Karbon Aktif dari Batang Pisang. *Jurnal Hasil Penelitian Industri*. 20(1). 1–10.
- Jain, V. K., Pillai, S. G., Pandya, R. A., Agrawal, Y. K., & Shrivastav, P. S. (2005). Selective Extraction, Preconcentration and Transport Studies of Thorium (IV) Using Octa-Functionalized Calix[4]resorcinarene-hydroxamic Acid. *Analytical Sciences*. 21(2). 129–135.
- Kadirvelu, K., Karthika, C., Vennilamani, N., & Pattabhi, S. (2005). Activated Carbon from Industrial Solid Waste as an Adsorbent for the Removal of Rhodamine-B from Aqueous Solution: Kinetic and Equilibrium Studies. *Chemosphere*. 60(8). 1009–1017.
- Kazakova, E. K., Syakaev, V. V., Morozova, J. E., Makarova, N. A., Muslinkina, L. A., Evtugyn, G. A., & Konovalov, A. I. (2007). Stable Complexes of Tertiary Ammonia Derivative of Phenothiazine with Tertramethylsulfonated Resorcin[4]arenes Obtained Under Substoichiometric Conditions. *Journal of Inclusion Phenomena and Macrocyclic Chemistry*. 59(1–2). 143–154.
- Kementerian Perindustrian. (2020). *Sepanjang 2019, Sektor Industri Unggulan Tumbuh Melesat*. Kementerian Perindustrian Republik Indonesia. diakses pada 21 November 2020. <https://kemenperin.go.id/artikel/21492/Sepanjang-2019,-Sektor-Industri-Unggulan-Tumbuh-Melesat>.
- Khopkar, S. M. (1984). *Konsep Dasar Kimia Analitik*. Jakarta: UI Press.
- Kipling, J.J. (1965). *Adsorption for Solution of Non Electrolytes*. London: Academic Press.
- Liu, C., Pei, W. Y., Li, J. F., Yang, J., & Ma, J. F. (2020). Calix[4]arene-based [Co4] Complex/ordered Mesoporous Carbon as a High-Performance Electrocatalyst for Efficient Detection of Baicalein. *Sensors and Actuators, B: Chemical*. 308. 1–9.
- Luo, H., Dai, S., Bonnesen, P. V., Buchanan, A. C., Holbrey, J. D., Bridges, N. J., & Rogers, R. D. (2004). Extraction of Cesium Ions from Aqueous Solutions Using Calix[4]arene-bis(tert.octylbenzo-crown-6) in Ionic Liquids. *Analytical Chemistry*. 76(11). 3078–3083.

- Mahatmanti, F. W., Rengga, W. D. P., Kusumastuti, E., & Nuryono. (2017). Chitosan/Silica/Polyethylene Glycol (Ch/Si/P) Composites Membrane as Selective Adsorbent of Rhodamine B From Aqueous Solution. *Asian Journal of Chemistry*. 29(2). 283–286.
- Mayo, D. H. (2006). Protonation and Solvent Effects on a Resorcin[4]arene Based Cavitand. A Senior Honors. *Thesis*. The Ohio State University.
- McMurry, J. E., (2012). *Organic Chemistry 8th edition*. Canada: Brooks/Cole Cengage Learning.
- Miller, J. (2000). *Statistics and Chemometrics for Analytical Chemistry 4th Edition*. Harlow: Prentice Hall.
- Mouradzadegan, A., Elahi, S., Abadast, F., & Motamedi, H. (2016). A Straightforward Route for Covalently Anchored Pyridinium Salt Onto Upper Rim of C-methylcalix[4]resorcinarene with Selective Antibacterial Activity Against Gram-positive Bacteria. *Research on Chemical Intermediates*. 42(3). 1583–1591.
- Musafira, Adam, N. M. & Puspitasari, D. J. (2019). Pemanfaatan Limbah Kulit Buah Pisang Kepok (Musa paradisiaca) Sebagai Biosorben Zat Warna Rhodamin B. *Kovalen*. 5(3). 308–314.
- Mustafina, A. R., Skripacheva, V.V., Kazakova, E. K. H., Markarova, N. A., Kataev, V. E., & Ermolaeva, L. V. (2002). A Watersoluble Sulfonatomethylated Calix[4]resorcinarene as Artificial Receptor of Metal Complexes. *Journal of Inclusion and Macrocyclic Chemistry*. 42(1). 77–81.
- Nasrollahzadeh, M., Atarod, M., Sajjadi, M., Sajadi, S. M., & Issaabadi, Z. (2019). Plant-Mediated Green Synthesis of Nanostructures: Mechanisms, Characterization, and Applications. *Interface Science and Technology*. (28). 199–322.
- Ngurah, B. I. G. M., Jumina, Anwar, C., Mustofa, & Sahadewa. (2014). Synthesis of Benzoyl C-phenylcalix[4]resorcinarene Octaacetate and Cinnamoyl C-phenylcalix[4]arene for UV Absorbers. *Indonesian Journal of Chemistry*. 14(2). 160–167.
- Ngurah, B. I. G. M. (2018). Synthetic C-methoxyphenylcalix[4]resorcinarene and Its Antioxidant Activity. *Journal of Applied Chemical Science*. 5(1). 403–408.
- Oliveira, C. B. S., Meurer, Y. S. R., Oliveira, M. G., Medeiros, W. M. T. Q., Silva, F. O. N., Brito, A. C. F., De Pontes, D. L., & Andrade-Neto, V. F. (2014). Comparative Study on The Antioxidant and Anti-Toxoplasma Activities of Vanillin and Its Resorcinarene Derivative. *Molecules*. 19(5). 5898–5912.
- Ouachtak, H., El Haouti, R., El Guerdaoui, A., Haounati, R., Amaterz, E., Addi, A. A., Akbal, F., & Taha, M. L. (2020). Experimental and Molecular

