



DAFTAR PUSTAKA

- Abis, L., Dalcanale, E., Du vosel, A., and Spera, S., 1990, Nuclear Magnetic Resonance Elucidation of Ring-Inversion Processes in Macrocyclic Octaol, *J. Chem. Soc. Perkin Trans. 2*, 2075-2080.
- Abosadiya, H.M., Hasbullah, S.H., Mackeen, M.M., Low, S.C., Ibrahim, Z., Koketsu, M., and Yamin, B.M., 2013, Synthesis, Characterization, X-ray Structure and Biological Activities of C-5-Bromo-2-hydroxyphenylcalix[4]-2-methylresorcinarene, *Molecules*, 18, 13369-13384.
- Agrapidis-Paloympis, L.E., Nash, R.A., and Shaath, N.A., 1987, The Effect of Solvents on the Ultraviolet Absorbance of Sunscreens, *J. Soc. Cosmet. Chem.*, 38, 209-221.
- Anonim, 2007, *Opinion on homosalate*. Scientific Committee on Consumer Products, Brussels.
- Berger, J.M., 2001, Isolation, Characterization, and Synthesis of Bioactive Natural Products from Rainforest Flora, *Dissertation*, Virginia Polytechnic Institute and State University, Virginia.
- Beyeh, N.K., and Rissanen, K., 2009, Tetranitroresorcin[4]arene: Synthesis and Structure of A New Stereoisomer, *Tetrahedron Lett.*, 50, 7369-7373.
- Bourgeois, J-M., and Stoeckli-Evans, H., 2005, Synthesis of New Resorcinarenes Under Alkaline Conditions, *Helv. Chim. Acta.*, 88, 2722-2730.
- Boyd, A.S., Naylor, M., Cameron, G.S., Pearse, A.D., Gaskell, S.A., and Neldner, K.H., 1995, The Effects of Chronic Sunscreen Use on the Histologic Changes of Dermatoheliosis, *J. Am. Acad. Dermatol.*, 33, 941-946.
- Budiana, I.G.N., 2015, Sintesis Seri Benzoat-Sinamat Kaliks[4]resorsinarena dan Benzoil-Sinamoil Kaliks[4]resorsinarena serta Uji Aktivitasnya sebagai Tabir Surya dan Adsorben Cr(III), Pb(II), dan Cd(II), *Disertasi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Carey, S.J.J., 2006, The Synthesis and Medicinal Applications of Pyrogallol[4]arenes, *Dissertation*, Dublin City University, Dublin.
- Chawla, H.M., Pant, N., Kumar, S., Mrig, S., Srivastava, B., Kumar, N., and Black, D.StC., 2011, Synthesis and Evaluation of Novel Tetrapropoxycalix[4]Arene Enones and Cinnamates for Protection from Ultraviolet Radiation, *J. Photochem. Photobiol. B: Biol.*, 105, 25-33.



- Cotterill, A.S., Hartopp, P., Jones, G.B., Moody, C.J., Norton, C.L., O'Sullivan, N., and Swann, E., 1994, Cyclopropamitosenes, Novel Bioreductive Anticancer Agents. Synthesis of 7-Methoxycyclopropamitosenes and Related Indolequinones, *Tetrahedron*, 50(25), 7657-7674.
- Dahle, J., and Kvan, E., 2003, Induction of Delayed Mutations and Chromosomal Instability in Fibroblasts after UVA, UVB, and X-Radiation, *Cancer. Res.*, 63, 1464-1469.
- de Freitas, Z.M.F., dos Santos, E.P., da Rocha, J.F., Dellamora-Ortiz, G. M., and Goncalves, J.C.S., 2005, A New Sunscreen of the Cinnamate Class: Synthesis and Enzymatic Hydrolysis Evaluation of Glyceryl Esters of *p*-methoxycinnamic acid, *Eur. J. Pharm. Sci.*, 25, 67-72.
- de Gruijl, F.R., 2002, Photocarcinogenesis: UVA vs. UVB Radiation, *Skin. Pharmacol. Appl. Skin. Physiol.*, 15, 316-320.
- del Hoyo, C.M., Rives, V., and Vicente, M.A., 1996, Application of Methyl Cinnamate/Montmorillonite as Ultraviolet Radiation Shelters, *Drug. Dev. Ind. Pharm.*, 22(11), 1089-1095.
- Denmark, S.E., and Beutner, G.L., 2008, Lewis Base Catalysis in Organic Synthesis, *Angew. Chem. Int. Ed.*, 47, 1560-1638.
- Dondi, D., Albini, A., and Serpone, N., 2006, Interactions between Different Solar UVB/UVA Filters Contained in Commercial Suncreams and Consequent Loss of UV Protection, *Photochem. Photobiol. Sci.*, 5, 835-843.
- Durairaj, R.B., 2005, *Resorcinol: Chemistry, Technology and Applications*, Springer-Verlag Berlin, Heidelberg.
- Freshney, R.I., 2010, *Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, Sixth Edition*, Wiley-Blackwell, New Jersey.
- Funck, M., Guest, D.P., and Cave, G.W.V., 2010, Microwave-Assisted Synthesis of Resorcin[4]arene and Pyrogallol[4]arene Macrocycles, *Tetrahedron Lett.*, 51, 6399-6402.
- Gaspar, L.R., and Campos, P.M.B.G.M., 2006, Evaluation of the Photostability of Different UV Filter Combinations in A Sunscreen, *Int. J. Pharm.*, 307, 123-128.
- Gloster, H.M.J., and Neal, K., 2006, Skin Cancer in Skin of Color, *J. Am. Acad. Dermatol.*, 55(5), 741-760.



