

Kesimpulan

Proses pembuatan SCC tipe *analogue cheese* parsial *dairy* dilakukan dengan proses utama hidrogenasi parsial pada suhu 170°C dan tekanan 11 bar menggunakan katalis Ni/Al menghasilkan *hardened coconut oil* dengan stabilitas tinggi dan kemudian dicampurkan dengan bahan-bahan pendukung lainnya untuk memberikan karakteristik dan tampilan fisik SCC yang diinginkan. SCC yang dihasilkan memiliki karakteristik berupa kaya mineral dan vitamin, stabilitas rasa yang baik dengan masa simpan yang panjang.

Daftar Pustaka

- [1] Dong F. The outlook for Asian dairy markets: The role of demographics, income, and prices. *Food Policy*. 2006;31(3):260-271.
- [2] Bachmann H-P. Cheese analogues: a review. *Int Dairy J*. 2001;11(4):505-515.
- [3] Ahmed N, Hassan F. Utilization of plant proteins in manufacture of cheese analogs. *Egypt J Food Sci*. 1995;23:37-45.
- [4] Mounsey J, O'riordan E. Characteristics of imitation cheese containing native starches. *J Food Sci*. 2001;66(4):586-591.
- [5] El-Bakry M, Duggan E, O'Riordan ED, O'Sullivan M. Effects of emulsifying salts reduction on imitation cheese manufacture and functional properties. *J Food Eng*. 2010;100(4):596-603.
- [6] McSweeney PLH. Cheese-like products. *Cheese problems solved* Woodhead Publishing Limited; Cambridge England:2007. pp. 384-388.
- [7] Kong-Chan JL, Hellyer JA, Tafuri MW. Simulated cheese products with reduced animal fat and calories. US Patent 5061503; 1991.
- [8] Mortensen H. Imitation cheese products will gain importance. *J Scand Dairy Inf*. 1991;5(2):14-15.
- [9] Giese J. Developing low-fat meat products. *J Food Technol*. 1992;46(4):100-108.
- [10] Kneifel W, Seiler A. Water-holding properties of milk protein products-A review. *Food Struct*. 1993;12(3):3.
- [11] Leialohilani A, de Boer A. EU food legislation impacts innovation in the area of plant-based dairy alternatives. *Trends Food Sci Technol*. 2020;104:262-267.
- [12] McNutt K. Cheese analogs. *Int Dairy J*. 1989;61:76-79.
- [13] Novariantio H, Warokka J, editors. Past, present and future coconut research in Indonesia. *ACIAR PROCEEDINGS*; 2006: ACIAR; 1998.
- [14] Arellano-Gomez L, Lobato-Calleros C, Aguirre-Mandujano E, Lobato-Calleros M, editors. Effect of using different fats in the microstructure and texture characteristics of cheese analogs. *Proceedings 1996 IFT Annual Meeting*; 1996.
- [15] Brander RW, Raap TA, Gessler JF. Soy milk containing cheese analog. US Patent 4556569; 1985.
- [16] Lobato-Calleros C, Vernon-Carter E, Hornelas-Urbe Y. Microstructure and texture of cheese analogs containing different types of fat. *J Texture Stud*. 1998;29(5):569-586.
- [17] Lockyer S, Stanner S. Coconut oil—a nutty idea? *Nutr Bull*. 2016;41(1):42-54.