Dynamics Simulation Study on the Adsorption of Rhodamine B Dye on Magnetic Montmorillonite Composite γ -Fe₂O₃@Mt. *Journal of Molecular Liquids*. 309. 1–18.

- Oxtoby, D. W. (1990). *Prinsip-Prinsip Kimia Modern*. Jakarta: Erlangga.
- Pescok, R. L., Shields, L. D., Cairns, T., & Mc. William, I. G. (1976). *Modern Methods of Chemical Analysis 2nd edition*. New York: Jhon Wiley and Sons.
- Puriyandari, D., & Laksono, P. J. (2019). Pengaruh Ion Cr (VI) pada Variasi pH Terhadap Serapan Ion Cu (II) Oleh Adsorben Kulit Kacang Tanah dengan Spektrofotometri Serapan Atom. *Orbital: Jurnal Pendidikan Kimia*. 3(1). 15–29
- Putri, S. A., Asnawati, & Indarti, D. (2013). Optimalisasi Adsorpsi Zat Warna Rhodamin B pada Hemiselulosa dalam Sistem Dinamis. *Berkala Saintek*. 7(1). 1–6.
- Qi, F. & Wen-fang, S. (2009). Effect of C-tetramethyl Calix[4]resorcinarene Acrylate on Curing Behavior and Film Properties of Thiol-acrylate Coating System. *Chemical Research in Chinese Universities*. 25(5). 760–766.
- Qu, J., Zhang, Q., Xia, Y., Cong, Q., & Luo, C. (2015). Synthesis of Carbon Nanospheres Using Fallen Willow Leaves and Adsorption of Rhodamine B and Heavy Metals by Them. *Environmental Science and Pollution Research*. 22(2). 1408–1419.
- Rahayu, S., Herawati, N., & Wijaya, M. (2020). Sintesis Nanopartikel Mangan Oksida dengan Metode Sol Gel dan Uji Aktivitas Katalitik terhadap Degradasi Zat Warna Rhodamin B. *Chemica: Jurnal Ilmiah Kimia Dan Pendidikan Kimia*. 21(2). 190–199.
- Rahayu, A. P., Sulmartiwi, L., & Kurnia, K. A. (2021). Overview of the Impact of Different Concentration of Acid Solutions in the Production of Adsorbents from Shrimp Waste and the Capacity to Eliminate Textile Colours. *IOP Conference Series: Earth and Environmental Science*. 718(1). 1–4.
- Roberts, B. A., Cave, G. W. V., Raston, C. L., & Scott, J. L. (2001). Solvent-free Synthesis of Calix[4]resorcinarenes. *Green Chemistry*. 3(6). 280–284.
- Sanjaya, A.S., & Agustine, R.(2015). Studi Kinetika Adsorpsi Pb Menggunakan Arang Aktif dari Kulit Pisang. *Jurnal Konversi*. 4(1). 17–24.
- Santos, O. A. A. D., Castelli, C. Z., Oliveira, M. F., Neto, A. F. D. A., & De Silva, M. G. C. (2013). Adsorption of Synthetic Orange Dye Wastewater in Organoclay. *Chemical Engineering Transactions*. 32. 307–312.
- Serdjono, R. E., Dwiyanti, G. Aisyah, S. & Khoerunnisa, F. (2009). The Synthesis of Calix[4]resorcinarene from Cassia Oil and Its Application for Solid Phase Extraction of Heavy Metals Hg (II) and Pb (II). *Prosiding Seminar Kimia Bersama UKM-ITB*. 8. 110–117.

