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DAFTAR PUSTAKA

Agoes, G., 2009. *Seri Farmasi Industri-2 (SF-2): Teknologi Bahan Alam*, Revisi. ed. Penerbit ITB, Bandung.

Agoes, G., 2015. *Seri Farmasi Industri-9 (SF-9): Sediaan Kosmetik*. Penerbit ITB, Bandung.

Amagliani, L., O'Regan, J., Kelly, A.L., dan O'Mahony, J.A., 2016. Chemistry, structure, functionality and applications of rice starch. *Journal of Cereal Science*, **70**: 291–300.

Anasuri, S., Sriram, P., Singh, A., Singh, G., dan Suttee, A., 2019. A REVIEW ON THE DEVELOPMENT AND EVALUATION OF PLANT BASED EMULGEL FORMULATIONS **6**: .

Anonim, 2017. What is ultraviolet radiation? *Government of Canada*.

Arshad, W., Khan, H.M.S., Akhtar, N., dan Mohammad, I.S., 2020. Polymeric emulgel carrying Cinnamomum tamala extract: promising delivery system for potential topical applications. *Brazilian Journal of Pharmaceutical Sciences*, **56**: e18318.

Bajaj, S., Singla, D., dan Sakhuja, N., 2012. Stability Testing of Pharmaceutical Products. *Journal of Applied Pharmaceutical Science*, .

Baki, G. dan Alexander, K.S., 2015. *Introduction to Cosmetic Formulation and Technology*, 1st ed. John Wiley & Sons, Inc., New Jersey.

Bao, J., 2019. Rice starch, dalam: *Rice*. Elsevier, hal. 55–108.

Bhalke, R.D., Kulkarni, S.S., Kendre, P.N., Pande, V.V., dan Giri, M.A., 2020. A facile approach to fabrication and characterization of novel herbal microemulsion-based UV shielding cream. *Future Journal of Pharmaceutical Sciences*, **6**: 76.

Bhattacharya, C., Kumar, N., Sagiri, S., Pal, K., dan Ray, S., 2012. Development of span 80-tween 80 based fluid-filled organogels as a matrix for drug delivery. *Journal of Pharmacy And Bioallied Sciences*, **4**: 155.

Bhattacharya, S. dan Sherje, A.P., 2020. Development of resveratrol and green tea sunscreen formulation for combined photoprotective and antioxidant properties. *Journal of Drug Delivery Science and Technology*, **60**: 102000.

BPOM RI, 2020. *Peraturan Badan Pengawas Obat Dan Makanan, Nomor 31 Tahun 2020, Tentang Perubahan Atas Peraturan Badan Pengawas Obat Dan Makanan Nomor 25 Tahun 2019 Tentang Pedoman Cara Pembuatan Kosmetika Yang Baik*, Badan Pengawas Obat dan Makanan Republik Indonesia, Jakarta.

BPOM RI, 2022a. *Peraturan Badan Pengawas Obat Dan Makanan, Nomor 3 Tahun 2022, Tentang Persyaratan Teknis Klaim Kosmetika*, Badan Pengawas Obat dan Makanan Republik Indonesia, Jakarta.

BPOM RI, 2022b. *Peraturan Badan Pengawas Obat Dan Makanan, Nomor 17 Tahun 2022, Tentang Perubahan Atas Peraturan Badan Pengawas Obat Dan Makanan Nomor 23 Tahun 2019 Tentang Persyaratan Teknis Bahan*

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Kosmetika, Badan Pengawas Obat dan Makanan Republik Indonesia, Jakarta.

Burapan, S., Kim, M., Paisooksantivatana, Y., Eser, B.E., dan Han, J., 2020. Thai Curcuma Species: Antioxidant and Bioactive Compounds. *Foods*, **9**: 1219.

Chiczewski, R., Sobol, Ż., Pacholska, A., dan Wątróbska-Świetlikowska, D., 2025. Extended Stability of Ascorbic Acid in Pediatric TPN Admixtures: The Role of Storage Temperature and Emulsion Integrity. *Pharmaceutics*, **17**: 1375.

CTFA, 2004. Cosmetics Europe: Guidelines on Stability Testing of Cosmetic Products.

Dalla, E., Koumentakou, I., Bikiaris, N., Balla, E., Lykidou, S., dan Nikolaidis, N., 2022. Formulation, Characterization and Evaluation of Innovative O/W Emulsions Containing Curcumin Derivatives with Enhanced Antioxidant Properties. *Antioxidants*, **11**: 2271.

