

DAFTAR PUSTAKA

- Abdelghany, S., Alkhalaf, M., Alkhatib, H.S., 2017. Carrageenan-stabilized chitosan alginate nanoparticles loaded with ethionamide for the treatment of tuberculosis. *J Drug Deliv Sci Technol* 39, 442–449.
- Abuhelwa, A.Y., Williams, D.B., Upton, R.N., Foster, D.J.R., 2017. Food, gastrointestinal pH, and models of oral drug absorption. *European Journal of Pharmaceutics and Biopharmaceutics* 112, 234–248.
- Adepu, S., Ramakrishna, S., 2021. Controlled drug delivery systems: Current status and future directions. *Molecules*.
- Afrasiabi Garekani, H., Sadeghi, F., Salary, M., 2004. Dissolution of acetaminophen crystallised in the presence of polyvinylpyrrolidone.
- Ahmad, S., Ahmad, M., Manzoor, K., Purwar, R., Ikram, S., 2019. A review on latest innovations in natural gums based hydrogels: Preparations & applications. *Int J Biol Macromol* 136, 870–890.
- Ahmed, T.A., Aljaeid, B.M., 2017. A potential in situ gel formulation loaded with novel fabricated poly(Lactide-co-glycolide) nanoparticles for enhancing and sustaining the ophthalmic delivery of ketoconazole. *Int J Nanomedicine* 12, 1863–1875.
- Ali, S.A., El-Regal, N.S., Saeed, S.M., 2015. Antischistosomal Activity of Two Active Constituents Isolated from the Leaves of Egyptian Medicinal Plants. *Infectious Diseases: Research and Treatment* 8, IDRT.S24342.
- Annisa, V., Sulaiman, T.N.S., Nugroho, A.K., Nugroho, A.E., 2022. Validation of RP-HPLC method for determination of pH-dependent solubility of ketoconazole in phosphate buffer pH 6.8. *Journal of Research in Pharmacy* 26, 1694–1702.
- Ataide, J., Cefali, L., Rebelo, M., Spir, L., Tambourgi, E., Jozala, A., Chaud, M., Silveira, E., Gu, X., Gava Mazzola, P., 2017. Bromelain Loading and Release from a Hydrogel Formulated Using Alginate and Arabic Gum. *Planta Med* 83, 870–876.
- Auch, C., Jede, C., Harms, M., Wagner, C., Mäder, K., 2020. Impact of amorphization and GI physiology on supersaturation and precipitation of poorly soluble weakly basic drugs using a small-scale in vitro transfer model. *Int J Pharm* 574, 118917.
- Barra, P.A., Márquez, K., Gil-Castell, O., Mujica, J., Ribes-Greus, A., Faccini, M., 2019. Spray-drying performance and thermal stability of L-ascorbic acid microencapsulated with sodium alginate and gum Arabic. *Molecules* 24.
- Basheer, L., Schultz, K., Fichman, M., Kerem, Z., 2015. Use of In Vitro and Predictive In Silico Models to Study the Inhibition of Cytochrome P4503A by Stilbenes. *PLoS One* 10, e0141061.

- Batool, N., Sarfraz, R.M., Mahmood, A., Rehman, U., Zaman, M., Akbar, S., Almasri, D.M., Gad, H.A., 2023. Development and Evaluation of Cellulose Derivative and Pectin Based Swellable pH Responsive Hydrogel Network for Controlled Delivery of Cytarabine. *Gels* 9.
- Baxter, J.G., Brass, C., Schentag, J.J., Slaughter, R.L., 1986. Pharmacokinetics of ketoconazole administered intravenously to dogs and orally as tablet and solution to humans and dogs. *J Pharm Sci* 75, 443–447.
- Bekhit, M., Sánchez-González, L., Ben Messaoud, G., Desobry, S., 2016. Encapsulation of *Lactococcus lactis* subsp. *lactis* on alginate/pectin composite microbeads: Effect of matrix composition on bacterial survival and nisin release. *J Food Eng* 180, 1–9.
- Belitz, H.D., Grosch, W., Schieberle, P., 2004. *Food Chemistry*, 3rd ed. Springer Verlag Berlin Heidelberg, Jerman.
- Benfattoum, Kahina, Haddadine, N., Bouslah, N., Benaboura, A., Maincent, P., Barillé, R., Sapin-Minet, A., El-Shall, M.S., 2018. Formulation characterization and in vitro evaluation of acacia gum–calcium alginate beads for oral drug delivery systems. *Polym Adv Technol* 29, 884–895.
- Benfattoum, K., Haddadine, N., Bouslah, N., Benaboura, A., Maincent, P., Barillé, R., Sapin-Minet, A., El-Shall, M.S., 2018. Formulation characterization and in vitro evaluation of acacia gum–calcium alginate beads for oral drug delivery systems. *Polym Adv Technol* 29, 884–895.
- Berben, P., Ashworth, L., Beato, S., Bevernage, J., Bruel, J.L., Butler, J., Dressman, J., Schäfer, K., Hutchins, P., Klumpp, L., Mann, J., Nicolai, J., Ojala, K., Patel, S., Powell, S., Rosenblatt, K., Tomaszewska, I., Williams, J., Augustijns, P., 2019. Biorelevant dissolution testing of a weak base: Interlaboratory reproducibility and investigation of parameters controlling in vitro precipitation. *European Journal of Pharmaceutics and Biopharmaceutics* 140, 141–148.
- Berlin, M., Przyklenk, K.H., Richtberg, A., Baumann, W., Dressman, J.B., 2014. Prediction of oral absorption of cinnarizine - A highly supersaturating poorly soluble weak base with borderline permeability. *European Journal of Pharmaceutics and Biopharmaceutics* 88, 795–806.
- Bevernage, J., Brouwers, J., Brewster, M.E., Augustijns, P., 2013. Evaluation of gastrointestinal drug supersaturation and precipitation: Strategies and issues. *Int J Pharm* 453, 25–35.
- Bevernage, J., Hens, B., Brouwers, J., Tack, J., Annaert, P., Augustijns, P., 2012. Supersaturation in human gastric fluids. *European Journal of Pharmaceutics and Biopharmaceutics* 81, 184–189.

- Blaabjerg, L.I., Grohgan, H., Lindenberg, E., Löbmann, K., Müllertz, A., Rades, T., 2018. The influence of polymers on the supersaturation potential of poor and good glass formers. *Pharmaceutics* 10, 1. – 14.
- Boppana, R., Krishna Mohan, G., Nayak, U., Mutalik, S., Sa, B., Kulkarni, R. V, 2015. Novel pH-sensitive IPNs of polyacrylamide-g-gum ghatti and sodium alginate for gastro-protective drug delivery. *Int J Biol Macromol* 75, 133–143.
- Boppana, R., Yadaora Raut, S., Krishna Mohan, G., Sa, B., Mutalik, S., Reddy, K.R., Das, K.K., Biradar, M.S., Kulkarni, R. V., 2019. Novel pH-sensitive interpenetrated network polyspheres of polyacrylamide-g-locust bean gum and sodium alginate for intestinal targeting of ketoprofen: In vitro and in vivo evaluation. *Colloids Surf B Biointerfaces* 180, 362–370.
- BPOM, 2005. Peraturan Kepala BPOM tentang Pedoman Uji Bioekivalensi. Jakarta.
- BPOM, 2012. Farmakope Indonesia V. Badan Pengawasan Obat dan Makanan RI, Jakarta.
- Brouwers, J., Brewster, M.E., Augustijns, P., 2009. Supersaturating Drug Delivery Systems: The Answer to Solubility-Limited Oral Bioavailability? *J Pharm Sci* 98, 25–49.
- Canadian Institutes of Health Research, 2023. Gum Arabic [WWW Document]. Canadian Institutes of Health Research. URL <https://foodb.ca/compounds/FDB001217> (accessed 5.8.23).
- Cao, L., Lu, W., Mata, A., Nishinari, K., Fang, Y., 2020. Egg-box model-based gelation of alginate and pectin: A review. *Carbohydr Polym* 242, 116389.
- Carlert, S., Lennernäs, H., Abrahamsson, B., 2014. Evaluation of the use of Classical Nucleation Theory for predicting intestinal crystalline precipitation of two weakly basic BSC class II drugs. *European Journal of Pharmaceutical Sciences* 53, 17–27.
- Carlert, S., Pålsson, A., Hanisch, G., Von Corswant, C., Nilsson, C., Lindfors, L., Lennernäs, H., Abrahamsson, B., 2010. Predicting intestinal precipitation-A case example for a basic BCS class II drug. *Pharm Res* 27, 2119–2130.
- Cavanagh, K.L., Maheshwari, C., Rodríguez-Hornedo, N., 2018. Understanding the Differences Between Cocrystal and Salt Aqueous Solubilities. *J Pharm Sci* 107, 113–120.
- Cengiz, E., Dogan, M., Karaman, S., 2013. Characterization of rheological interactions of Gleditsia triacanthos gum with some hydrocolloids: Effect of hydration temperature. *Food Hydrocoll* 32, 453–462.
- Cha, D.S., Choi, J.H., Chinnan, M.S., Park, H.J., 2002. Antimicrobial films based on Na-alginate and κ -carrageenan. *LWT - Food Science and Technology* 35, 715–719.