- [18] Fox PF, McSweeney PL, Cogan TM, Guinee TP. Cheese: chemistry, physics and microbiology, volume 1: general aspects. 3 ed. Oxford: Elsevier Academic Press; 2004.
- [19] Walther B, Schmid A, Sieber R, Wehrmüller K. Cheese in nutrition and health. *J Dairy Sci Technol.* 2008;88(4-5):389-405.
- [20] Politis I, Ng-Kwai-Hang KF. Effects of Somatic Cell Count and Milk Composition on Cheese Composition and Cheese Making Efficiency. *J Dairy Sci.* 1988;71(7):1711-1719.
- [21] Steele J, Broadbent J, Kok J. Perspectives on the contribution of lactic acid bacteria to cheese flavor development. *Curr Opin Biotechnol.* 2013;24(2):135-141.
- [22] Fox PF, Guinee TP, Cogan TM, McSweeney PL. Processed cheese and substitute/imitation cheese products. *Fundamentals of cheese science Springer*;2017. pp. 589-627.
- [23] Krishna AG, Gaurav R, Singh BA, Kumar PP, Preeti C. Coconut oil: chemistry, production and its applications-a review. *Indian J Microbiol.* 2010;53(3):15-27.
- [24] Thampan PK. Glimpses of coconut industry in India/PK Thampan. India: Coconut Development Board; 1988.
- [25] Seneviratne K, Dissanayake D. Effect of method of extraction on the quality of coconut oil. *Kelaniya Sri Lanka J Sci.* 2011;2:63-72.
- [26] Kiyasu J, Bloom B, Chaikoff I. The portal transport of absorbed fatty acids. *J Biol Chem.* 1952;199(1):415-419.
- [27] Bhatnagar AS, Kumar PP, Hemavathy J, Krishna AG. Fatty acid composition, oxidative stability, and radical scavenging activity of vegetable oil blends with coconut oil. *J Am Oil Chem' Soc.* 2009;86(10):991-999.
- [28] Wu L-c, Hsu H-W, Chen Y-C, Chiu C-C, Lin Y-I, Ho J-aA. Antioxidant and antiproliferative activities of red pitaya. *Food Chem.* 2006;95(2):319-327.
- [29] Huang Z, Wang B, Eaves DH, Shikany JM, Pace RD. Phenolic compound profile of selected vegetables frequently consumed by African Americans in the southeast United States. *Food Chem.* 2007;103(4):1395-1402.
- [30] Wagner KH, Wotruba F, Elmadfa I. Antioxidative potential of tocotrienols and tocopherols in coconut fat at different oxidation temperatures. *Eur J Lipid Sci Technol.* 2001;103(11):746-751.
- [31] Seneviratne KN, Hapuarachchi CD, Ekanayake S. Comparison of the phenolic-dependent antioxidant properties of coconut oil extracted under cold and hot conditions. *Food Chem.* 2009;114(4):1444-1449.

- [32] Seneviratne KN, Sudarshana Dissanayake DM. Variation of phenolic content in coconut oil extracted by two conventional methods. *Int J Food Sci Technol*. 2008;43(4):597-602.
- [33] Jayadas NH, Nair KP. Coconut oil as base oil for industrial lubricants—evaluation and modification of thermal, oxidative and low temperature properties. *Tribol Int*. 2006;39(9):873-878.
- [34] Kinsella R, Maher T, Clegg ME. Coconut oil has less satiating properties than medium chain triglyceride oil. *Physiol Behav*. 2017;179:422-426.
- [35] Guinee TP, Carić M, Kaláb M. Pasteurized processed cheese and substitute/imitation cheese products. In: Fox PF, McSweeney PLH, Cogan TM, Guinee TP, editors. *Cheese: Chemistry, Physics and Microbiology*. 2 Elsevier Academic Press; Oxford:2004. pp. 349-394.
- [36] Caric M, Gantar M, Kalab M. Effects of emulsifying agents on the microstructure and other characteristics of process cheese-a review. *Food Struct*. 1985;4(2):13.
- [37] Chavan RS, Jana A. Cheese substitutes: an alternative to natural cheese-a review. *Int J Food Sci Technol Nutr*. 2007;2:25-39.
- [38] El-Bakry M, Duggan E, O’Riordan ED, O’Sullivan M. Casein hydration and fat emulsification during manufacture of imitation cheese, and effects of emulsifying salts reduction. *J Food Eng*. 2011;103(2):179-187.
- [39] Masotti F, Cattaneo S, Stuknytė M, De Noni I. Status and developments in analogue cheese formulations and functionalities. *Trends Food Sci Technol*. 2018;74:158-169.
- [40] Cavalier-Salou C, Cheftel J. Emulsifying salts influence on characteristics of cheese analogs from calcium caseinate. *J Food Sci*. 1991;56(6):1542-1547.
- [41] Phillips J, Muir JG, Birkett A, Lu ZX, Jones GP, O’Dea K, et al. Effect of resistant starch on fecal bulk and fermentation-dependent events in humans. *Am J Clin Nutr*. 1995;62(1):121-130.
- [42] Mania I, Delgado AM, Barone C, Parisi S. Food additives in cheese substitutes. *Traceability in the dairy industry in europe Springer*;2018. pp. 109-117.
- [43] Fox P. Milk proteins as food ingredients. *Int J Dairy Technol*. 2001;54(2):41-55.
- [44] Li N, Zhong Q. Casein core-polysaccharide shell nanocomplexes stable at pH 4.5 enabled by chelating and complexation properties of dextran sulfate. *Food Hydrocoll*. 2020;103:105723.
- [45] Arora N, Garg T, Bilandi A. Review on casein production and casein based nano-formulations. *Int Res J Pharm*. 2012;3(1):41-45.

