

## **BAB 5**

### **KESIMPULAN**

#### **5.1 Kesimpulan**

1. Konsentrasi natrium bikarbonat dan asam sitrat dapat berpengaruh pada sifat mutu fisik dan efektivitas sediaan yang meliputi organoleptis, pH, keseragaman bobot, dan kekerasan, serta efektivitas sediaan meliputi kadar air dan waktu larut sediaan.
2. Formula optimum sediaan *bath bomb* ekstrak buah lemon dapat diperoleh dengan menggunakan konsentrasi kombinasi natrium bikarbonat 33,362% dan konsentrasi asam sitrat 17,320% dengan perkiraan respon kekerasan sebesar 21,13 N, kadar air 5,76%, dan waktu larut 4,20 menit.

#### **5.2 Saran**

Pada penelitian selanjutnya untuk proses pencetakan dapat menggunakan alat press untuk sediaan agar *bath bomb* dapat lebih padat dan tidak gampang rapuh, juga dapat diperhatikan untuk kelembapan ruangan selama proses formulasi.

## DAFTAR PUSTAKA

- Addi, M., Elbouzidi, A., Abid, M., Tungmunnithum, D., Elamrani, A., and Hano, C., 2021, An Overview of Bioactive Flavonoids from Citrus Fruits, *Applied Sciences*, **12**: 1-15.
- Anshori, S., Maflahah, I., dan Supriyanto, 2022, Pengaruh Penambahan Natrium Bikarbonat dan Asam Sitrat Terhadap Karakteristik Mutu Garam Mandi (*Bath Bomb Salt*), *Jurnal Rekayasa dan Manajemen Agroindustri*, **10(3)**: 360-369.
- Antony, J. 2023, *Design of Experiments for Engineers and Scientists*, 3<sup>rd</sup> Edition, Elsevier, United Kingdom.
- Anwar, Y. dan Wau, G. L. G., 2024, Aktivitas Antioksidan Minyak Atsiri, *Jurnal Ilmu Kesehatan*, **1(5)**: 21-30.
- Aulton, M. E. and Taylor, K. M. G., 2021, *Aulton's Pharmaceutics: The Design and Manufacture of Medicines*, 6<sup>th</sup> Edition, Churchill Livingstone Elsevier.
- Badan Pengawas Obat dan Makanan, 2022, *Persyaratan Teknis Klaim Kosmetika*, Kementerian Hukum Dan Hak Asasi Manusia Republik Indonesia, Jakarta.
- Badan Pengawas Obat dan Makanan, 2023, *Persyaratan Keamanan dan Mutu Obat Bahan Alam*, Kementerian Hukum Dan Hak Asasi Manusia Republik Indonesia, Jakarta.
- BBC Good Food, 2022, How to Make a Bath Bomb. Diakses pada 20 Maret 2024, <https://www.bbcgoodfood.com/howto/guide/how-make-bath-bomb>.
- Bedlovičová, Z., Strapáč, I., Baláž, M., and Salayová, A., 2020, A Brief Overview on Antioxidant Activity Determination of Silver Nanoparticles, *Molecules*, *MDPI*.
- Body and Earth, 2022, 9 Main Benefits of Bath Bombs. Diakses pada 06 Januari 2024, <https://bodyandearth.shop/blogs/beauty-advice-portal/benefits-of-bath-bombs>.
- Bolton, S. and Bon, C., 2010, *Pharmaceutical Statistics: Practical and Clinical Applications*, Fifth Edition, Informa Healthcare, USA.