- Chanamai, R., McClements, D.J., 2002. Comparison of gum arabic, modified starch, and whey protein isolate as emulsifiers: Influence of pH, CaCl₂ and temperature. *J Food Sci* 67, 120–125.
- Chauhan, H., Hui-Gu, C., Atef, E., 2013. Correlating the Behavior of Polymers in Solution as Precipitation Inhibitor to its Amorphous Stabilization Ability in Solid Dispersions. *J Pharm Sci* 102, 1924–1935.
- Chavan, R.B., Thipparaboina, R., Kumar, D., Shastri, N.R., 2016. Evaluation of the inhibitory potential of HPMC, PVP and HPC polymers on nucleation and crystal growth. *RSC Adv* 6, 77569–77576.
- Chen, F., Deng, Z., Zhang, Z., Zhang, R., Xu, Q., Fan, G., Luo, T., McClements, D.J., 2018. Controlling lipid digestion profiles using mixtures of different types of microgel: Alginate beads and carrageenan beads. *J Food Eng* 238, 156–163.
- Chen, X., Li, D., Deng, Z., Zhang, H., 2020. Ketoconazole: Solving the Poor Solubility via Cocrystal Formation with Phenolic Acids. *Cryst Growth Des* 20, 6973–6982.
- Chen, Z.Q., Liu, Y., Zhao, J.H., Wang, L., Feng, N.P., 2012. Improved oral bioavailability of poorly water-soluble indirubin by a supersaturatable self-microemulsifying drug delivery system. *Int J Nanomedicine* 7, 1115–1125.
- Cheng, T., Xu, J., Li, Y., Zhao, Y., Bai, Y., Fu, X., Gao, X., Mao, X., 2020. Effect of gum ghatti on physicochemical and microstructural properties of biodegradable sodium alginate edible films. *Journal of Food Measurement and Characterization*.
- Ching, S.H., Bansal, N., Bhandari, B., 2017. Alginate gel particles—A review of production techniques and physical properties. *Crit Rev Food Sci Nutr* 57, 1133–1152.
- Choi, A.Y., Kim, C.T., Park, H.Y., Kim, H.O., Lee, N.R., Lee, K.E., Gwak, H.S., 2013. Pharmacokinetic characteristics of capsaicin-loaded nanoemulsions fabricated with alginate and chitosan. *J Agric Food Chem* 61, 2096–2102.
- Chopra, M., Bernela, M., Kaur, P., Manuja, A., Kumar, B., Thakur, R., 2015. Alginate/gum acacia bipolymeric nanohydrogels-Promising carrier for Zinc oxide nanoparticles. *Int J Biol Macromol* 72, 827–833.
- Chopra, Meenu, Bernela, M., Kaur, P., Manuja, A., Kumar, B., Thakur, R., 2015. Alginate/gum acacia bipolymeric nanohydrogels-Promising carrier for Zinc oxide nanoparticles. *Int J Biol Macromol* 72, 827–833.
- Clarysse, S., Psachoulas, D., Brouwers, J., Tack, J., Annaert, P., Duchateau, G., Reppas, C., Augustijns, P., 2009. Postprandial changes in solubilizing capacity of human intestinal fluids for BCS class II drugs. *Pharm Res* 26, 1456–1466.

- Cristofolletti, R., Patel, N., Dressman, J.B., 2017a. Assessment of Bioequivalence of Weak Base Formulations Under Various Dosing Conditions Using Physiologically Based Pharmacokinetic Simulations in Virtual Populations. Case Examples: Ketoconazole and Posaconazole. *J Pharm Sci* 106, 560–569.
- Cristofolletti, R., Patel, N., Dressman, J.B., 2017b. Assessment of Bioequivalence of Weak Base Formulations Under Various Dosing Conditions Using Physiologically Based Pharmacokinetic Simulations in Virtual Populations. Case Examples: Ketoconazole and Posaconazole. *J Pharm Sci* 106, 560–569.
- Curatolo, W., Nightingale, J.A., Herbig, S.M., 2009. Utility of hydroxypropylmethylcellulose acetate succinate (HPMCAS) for initiation and maintenance of drug supersaturation in the GI milieu. *Pharm Res* 26, 1419–1431.
- Dahlgren, D., Venczel, M., Ridoux, J.-P., Skjöld, C., Müllertz, A., Holm, R., Augustijns, P., Hellström, P.M., Lennernäs, H., 2021. Fasted and fed state human duodenal fluids: Characterization, drug solubility, and comparison to simulated fluids and with human bioavailability. *European Journal of Pharmaceutics and Biopharmaceutics* 163, 240–251.
- Dai, W.G., 2010. In vitro methods to assess drug precipitation. *Int J Pharm* 393, 1–16.
- Daneshmend, T.K., Warnock, D.W., 1988. Clinical Pharmacokinetics of Ketoconazole. *Clin Pharmacokinet* 14, 13–34.
- Das, S., Chaudhury, A., Ng, K.Y., 2011. Preparation and evaluation of zinc-pectin-chitosan composite particles for drug delivery to the colon: Role of chitosan in modifying in vitro and in vivo drug release. *Int J Pharm* 406, 11–20.
- Demirel, M., Yurtdaş, G., Genç, L., 2011. Inclusion complexes of ketoconazole with beta-cyclodextrin: Physicochemical characterization and in vitro dissolution behaviour of its vaginal suppositories. In: *Journal of Inclusion Phenomena and Macrocyclic Chemistry*. pp. 437–445.
- Dimofte, A., Dinu, M.V., Anghel, N., Doroftei, F., Spiridon, I., 2022. Xanthan and alginate-matrix used as transdermal delivery carrier for piroxicam and ketoconazole. *Int J Biol Macromol* 209, 2084–2096.
- Dokania, S., Joshi, A.K., 2015. Self-microemulsifying drug delivery system (SMEDDS)-challenges and road ahead. *Drug Deliv*.
- Dressman, J.B., Amidon, G.L., Reppas, C., Shar, V.P., 1998. Dissolution testing as a prognostic tool for oral drug absorption: Immediate release dosage forms. *Pharm Res* 15, 11–22.
- Dressman, J.B., Reppas, C., 2000. In vitro-in vivo correlations for lipophilic, poorly water-soluble drugs. *European Journal of Pharmaceutical Sciences* 11, 73–80.