- Sastrohamidjojo, H. (1991). *Kromatografi*. Yogyakarta: Universitas Gajah Mada
- Setiyanto, S., Riwayati, I., & Kurniasari, L. (2015). Adsorpsi Pewarna Tekstil Rodhamin B Menggunakan Senyawa Xanthat Pulpa Kopi. *Jurnal Momentum*. 11(1). 24–28.
- Shumatbaeva, A. M., Morozova, J. E., Shalaeva, Y. V., Saifina, A. F., Gubaidullin, A. T., Syakaev, V. V., Sapunova, A. S., Voloshina, A. D., Nizameev, I. R., Kadirov, M. K., Bulygina, K. S., Babaev, V. M., & Antipin, I. S. (2020). Synthesis of Ag-AgCl Nanoparticles Capped by Calix[4]resorcinarene-mPEG Conjugate and Their Antimicrobial Activity. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*. 602. 1–29.
- Silverstein, R. M., Bassler, G. C., & Morrill, T. C. (1981). *Spectrometric Identification of Organic Compounds 4th Edition*. Singapore: John Wiley and Sons.
- Singh, S., Parveen, N., & Gupta, H. (2018). Adsorptive Decontamination of Rhodamine-B from Water Using Banana Peel Powder: A biosorbent. *Environmental Technology and Innovation*. 12. 189–195.
- Siswanta, D., Zulkarnain, A. K., Triono, S., Yuanita, E., Imawan, C., Fatmasari, N., & Nursalim, I. (2019). Development of C-arylcalix[4]resorcinarenes and C-arylcalix[4]pyrogallolarenes as Antioxidant and UV-B Protector. *Indonesian Journal of Chemistry*. 19(2). 273–284.
- Skoog, A. D., West, M. D., Holler, J. F., & Crouch R. S. (2013). *Fundamentals of Analytical Chemistry*. Canada: Brooks/Cole.
- Stuart, B. (2004). *Spectroscopy :Fundamental and Applications*. New York: John Wiley & Sons.
- Tandy, E., Hasibuan, I. F., & Harahap, H. (2012). Kemampuan Adsorben Limbah Lateks Karet Alam Terhadap Minyak Pelumas dalam Air. *Jurnal Teknik Kimia USU*. 1(2). 34–38.
- Tunstad, L. M., Tucker, J. A., Dalcanale, E., Weiser, J., Bryant, J. A., Sherman, J.C., Helgeson, R.C., Knobler, C.B. & Cram, D.J. (1989). Host-Guest Complexation 48. Octol Building Blocks for Cavitands and Carcerands. *The Journal Organic Chemistry*. 54(6). 1305-1312.
- Tuzahiroh, A. (2020). Sintesis C-hidroksifenilkaliks[4]resorsinarena serta Uji Aktivitas Antibakteri Terhadap Bakteri *Staphylococcus aureus*. *Skripsi*. Purwokerto : Universitas Jenderal Soedirman.
- Utomo, S. B., Siswanta, D., & Kumar, N. (2011). Synthesis of Thiomethylated Calix[4]resorcinarene Based on Fennel Oil via Chloromethylation. *Indonesian Journal of Chemistry*. 11(1). 1–8.
- Utomo, S. B., Fujiyanti, M., Lestari, W. P., & Mulyani, S. (2018). Uji Aktivitas Antibakteri Senyawa C-4-metoksifenilkaliks[4]resorsinarena Termodifikasi Hexadecyltrimethylammonium-Bromide Terhadap Bakteri *Staphylococcus aureus* dan *Escherichia coli*. *JKPK (Jurnal Kimia Dan*

Pendidikan Kimia). 3(3). 201–209.

- Utomo, S. B., & Setiati, T. (2019). Aplikasi Kaliksarena Sebagai Katalis Transfer Fasa dalam Sintesis Vanilin dari Eugenol. *JKPK (Jurnal Kimia dan Pendidikan)*. 4(3). 179–188.
- Virtanen, T., Rudolph, G., Lopatina, A., Al-Rudainy, B., Schagerlöf, H., Puro, L., Kallioinen, M., & Lipnizki, F. (2020). Analysis of Membrane Fouling by Brunauer-Emmet-Teller Nitrogen Adsorption/Desorption Technique. *Scientific Reports*. 10(1). 1–10.
- Widihati, I. A. G., Suastuti, N. G. A. M., & Nirmalasari, M. A. Y. (2012). Studi Kinetika Adsorpsi Larutan Ion Logam Kromium (Cr) Menggunakan Arang Batang Pisang (Musa Paradisiaca). *Jurnal Kimia*. 6(1). 8–16.
- Wulandari, R., Jumina, & Siswanta, D. (2015). Adsorption of Remazol Brilliant Blue R (RBBR) by C-4-ethoxy-3-methoxyphenylcalix[4]resorcinarene Triphenylphosphonium Chloride. *Advanced Materials Research*. 1101. 290–293.
- Yu, J. X., Li, B. H., Sun, X. M., Yuan, J., & Chi, R. A. (2009). Polymer Modified Biomass of Baker's Yeast for Enhancement Adsorption of Methylene Blue, Rhodamine B and Basic Magenta. *Journal of Hazardous Materials*. 168(2–3). 1147–1154.
- Zhao, J., Bolte, M., Dordea, C., Grüner, B., & Böhmer, V. (2009). Calix[4]arenes Substituted on the Narrow Rim with Malononitrile and Cobalt Bis(dicarbollide) Anion. *Synthesis*. 23. 4063–4067.