

DAFTAR PUSTAKA

- Abdou, H. M. (1989). *Dissolution, Bioavailability, and Bioequivalence*. Pennsylavania: Mark Publishing Company Easton.
- Andronis, V. & Zografi, G. (2000). Crystal Nucleation and Growth of Indomethacin Polymorphs from The Amorphous State. *Journal of Non-Crystalline Solids*, 271, 236-248.
- Ansel, C. H. (2005). *Pengantar Bentuk Sediaan Farmasi Edisi Keempat*. Jakarta: UI Press.
- Alatas, F., Soewandhi, S.N., Sasongko, L., Ismunandar, & Uekusa, H. 2013. Cocrystal formation between didanosine and two aromatic acids. *International Journal of Pharmaceutical Sciences and Research*, 5, 275-280.
- Backor, M., Gaburjakova, J., Hudak, J. & Ziegler, W. (1997). The Biological role of Secondary Metabolites From Lichen: The influence of (+) Usnic Acid on Bimolecular Lipid Membranes. *Acta Facultatis Rerum Naturalium Universitatis Comenianae---Physiologia Plantarum*, XXIX : 67- 61.
- Backor, M., Hudak, J., Ziegler, W. & Backrovora, M. (1998). The Influence of Lichen Metabolites (Vulpinic Acid Ang (+) Usnic Acid) on The Growth of The Lichen Photobiont *Trebouxia Irregularis*. *Lichenologist*, 6 (30): 577-582.
- Bagde, Shubhangi A., Kanchan P. Upadhye, Gauri R. Dixit, & Suparna S. Bakhle. (2016). Formulation and Evaluation of Co-Crystals of Poorly Water Soluble Drug. *International Journal of Pharmaceutical Sciences and Research*, 12 (3): 4988-4997.
- Banakar, U.V. (1991). *Pharmaceutical Dissolution Testing*. New York: Marcel Dekker Inc.
- Behera, B. C., N. Verma, A. Sonone & U. Makhija. (2005). Antioxidant and Antibacterial Activities of Lichen *Usnea Ghattensis* In Vitro. *Biotechnology Letters*, 27, 991-995
- Brittain, H.G. (1999). *Analytical Profiles of Drugs Substances and Excipients* (Volume 26). California: Academic Press.
- Byrn, S. R., Pfeiffer R, & Stowell J.G. (1999). *Solid-State Chemistry of Drug*. West Lafayette: SSCI, IN
- Campanella, L., M. Delfini, P. Ercole, A. Lacoangeli & G. Risuleo. (2002). Molecular Characterization and Action of Usnic Acid: A Drug That

- Inhibits Proliferations of Mouse Polyomavirus *In Vitro* and Whose Main Target is RNA Transcription. *Biochimie*, 84, 329-334.
- ChemID. (17 April 2003). 2-Aminopyridine; 3-aminopyridine; 4-aminopyridine; 2-nitropyridine; 3nitropyridine; 4-nitropyridine; 2,6-diaminopyridine; and 3,4-diaminopyridine. *Chemical Identification plus*. Bethesda: National Library of Medicine, Diakses pada 07 Maret 2017 dari <http://chem.sis.nlm.nih.gov/chemidplus>
- Cocchietto, M., Skert N., Nimis P.L. (2002). A Review on Usnic Acid, An Interesting Natural Compound. *Naturwissenschaften*, 89, 137-149.
- Costayz, R. M. Ribeiro, A. J. Alvesz, N. P. Santosy, S. C. Nascimento}, E. C. P. Gonc, Alves, N. H. Silva, N. K. Honda And N. S. Santos-Magalhaes. (2003). In Vitro and In Vivo Properties of Usnic Acid Encapsulated into PLGA-Microspheres. *Journal of Microencapsulation*, 21 (44,): 371–384.
- Cruz-Cabeza, A.J. (2012). Acid Base Crystalline Complex and The pKa Rule. *Crystal Engineering Communication*, 14, 6362-6365.
- Cui, Y.A. (2007). Material Science Prespective of Pharmaceutical Solids. *International Journal of Pharmaceutical Sciences and Research.*, 339, 3-18.
- Dash, S., Murthy, P.N., Nath, L., Chowdhury, P. (2010). Kinetic Modeling on Drug Release from Controlled Drug delivery System. *Acta Poloniae Pharmaceutics-Drug Research*, 67 (3): 217-223
- Departemen Kesehatan RI. (1995). *Farmakope Indonesia Edisi Keempat*. Jakarta: Departemen Kesehatan RI.
- Desiraju, G.R. (1995). Supramolecular Syhnthons in Crystal Engineering; A New Organic Synthesis. *Angrewantde Chemie International Edition England*. 34, 2311-2327.
- Franciosi, S., Jae K. Ryu, Hyun B. Choi, Lesley Radov, Seung U. Kim, and James G. McLarnon. (2006). Broad-Spectrum Effects of 4-Aminopyridine to Modulate Amyloid 1– 42-Induced Cell Signaling and Functional Responses in Human Microglia. *Journal of Neuroscience*. 45 (26) 11652–11664.
- Francolini, L., Vincenzo T., dan Fernanda C. (2013). Water Soluble Usnic Acid-Polyacrylamide Complexes with Enhanced Antimicrobial Activity against *Staphylococcus epidermidis*. *International Journal of Moecularl Sciences*, 14 (4) 7356-7369
- Friscic, T., Childs, S. L., Rizvic, S. A. A., & Jonesa, W. (2009). The Role of Solvent in Mechanochemical and Sonochemical Cocrystal Formation: A Solubility-Based Approach for Predicting Cocrystallisation Outcome.