- Drugbank, 2020. Ketoconazole [WWW Document]. URL <https://go.drugbank.com/drugs/DB01026> (accessed 10.18.20).
- El-Baky, R.M.A., Sandle, T., John, J., Abuo-Rahma, G.E.D.A., Hetta, H.F., 2019. A novel mechanism of action of ketoconazole: Inhibition of the nora efflux pump system and biofilm formation in multidrug-resistant staphylococcus aureus. *Infect Drug Resist* 12, 1703–1718.
- El-Zhry El-Yafi, A.K., El-Zein, H., 2014. Technical crystallization for application in pharmaceutical material engineering: Review article. *Asian J Pharm Sci* 10, 283–291.
- EMA, 2011. Guideline on bioanalytical method validation.
- Emmanuel, S., Marc, L., Eric, B., Jean-Michel, C., 2010. Small volume dissolution testing as a powerful method during pharmaceutical development. *Pharmaceutics* 2, 351–363.
- Erben, M., Pérez, A.A., Osella, C.A., Alvarez, V.A., Santiago, L.G., 2019. Impact of gum arabic and sodium alginate and their interactions with whey protein aggregates on bio-based films characteristics. *Int J Biol Macromol* 125, 999–1007.
- Fagury, H.S., Talib, M.A., Rayis, O.A., El-Hag, K.H., 2018. Extending Cloud Stability of *Tamarindus indica* L. Juice Using Sodium Alginate and Gum Arabic During Storage in the Refrigerator. In: *Gum Arabic*. Elsevier, pp. 173–180.
- Fan, L., Peng, K., Li, M., Wang, L., Wang, T., 2013. Preparation and properties of carboxymethyl κ -carrageenan/alginate blend fibers. *J Biomater Sci Polym Ed* 24, 1099–1111.
- Farhah, A.N., Ekantari, N., 2020. Combination of Sodium Alginate and Kappa-Carrageenan Increases Texture Stability of *Spirulina platensis* Ice Cream. In: *E3S Web of Conferences*.
- Fiolka, T., Dressman, J., 2018. Development, current applications and future roles of biorelevant two-stage in vitro testing in drug development. *Journal of Pharmacy and Pharmacology*.
- Fornells, E., Fuguet, E., Mañé, M., Ruiz, R., Box, K., Bosch, E., Ràfols, C., 2018. Effect of vinylpyrrolidone polymers on the solubility and supersaturation of drugs; a study using the Cheqsol method. *European Journal of Pharmaceutical Sciences* 117, 227–235.
- Fouad, S.A., Malaak, F.A., El-Nabarawi, M.A., Zeid, K.A., Ghoneim, A.M., 2021. Preparation of solid dispersion systems for enhanced dissolution of poorly water soluble diacerein: In-vitro evaluation, optimization and physiologically based pharmacokinetic modeling. *PLoS One* 16.

- Fuchs, A., Dressman, J.B., 2014. Composition and physicochemical properties of fasted-state human duodenal and jejunal fluid: A critical evaluation of the available data. *J Pharm Sci*.
- Fung, M.H., Devault, M., Kuwata, K.T., Suryanarayanan, R., 2018. Drug-Excipient Interactions: Effect on Molecular Mobility and Physical Stability of Ketoconazole-Organic Acid Coamorphous Systems. *Mol Pharm* 15, 1052–1061.
- Gao, P., Akrami, A., Alvarez, F., Hu, J., Lan, L., Chandra, M., Surapaneni, S., 2009. Characterization and Optimization of AMG 517 Supersaturatable Self-Emulsifying Drug Delivery System (S-SEDDS) for Improved Oral Absorption. *J Pharm Sci* 98, 516–528.
- Ge, M., Li, X., Li, Y., Jahangir Alam, S.M., Gui, Y., Huang, Y., Cao, L., Liang, G., Hu, G., 2022. Preparation of Magadiite-Sodium Alginate Drug Carrier Composite by Pickering-Emulsion-Templated-Encapsulation Method and Its Properties of Sustained Release Mechanism by Baker–Lonsdale and Korsmeyer–Peppas Model. *J Polym Environ* 30, 3890–3900.
- Giri, T.K., Verma, D., Badwaik, H.R., 2017. Effect of aluminium chloride concentration on diltiazem hydrochloride release from pH-sensitive hydrogel beads composed of hydrolyzed grafted k-carrageenan and sodium alginate. *Curr Chem Biol* 11, 44–49.
- Gong, W., Wang, Y., Sun, L., Yang, J., Shan, L., Yang, M., Gao, C., 2016. Development of Itraconazole Liquisolid Compact: Effect of Polyvinylpyrrolidone on the Dissolution Properties. *Curr Drug Deliv* 13, 452–461.
- Górniak, A., Karolewicz, B., Czapor-Irzabek, H., Gładysz, O., 2016. A physicochemical and dissolution study of ketoconazole-pluronic F127 solid dispersions. *Farmacia* 64, 244–251.
- Gu, C.H., Rao, D., Gandhi, R.B., Hilden, J., Raghavan, K., 2005. Using a novel multicompartiment dissolution system to predict the effect of gastric pH on the oral absorption of weak bases with poor intrinsic solubility. *J Pharm Sci* 94, 199–208.
- Gu, X.F., Mao, B.Y., Xia, M., Yang, Y., Zhang, J.L., Yang, D.S., Wu, W.X., Du, Y.X., Di, B., Su, M.X., 2016. Rapid, sensitive and selective HPLC-MS/MS method for the quantification of topically applied besifloxacin in rabbit plasma and ocular tissues: Application to a pharmacokinetic study. *J Pharm Biomed Anal* 117, 37–46.
- Guo, J., Giusti, M.M., Kaletunç, G., 2018. Encapsulation of purple corn and blueberry extracts in alginate-pectin hydrogel particles: Impact of processing and storage parameters on encapsulation efficiency. *Food Research International* 107, 414–422.
- Gupta, A.K., Daigle, D., Foley, K.A., 2015. Drug safety assessment of oral formulations of ketoconazole. *Expert Opin Drug Saf*.

- Gutsche, S., Krause, M., Kranz, H., 2008. Strategies to overcome pH-dependent solubility of weakly basic drugs by using different types of alginates. *Drug Dev Ind Pharm* 34, 1277–1284.
- Güven, K.C., Yurdun, T., Aksoy, A., 2006. The clarification and retention of zinc and manganese from raw water by alginate and carrageenan. *Acta Pharmaceutica Scientia* 48, 129–139.
- Hallare, J., Gerriets, V., 2022. Half Life [WWW Document]. StatPearls Publishing. URL <https://www.ncbi.nlm.nih.gov/books/NBK499866/> (accessed 2.15.23).
- Hamed, R., AlJanabi, R., Sunoqrot, S., Abbas, A., 2017. The effect of pH, buffer capacity and ionic strength on quetiapine fumarate release from matrix tablets prepared using two different polymeric blends. *Drug Dev Ind Pharm* 43, 1330–1342.
- Hamed, R., Awadallah, A., Sunoqrot, S., Tarawneh, O., Nazzal, S., AlBaraghthi, T., Al Sayyad, J., Abbas, A., 2016. pH-Dependent Solubility and Dissolution Behavior of Carvedilol—Case Example of a Weakly Basic BCS Class II Drug. *AAPS PharmSciTech* 17, 418–426.
- Hansen, M.B., 2002. Small Intestinal Manometry. *Physiology Research* 51, 541–556.
- Hansmann, S., Miyaji, Y., Dressman, J., 2018. An in silico approach to determine challenges in the bioavailability of ciprofloxacin, a poorly soluble weak base with borderline solubility and permeability characteristics. *European Journal of Pharmaceutics and Biopharmaceutics* 122, 186–196.
- Hassani, A., Mahmood, S., Enezei, H.H., Hussain, S.A., Hamad, H.A., Aldoghachi, A.F., Hagar, A., Doolaanea, A.A., Ibrahim, W.N., 2020. Formulation, characterization and biological activity screening of sodium alginate-gum Arabic nanoparticles loaded with curcumin. *Molecules* 25.
- Hens, B., Brouwers, J., Corsetti, M., Augustijns, P., 2016. Supersaturation and Precipitation of Posaconazole Upon Entry in the Upper Small Intestine in Humans. *J Pharm Sci* 105, 2677–2684.
- Huang, X., Xiao, Y., Lang, M., 2012. Micelles/sodium-alginate composite gel beads: A new matrix for oral drug delivery of indomethacin. *Carbohydr Polym* 87, 790–798.
- Huang, Y.-C., Colaizzi, J.L., Bierman, R.H., Woestenborghs, R., Heykants, A.J., 1986. Pharmacokinetics and Dose Proportionality of Ketoconazole in Normal Volunteers, *ANTIMICROBIAL AGENTS AND CHEMOTHERAPY*.
- ICH, 2022. ICH Guideline Q2(R2)-VALIDATION OF ANALYTICAL PROCEDURES.
- Ilevbare, G.A., Liu, H., Edgar, K.J., Taylor, L.S., 2013. Maintaining supersaturation in aqueous drug solutions: Impact of different polymers on induction times. *Cryst Growth Des* 13, 740–751.

