

BAB 5

KESIMPULAN DAN SARAN

1.1 Kesimpulan

1. Kondisi optimum sintesis senyawa 2,5-dibenzilidensiklopentanon dengan bantuan iradiasi gelombang mikro pada daya 600 Watt (P30) selama 30 detik dengan persentase rendemen sebesar 95,40%.
2. Kondisi optimum sintesis senyawa 2,5-*bis*(4-nitrobenziliden)siklopentanon dengan bantuan iradiasi gelombang mikro pada daya 600 Watt (P30) selama 240 detik (4 menit) dengan persentase rendemen sebesar 87,16%.
3. Pengaruh penambahan gugus nitro pada 4-nitrobenzaldehyd terhadap sintesis senyawa 2,5-*bis*(4-nitrobenziliden)siklopentanon memperlambat jalannya reaksi ditinjau dari lama waktu reaksi.

1.2 Saran

Penelitian ini dapat dikembangkan lebih lanjut mengenai uji aktivitas dari senyawa analog kurkumin 2,5-*bis*(4-nitrobenziliden)siklopentanon.

DAFTAR PUSTAKA

- Aggarwal, B., Sundaram, C., Malani, N. and Ichikawa, H., 2007, Curcumin: The Indian Solid Gold, *Advances in Experimental Medicine and Biology*, **595(1)** : 1-75.
- Ali, S., Kenawy, E., Sonbol, F. I., Sun, J., Al-Etewy, M., Ali, A., Huizi, L., and El-Zawawy, N. A., 2019, Pharmaceutical Potential of a Novel Chitosan Derivative Schiff Base with Special Reference to Antibacterial, Anti-Biofilm, Antioxidant, Anti-Inflammatory, Hemocompatibility and Cytotoxic Activities, *Springer*, **36(1)** : 5-22.
- Ameta, C., Dashora, P. and Vyas, R., 2015, 'Instrumentation', in Ameta, S.C., Punjabi, P.B., Ameta, R. and Ameta, C., *Microwave-Assisted Organic Synthesis: A Green Chemical Approach*, Apple Academic Press, Toronto, pp 15-29.
- Ameta, S.C. 2015, 'Introduction', in Ameta, S.C., Punjabi, P.B., Ameta, R. and Ameta, C., *Microwave-Assisted Organic Synthesis: A Green Chemical Approach*, Apple Academic Press, Toronto, pp 1-13.
- Anand, P., Thomas, S. G., Kunnumakkara, A. B., Sundaram, C., Harikumar, K. B., Sung, B., Tharakan, S. T., Misra, K., Priyadarsini, I. K., Rajasekharan, K. N., & Aggarwal, B. B., 2008, Biological activities of curcumin and its analogues (Congeners) made by man and Mother Nature. *Biochemical Pharmacology*, **76(11)**, 1590–1611.
- Anand, P., Kunnumakkara, A.B., Newman, R.A., Aggarwal, B.B., 2007, Bioavailability of curcumin: problems and promises, *Mol. Pharmacol.* 807–818.
- Budiati, T., Suzana, dan Surdijati, S., 2010, Sintesis Uji Aktivitas Analgesik dan Antiinflamasi Senyawa Benzoilthiourea Tersubstitusi. *Majalah Farmasi Indonesia*, **21 (2)**, 68-76.
- Cai, L. 2014, Thin layer chromatography, *Current Protocols in Essential Laboratory Techniques*.
- C. Kappe, A. Stadler, R. Mannhold, H. Kubinyi, G. Folkers, 2005, "Methods and Principles in Medicinal Chemistry: Microwaves in

Organic and Medicinal Chemistry", Volume 25, Wiley-Vch:Weinheim, Germany, pp. 9-24.