- Hagedorn-Leweke, U., and Lippold, B.C., 1995, Absorption of Sunscreens and Other Compounds through Human Skin in vivo: Derivation of a Method to Predict Maximum Fluxes, *Pharm. Res.*, 12(9), 1354-1360.
- Han, J., Song, X., Liu, L., and Yan, C., 2007, Synthesis, Crystal Structure and Configuration of Acetylated Aryl Pyrogallol[4]Arenes, *J. Incl. Phenom. Macroycl. Chem.*, 59, 257-263.
- Hasbullah, A., Abosadiya, H.M., Jumina, J., Tahir, M.I.M., and Yamin, B.M., 2013, Synthesis, Structural and Antioxidant Properties of C-p-methoxyphenylcalix[4]resorcinarene, *Int. J. Advan. Sci. Eng. Inform. Tech.*, 3(2), 36-39.
- Herzog, B., Wehrle, M., and Quass, K., 2009, Photostability of UV Absorber Systems in Sunscreens, *Photochem. Photobiol.*, 85, 869-878.
- Indarto, I., 2013, Sintesis Senyawa Tabir Surya Turunan Kaliks[4]Resorsinarena Seri Benzofenon dan Sinamat dari p-Anisaldehyda, *Tesis*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Jain, V.K., and Kanaiya, P.H., 2011, Chemistry of Calix[4]resorcinarenes, *Russ. Chemi. Rev.*, 80(1), 75-102.
- Jiang, R., Roberts, M.S., Collins, D.M., and Benson, H.A.E., 1999, Absorption of Sunscreens Across Human Skin: An Evaluation of Commercial Products for Children and Adults, *Br. J. Clin. Pharmacol.*, 48, 635-637.
- Jiang, Y., Rabbi, M., Kim, M., Ke, C., Lee, W., Clark, R.L., Mieczkowski, P.A., and Marszalek, P.E., 2009, UVA Generates Pyrimidine Dimers in DNA Directly, *Biophys. J.*, 96, 1151-1158.
- Kazakova, E.K., Makarova, N.A., Ziganshina, A.U., Liya A. Muslinkina, L.A., Muslinkin, A.A., and Habicher, W.D., 2000, Novel Water-Soluble Tetrasulfonatomethylcalix[4]resorcinarenes, *Tetrahedron Lett.*, 41, 10111-10115.
- Kobayashi, K., and Yamanaka, M., 2015, Self-Assembled Capsules based on Tetrafunctionalized Calix[4]resorcinarene Cavitands, **Chem. Soc. Rev.**, 44, 449-466.
- Krohn, K., Loock, U., Paavilainen, K., Hausen, B.M., Schmalle, H.W., and Kiesele, H., 2001, Synthesis and Electrochemistry of Annoquinone-A, Cypripedin Methyl Ether, Denbinobin and Related 1,4-Phenanthrenequinones, *ARKIVOC (i)*, 88-130.