- Inamdar, N., Mourya, V.K., 2010. Chitosan and Anionic Polymers - Complex Formation and Applications, Polysaccharides: Development, Properties and Applications.
- Indrianti, N., Pranoto, Y., Abbas, A., 2018. Preparation and characterization of edible films made from modified sweet potato starch through heat moisture treatment. Indonesian Journal of Chemistry 18, 679–687.
- Jaisamut, P., Wiwattanawongsa, K., Graidist, P., Sangsen, Y., Wiwattanapatpee, R., 2018. Enhanced Oral Bioavailability of Curcumin Using a Supersaturatable Self-Microemulsifying System Incorporating a Hydrophilic Polymer; In Vitro and In Vivo Investigations. AAPS PharmSciTech 19, 730–740.
- Jamil, R., Xu, T., Shah, H.S., Adhikari, A., Sardhara, R., Nahar, K., Morris, K.R., Polli, J.E., 2021. Similarity of dissolution profiles from biorelevant media: Assessment of interday repeatability, interanalyst repeatability, and interlaboratory reproducibility using ibuprofen and ketoconazole tablets. European Journal of Pharmaceutical Sciences 156, 105573.
- Jana, S., Das, A., Nayak, A.K., Sen, K.K., Basu, S.K., 2013. Aceclofenac-loaded unsaturated esterified alginate/gellan gum microspheres: In vitro and in vivo assessment. Int J Biol Macromol 57, 129–137.
- Jandera, P., 2011. Stationary and mobile phases in hydrophilic interaction chromatography: a review. Anal Chim Acta 692, 1–25.
- Jantratid, E., Janssen, N., Reppas, C., Dressman, J.B., 2008. Dissolution media simulating conditions in the proximal human gastrointestinal tract: An update. Pharm Res 25, 1663–1676.
- Jede, C., Wagner, C., Kubas, H., Weber, C., Weigandt, M., Koziolk, M., Weitschies, W., 2019. Automated small-scale in vitro transfer model as screening tool for the prediction of in vivo-dissolution and precipitation of poorly solubles. Int J Pharm 556, 150–158.
- Jede, C., Wagner, C., Kubas, H., Weber, C., Weitschies, W., 2018. In-line derivative spectroscopy as a promising application to a small-scale in vitro transfer model in biorelevant supersaturation and precipitation testing. Journal of Pharmacy and Pharmacology 70, 1315–1323.
- Johansson, K.E., Plum, J., Mosleh, M., Madsen, C.M., Rades, T., Müllertz, A., 2018. Characterization of the Hydrodynamics in a Miniaturized Dissolution Apparatus. J Pharm Sci 107, 1095–1103.
- Joseph, A., Shanmughan, P., Balakrishnan, A., Maliakel, B., Krishnakumar, I.M., 2022. Enhanced Bioavailability and Pharmacokinetics of a Natural Self-Emulsifying Reversible Hybrid-Hydrogel System of Quercetin: A Randomized Double-Blinded Comparative Crossover Study. ACS Omega 7, 46825–46832.

- Kalantzi, L., Persson, E., Polentarutti, B., Abrahamsson, B., Goumas, K., Dressman, J.B., Reppas, C., 2006. Canine intestinal contents vs. simulated media for the assessment of solubility of two weak bases in the human small intestinal contents. *Pharm Res* 23, 1373–1381.
- Kambayashi, A., Dressman, J.B., 2019. Predicting the Changes in Oral Absorption of Weak Base Drugs Under Elevated Gastric pH Using an In Vitro–In Silico–In Vivo Approach: Case Examples—Dipyridamole, Prasugrel, and Nelfinavir. *J Pharm Sci* 108, 584–591.
- Kambayashi, A., Yasuji, T., Dressman, J.B., 2016. Prediction of the precipitation profiles of weak base drugs in the small intestine using a simplified transfer (“dumping”) model coupled with in silico modeling and simulation approach. *European Journal of Pharmaceutics and Biopharmaceutics* 103, 95–103.
- Karolewicz, B., Górnjak, A., Owczarek, A., Zurawska-Płaksej, E., Piwowar, A., Pluta, J., 2014. Thermal, spectroscopic, and dissolution studies of ketoconazole-Pluronic F127 system. *J Therm Anal Calorim* 115, 2487–2493.
- Kataoka, M., Fukahori, M., Ikemura, A., Kubota, A., Higashino, H., Sakuma, S., Yamashita, S., 2016. Effects of gastric pH on oral drug absorption: In vitro assessment using a dissolution/permeation system reflecting the gastric dissolution process. *European Journal of Pharmaceutics and Biopharmaceutics* 101, 103–111.
- Kataoka, M., Takeyama, S., Minami, K., Higashino, H., Kakimi, K., Fujii, Y., Takahashi, M., Yamashita, S., 2019. In Vitro Assessment of Supersaturation/Precipitation and Biological Membrane Permeation of Poorly Water-Soluble Drugs: A Case Study With Albendazole and Ketoconazole. *J Pharm Sci* 108, 2580–2587.
- Kaur, N., Narang, A., Bansal, A.K., 2018. Use of biorelevant dissolution and PBPK modeling to predict oral drug absorption. *European Journal of Pharmaceutics and Biopharmaceutics* 129, 222–246.
- Kaur, N., Thakur, P.S., Shete, G., Gangwal, R., Sangamwar, A.T., Bansal, A.K., 2020. Understanding the Oral Absorption of Irbesartan Using Biorelevant Dissolution Testing and PBPK Modeling. *AAPS PharmSciTech* 21, 102.
- Khedr, A., 2008. Sensitive determination of ranitidine in rabbit plasma by HPLC with fluorescence detection. *J Chromatogr B Analyt Technol Biomed Life Sci* 862, 175–180.
- Ki, S.B., Singh, D., Kim, S.C., Son, T.W., Han, S.S., 2013. Effect of cross-linkers in fabrication of carrageenan-alginate matrices for tissue engineering application. *Biotechnol Appl Biochem* 60, 589–595.