- Carocho M and Ferreira I C F R. 2013, A review on antioxidants, prooxidants and related controversy: Natural and synthetic compounds, screening and analysis methodologies and future perspectives. *Food Chem. Toxicol.*, **51**: 15-25.
- Da'i, M., Fajria, A dan Utami, W. 2010, Sintesis Senyawa Analog Kurkumin 3,5-bis-(4-hidroksi-3-metoksibenzilidin) Piperidin4-on (Monohidrat Hidroklorida) dengan Katalis HCl. *Pharmacol.* **11(1)**: 33-38.
- Eryanti, Y., Nurulita, Y., Hendra, R., Yuharmen, Y., Syahri, J., & Zamri, A. 2012, Synthesizing derivatives from cyclopentanone analogue curcumin and their toxic, antioxidant and anti-Inflammatory activities, *Makara Journal of Science*, **15(2)**: 117-123.
- Franco, J. 2017, Purifying Compounds by Recrystallization, *Journal of Visualized Experiments*, 4–6.
- Hajibeygi, M., Faghihi, K., and Shabaniyan, M., 2011, Preparation and Characterization of New Photosensitive and Optically Active Poly(Amide-Imide)s from N-Trimellitylimido-L-Amino Acid and Dibenzalacetone Moiety in the Main Chain₁. *Polymer Science*, Ser. B, Nos. 9–10, pp. 518–527.
- Handayani, S., Budimarwanti, C., dan Haryadi, W., 2017, Microwave-assisted organic reactions: eco-friendly synthesis of dibenzylidenecyclohexanone derivatives via crossed aldol condensation, *Indonesian Journal of Chemistry*, **17(2)**:336-341.
- Harimurti, S., Setyonugroho, W., Pramono, A., & Hidayaturahmah, R. 2019, Synthesis of Curcumin Derivative Assisted by Microwave Irradiation, *Pharmaceutical Journal of Indonesia*, 16(2): 153-158.
- Harmita, P.D., 2009, *Analisis Fisikokimia Potensiometri & Spektroskopi*. Penerbit Buku Kedokteran EGC, Jakarta.
- Hawaiz, F., & Omer, S.D., 2017, Ultrasound-assisted Synthesis of Some New Curcumin Analogs and Their Corresponding Pyrazoline Derivatives. *ARO-The Scientific Journal of Koya University*, 5(1), 30–35.

- Halliwell, B. 2011. Free radicals and antioxidants – quo vadis? *Trends Pharmacol. Sci.*, **32**: 125-130.
- Kocaadam B and Şanlıer N. 2017, Curcumin, an active component of turmeric (*Curcuma longa*), and its effects on health. *Crit. Rev. Food Sci. Nutr.*, **57**: 2889-2895.
- Kuhnert, N. 2002, Microwave-assisted reactions in organic synthesis-are there any nonthermal microwave effects?, *Angewandte Chemie*, **41(11)**: 1863–1866.
- Kumar, S., Jyotirmayee, K., & Sarangi, M. 2013, Thin layer chromatography: A tool of biotechnology for isolation of bioactive compounds from medicinal plants, *International Journal of Pharmaceutical Sciences Review and Research*, 18(1): 126–132.
- Liang, G., Yang, S., Jiang, L., Zhao, Y., Shao, L., Xiao, J., Ye, F., Li, Y., & Li, X. 2008, Synthesis and anti-bacterial properties of mono-carbonyl analogues of curcumin. *Chemical & Pharmaceutical Bulletin*, 56(2), 162–167.
- Lehman, J. W., 2004, *Microscale Operation Organic Chemistry*, Prentice Hall Upper Saddle River, New Jersey, 493, 643.
- López-Alarcón C and Denicola A., 2013, Evaluating the antioxidant capacity of natural products: A review on chemical and cellular-based assays. *Anal. Chim. Acta*, **763**: 1-10.
- Maulik, N. Mcfadden, D. Otani, H. Thirunavukkarasu, M. and Parinandi, N., L., 2013, Antioxidants in longevity and medicine. *Oxidative Med Cellular Longevity*, 2013: 3.
- McMurry, J., 2016, *Organic Chemistry, 9th ed*, Physical Science, Canada.
- Mohrig, J.R., Hammond, C.N. and Schatz, P.F. 2010, *Techniques in Organic Chemistry*, W.H Freeman and Company, New York.
- O'Neil, M., Heckelman, P., Koch, C., Roman, K., dan Kenny, C. 2006, *The Merck Index*, Ed 14th, Merck & Co, Inc., New York.