- Carli, B. 2020, *Cosmetic Formulations: A Beginners Guide*, The Institute of Personal Care Science.
- Chatzimitakos, T., Athanasiadis, V., Kotsou, K., Bozinou, E., and Lalas, S. I., 2023, Response Surface Optimization for the Enhancement of the Extraction of Bioactive Compounds from Citrus limon Peel, *Antioxidants, MDPI*.
- Christodoulou, M. C., Palacios, J. C. O., Hesami, G., Jafarzadeh, S., Lorenzo, J. M., Dominguez, R., Moreno, A., and Hadidi, M., 2022, Spectrophotometric Methods for Measurement of Antioxidant Activity in Food and Pharmaceuticals, *Antioxidant, MDPI*.
- Danet, A. 2021, Recent Advances in Antioxidant Capacity Assays, Viduranga, W. (Ed), *Antioxidants – Benefits, Sources, Mechanisms of Action* (pg. 1-35), IntechOpen, United Kingdom.
- Darsono, F. L., Soegianto, L., dan Jessica, M. A., 2022, Study Efektivitas Ekstrak Kental Kulit Buah Jeruk Purut Terstandar (*Citrus hystrix*) Sebagai Antioksidan dan Antijerawat, *Pharmaceutical Journal of Indonesia*, **8(1)**: 59-69.
- Dehgan, B. 2022, *Garden Plants Taxonomy: Volume 1*, Springer, Gewerbestrasse.
- Direktorat Jenderal Pengawasan Obat dan Makanan, 2000, *Parameter Standar Umum Ekstrak Tumbuhan Obat*, Departemen Kesehatan Republik Indonesia, Jakarta.
- Divya, K., Vamshi, G., Vijaykumar, T., Rani, M. S., and Kishore, B., 2020, Review on Introduction to Effervescent Tablets and Granules, *Kenkyu Journal of Pharmacology*, **6**:01-11.
- Gawalek, J. and Domian, E., 2020, Tapioca Dextrin as an Alternative Carrier in the Spray Drying of Fruit Juice: A Case Study of Chokeberry Powder, *Foods*, **9(8)**: 1-15.
- Juwanda, F. S. and Zin, H. M., 2021, The Development of Skin Analyzer for Skin Type and Skin Problem Detection, *Journal of ICT in Education*, **8(3)**:27-37.
- Kementrian Kesehatan Republik Indonesia. 2017, *Suplemen II Farmakope Herbal Indonesia Edisi II*, Departemen Kesehatan Republik Indonesia, Jakarta.

- Kementrian Kesehatan Republik Indonesia. 2020, *Farmakope Indonesia, Edisi VI*. Kementerian Kesehatan RI, Jakarta.
- Klimek-szczykutowicz, M., Szopa, A., and Ekiert, H., 2020, Citrus limon (Lemon) Phenomenon—A Review of the Chemistry, Pharmacological Properties, Applications in the Modern Pharmaceutical, Food, and Cosmetics Industries, and Biotechnological Studies, *Plants, MDPI*.
- Ladaniya, M. 2023, *Citrus Fruit: Biology, Technology and Evaluation*, 2<sup>nd</sup> Edition. Academic Press, India.
- Lambros, M., Tran, T. H., Fei, Q., and Nicolau, M., 2022, Citric Acid: A Multifunctional Pharmaceutical Excipient, *Pharmaceutics*, **14**: 1-18.
- Laurent, K. V., dan Salsabila, A. A., 2023, Sediaan *Bath Bomb* Biji Pepaya California (*Carica Papaya* L.) Sebagai Larvasida *Aedes Aegypti* di Bak Mandi, *Journal for Energetic Youngers*, **1(2)**: 79-87.
- Lestari, U., Syamsurizal, dan Handayani, W. T., 2020, Formulasi dan Uji Efektivitas Daya Bersih Sabun Padat Kombinasi Arang Aktif Cangkang Sawit dan Sodium Lauril Sulfat, *Journal of Pharmaceutical Science and Clinical Research*, **02**: 136-150.
- Lima, A. L., Pinho, L. A. G., Chaker, J. A., Sa-Barreto, L. L., Marreto, R. N., Gratieri, T., Gelfuso, G. M., and Cunha-Filho, M., 2020, Hot-Melt Extrusion as an Advantageous Technology to Obtain Effervescent Drug Products, *Pharmaceutics*, **12**: 1-20.
- Lodhi, V. D., Jadon, A. S., Sen, J., Jain, P. K., Thakur, B. S., Khare, B., and Jain, A., 2022, Effervescent Tablet: Everything You Need To Know, *Asian Journal of Dental and Health Sciences*, **2(4)**: 1-8.
- Maharani, A. B., Destiarti, L., Nurlina, Syahbanu, I., dan Rahmalia, W., 2020, Pengaruh Jenis Minyak Terhadap Sifat Fisik Dan Kimia *Bath Bomb*, *Indonesian Journal of Pure and Applied Chemistry*, **3(1)**: 22-30.
- Margareth, E., Florentina, N., Aritonang, B., dan Hafizullah, Ahmad., 2021, Pembuatan Sabun Padat Antiseptik Ekstrak Etanol Kulit Jeruk Lemon (*Citrus limon* (L.) Burm. f.), *Jurnal Indah Sains dan Klinis*, **2(3)**: 17-24.