- [46] Livney YD. Milk proteins as vehicles for bioactives. *Curr Opin Colloid Interface Sci.* 2010;15(1-2):73-83.
- [47] Badem A, Uçar G. Production of caseins and their usages. *Int J Food Sci.* 2017;2:4-9.
- [48] Eymery O, Pangborn R. Influence of fat, citric acid and sodium chloride on texture and taste of a cheese analog. *J Food Sci Technol.* 1988;8(1):15-32.
- [49] Sarode A, Sawale P, Khedkar C, Kalyankar S, Rd P. Casein and caseinate: methods of manufacture. In: Caballero B, Finglas PM, Toldrá F, editors. *Encyclopedia of food and health.* 1 Academic Press; Oxford:2016. pp. 676-682.
- [50] Patel AR, Bouwens EC, Velikov KP. Sodium caseinate stabilized zein colloidal particles. *J Agric Food Chem.* 2010;58(23):12497-12503.
- [51] Hokes JC, Mangino M, Hansen P. A model system for curd formation and melting properties of calcium caseinates. *J Food Sci.* 1982;47(4):1235-1249.
- [52] Shima H, Tanimoto M. Quantifying thermally induced flowability of rennet cheese curds. *Int J Food Prop.* 2015;18(10):2277-2283.
- [53] McIntyre I, O'Sullivan M, O'Riordan D. Effects of calcium chelators on calcium distribution and protein solubility in rennet casein dispersions. *Food Chem.* 2016;197:233-239.
- [54] Tomasula PM, Craig JC, Boswell RT. A continuous process for casein production using high-pressure carbon dioxide. *J Food Eng.* 1997;33(3-4):405-419.
- [55] Chen L, Liu H. Effect of emulsifying salts on the physicochemical properties of processed cheese made from Mozzarella. *J Dairy Sci.* 2012;95(9):4823-4830.
- [56] Tamime AY. *Processed cheese and analogues.* Oxford: John Wiley & Sons; 2011.
- [57] Sádliková I, Buňka F, Budinský P, Barbora V, Pavlínek V, Hoza I. The effect of selected phosphate emulsifying salts on viscoelastic properties of processed cheese. *Food Sci.* 2010;43(8):1220-1225.
- [58] Ennis MP, Mulvihill DM. Maillard reaction contributes to variability in hydration characteristics of rennet caseins in solutions of a calcium-sequestering salt. *Int J Dairy Technol.* 1999;52(4):156-160.
- [59] Brickley CA, Govindasamy-Lucey S, Jaeggi JJ, Johnson ME, McSweeney PLH, Lucey JA. Influence of Emulsifying Salts on the Textural Properties of Nonfat Process Cheese Made from Direct Acid Cheese Bases. *J Dairy Sci.* 2008;91(1):39-48.
- [60] Mayer HK. Bitterness in processed cheese caused by an overdose of a specific emulsifying agent? *Int Dairy J.* 2001;11(4-7):533-542.