- Paulina, M. dan Ayuningtyas, F. 2016, Efek Antiinflamasi Sediaan Krim dan Salep Senyawa 2,5-Bis-(4-Nitrobenzilidin) Siklopentanon pada Edema Mencit yang Diinduksi Formalin, *Journal of Pharmaceutical Science and Clinical Research*, **01**: 102-111.
- Pavia, D.L., Lampman, G.M., Kriz, G.S., and Vyvyan, J.A. 2008. *Introduction to spectroscopy*. Cengage Learning, California.
- Pisoschi A M and Pop A. 2015, The role of antioxidants in the chemistry of oxidative stress: A review. *Eur J Med Chem.*, **97**: 55-74.
- Pudjono, S., & Irawati, T., 2006, Sintesis 2,5-dibenzilidinsiklopentanon dari benzaldehid dan siklopentanon dengan variasi pelarut. *Majalah Farmasi Indonesia*, **17(1)**: 45-49.
- Raju, K., Vinod, J. and Mulukuri, S., 2017, Synthesis and Anti-Oxidant Activity of Dibenzalketones. *International Journal of Research in Pharmacy and Chemistry*, **7(4)** : 585-606.
- Reddy, C. S. K., Khan, K. K. A., & Nagaraja, C. 2016, A Review on the Determination of Melting Point Measurement System, *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering*, **5(2)**: 975-979.
- Ritmaleni, R. dan Simbara, A., 2010, Synthesis of Tetrahydropentagavunon-0, *Majalah Farmasi Indonesia.*, **21**: 100-105.
- Rosidi, A., Khomsan, A., Setiawan, B. dan Briawan, D., 2004, Potensi Temulawak (*Curcuma xanthorrhiza Roxb*) sebagai Antioksidan, Lembaga Penelitian dan Pengabdian kepada Masyarakat Universitas Muhammadiyah Semarang, Semarang.
- Sardjiman, 2000, Synthesis of Some New Series of Curcumin Analogues, Antioxidative, Antiinflammatory, Antibacterial Activities, and Qualitative Structure Activity Relationship, *Desertasi*, Fakultas Farmasi, Universitas Gadjah Mada, Yogyakarta.
- Sari, N. K. 2010, *Analisa Instrumentasi*, Yayasan Humaniora, Klaten, Surakarta.

- Sherma, J. and Fried, B. 2003, *Handbook of Thin Layer Chromatography*, 3rd edition, Marcel Dekker Inc., New York.
- Silverstein, R. M., Webster, F. X., Kiemle, D. J. 2005, *Spectrometric Identification of Organic Compounds* 7th ed, John Wiley & Sons, Inc, USA.
- Skoog, D.A., Holler, F.J., dan Crouch, S.R., 2007, *Principles of Instrumental Analysis*, Ed 6th.
- Smith, J.G. 2011, *Organic Chemistry* 3rd Edition, McGraw-mohrig, New York.
- Theresih, K., & Budimarwanti, C. 2016, Pengaruh Gugus P-Metoksi Pada Reaksi Kondensasi Claysen-Schmidt Menggunakan Metoda Grinding, *Jurnal Sains Dasar*, **5(2)**: 124-132.
- Toda S. 2011, Polyphenol Content and Antioxidant Effects in Herb Teas. *Chinese Medicine*, **2**: 3.
- Tonnesen, H.H., Karlsen, J., and Van Henegouwen, G.B, 1986, Studies of Curcumin and Curcuminoids VIII, Photochemical Stability of Curcumin, *Original Paper, 2 Lebensm. Unters. Fosch.* **183**:116-122.
- Warren. S., 1994, *Sintesis Organik, Pendekatan Diskoneksi*, Terjemahan oleh M. Samhoedi , Ed. I., Gadjah Mada University Press., Yogyakarta.
- Yuan, X., Li, H., Bai, H., Su, Z., Xiang, Q., & Wang, C., 2014, Synthesis of novel curcuminanalogues for inhibition of properties. *European Journal of Medicinal Chemistry*, **77**, 223–230.
- Zhang, Y., Zhao, L., Wu, J., Jiang, X., Dong, L., Xu, F., Zou, P., Dai, Y., Shan, X., Yang, S., & Liang, G. 2014, Synthesis and evaluation of a series of novel asymmetrical curcumin analogs for the treatment of inflammation, *Molecules (Basel, Switzerland)*, **19(6)** : 7287-7307.