- Mendonça, J. D. S., Guimarães, R. D. C. A., Zorgetto-Pinheiro, V. A., Fernandes, C. D. P., Marcelino, G., Bogo, D., Freitas, K. D. C., Hiane, P. A., Melo, E. S. D. P., Vilela, M. L. B., and Nascimento, V. A., 2021, Natural Antioxidant Evaluation: A Review of Detection Methods, *Molecules*, **27**: 1-37.
- Munteanu, I.G. dan Apetrei, C. 2021, Analytical Methods Used in Determining Antioxidant Activity: A Review, *International Journal of Molecular Sciences*, MDPI.
- Nangare, S., Vispute, Y., Tade, R., Dugam, S., and Patil, P., 2021, Pharmaceutical Applications of Citric Acid, *Future Journal of Pharmaceutical Sciences*, **7**(54).
- Nirmala, E., Dhivya, S., Sarojini, S., and Duraivei, S., 2021, A Review on Sodium Lauryl Sulphate – A Surfactant, *World Journal of Pharmaceutical Research*, **10**(13): 506-512.
- Nirmala, F. M., Saputri, G. A. R., dan Marcellia, S., 2021, Formulasi Sediaan Faciah Wash Kombinasi Perasan Jeruk Lemon (*Citrus limon* L.) dan Ekstrak Buah Tomat (*Solanum lycopersicum* L.) Terhadap Daya Hambat Bakteri Propionibacterium Acnes, *Jurnal Mandala Pharmacon Indonesia*, **7**(2): 188-206.
- Noval, Kuncahyo, I., Pratama, A. F. S., Nabillah, S., dan Hatmayana, R., 2021, Formulasi Sediaan Tablet Effervescent dari Ekstrak Etanol Tanaman Bundung (*Actionoscirpus grossus*) sebagai Antioksidan, *Jurnal Surya Medika*, 128-139.
- Nurkhansah, Bachri, M. S., dan Yuliani, S., 2023, *Antioksidan dan Stres Oksidatif*, UAD Press, Yogyakarta.
- Oliveira, R., Ferreira, J., Azevedo, L. F., and Almeida, I. F., 2023, An Overview of Methods to Characterize Skin Type: Focus on Visual Rating Scales and Self-Report Instruments, *Cosmetics*, **10**:1-15.
- Paat, S. F. A., Fatimawali, dan Antasionasti, I., 2022, Uji Aktivitas Antioksidan dari Ekstrak Etanol Kulit Buah Lemon Suanggi (*Citrus limon* L.) dengan Metode DPPH (1,1-Diphenil-2-Picrylhydrazyl), *Pharmacon*, **11**(1).
- Parikh, D. 2021, *Handbook of Pharmaceutical Granulation Technology: 4<sup>th</sup> Edition*, CRC Press, USA.