- Kiaei Pour, P., Alemzadeh, I., Vaziri, A.S., Beiroti, A., 2020. Potential effects of alginate–pectin biocomposite on the release of folic acid and their physicochemical characteristics. *J Food Sci Technol* 57, 3363–3370.
- Kim, M.H., Lee, Y.W., Jung, W.-K., Oh, J., Nam, S.Y., 2019. Enhanced rheological behaviors of alginate hydrogels with carrageenan for extrusion-based bioprinting. *J Mech Behav Biomed Mater* 98, 187–194.
- Klein, S., 2006. The mini paddle apparatus– A useful tool in the early developmental stage? Experiences with immediate-release dosage forms. *Dissolut Technol*.
- Klein, S., 2010. The use of biorelevant dissolution media to forecast the in vivo performance of a drug. *AAPS Journal* 12, 397–406.
- Klein, S., Buchanan, N.L., Buchanan, C.M., 2012. Miniaturized transfer models to predict the precipitation of poorly soluble weak bases upon entry into the small intestine. *AAPS PharmSciTech* 13, 1230–1235.
- Kolesnyk, I., Konovalova, V., Burban, A., 2015. Alginate/ κ -Carrageenan Microspheres and their Application for Protein Drugs Controlled Release. *Chemistry & Chemical Technology* 9, 485–492.
- Koo, S.Y., Cha, K.H., Song, D.G., Chung, D., Pan, C.H., 2014. Microencapsulation of peppermint oil in an alginate-pectin matrix using a coaxial electrospray system. *Int J Food Sci Technol* 49, 733–739.
- Kostewicz, E.S., Brauns, U., Becker, R., Dressman, J.B., 2002. Forecasting the oral absorption behavior of poorly soluble weak bases using solubility and dissolution studies in biorelevant media. *Pharm Res* 19, 345–349.
- Kostewicz, E.S., Wunderlich, M., Brauns, U., Becker, R., Bock, T., Dressman, J.B., 2004. Predicting the precipitation of poorly soluble weak bases upon entry in the small intestine. *Journal of Pharmacy and Pharmacology* 56, 43–51.
- Kou, D., Zhang, C., Yiu, H., Ng, T., Lubach, J.W., Janson, M., Mao, C., Durk, M., Chinn, L., Winter, H., Wigman, L., Yehl, P., 2018. In Vitro, in Silico, and in Vivo Assessments of Intestinal Precipitation and Its Impact on Bioavailability of a BCS Class 2 Basic Compound. *Mol Pharm* 15, 1607–1617.
- Kukanich, B., Hubin, M., 2010. The pharmacokinetics of ketoconazole and its effects on the pharmacokinetics of midazolam and fentanyl in dogs. *J Vet Pharmacol Ther* 33, 42–49.
- Kulkarni, R. V, Baraskar, V. V, Setty, C.M., Sa, B., 2011. Interpenetrating polymer network matrices of sodium alginate and carrageenan for controlled drug delivery application. *Fibers and Polymers* 12, 352–358.

- Kumar, S., Sureshkuman, R., 2020. A Review on Precipitation inhibitors in supersaturable self emulsifying drug delivery system. *International Journal of Research in Pharmaceutical Sciences* 11, 2481–2488.
- Lee, D.R., Ho, M.J., Choi, Y.W., Kang, M.J., 2017. A polyvinylpyrrolidone-based supersaturable self-emulsifying drug delivery system for enhanced dissolution of cyclosporine A. *Polymers (Basel)* 9.
- Lee, E.H., 2014. A practical guide to pharmaceutical polymorph screening & selection. *Asian J Pharm Sci* 9, 163–175.
- Li, J., Zhai, J., Dyett, B., Yang, Y., Drummond, C.J., Conn, C.E., 2020. Effect of gum arabic or sodium alginate incorporation on the physicochemical and curcumin retention properties of liposomes. *Lwt* 110571.
- Li, L., Zhao, J., Sun, Y., Yu, F., Ma, J., 2019. Ionically cross-linked sodium alginate/ κ -carrageenan double-network gel beads with low-swelling, enhanced mechanical properties, and excellent adsorption performance. *Chemical Engineering Journal* 372, 1091–1103.
- Li, M., Li, H., Li, X., Zhu, H., Xu, Z., Liu, L., Ma, J., Zhang, M., 2017. A Bioinspired Alginate-Gum Arabic Hydrogel with Micro-/Nanoscale Structures for Controlled Drug Release in Chronic Wound Healing. *ACS Appl Mater Interfaces* 9, 22160–22175.
- Lim, H.-P., Ooi, C.-W., Tey, B.-T., Chan, E.-S., 2017. Controlled delivery of oral insulin aspart using pH-responsive alginate/ κ -carrageenan composite hydrogel beads. *React Funct Polym* 120, 20–29.
- Lindfors, L., Forssén, S., Westergren, J., Olsson, U., 2008. Nucleation and crystal growth in supersaturated solutions of a model drug. *J Colloid Interface Sci* 325, 404–413.
- Litou, C., Psachoulias, D., Vertzoni, M., Dressman, J., Reppas, C., 2020. Measuring pH and Buffer Capacity in Fluids Aspirated from the Fasted Upper Gastrointestinal Tract of Healthy Adults. *Pharm Res* 37.
- Liu, S., Li, L., 2016. Thermoreversible gelation and scaling behavior of Ca²⁺-induced κ -carrageenan hydrogels. *Food Hydrocoll* 61, 793–800.
- Liu, Z., Jiao, Y., Wang, Y., Zhou, C., Zhang, Z., 2008. Polysaccharides-Based Nanoparticles as Drug Delivery Systems. *Adv Drug Deliv Rev* 60, 1650–1662.
- Ma, H., Zhao, J., Liu, Y., Liu, L., Yu, J., Fan, Y., 2023. Controlled delivery of aspirin from nanocellulose-sodium alginate interpenetrating network hydrogels. *Ind Crops Prod* 192.
- MacArtain, P., Jacquier, J.C., Dawson, K.A., 2003. Physical characteristics of calcium induced κ -carrageenan networks. *Carbohydr Polym* 53, 395–400.

- Madsen, C.M., Boyd, B., Rades, T., Müllertz, A., 2016. Supersaturation of zafirlukast in fasted and fed state intestinal media with and without precipitation inhibitors. *European Journal of Pharmaceutical Sciences* 91, 31–39.
- Mahdavinia, G.R., Rahmani, Z., Karami, S., Pourjavadi, A., 2014. Magnetic/pH-sensitive κ -carrageenan/sodium alginate hydrogel nanocomposite beads: preparation, swelling behavior, and drug delivery. *J Biomater Sci Polym Ed* 25, 1891–1906.
- Malhotra, I., Basir, S.F., 2020. Immobilization of invertase in calcium alginate and calcium alginate-kappa-carrageenan beads and its application in bioethanol production. *Prep Biochem Biotechnol* 50, 494–503.
- Manuja, A., Raguvaran, R., Kumar, B., Kalia, A., Tripathi, B.N., 2020. Accelerated healing of full thickness excised skin wound in rabbits using single application of alginate/acacia based nanocomposites of ZnO nanoparticles. *Int J Biol Macromol* 155, 823–833.
- Marathe, P.H., 2015. Pharmacokinetic Considerations in Drug Design and Development. In: ACS Webinar. ACS Chemistry for life, Washington DC.
- Marimuthu, M., Ilansuriyan, P., Yap, T.N., Shanmugam, M., 2017. Interaction of semi-refined carrageenan (E407A) with nano quanta of some food hydrocolloids and their physiochemical, functional and rheological properties. *Journal of Microbiology, Biotechnology and Food Sciences* 6, 1049–1053.
- Markopoulos, C., Andreas, C.J., Vertzoni, M., Dressman, J., Reppas, C., 2015. In-vitro simulation of luminal conditions for evaluation of performance of oral drug products: Choosing the appropriate test media. *European Journal of Pharmaceutics and Biopharmaceutics* 93, 173–182.
- Martau, G.A., Mihai, M., Vodnar, D.C., 2019. The use of chitosan, alginate, and pectin in the biomedical and food sector-biocompatibility, bioadhesiveness, and biodegradability. *Polymers (Basel)*.
- Martin, F.A., Pop, M.M., Borodi, G., Filip, X., Kacso, I., 2013. Ketoconazole salt and co-crystals with enhanced aqueous solubility. *Cryst Growth Des* 13, 4295–4304.
- Menchicchi, B., Fuenzalida, J.P., Hensel, A., Swamy, M.J., David, L., Rochas, C., Goycoolea, F.M., 2015. Biophysical Analysis of the Molecular Interactions between Polysaccharides and Mucin. *Biomacromolecules* 16, 924–935.
- Moffat, A.C., Osselton, M.D., Widdop, B., 2011. Clarke's Analysis of Drugs and Poisons, 4th ed. Pharmaceutical Press, London.
- Mohamadnia, Z., Zohuriaan-Mehr, M.J., Kabiri, K., Jamshidi, A., Mobedi, H., 2007. pH-sensitive IPN hydrogel beads of carrageenan-alginate for controlled drug delivery. *J Bioact Compat Polym* 22, 342–356.