Daud, N.S., Akbar, A.J., Nurhikma, E., dan Karmilah, K., 2018. Formulation of Snail Slime (Achatina Fulica) Anti-Acne Emulgel using Tween 80-Span 80 as Emulsifying and HPMC as Gelling Agent. *Borneo Journal of Pharmacy*, **1**: 64–67.

Dewi, R.S. dan Fauzia, S., 2022. Limpasu (Baccaurea lanceolata), Rahasia Anti Penuaan Khas Kalimantan, dalam: *Tentang Etnobiologi Di Kalimantan Selatan*. CV. Batang, Banjarmasin.

Djekic, L., Martinovic, M., Stepanović-Petrović, R., Micov, A., Tomić, M., dan Primorac, M., 2016. Formulation of hydrogel-thickened nonionic microemulsions with enhanced percutaneous delivery of ibuprofen assessed in vivo in rats. *European Journal of Pharmaceutical Sciences*, **92**: 255–265.

Dutra, E.A., Oliveira, D.A.G.D.C., Kedor-Hackmann, E.R.M., dan Santoro, M.I.R.M., 2004. Determination of sun protection factor (SPF) of sunscreens by ultraviolet spectrophotometry. *Revista Brasileira de Ciências Farmacêuticas*, **40**: 381–385.

Elcistia, R. dan Zulkarnain, A.K., 2019. Optimasi Formula Sediaan Krim o/w Kombinasi Oksibenzon dan Titanium Dioksida Serta Uji Aktivitas Tabir Suryanya Secara In Vivo. *Majalah Farmaseutik*, **14**: 63–78.

Forestier, S., 2008. Rationale for sunscreen development. *Journal of the American Academy of Dermatology*, **58**: S133–S138.

Ghazi, S., 2022. Do the polyphenolic compounds from natural products can protect the skin from ultraviolet rays? *Results in Chemistry*, **4**: 100428.

Ghiasvand, R., Weiderpass, E., Green, A.C., Lund, E., dan Veierød, M.B., 2016. Sunscreen Use and Subsequent Melanoma Risk: A Population-Based Cohort Study. *Journal of Clinical Oncology*, **34**: 3976–3983.

Hasan, S., Bhandari, S., Sharma, A., dan Garg, P., 2021. Emulgel: A Review. *Asian Journal of Pharmaceutical Research*, 263–268.

Iannacone, M.R., Hughes, M.C.B., dan Green, A.C., 2014. Effects of sunscreen on skin cancer and photoaging. *Photodermatology, Photoimmunology & Photomedicine*, **30**: 55–61.

IARC, 2024. 'Population factsheet: Indonesia', *The Global Cancer Observatory*. URL: https://gco.iarc.who.int/media/globocan/factsheets/populations/360-indonesia-fact-sheet.pdf.

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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

ISO, 2018. 'Cosmetics - Guidelines on the stability testing of cosmetic products', , ISO/TR 18811:2018. International Organization for Standardization, Switzerland.

ISO, 2019. 'Cosmetics — Sun protection test methods — In vivo determination of the sun protection factor (SPF)', , ISO/TR 24444:2019. International Organization for Standardization, Switzerland.

Kementerian Kesehatan RI, 2020. *Farmakope Indonesia*, VI. ed. Kementerian Kesehatan Republik Indonesia, Jakarta.

Kharat, M., Du, Z., Zhang, G., dan McClements, D.J., 2017. Physical and Chemical Stability of Curcumin in Aqueous Solutions and Emulsions: Impact of pH, Temperature, and Molecular Environment. Journal of Agricultural and Food Chemistry, 65: 1525–1532.

Kolimi, P., Narala, S., Nyavanandi, D., Youssef, A.A.A., dan Dudhipala, N., 2022. Innovative Treatment Strategies to Accelerate Wound Healing: Trajectory and Recent Advancements. *Cells*, **11**: 2439.

Kouka, S., Gajdosova, V., Strachota, B., Sloufova, I., Kuzel, R., Stary, Z., dkk., 2025. Impact of Acid Hydrolysis on Morphology, Rheology, Mechanical Properties, and Processing of Thermoplastic Starch. *Polymers*, **17**: 1310.

Kusumanti, D.P., Sayuti, N.A., dan As, I., 2017. Aktivitas Tabir Surya Formula Bedak Dingin Jawa. *Indonesian Journal of Pharmaceutical Science and Technology*, **1**: 01.

Lodge, T.P., Maxwell, A.L., Lott, J.R., Schmidt, P.W., McAllister, J.W., Morozova, S., dkk., 2018. Gelation, Phase Separation, and Fibril Formation in Aqueous Hydroxypropylmethylcellulose Solutions. *Biomacromolecules*, **19**: 816–824.