- Poole, C., 2023, *Instrumental Thin-Layer Chromatography*, 2<sup>nd</sup> Edition, Elsevier, United States.
- Purkait, M. K., Haldar, D., and Duarah, P., 2022, *Advances in Extraction and Applications of Bioactive Phytochemicals*, Academic Press, London.
- Puspitasari, A. D., Susanti, E., dan Khustiana, A., 2019, Aktivitas Antioksidan dan Penetapan Kadar Vitamin C Perasan Daging Buah Lemon (*Citrus Limon* (L.) Osbeck) Menggunakan Metode ABTS, *Jurnal Ilmiah Teknosains*, **5(2)**: 99-104.
- Pyrzynska, K. 2022, Hesperidin: A Review on Extraction Methods, Stability and Biological Activities, *Nutrients*, *MDPI*.
- Rafique, S., Hassan, S. M., Mughal, S. S., Hassan, S. K., Shabbir, N., Pervez, S., Mushtaq, M., and Farman, M., 2020, Biological Attributes of Lemon: A Review, *Journal of Addiction Medicine and Therapeutic Science*, **6(1)**: 030-034.
- Rani, K. C., Parfati, N., Jayani, N. I. E., Kurniawan, I. M. A., and Kristiani, N. P. W., 2021. The development of Moringa leaves effervescent granules with effervescent agent of citric acid and sodium bicarbonate, *Pharmaciana*, **11(2)**: 225-238.
- Richa, R., Kohli, D., Vishwakarma, D., Mishra, A., Kabdal, B., Kothakota, A., Richa, S., Sirohi, R., Kumar, R., and Naik, B., 2023, Citrus Fruit: Classification, Value Addition, Nutritional and Medicinal Values, and Relation with Pandemic and Hidden Hunger, *Journal of Agriculture and Food Research*.
- Ritgen, U. 2023, *Analytical Chemistry I*, Springer-Verlag GmbH, Germany.
- Sa'Ayinzat, F. E., Bawa, E. K., Ogqu, D., and Ayo, J. O., 2021, Hesperidin-Sources, Chemistry, Extraction, Measurement and Biologic Effects on Reproduction in Animals: A Review, *International Journal of Veterinary Sciences and Animal Husbandry*, **6(4)**: 01-08.
- Sachs, D., Wahisten, A., Kozerke, S., Restivo, G., and Mazza, E., 2021, A Biphasic Multiplayer Computational Model of Human Skin, *Biomechanics and Modeling in Mechanobiology*, **20**: 9.
- Salman, Sibarani, A. M., Sudewi, dan Indriana, M., 2023, Formulasi Sediaan Garam Mandi Dengan Penambahan Pewarna Alami

- Kopigmentasi Kesumba Keling (*Bixa orellana* L.) dan Angkak Merah, *Journal of Pharmaceutical and Sciences*, **6(2)**: 592-507.
- Salmatuzzahro, A., Nawangsari, D., dan Fitriana, A. S., 2022, Uji Sifat Fisik Tablet Effervescent dari Ekstrak Kulit Buah Pisang Raja (*Musa X Paradisiaca* L) dengan Perbandingan Asam Sitrat dan Natrium Bikarbonat, *Seminar Nasional Penelitian dan Pengabdian Kepada Masyarakat*, 306-314.
- Sheskey, P. J., Hancock, B. C., Goldfarb, D. J., Moss, G. P., 2020, *Handbook of Pharmaceutical Excipients*. 9<sup>th</sup> Edition, Pharmaceutical Press and Pharmacists Association, London.
- Silalahi, Y. C. E., Sinaga, E. M., dan Thaib, C. M., 2019, Formulasi Krim Anti-Aging dari Ekstrak Kulit Buah Jeruk Lemon (*Citrus limon*), *Farmanesia*, **6(1)**.
- Silver, J., 2020, Let Us Teach Proper Thin Layer Chromatography Technique, *Journal of Chemical Education*, **97**: 4217-4219.
- Soffiantini, V. 2022, *Analytical Chemistry: Principle and Practice*, De Gruyter, Boston.
- Standar Nasional Indonesia. 2021, *Sabun Mandi Padat*, Dewan Standarisasi Nasional, Jakarta.
- Thasni, K. S., Silpa, V. S., Sreekumar, C. N., Vandhana, V., Divya Gupta, G. P. K., and Nihala, N., 2022, A Review on Formulation and Evaluation of Herbal Derived Bath Bomb, *International Journal of Creative Research Thoughts*, **10(4)**: 2320-2882.
- Thoughtfully Sustainable. 2024, How to Explain the Chemistry Behind Bath Bombs + Free Recipe. Diakses pada 29 April 2024, <https://thoughtfullysustainable.com/spa-day-science-the-chemistry-of-bath-bombs>.
- Tortora, G. J. and Derrickson, B. H., 2021, *Principles of Anatomy and Physiology*, 16<sup>th</sup> ed. John Wiley and Sons, Hoboken.
- United States Department of Agriculture. 2020, *Basic Report Lemon Raw*, USDA National Nutrient Database for Standard Reference.
- Vanhere, K. G., Derle, D. V., Khatale, S. B., and Nangude, S. L., 2023, A Comprehensive Review on Effervescent Tablets, *Journal of Drug Delivery and Therapeutics*, **13(7)**: 141-150.

Wirawan, S., 2023, *Metodologi Penelitian untuk Tenaga Kesehatan*, Thema Publishing, Yogyakarta.

Yousef, H., Alhadj, M., and Sharma, S., 2022, *Anatomy, Skin (Integument), Epidermis*, StatPearls Publishing, Treasure Island.