- Mohamadnia, Z., Zohuriaan-Mehr, M.J., Kabiri, K., Jamshidi, A., Mobedi, H., 2008. Ionically cross-linked carrageenan-alginate hydrogel beads. *J Biomater Sci Polym Ed* 19, 47–59.
- Musa, H.H., Ahmed, A.A., Musa, T.H., 2019. Chemistry, Biological, and Pharmacological Properties of Gum Arabic. In: *Reference Series in Phytochemistry*. Springer Science and Business Media B.V., pp. 797–814.
- Nahar, K., Hossain, M.K., Khan, T.A., 2017. Alginate and its versatile application in drug delivery. *Journal of Pharmaceutical Sciences and Research* 9, 606–617.
- Nair, R.M., Bindhu, B., V L, R., 2020. A polymer blend from Gum Arabic and Sodium Alginate - preparation and characterization. *Journal of Polymer Research* 27.
- National Center for Biotechnology Information, 2019. Alginate [WWW Document]. PubChem. URL <https://pubchem.ncbi.nlm.nih.gov/compound/131704328> (accessed 5.8.23).
- National Center for Biotechnology Information, 2021a. Pectin [WWW Document]. PubChem. URL <https://pubchem.ncbi.nlm.nih.gov/compound/441476> (accessed 5.8.23).
- National Center for Biotechnology Information, 2021b. Kappa Carrageenan [WWW Document]. PubChem. URL <https://pubchem.ncbi.nlm.nih.gov/compound/11966249> (accessed 5.8.23).
- Nayak, A.K., Das, B., Maji, R., 2012. Calcium alginate/gum arabic beads containing glibenclamide: Development and in vitro characterization. *Int J Biol Macromol* 51, 1070–1078.
- Nguyen, B.T., Nicolai, T., Benyahia, L., Chassenieux, C., 2014. Synergistic effects of mixed salt on the gelation of κ -carrageenan. *Carbohydr Polym* 112, 10–15.
- Nicolaides, E., Symillides, M., Dressman, J.B., Reppas, C., 2001. Biorelevant Dissolution Testing to Predict the Plasma Profile of Lipophilic Drugs After Oral Administration.
- Nkenmogne Kamdem, I.E., Saidou, C., Ngassoum, M.B., Ndjouenkeu, R., 2020. Synergistic interactions in dilute aqueous solutions between alginate and tropical vegetal hydrocolloids. *Heliyon* 6.
- Nugroho, A.E., 2012. *Prinsip Aksi dan Nasib Obat Dalam Tubuh*, 1st ed. Pustaka Pelajar, Yogyakarta.
- O'Dwyer, P.J., Litou, C., Box, K.J., Dressman, J.B., Kostewicz, E.S., Kuentz, M., Reppas, C., 2019. In vitro methods to assess drug precipitation in the fasted small intestine – a PEARL review. *Journal of Pharmacy and Pharmacology* 71, 536–556.

- Oh, G.W., Nam, S.Y., Heo, S.J., Kang, D.H., Jung, W.K., 2020. Characterization of ionic cross-linked composite foams with different blend ratios of alginate/pectin on the synergistic effects for wound dressing application. *Int J Biol Macromol* 156, 1565–1573.
- Ozaki, S., Minamisono, T., Yamashita, T., Kato, T., Kushida, I., 2012. Supersaturation–Nucleation Behavior of Poorly Soluble Drugs and its Impact on the Oral Absorption of Drugs in Thermodynamically High-Energy Forms. *J Pharm Sci* 101, 2271–2280.
- Pal, K., Banerjee, I., Sarkar, P., Kim, D., Deng, W.-P., Dubey, N.K., Majumder, K., 2020. *Biopolymer-Based Formulations : Biomedical and Food Applications*.
- Palmelund, H., Madsen, C.M., Plum, J., Müllertz, A., Rades, T., 2016. Studying the Propensity of Compounds to Supersaturate: A Practical and Broadly Applicable Approach. *J Pharm Sci* 105, 3021–3029.
- Pan, X., Julian, T., Augsburger, L., 2008. Increasing the dissolution rate of a low-solubility drug through a crystalline-amorphous transition: A case study with indomethacin. *Drug Dev Ind Pharm* 34, 221–231.
- Pasparakis, G., Bouropoulos, N., 2006. Swelling studies and in vitro release of verapamil from calcium alginate and calcium alginate-chitosan beads. *Int J Pharm* 323, 34–42.
- Patel, D.D., 2015. *KINETICS AND MECHANISMS OF CRYSTAL GROWTH INHIBITION OF INDOMETHACIN BY MODEL PRECIPITATION INHIBITORS*. University of Kentucky.
- Pathak, S.M., Ruff, A., Kostewicz, E.S., Patel, N., Turner, D.B., Jamei, M., 2017. Model-Based Analysis of Biopharmaceutic Experiments to Improve Mechanistic Oral Absorption Modeling: An Integrated in Vitro in Vivo Extrapolation Perspective Using Ketoconazole as a Model Drug. *Mol Pharm* 14, 4305–4320.
- Permanadewi, I., Kumoro, A.C., Wardhani, D.H., Aryanti, N., 2019. Modelling of controlled drug release in gastrointestinal tract simulation. In: *Journal of Physics: Conference Series*. Institute of Physics Publishing.
- Pongjanyakul, T., Puttipipatkachorn, S., 2007. Xanthan-alginate composite gel beads: Molecular interaction and in vitro characterization. *Int J Pharm* 331, 61–71.
- Prasad, A.R., Thireesha, B., 2018. UV-spectrophotometric method development and validation for the determination of lornoxicam in microsponges. *International Journal of Applied Pharmaceutics* 10, 74–78.
- Price, D.J., Ditzinger, F., Koehl, N.J., Jankovic, S., Tsakiridou, G., Nair, A., Holm, R., Kuentz, M., Dressman, J.B., Saal, C., 2019. Approaches to increase mechanistic understanding and aid in the selection of precipitation inhibitors for supersaturating formulations – a PEARRL review. *Journal of Pharmacy and Pharmacology*.

- Psachoulias, D., Vertzoni, M., Goumas, K., Kalioras, V., Beato, S., Butler, J., Reppas, C., 2011. Precipitation in and supersaturation of contents of the upper small intestine after administration of two weak bases to fasted adults. *Pharm Res* 28, 3145–3158.
- Pubchem, 2019. Ketoconazole [WWW Document]. URL <https://pubchem.ncbi.nlm.nih.gov/compound/Ketoconazole> (accessed 10.18.20).
- Raghavan, S. L., Trividic, A., Davis, A.F., Hadgraft, J., 2001. Crystallization of hydrocortisone acetate: Influence of polymers. *Int J Pharm* 212, 213–221.
- Raghavan, S L, Trividic, A., Davis, A.F., Hadgraft, J., 2001. Crystallization of hydrocortisone acetate: influence of polymers, *International Journal of Pharmaceutics*.
- Raguvaran, R., Manuja, B.K., Chopra, M., Thakur, R., Anand, T., Kalia, A., Manuja, A., 2017. Sodium alginate and gum acacia hydrogels of ZnO nanoparticles show wound healing effect on fibroblast cells. *Int J Biol Macromol* 96, 185–191.
- Raina, S.A., Eerdenbrugh, B. Van, Alonzo, D.E., Mo, H., Zhang, G.G.Z., Gao, Y., Taylor, L.S., 2015. Trends in the precipitation and crystallization behavior of supersaturated aqueous solutions of poorly water-soluble drugs assessed using synchrotron radiation. *J Pharm Sci* 104, 1981–1992.
- Rao, M.A., 1980. *Rheology of Food Gum and Starch Dispersions*.
- Rasool, A., Ata, S., Islam, A., Rizwan, M., Azeem, M.K., Mehmood, A., Khan, R.U., Qureshi, A. ur R., Mahmood, H.A., 2020. Kinetics and controlled release of lidocaine from novel carrageenan and alginate-based blend hydrogels. *Int J Biol Macromol* 147, 67–78.
- Rehman, U., Sarfraz, R.M., Mahmood, A., Mahmood, T., Batool, N., Haroon, B., Benguerba, Y., 2023. Tamarind/ β -CD-g-poly (MAA) pH responsive hydrogels for controlled delivery of Capecitabine: fabrication, characterization, toxicological and pharmacokinetic evaluation. *Journal of Polymer Research* 30.
- Riethorst, D., Mitra, A., Kesisoglou, F., Xu, W., Tack, J., Brouwers, J., Augustijns, P., 2018. Human intestinal fluid layer separation: The effect on colloidal structures & solubility of lipophilic compounds. *European Journal of Pharmaceutics and Biopharmaceutics* 129, 104–110.
- Rinto, Lestari, S.D., Baehaki, A., Sari, Y., 2019. The effect of degradation time in the simulated gastric fluid for bioactive compounds from bekasam. In: *IOP Conference Series: Earth and Environmental Science*. Institute of Physics Publishing.
- Roh, Y.H., Shin, C.S., 2006. Preparation and characterization of alginate–carrageenan complex films. *J Appl Polym Sci* 99, 3483–3490.