- [61] Swaitek AJM. The effect of type and quantity of emulsifying salts on the consistency of processed cheese. *Milchwissenschaft*. 1964;19:409-403.
- [62] Glass K, Doyle M. Safety of processed cheese: A review of the scientific literature. *Food Res*. 2005;1-11.
- [63] Tanaka N, Traisman E, Plantinga P, Finn L, Flom W, Meske L, et al. Evaluation of factors involved in antitubercular properties of pasteurized process cheese spreads. *J Food Prot*. 1986;49(7):526-531.
- [64] Ramírez Rangel E. Contribution to the study of heterogeneous catalytic reactions in SCFs: hydrogenation of sunflower oil in Pd catalysts at single-phase conditions. Barcelona: Universitat Politècnica de Catalunya; 2005.
- [65] Campbell GM, Mougeot E. Creation and characterisation of aerated food products. *Trends Food Sci Technol*. 1999;10(9):283-296.
- [66] Alfred T, Matthäus B, Fiebig H. Fats and fatty oils. Weinheim: Wiley-VCH; 2002.
- [67] Austin GT. Shreve's chemical process industries. New York: McGraw-Hill Companies; 1984.
- [68] Brownell LE, Young EH. Process equipment design: vessel design. New York: Wiley; 1959.
- [69] Geankoplis CJ. Transport processes and separation process principles:(includes unit operations). New Jersey: Prentice Hall Professional Technical Reference; 2003.
- [70] Richardson JF. Advances in Chemical Engineering. *Nature*. 1965;207(4994):231-231.
- [71] Sinnott R. Chapter 6: Costing and Project Evaluation. Coulson richardson's chemical engineering: chemical engineering design. 4th ed Elsevier Butterworth-Heinemann; Oxford:2005. pp. 243-283.
- [72] Treybal ER. Mass-transfer operations. 3rd ed. Singapore: McGraw-Hill Book Company; 1981.
- [73] Shahin AAM. Study on the use of vegetable oils in the manufacture of soft cheese. Egypt: Cairo University; 2016.
- [74] Wahyudi, Wardana ING, Widodo A, Wijayanti W. Improving Vegetable Oil Properties by Transforming Fatty Acid Chain Length in Jatropha Oil and Coconut Oil Blends. *Energies*. 2018;11(2).
- [75] Mensink RP. Fatty Acids: Health Effects of Saturated Fatty Acids. In: Caballero B, editor. *Encyclopedia of Human Nutrition (Third Edition)* Academic Press; Waltham:2013. pp. 215-219.
- [76] Marapana R, Kaluarachchi C, Kodagoda K, Serasinhe R. Development of cheese analogue by substitution of milk fat from vegetable fats. *Int J Food Sci*. 2017;2(4):43-46.

- [77] Oliveira R, Faria M, Silva R, Bezerra L, Carvalho G, Pinheiro A, et al. Fatty Acid Profile of Milk and Cheese from Dairy Cows Supplemented a Diet with Palm Kernel Cake. *Molecules*. 2015;20(8):15434-15448.
- [78] Karouw S. Fatty acids profile, oxidative and hydrolysis stability of virgin coconut oil and palm stearin based human milk fat analog. *J Int Coconut Community*. 2014;30(2):9-9.
- [79] Langstraat A. Characteristics and composition of vegetable oil-bearing materials. *J Am Oil Chem' Soc*. 1976;53(6):241-247.
- [80] Gabrovska M, Bankova M, Idakiev V, Kardjieva R, Uzunov I. Hydrogenation of vegetable oil on Ni-Mg-Al Catalyst obtained from hydrotalcite-like precursors. Petrov L, C B, G K, editors. Bulgaria: Institute of Catalysis; 2000.
- [81] Chen X, Ma Y, Wang L, Yang Z, Jin S, Zhang L, et al. Nickel–aluminum intermetallic compounds as highly selective and stable catalysts for the hydrogenation of naphthalene to tetralin. *ChemCatChem*. 2015;7(6):978-983.
- [82] Belkacemi K, Boulmerka A, Arul J, Hamoudi S. Hydrogenation of Vegetable Oils With Minimum Trans and Saturated Fatty Acid Formation Over a New Generation of Pd-Catalyst. *Top Catal*. 2006;37:113-120.
- [83] Dayrit FM. Lauric acid is a medium-chain fatty acid, coconut oil is a medium-chain triglyceride. *Philipp J Sci*. 2014;143(2):157-166.
- [84] Hasibuan HA. Optimization condition of hydrogenation of palm kernel oil in trans fat free cocoa butter substitute production. *J Widyariset*. 2011;14(2):423-430.
- [85] Schmidt A, Schomäcker R. Partial hydrogenation of sunflower oil in a membrane reactor. *J Mol Catal A Chem*. 2007;271(1):192-199.
- [86] Dijkstra AJ. Revisiting the formation of trans isomers during partial hydrogenation of triacylglycerol oils. *Eur J Lipid Sci Technol*. 2006;108(3):249-264.
- [87] Dijkstra AJ, van Duijn G. Vegetable oils: oil production and processing. In: Caballero B, Finglas PM, Toldrá F, editors. *Encyclopedia of food and health* Academic Press; Oxford:2016. pp. 373-380.
- [88] Gamallo O, Machado H, Saldanha T. Modified fats by heterogeneous catalysis: changes on the way to green chemistry. *Adv J Food Sci Technol*. 2015;9(8):584-591.