- Crystal Engineering Communication*, 11, 418–426,
- Glomme A., Marz J., & Dressman J.B. (2005). Comparison of A Mininaturized Shake-Flask Solubility Method with Automated Potentiometric Acid/Base Titration and Calculated Solubilities. *Journal of Pharmaceutical Sciences and Research.*, 94, 1.
- Hancock, B. C., Parks M. (2000). What is The True Solubility Advantage for Amorphous Pharmaceutical?. *Pharmaceutical Research*. 17, 397-404.
- Haynes, W.M. (2013). *CRC Handbook of Chemistry and Physics 94th Edition*. Boca Raton: CRC Press LLC. 3-474.
- Hubschen, Gerhard, Iris Alpeter, Ralf T., Hans G.H., (2016). *Ateral Characterzation Using Nondestructive Evaluation (NDE) Methodes*. United Kingdom ; Woodhead Publishing
- Ingolfsdottir, K. (2002). Usnic Acid. *Phytochemistry*, 61 (7): 729–736.
- Jain, A dan Yalkowsky S. H. (2006). Estimation of Melting Points of Organic Compounds-II. *Journal of Pharmaceutical Sciences and Research*. 95, 2562–2618.
- King, A. M., N. B. Menke, K. D. Katz, A. F. Pizon. (2012). 4-Aminopyridine Toxicity: A Case Report and Review of The Literature. *Journal of Medical Toxicology*, 8, 314-21.
- Kristmundsdottir, T., Aradottir HA, Ingolfsdottir K, Ogmundsdottir HM. (2002). Solubilization of The Lichen Metabolite (+)-Usnic Acid for Testing in Tissue Culture. *Journal of Pharmacy and Pharmacology*. 54, 1447-1452.
- Levi, G., Gumtow, R.J. (1963). Effect of Certain Tablet Formulation Factor on Dissolution Rate of The Active Ingredient II. *Journal of Pharmaceutical Sciences and Research*, 52, 1139
- Lewis, R.J. (2002). 2-Aminopyridine and 4-aminopyridine. *Hawley's Condensed Chemical Dictionary*, 14th Ed. NY: John Wiley & Sons, Inc.
- Lide, D.R. (2003). 2-Aminopyridine, 3-aminopyridine, and 4-aminopyridine. *CRC Handbook of Chemistry and Physics*. Boca Raton: CRC Press LLC
- Lira, MCB, Ferraz MS, Da Silva DGVC, *et al.* (2009). Inclusion Complex of Usnic Acid with B- Cyclodextrin: Characterization and Nanoencapsulation Into Liposomes. *Journal of Inclusion Phenomena and Macrocyclic Chemistry* -.64:215-224
- Lu, E., Rodríguez-Hornedo, N., & Suryanarayanan, R. 2008. A rapid thermal method for cocrystal screening. *Crystal Engineering Communication*, 10(6), 665-668