- Rohman, A., 2014. Validasi dan Penjaminan Mutu Metode Analisis Kimia. Gadjah Mada University Press, Yogyakarta.
- Roos, R.W., Lau-Cam, C.A., 1986. General reversed-phase high-performance liquid chromatographic method for the separation of drugs using triethylamine as a competing base. *J Chromatogr A* 370, 403–418.
- Rosés, M., Bosch, E., 2002. Influence of mobile phase acid–base equilibria on the chromatographic behaviour of protolytic compounds. *J Chromatogr A* 982, 1–30.
- Rowe, R.C., Sheskey, P.J., Quinn, M.E., 2009. Handbook of Pharmaceutical Excipients, 6th ed. Pharmaceutical Press, UK.
- Rubbens, J., Brouwers, J., Tack, J., Augustijns, P., 2016. Gastrointestinal dissolution, supersaturation and precipitation of the weak base indinavir in healthy volunteers. *European Journal of Pharmaceutics and Biopharmaceutics* 109, 122–129.
- Ruff, A., Fiolka, T., Kostewicz, E.S., 2017a. Prediction of Ketoconazole absorption using an updated in vitro transfer model coupled to physiologically based pharmacokinetic modelling. *European Journal of Pharmaceutical Sciences* 100, 42–55.
- Ruff, A., Holm, R., Kostewicz, E.S., 2017b. Evaluating the predictability of the in vitro transfer model and in vivo rat studies as a surrogate to investigate the supersaturation and precipitation behaviour of different Albendazole formulations for humans. *European Journal of Pharmaceutical Sciences* 105, 108–118.
- Sadeghnia, H.R., Hassanzadeh-Khayyat, M., 2005. Bioequivalency Study of Two Formulations of Ketoconazole Tablet in Healthy Volunteers. *Iranian Journal of Pharmaceutical Sciences Autumn* 1, 209–215.
- Sankalia, J.M., Sankalia, M.G., Sutariya, V.B., Mashru, R.C., 2007. Nateglinide quantification in rabbit plasma by HPLC: Optimization and application to pharmacokinetic study. *J Pharm Biomed Anal* 44, 196–204.
- Sariyer, S., Duranoğlu, D., Doğan, Ö., Küçük, İ., 2020. pH-responsive double network alginate/kappa-carrageenan hydrogel beads for controlled protein release: Effect of pH and crosslinking agent. *J Drug Deliv Sci Technol* 56.
- Schiller, C., Fröhlich, C.P., Giessmann, T., Siegmund, W., Mönnikes, H., Hosten, N., Weitschies, W., 2005. Intestinal fluid volumes and transit of dosage forms as assessed by magnetic resonance imaging. *Aliment Pharmacol Ther* 22, 971–979.
- Shargel, L., Wu-Pong, S., Yu, A.B.C., 2012. Biofarmasetika dan Farmakokinetika Terapan, 5th ed. Pusat Penerbitan dan Percetakan Universitas Airlangga, Surabaya.
- Shayanfar, A., Jouyban, A., 2014. Physicochemical characterization of a new cocrystal of ketoconazole. *Powder Technol* 262, 242–248.

- Shi, N.Q., Jin, Y., Zhang, Y., Che, X.X., Xiao, X., Cui, G.H., Chen, Y.Z., Feng, B., Li, Z.Q., Qi, X.R., 2019. The Influence of Cellulosic Polymer's Variables on Dissolution/Solubility of Amorphous Felodipine and Crystallization Inhibition from a Supersaturated State. *AAPS PharmSciTech* 20.
- Singh, D., Singh, M., Tharmatt, A., Tiwary, A.K., Bedi, N., 2019. Polymeric precipitation inhibitor as an effective trigger to convert supersaturated into supersaturable state in vivo. *Ther Deliv* 10, 599–608.
- Singh, V., Preeti, 2015. Mesoporous titania spheres derived from sodium alginate-gum acacia composite beads: Efficient adsorbent for “Reactive blue H5G” dye. *J Environ Chem Eng* 3, 2727–2737.
- Soderlind, E., Karlsson, E., Carlsson, A., Kong, R., Lenz, A., Lindborg, S., Sheng, J.J., 2010. Simulating Fasted Human Intestinal Fluids: Understanding the Roles of Lecithin and Bile Acids. *Mol Pharm* 7, 1498–1507.
- Soetrisnanto, D., 2004. Kecepatan Tumbuh Kristal Asam Sitrat Mono Hidrat Dalam Kolom Fluidasi dan Kaitannya dengan Impuritas Kristal. *Reaktor* 8, 48–51.
- Soppimath, K.S., Kulkarni, A.R., Aminabhavi, T.M., 2001. Chemically modified polyacrylamide-g-guar gum-based crosslinked anionic microgels as pH-sensitive drug delivery systems: preparation and characterization, *Journal of Controlled Release*.
- Sousa, J., Alves, G., Fortuna, A., Falcão, A., 2012. Analytical methods for determination of new fluoroquinolones in biological matrices and pharmaceutical formulations by liquid chromatography: a review. *Anal Bioanal Chem* 403, 93–129.
- Spadari, C. de C., Lopes, L.B., Ishida, K., 2017. Potential use of alginate-based carriers as antifungal delivery system. *Front Microbiol*.
- Sugano, K., 2007. Artificial Membrane Technologies to Assess Transfer and Permeation of Drugs in Drug Discovery. In: Taylor, J.B., Triggler, D.J. (Eds.), *Comprehensive Medicinal Chemistry II*. Elsevier, pp. 453–487.
- Sugar, A.M., Alsip, S.G., Galgiani, J.N., Graybill, John R, Dismukes, William E, Cloud, Gretchen A, Craven, P.C., Stevens, D.A., Galgiani, N., Stevens, D.A., Graybill, J R, Dismukes, W E, Cloud, G A, 1987. Pharmacology and Toxicity of High-Dose Ketoconazole.
- Sugihara, H., Taylor, L.S., 2018. Evaluation of Pazopanib Phase Behavior Following pH-Induced Supersaturation. *Mol Pharm* 15, 1690–1699.
- Sutton, S.C., 2009. Role of physiological intestinal water in oral absorption. *AAPS Journal* 11, 277–285.