Manaia, E.B., Kaminski, R.C.K., Corrêa, M.A., dan Chiavacci, L.A., 2013. Inorganic UV filters. *Brazilian Journal of Pharmaceutical Sciences*, **49**: 201–209.

Martino, G.T., Pasapane, J., dan Nowak, F.A., 1993. 'Granular starch as sunscreen agent in aqueous compositions', [*patent*] EP0583756A2.

Marwa, S., Hasina, R., dan Sunarwidhi, A.L., 2022. Studi Etnobotani Bahan Kosmetik Asli Masyarakat Desa Tanjung Luar Kabupaten Lombok Timur, Indonesia. *Jurnal Sosial dan Sains*, **2**: 77–88.

Murdiyanti, R. dan Febrinastasia, W., 2022. Bangkal, Rahasia Kecantikan Alami Gadis Banjar, dalam: *Tentang Etnobiologi Di Kalimantan Selatan*. CV. Batang, Banjarmasin.

Myers, R.H., Montgomery, D.C., dan Anderson-Cook, C.M., 2016. *Response Surface Methodology*, 4th ed. John Wiley & Sons, Inc., New Jersey.

NCBI, 2023. Curcumin. *PubChem Compound Summary for CID 969516*, .

Ngan, C.L., Basri, M., Tripathy, M., Abedi Karjiban, R., dan Abdul-Malek, E., 2014. Physicochemical Characterization and Thermodynamic Studies of Nanoemulsion-Based Transdermal Delivery System for Fullerene. *The Scientific World Journal*, **2014**: 1–12.

Ngoc, Tran, Moon, Chae, Park, dan Lee, 2019. Recent Trends of Sunscreen Cosmetic: An Update Review. *Cosmetics*, **6**: 64.

UNIVERSITAS
GADJAH MADA
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Nurhasnawati, H., Sundu, R., dan Sukmawati, A., 2024. Study of Curcuma diversity from Central Java, Indonesia for sunscreen and antioxidant activity based on quantitative phytochemical analysis. *Biodiversitas Journal of Biological Diversity*, **24**: .

Oh, C.M., Heng, P.W.S., dan Chan, L.W., 2015. A Study on the Impact of Hydroxypropyl Methylcellulose on the Viscosity of PEG Melt Suspensions Using Surface Plots and Principal Component Analysis. *AAPS PharmSciTech*, **16**: 466–477.

Oktaviasari, L. dan Zulkarnain, A.K., 2017. Formulasi dan Uji Stabilitas Fisik Sediaan Lotion O/W Pati Kentang (Solanum Tuberosum L.) Serta Aktivitasnya Sebagai Tabir Surya. *Majalah Farmaseutik*, **13**: 9–27.

Olayemi, O.J. dan David, C., 2023. Emulgel: A Promising Technology for Topical Delivery of Herbal Extracts. *British Journal of Pharmacy*, **8**: .

Parihar, N., Saini, M., Soni, S.L., dan Sharma, V., 2020. Emulgel: A Topical Preparation. *Asian Journal of Pharmaceutical Research and Development*, **8**: 196–201.

Patindol, J.A., Siebenmorgen, T.J., dan Wang, Y., 2015. Impact of environmental factors on rice starch structure: A review. *Starch - Stärke*, **67**: 42–54.

Pereira, T.F., Borchardt, H., Wanderley, W.F., Vasconcelos, U., dan Leite, I.F., 2025. Pequi Pulp (Caryocar brasiliense) Oil-Loaded Emulsions as Cosmetic Products for Topical Use. *Polymers*, **17**: 226.

Pudyastuti, B., Marchaban, dan Kuswahyuning, R., 2015. PENGARUH KONSENTRASI XANTHAN GUM TERHADAP STABILITAS FISIK KRIM VIRGIN COCONUT OIL (VCO). *Jurnal Farmasi Sains dan Komunitas*, **12**: 6–14.

Pulido-Moran, M., Moreno-Fernandez, J., Ramirez-Tortosa, C., dan Ramirez-Tortosa, Mc., 2016. Curcumin and Health. *Molecules*, **21**: 264.

Rajasekar, M., Mary, J., Sivakumar, M., dan Selvam, M., 2024. Recent developments in sunscreens based on chromophore compounds and nanoparticles. *Royal Society of Chemistry Advances*, **14**: 2529–2563.

Ramalingam, N., P, F.S., A., M, H., C., Jith, A., Thahsin, F., Ganesan, T., Babu, dkk., 2022. Antibiotic Emulgel: Design and Characterization for Topical Drug Delivery. *Saudi Journal of Medical and Pharmaceutical Sciences*, **8**: 381–391.