- Kunsagi-Mate, S., Szabo, K., Lemli, B., Bitter, I., Nagy, G., and Kollar, L., 2004, Increased Complexation Ability of Water-Soluble Calix[4]resorcinarene Octacarboxylate toward Phenol by the Assistance of Fe(II) Ions, *J. Phys. Chem. B.*, 108, 15519-15522.
- Kürti, L., and Czakó, B., 2005, *Strategic Applications of Named Reactions in Organic Synthesis: Background and Detailed Mechanisms*, Elsevier Academic Press, Burlington.
- Krutmann, J., 2000, Ultraviolet A radiation-induced biological effects in human skin: relevance for photoaging and photodermatosis, *J. Dermatol. Sci.*, 23, S22-S26.
- Liardet, S., Scaletta, C., Panizzon, R., Hohlfeld, P., and Laurent-Applegate, L., 2001, Protection Against Pyrimidine Dimers, p53, and 8-hydroxy-2 β -Deoxyguanosine Expression in Ultraviolet-Irradiated Human Skin by Sunscreens: Difference Between UVB + UVA and UVB Alone Sunscreens, *J. Invest. Dermatol.*, 117(6), 1437-1441.
- Lijanova, I.V., Moggio, I., Arias, E., Vazquez-Garcia, R., and Martínez-García, M., 2007, Highly Fluorescent Dendrimers Containing Stilbene, and 4-Styrylstilbene with Resorcinarene Cores: Synthesis and Optical Properties, *J. Nanosci. Nanotechnol.*, 7, 3607-3614.
- Lim, H.W., Cooper, K., Rubenstein, R., Hufford, D., Downham, T., Trancik, R., Swerlick, R., Weinstock, M.A., DeLeo, V., Amonette, R., Spencer, J.M., Rosen, C., Rivers, J.K., Bergfeld, W., Miller, A.J., Gordon, S., Gross, P., Eustis, A., and Koh, H., 1999, The Health Impact of Solar Radiation and Prevention Strategies: Report of the Environment Council, *J. Am. Acad. Dermatol.*, 41, 81-99.
- Mackie, B.S., and Mackie, L.E., 1999, The PABA Story, *Australas. J. Dermatol.*, 40, 51-53.
- Maerz, A.K., 2011, Synthesis and Characterization of Host-Guest Complexes: Metal-Organic Nanocapsules Using Aryl-Substituted Pyrogallol[4]arenes, *Dissertation*, University of Missouri-Columbia, Columbia.
- Manaia, E.B., Kaminski, R.C.K., Marcos Antonio Corrêa¹, M.A., Chivacchi¹, L.A., 2013, Inorganic UV filters, *Braz. J. Pharm. Sci.* 49(2), 201-209.
- Maslennikova, V.I., Burikhina, A.V., Vasyanina, L.K., and Nifant'ev, E.E., 2010, Amination of Calix[4]resorcinarenes. First Synthesis of Calix[4]phenylenediamines, *Russ. J. Gen. Chem.*, 80(3), 548-549.