- Takano, R., Sugano, K., Higashida, A., Hayashi, Y., Machida, M., Aso, Y., Yamashita, S., 2006. Oral absorption of poorly water-soluble drugs: Computer simulation of fraction absorbed in humans from a miniscale dissolution test. *Pharm Res* 23, 1144–1156.
- Taneri, F., Güneri, T., Aigner, Z., Berkesi, O., Kata, M., 2003. THERMOANALYTICAL STUDIES ON COMPLEXES OF KETOCONAZOLE WITH CYCLODEXTRIN DERIVATIVES, *Journal of Thermal Analysis and Calorimetry*.
- Taneri, F., Ozcan, I., Guneri, T., 2010. In vitro and in vivo evaluation of oral tablet formulations prepared with ketoconazole and hydroxypropyl- β -cyclodextrin. *Drug Deliv* 17, 152–157.
- Taupitz, Thomas, Dressman, J.B., Klein, S., 2013. In vitro tools for evaluating novel dosage forms of poorly soluble, weakly basic drugs: Case example ketoconazole. *J Pharm Sci* 102, 3645–3652.
- Taupitz, T., Dressman, J.B., Klein, S., 2013. In vitro tools for evaluating novel dosage forms of poorly soluble, weakly basic drugs: Case example ketoconazole. *J Pharm Sci* 102, 3645–3652.
- Teuscher, N., 2010. What is a Half-life? [WWW Document]. Certara, USA. URL <https://www.certara.com/knowledge-base/what-is-a-half-life/> (accessed 5.15.23).
- Tonnesen, H.H., Karlsen, J., 2002. Alginate in drug delivery systems. *Drug Dev Ind Pharm*.
- Torres, F.G., Troncoso, O.P., Pisani, A., Gatto, F., Bardi, G., 2019. Natural polysaccharide nanomaterials: An overview of their immunological properties. *Int J Mol Sci* 20, 1–22.
- Tozer, T.N., 2011. *Farmakokinetika dan farmakodinamika: dasar kuantitatif terapi obat*. EGC, Jakarta.
- Trasi, N.S., Taylor, L.S., 2012. Effect of polymers on nucleation and crystal growth of amorphous acetaminophen. *CrystEngComm* 14, 5188–5197.
- Tsai, F.-H., Kitamura, Y., Kokawa, M., 2017. Effect of gum arabic-modified alginate on physicochemical properties, release kinetics, and storage stability of liquid-core hydrogel beads. *Carbohydr Polym* 174, 1069–1077.
- Tsume, Y., Matsui, K., Searls, A.L., Takeuchi, S., Amidon, G.E., Sun, D., Amidon, G.L., 2017. The impact of supersaturation level for oral absorption of BCS class IIb drugs, dipyridamole and ketoconazole, using in vivo predictive dissolution system: Gastrointestinal Simulator (GIS). *European Journal of Pharmaceutical Sciences* 102, 126–139.

- Tsume, Y., Mudie, D.M., Langguth, P., Amidon, G.E., Amidon, G.L., 2014. The Biopharmaceutics Classification System: Subclasses for in vivo predictive dissolution (IPD) methodology and IVIVC. *Eur J Pharm Sci* 57, 152–163.
- Tudorache, M., Gheorghe, A., Negoii, A., Enache, M., Maria, G.-M., Parvulescu, V.I., 2016. Bifunctional carbohydrate biopolymers entrapped lipase as catalyst for the two consecutive conversions of α -pinene to oxy-derivatives. *Carbohydr Polym* 152, 726–733.
- Uekusa, T., Sugano, K., 2018. Precipitation behavior of pioglitazone on the particle surface of hydrochloride salt in biorelevant media. *J Pharm Biomed Anal* 161, 45–50.
- Ullrich, A., Schiffter, H.A., 2018. The influence of polymer excipients on the dissolution and recrystallization behavior of ketoconazole: Application, variation and practical aspects of a pH shift method. *European Journal of Pharmaceutics and Biopharmaceutics* 133, 20–30.
- Van Tyle, J.H., 1984. Ketoconazole. Mechanism of action, spectrum of activity, pharmacokinetics, drug interactions, adverse reactions and therapeutic use. *Pharmacotherapy*.
- Vandecruys, R., Peeters, J., Verreck, G., Brewster, M.E., 2007. Use of a screening method to determine excipients which optimize the extent and stability of supersaturated drug solutions and application of this system to solid formulation design. *Int J Pharm* 342, 168–175.
- Venkatesan, J., Anil, S., Singh, S.K., Kim, S.K., 2017. Preparations and Applications of Alginate Nanoparticles, Seaweed Polysaccharides: Isolation, Biological and Biomedical Applications. Elsevier Inc.
- Vertzoni, M., Augustijns, P., Grimm, M., Koziolok, M., Lemmens, G., Parrott, N., Pentafragka, C., Reppas, C., Rubbens, J., Van Den Abeele, J., Vanuytsel, T., Weitschies, W., Wilson, C.G., 2019. Impact of regional differences along the gastrointestinal tract of healthy adults on oral drug absorption: An UNGAP review. *European Journal of Pharmaceutical Sciences* 134, 153–175.
- Vertzoni, M., Fotaki, N., Nicolaidis, E., Reppas, C., Kostewicz, E., Stippler, E., Leuner, C., Dressman, J., 2010. Dissolution media simulating the intraluminal composition of the small intestine: physiological issues and practical aspects. *Journal of Pharmacy and Pharmacology* 56, 453–462.
- Vertzoni, M., Pastelli, E., Psachouliasis, D., Kalantzi, L., Reppas, C., 2007. Estimation of intragastric solubility of drugs: In what medium? *Pharm Res* 24, 909–917.
- Vora, C., Patadia, R., Mittal, K., Mashru, R., 2016. Preparation and characterization of dipyridamole solid dispersions for stabilization of supersaturation: effect of

- precipitation inhibitors type and molecular weight. *Pharm Dev Technol* 21, 847–855.
- Walkenström, P., Kidman, S., Hermansson, A.M., Rasmussen, P.B., Hoegh, L., 2003. Microstructure and rheological behaviour of alginate/pectin mixed gels. *Food Hydrocoll* 17, 593–603.
- Wang, Y., Liu, M., Ni, B., Xie, L., 2012. κ -Carrageenan-sodium alginate beads and superabsorbent coated nitrogen fertilizer with slow-release, water-retention, and anticompaction properties. *Ind Eng Chem Res* 51, 1413–1422.
- Warren, D.B., Benameur, H., Porter, C.J.H., Pouton, C.W., 2010. Using polymeric precipitation inhibitors to improve the absorption of poorly water-soluble drugs: A mechanistic basis for utility. *J Drug Target* 18, 704–731.
- Wolfgang Beckmann, 2013. *Crystallization*. Wiley VCH Verlag GmbH & Co. KGaA, Germany.
- Wurm, F., Pham, T., Bechtold, T., 2019. Modelling of phase separation of alginate-carrageenan gels based on rheology. *Food Hydrocoll* 89, 765–772.
- Xie, S., Poornachary, S.K., Chow, P.S., Tan, R.B.H., 2010a. Direct precipitation of micron-size salbutamol sulfate: New insights into the action of surfactants and polymeric additives. *Cryst Growth Des* 10, 3363–3371.
- Xie, S., Poornachary, S.K., Chow, P.S., Tan, R.B.H., 2010b. Direct precipitation of micron-size salbutamol sulfate: New insights into the action of surfactants and polymeric additives. *Cryst Growth Des* 10, 3363–3371.
- Xua, S., Dai, W.G., 2013. Drug precipitation inhibitors in supersaturable formulations. *Int J Pharm*.
- Yagar, H., Kocaturk, S., 2014. Comparison of some biochemical properties of artichoke polyphenol oxidase entrapped in alginate-carrageenan and alginate gels. *Artif Cells Nanomed Biotechnol*.
- Ye, Z., Ma, P., Tang, M., Li, X., Zhang, W., Hong, X., Chen, X., Chen, D., 2017. Interactions between calcium alginate and carrageenan enhanced mechanical property of a natural composite film for general packaging application. *Polymer Bulletin* 74, 3421–3429.
- Zhang, Y., Cao, J., Wang, X., Liu, H., Shao, Y., Chu, C., Xue, F., Bai, J., 2022. The effect of enzymes on the in vitro degradation behavior of Mg alloy wires in simulated gastric fluid and intestinal fluid. *Bioact Mater* 7, 217–226.
- Zhang, Y., Huo, M., Zhou, J., Zou, A., Li, W., Yao, C., Xie, S., 2010. DDSolver: An add-in program for modeling and comparison of drug dissolution profiles. *AAPS Journal* 12, 263–271.

Zia, T., Usman, M., Sabir, A., Shafiq, M., Khan, R.U., 2020. Development of interpolymeric complex of anionic polysaccharides, alginate/k-carrageenan bio-platform for burn dressing. *Int J Biol Macromol* 157, 83–95.