Raya, S.A., Saaid, I.M., Mohd Aji, A.Q., dan A Razak, A.A., 2022. Investigation of the synergistic effect of nonionic surfactants on emulsion resolution using response surface methodology. *RSC Advances*, **12**: 30952–30961.

Rowe, R.C., Sheskey, P.J., dan Quinn, M.E. (Editor), 2009. *Handbook of Pharmaceutical Excipients*, 6th ed. Pharmaceutical Press.

Sander, Megan, Sander, Michael, Burbidge, T., dan Beecker, J., 2020. The efficacy and safety of sunscreen use for the prevention of skin cancer. *Canadian Medical Association Journal*, **192**: E1802–E1808.

Sayre, R.M., Agin, P.P., LeVee, G.J., dan Marlowe, E., 1979. A COMPARISON OF *IN VIVO* AND *IN VITRO* TESTING OF SUNSCREENING FORMULAS. *Photochemistry and Photobiology*, **29**: 559–566.

UNIVERSITAS
GADJAH MADA
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Shafiei, M., Kazemzadeh, Y., Martyushev, D.A., Dai, Z., dan Riazi, M., 2023. Effect of chemicals on the phase and viscosity behavior of water in oil emulsions. *Scientific Reports*, **13**: 4100.

Shah, P., Goodyear, B., Dholaria, N., Puri, V., dan Michniak-Kohn, B., 2021. Nanostructured Non-Ionic Surfactant Carrier-Based Gel for Topical Delivery of Desoximetasone. *International Journal of Molecular Sciences*, **22**: 1535.

Sinko, P.J. (Editor), 2016. *Martin's Physical Pharmacy and Pharmaceutical Sciences*, 7th ed. Wolters Kluwer Health, Philadelphia.

Sugihartini, N., 2010. Curcumin and Extract of Plantago major, L Increased SPF Value of Cold Cream Base. *Indonesian Journal of Cancer Chemoprevention*, **1**: 43.

Taufik, I.I., Soewandhi, S.N., dan Nugraha, Y.P., 2023. Optimasi Formula Emulgel Vitamin C dengan Pendekatan Simplex Lattice Design. *Jurnal Sains Farmasi & Klinis*, **10**: 145.

Tranggono, R.I. dan Latifah, F., 2007. *Buku Pegangan Ilmu Pengetahuan Kosmetik*. PT Gramedia Pustaka Utama, Jakarta.

Voigt, R., 1994. *Buku Pelajaran Teknologi Farmasi*, 3rd ed. Gadjah Mada University Press, Yogyakarta.

Wang, Q., Zhang, H., Han, Y., Cui, Y., dan Han, X., 2023. Study on the relationships between the oil HLB value and emulsion stabilization. *RSC Advances*, **13**: 24692–24698.

Washington, C., 1992. *Particle Size Analysis in Pharmaceutics and Other Industries: Theory and Practice*, 1st ed, Ellis Horwood Series in Pharmaceutical Technology incorporating Pharmacological Sciences. Ellis Horwood Limited, Chicester.

Wu, H., Wang, H., Ou, Y., Zheng, B., dan Zhang, Y., 2025. Effect of Different Freeze–Thaw Cycles and Fucoidan on Structural and Functional Properties of Lotus Seed Starch Gels: Insights from Structural Characterization and In Vitro Gastrointestinal Digestion. *Foods*, **14**: 3177.

Yadav, S.K., Mishra, M.K., Tiwari, A., dan Shukla, A., 2016. Emulgel: A New Approach for Enhanced Topical Drug Delivery. *International Journal of Current Pharmaceutical Research*, **9**: 15.

Zdrada-Nowak, J., Aniołkowska, S., dan Deska, M., 2025. The Evaluating Skin Acid–Base Balance After Application of Cold-Processed and Hot-Processed Natural Soaps: A Double-Blind pH Monitoring Study. *Cosmetics*, **12**: 120.

Zulfaidah, N.T., Lukitaningsih, E., dan Zulkarnain, A.K., 2023. Physical Stability, Photostability, and Sunscreen Effectiveness of Combination Cream of Arabica Green Coffee Bean Extract (Coffea arabica) and Octyl Methoxycinnamate. *Majalah Obat Tradisional*, **28**: 132.

Zulkarnain, A.K., Ernawati, N., dan Sukardani, N.I., 2013. Activities of Yam Starch (Pachyrrizus erosus (L.) Urban) as Sunscreen in Mouse and The Effect of Its Concentration to Viscosity Level. *Traditional Medicine Journal*, **18**: 1–8.