- Meeker, J.D., Cantonwine, D.E., Rivera-González, L.O., Ferguson, K.K., Mukherjee, B., Calafat, A.M., Ye, X., Toro, L.V.A.D., Crespo-Hernández, N., Jiménez-Vélez, B., Alshawabkeh, A.N., and Cordero, J.F., 2013, Distribution, Variability, and Predictors of Urinary Concentrations of Phenols and Parabens among Pregnant Women in Puerto Rico, *Environ. Sci. Technol.*, 47, 3439–3447.
- Middel, O., Verboom, W., Hulst, R., Kooijman, H., Spek, A.L., and Reinhoudt, D.N., 1998, Bridging of Resorcin[4]arenes in the Chair Conformation to Cavitands Having Two Pairs of Axial and Equatorial Substituents, *J. Org. Chem.*, 63, 8259-8265.
- Moyal, D., 2004, Prevention of Ultraviolet-Induced Skin Pigmentation, *Photodermatol. Photoimmunol. Photomed.*, 20, 243–247.
- Nohynek, G.J., and Schaefer, H., 2001, Benefit and Risk of Organic Ultraviolet Filters, *Regul. Toxicol. Pharmacol.*, 33, 285-299.
- Ogata, Y., Takagi, K., and Takayanagi, Y., 1973, Photodecomposition of Alkyl Benzoates and S-Alkyl Thiobenzoates. Possibility of A Barton-Type Transition State, *J. Chem. Soc., Perkin Trans.. 1.*, 1244-1247.
- Oliveira, C.B.S., Meurer, Y.S.R., Oliveira, M.G., Medeiros, W.M.T.Q., Silva, F.O.N., Brito, A.C.F., Pontes, D.L., and Andrade-Neto, V.F., 2014, Comparative Study on the Antioxidant and Anti-*Toxoplasma* Activities of Vanillin and Its Resorcinarene Derivative, *Molecules.*, 19, 5898-5912.
- Osterwalder, U., and Herzog, B., *Chemistry and Properties of Organic and Inorganic UV Filters*. In: Lim, H.W., and Draelos, Z.D., ed., 2009, *Clinical Guide to Sunscreens and Photoprotection*, Informa Healthcare USA, Inc., New York.
- Parrish, J.A., Jaenicke, K.F., and Anderson, R.R., 1982, Erythema and Melanogenesis Action Spectra of Normal Skin, *Photochem. Photobiol.*, 36, 187-191.
- Pojarova, M., Ananchenko, G.S., Udachin, K.A., Daroszewska, M., Perret, F., Coleman, A.W., and Ripmeester, J.A., 2006, Solid Lipid Nanoparticles of *p*-Hexanoyl Calix[4]arene as a Controlling Agent in the Photochemistry of a Sunscreen Blocker, *Chem. Mater.*, 18, 5817-5819.
- Richard, H., and Candau, D., 2008, *Photostable Sunscreen Compositions Comprising Cinnamate Ester UV-B Filters and S-Triazine Compounds*, US 2008/0008669 A1.



- Schrader, A., Jakupovic, J., and Baltes, W., 1994, Photochemical Studies on trans-3-methylbutyl 4-methoxycinnamate, *J. Soc. Cosmet. Chem.*, 45, 43-52.
- Setyawan, T., 2013, Sintesis Senyawa tabir Surya Turunan Kaliks[4]resorsinaren Seri Benzophenon dari Vanilin, *Tesis*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Shaath, N.A., *The Chemistry of Ultraviolet Filters*. In: Shaath, N.A., ed., 2005, *Sunscreens: Regulations and Commercial Development 3rd Edition*, Taylor & Francis Group, Boca Raton.
- Staberg, B., Wulf, H.C., Klemp, P., Poulsen, T., and Brodthagen, H., 1983, The Carcinogenic Effect of UVA Irradiation, *J. Invest. Dermatol.*, 81, 517-519.
- Timmerman, P., Verboom, W., and Reinhoudt, D. N., 1996, Resorcinarenes, *Tetrahedron*, 52(8), 2663-2704.
- Ungnade, H.E., and Lamb, R.W., 1952, The Absorption Spectra of Benzoic Acid and Esters, *J. Am. Chem. Soc.*, 74 (15), 3789–3794.
- van Praag, M.C.G., Roza, L., Boom, B.W., Out-Luijting, C., Henegouwen, J.B.A.B, Vermeera, B.J., and Mommaas, A.M., 1993, Determination of The Photoprotective Efficacy of A Topical Sunscreen Against UVB-Induced DNA Damage in Human Epidermis, *J. Photochem. Photobiol. B: Biol.*, 19, 129-134.
- Weinelt, F., and Schneider, H-J., 1991, Mechanisms of Macrocycle Genesis. the Condensation of Resorcinol with Aldehydes, *J. Org. Chem.*, 56, 5527-5535.
- Yabe, A., Tsuda, M., Honda, K., and Tanaka, H., 1972, Photosensitivity and Photochemical Reactions of Poly(vinyl p-azidocinnamate), *J. Polym. Sci. A1.*, 10, 2379-2387.
- Yamin, B.M., Abosadiya, H.M, Hasbullah, S.A., and Jumina, J., 2014, Structural, Antioxidant and Antivarial Studies of C-3-nitrophenyl Calix[4]resorcinarene, *Int. J. Adv. Sci. Eng. Inform. Tech.*, 4(3), 1-4.
- Zachary, I., Determination of Cell Number. In: Hughes, D., and Mehmet, H., ed., 2003, *Cell Proliferation & Apoptosis*, BIOS Scientific Publishers, Oxford.