- Madamombe, I. T. dan Afolayan A. J. (2003). Evaluation of antimicrobial activity of extracts from South African *Usnea barbata*. *Pharmaceutical Biology*. 41, 199-202
- Markovitch, Omer, Agmon, Noam (2007). Structure and energetics of the hydronium hydration shells. *Journal of Physical Chemistry A*. 111(12): 253–2256.
- Martin, A., Swarbrick J., & Cammarata, A. (2009). *Farmasi Fisik*. Jakarta: UI Press.
- Mayer, M. A. O'Neill, K. E. Murray, N. S. Santos- Magalhaes, A. M. Carneiro-Leao, A. M. Thompson and V. C. Appleyard. (2005). *Anticancer Drugs*, 16, 805–809.
- Mirshafiey, A., R. Gholamnezhad-Jafari, M.M. Amiri, R. Sedaghat, A. Razavi, M.R. Khorramizadeh, P. Ekhtiari, V. Molla Kazemiha. (2010). Anti-inflammatory property and inhibitory effect of 4-aminopyridine in antibody production in the experimental model of immune complex-induced inflammation. *Journal of Chinese Clinical Medicine*, 5 (8): 450.
- Mirza, S. (2008). Co-crystal: An Emerging Approach for Enhancing Properties of Pharmaceutical Solid. *Journal of Pharmaceutical Sciences and Research* 24 (2): 90-95.
- Nugrahani, Ilma dan Muhammad Luthfi Bahari. (2014). The Dynamic Study of Cocrystal Formation between Anhydrous and Monohydrate Theophylline with Sodium Saccharine Dihydrate by FTIR. *Journal of Chemistry and Biochemistry*, 2 (2): 117-137.
- Okuyama, E., K. Umeyama, M. Yamazaki, Y. Kinoshita & Y. Yamamoto. (1995). Usnic Acid and Diffractaic Acid as Analgesic and Antipyretic Components of *Usnea Diffracta*. *Planta Medica*, 61, 113-115.
- O'Neil, M. J. (2001). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition*. Whitehouse Station, NJ: Merck and Co. Inc. Hal: 1762
- Ott, B.J. Bevan, Boerio-Goates, Juliana. (2000). *Chemical Thermodynamics: Advanced Applications*. Academic Press, ISBN 0-12-530985-6
- Perry, N. B., Benn M. H., Brennan N. J., Burgess E. J., Ellis G., Galloway D. J., Lorimer S. D., and Tangney R. S. (1999). Antimicrobial, antiviral and cytotoxic activity of New Zealand lichens. *Lichenologist*, 31, 627-636.
- Polman, CH, Bertelsmann FW, van Loenen AC, Koetsier JC. (1994). 4-aminopyridine in the treatment of patients with multiple sclerosis. Long-term efficacy and safety. *Arch Neurology Journal*, 51, 292-296.

- Pramyothin, P., Janthasoot W., Pongnimitprasert N., Phrukudom S., Ruangrungsi N. (2004). Hepatotoxic Effect Of (+) Usnic Acid From Usnea Siamensis Wainio In Rats, Isolated Rat Hepatocytes and Isolated Rat Liver Mitochondria. *Journal of Ethnopharmacology*. 90, 381-387
- Prasad, R. V., Rakesh MG, Jyotsna RM, Mangesh ST, Sapkale P, Mayur PK. (2012). Pharmaceutical Cocrystallization : A Review. *International Journal of Pharmaceutical Chemistry Sciences*, 3 (1): 725–36.
- Pubchem. (2005). Compound Summary for CID 1727 “4-aminopyridine”. *National Center for Biotechnology Information ; US National Library of Medicine*. Diakses pada 06 Maret 2017 dari <https://pubchem.ncbi.nlm.nih.gov/compound/4-aminopyridine#section=Top>.
- Putra, Okky D.D., Etsuo Y., & Hidehiro U. (2016). Isostructural Multicomponen Crystal with Improved Solubility. *Crystal Growth Design* 10, 1-23
- Santos, da Silva., N. P.; Nascimento, S. C.; Wanderley, M. S. O.; Pontes-Filho, N. T.; da Silva, J. F.; de Castro, C. M. M. B.; Pereira, E. C.; da Silva, N. H.; Honda, N. K.; Santos-Magalhães, N. S. (2006). Nanoencapsulation of Usnic Acid: An Attempt to Improve Antitumour Activity and Reduce Hepatotoxicity. *European Journal of Pharmaceutical and Biopharmaceutical*, 64, 154–160.
- Schultheiss, Nate dan Ann Newman. (2009). Pharmaceutical Cocrystal and Their Physicochemical Properties. *Crystal Growth Design*, 9, 2950-2967
- SDBSWeb. (03 Februari 2017). IR of 4-Aminopyridine (SDBS No.:3793). *Spectral Database for Organic Compound SDBS*. Japan: National Institute of Advanced Industrial Science and Technology, Diakses pada 18 Juni 2017 dari <http://sdbs.db.aist.go.jp>
- Segure-Sanchez, Freimar., Kawthar Bouchemal, Geneviève Lebasa, Christine Vauthier, Néréide S. Santos-Magalhaesd, Gilles Ponchel. (2009). Elucidation of the complexation mechanism between (+)-usnic acid and cyclodextrins studied by isothermal titration calorimetry and phase-solubility diagram experiments. *Journal of Molecular Recognition*. 22, 232-241.
- Sekhon, B.S. (2009). Pharmaceutical co-crystals – a review. *ARS Pharmaceutical*. 50, 99–117.
- Serajuddin, A. T. M. (2007). Salt Formation to Improve Drug Solubility. *Advanced Drug Delivery Review*. 59, 603-616.
- Sevukarajan, M., B. Thanuja, R. Sodanapalli & R. Nair (2011). Synthesis and Characterization of Pharmaceutical CoCrystal: (Aceclofenac:

- Nicotinamide). *Journal of Pharmaceutical Sciences Research*. 6 (3): 1288- 1293.
- Shargel, L., & Yu, A.B.C. (1988). *Applied biopharmaceutics and pharmacokinetics* (2th edition). New York: Appleton & Lange.
- Shoaib, H.M., Merchant, H.A., Tazee, J., dan Yousuf, R.I. (2006). Once-Daily Tablet Formulation and In Vitro Release Evaluation of Cefpodoxime Using Hydroxipropyl Methylcellulose: A Technical Note. *AAPS Pharmaceutical Sciences and Technology*, 7 (3): 78
- Soewandhi, S.N., Pamudji, J.S., Mauladdin, R., & Moegihardjo. (2005). Profil Disolusi Campuran Peritektik Mixed Crystal Ibuprofen dan Asetaminofen. *Actra Pharmaceutica Indonesia*, 30, 65-71.
- Stuart, Barbara. (2004). *Infrared Spectroscopy: Fundamental and Application*. New York: Jhon Wiley & Sons, Ltd.
- Suhera, M. Aburawi, Jamila M. Samalus, Reda A. Altubuly & Hana M. Zegallai. (2016). Effect of ion channel blockers on pharmacological action of paracetamol using albino mice. *Journal of Addiction Research and Therapy*, 7:3 ISSN: 2155-6105 JART.
- Trask, A.V., Motherwll W.D.S. dan Jones W. (2006). Pharmaceutical Cocrystals : An Emergin Approach To Physical Property Enhancement. *Mrs Bulletin*, 31, 976-879.
- Upadhyay, N., Shukla T. P., Mathur, A., Manmohan, & Jha, S. K. (2011). Pharmaceutical Co-Crystal: An Emerging Approach to Improve Physical Property. *International Journal of Pharmaceutical Sciences Review and Research*, 8, 144-148.
- USEPA/OPPTS. (26 Maret 2014). *Reregistration Eligibility Decisions (REDs) Database on 4-Aminopyridine (504-24-5)*. USEPA EPA 738-R-07-013. Diakses pada 07 Maret 2017 dari <http://www.epa.gov/pesticides/reregistration/status.html>
- Vijayakumar, C.S., Viswanathan, S., Kannappa Reddy, M., Parvathavarthini, S., Kundu, A.B., Sukumar, E. (2000). Antiinflammatory activity of (β)-usnic acid. *Fitoterapia*, 71: 564–566.
- West, A.R. (2001). *Basic solid state chemistry* (2nd edition). Toronto: John Wiley & Sons.
- Wicaksono, Y., Hendradi, E., & Radjaram, A. (2005). Analisis Proses Lepas Lambat Na Diklofenak dari Tablet Matrik Berbasis Etilselulosa Polivinilpirolidon K-30. *Analisis Farmasi*. Jakarta: EGC

Yadav, A., A. Shete, A. Dabke, P. V. Kulkarni & S. Sakhare. (2009). Co-crystal: A Novel Approach to Modify Physicochemical Properties of Active Ingredients. *Indian Journal of Pharmaceutical Science*. 71, 359-370

Yoshioka, S., dan Aso, Y. (2007). Correlation between Molecular Mobility and Chemical Stability During Storage of Amorphous Pharmaceutical. *Journal of Pharmaceutical Sciences and Research*, 96, 960-981.

Zaini, E., A.Halim, S.N. Soewandhi dan D. Setiawan. 2011. Peningkatan Laju Pelarutan TrimetoprimMelalui Metode Ko-Kristalisasi Dengan Nikotinamida. *Jurnal Farmasi Indonesia*. 5(4) 205 -212

Zhijun, Huang, Guohua Zheng, Junyan Tao, Jinlan Ruan. (2011). Anti-inflammatory Effects and Mechanisms of Usnic Acid. *Journal of Wuhan University of Technology-Mater Sci. Ed.* 955-959

