REFERENCES

Abdelmonaem, M., Hatem, B., Imen, G., & Jeannette, B. H. (2010). Classification of EC 3.1.1.3 bacterial true lipases using phylogenetic analysis. African Journal of Biotechnology, 9(48), 8243–8247.

Agarwal, R. K., & Bosco, S. J. D. (2017). Extraction processes of virgin coconut oil. MOJ Food Processing & Technology, 4(2), 00087.Choudhury, P., & Bhunia, B. (2015). Industrial application of lipase: a review. *Biopharm J*, *1*(2), 41-47.

AOCS, Method Cd 1–25, Estimation of Iodine Value of Fats and Oils Wijs Method. Official Methods and Recommended Practices of the American Oil Chemist's Society, Champaign, IL 2009.

AOCS, Method Cd 3–25, Estimation of saponification value. Official Methods and Recommended Practices of the American Oil Chemist's Society, Champaign, IL 2004.

AOCS, method Ca 5a–40, Estimation of free fatty acid value. Official Methods and Recommended Practices of the American Oil Chemist's Society, Champaign, IL 1990.

Arlee, R., Suanphairoch, S., & Pakdeechanuan, P. (2013). Differences in chemical components and antioxidant-related substances in virgin coconut oil from coconut hybrids and their parents. International Food Research Journal, 20(5), 2103.

Ball, D. W., Hill, J. W., & Scott, R. J. (2012). The Basics of General, Organic, and Biological Chemistry. Saylor Academy. https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/The_Basics_of_GOB_Chemistry_(Ball_et_al.)

Barlina, R., & Torar, D. J. (2010). Pemanfaatan kstrak enzim kasar papain dan bromelin pada pembuatan minyak starter dan pengaruhnya pada mutu virgin coconut oil (VCO) selama penyimpanan. Buletin Palma, (38), 1-9

Bawalan, D. D., & Chapman, K. R. (2006). *Virgin Coconut Oil: Production manual for micro- and village-scale processing*. Bangkok, TH: FAO Regional Office for Asia and the Pacific.

Bazina, N., & He, J. (2018). Analysis of fatty acid profiles of free fatty acids generated in deep-frying process. Journal of Food Science and Technology, 55(8), 3085–3092.

Boateng, L., Ansong, R., Owusu, W., & Steiner-Asiedu, M. (2016). Coconut oil and palm oil's role in nutrition, Health and National Development: A Review. Ghana Medical Journal, 50(3), 189-196.

Bisswanger, H. (2014). Enzyme assays. Perspectives in Science, 1(1-6), 41–55. doi:10.1016/j.pisc.2014.02.005

Chan, S., Liu, S., Tanujaya, S., & Tan, S. (2016). Coconut handbook (1st ed.). Gul Lane: Tetra Pak South East Asia Pte Ltd.

Cstorer, A., & Ménard, R. (1994). Catalytic mechanism in papain family of cysteine peptidases. Proteolytic Enzymes: Serine and Cysteine Peptidases, 486–500.

Dumancas, G. G., Viswanath, L. C. K., de Leon, A. R., Ramasahayam, S., Maples, R., Koralege, R. H., & Castles, S. (2016). Health benefits of virgin coconut oil. Vegetable Oil: Properties, Uses and Benefits; NOVA: Burleigh, Australia, 161-194.

Dunford, N. T. (2016, January 01). Edible oil quality - Oklahoma State University. Retrieved June 25, 2022, from https://extension.okstate.edu/fact-sheets/edible-oil-quality.html

Fikri, F., & Kadir, S. (2020). Kuantitas dan Kualitas Virgin Coconut Oil dari Berbagai Konnsentrasi Bubur Buah Pepaya (Carica papaya L.). *AGROTEKBIS: E-JURNAL ILMU PERTANIAN*, *8*(5), 1160-1173.

Ghani, N. A. A., Channip, A.-A., Chok Hwee Hwa, P., Ja'afar, F., Yasin, H. M., & Usman, A. (2018). Physicochemical properties, antioxidant capacities, and metal contents of virgin coconut oil produced by wet and dry processes. Food Science & Nutrition, 6(5), 1298–1306.

Gharby, S., Harhar, H., Boulbaroud, S., Bouzoubaa, Z., Madani, N. E., Chafchaouni, I., & Charrouf, Z. (2014). The stability of vegetable oils (sunflower, rapeseed and palm) sold on the Moroccan market at high temperature. Int J Chem Biochem Sci, 5, 47-54.

Hanjaya, C., Pranata, F. S., & Swasti, Y. R. (2020). Quality of virgin coconut oil with addition of peppermint oil. agriTECH, 40(3), 215-222.

Hartati, Y., Priyanto, G. & Yuliati, K. (2018). Effect of Temperature and Heating Time on Chemical and Proximate Characteristics of Laksan Sauce as a Palembang Traditional Food, Pakistan Journal of Nutrition, 17(2), Universitas Sriwijaya, 64–70.

Haslaniza, H., Maskat, M. Y., Wan Aida, W. M., & Mamot, S. (2010). The effects of enzyme concentration, temperature and incubation time on nitrogen content and degree of hydrolysis of protein precipitate from cockle (Anadara granosa) meat wash water. International Food Research Journal, 17(1), 147-152.

Kim, J. Y., Yi, B., Lee, C., Gim, S.-Y., Kim, M.-J., & Lee, J. (2016). Effects of pH on the rates of lipid oxidation in oil–water system. Applied Biological Chemistry, 59(2), 157–161.

Lad, V. N., & Murthy, Z. V. P. (2016). Natural materials as additives in food emulsions. Novel Approaches of Nanotechnology in Food, 97–132.

List, G. R. (2016). Oilseed composition and modification for health and nutrition. In Functional dietary lipids (pp. 23-46). Woodhead Publishing.

Mahmud, A., Ernawati, & Asmiati. (2019). Rancidity of Traditional Coconut Oil: Microbial Contaminant and Free Fatty Acid Content. Ecology, Environment and Conservation Paper, 28(1).

Mansor, T. S. T., Che Man, Y. B., Shuhaimi, M., Abdul Afiq, M. J., & Ku Nurul, F. K. M. (2012). Physicochemical properties of virgin coconut oil extracted from different processing methods. International Food Research Journal, 19(3).

Mohammed, N. K., Samir, Z. T., Jassim, M. A., & Saeed, S. K. (2021). Effect of different extraction methods on physicochemical properties, antioxidant activity, of virgin coconut oil. Materials Today: Proceedings, 42, 2000–2005

Olmoss, A. (2012). PAPAIN, A PLANT ENZYME OF BIOLOGICAL IMPORTANCE: A. American Journal of Biochemistry and Biotechnology, 8(2), 99-104.

Parekh, V. J., Rathod, V. K., & Pandit, A. B. (2011). Substrate Hydrolysis: Methods, Mechanism, and Industrial Applications of Substrate Hydrolysis. Comprehensive Biotechnology, 103–118. doi:10.1016/b978-0-08-088504-9.00094-5

Pathirana, D. H., Yalegama, C., Arachige, D. J., & Senarathne, M. (2021). Physicochemical Properties of Virgin Coconut Oil Extracted from Different Coconut (Cocos nucifera L) Varieties. CORD, 37, 1-10.

Patil, U., & Benjakul, S. (2018). Coconut Milk and Coconut Oil: Their Manufacture Associated with Protein Functionality. Journal of Food Science, 83(8), 2019–2027.

Perdani, C. G., Pulungan, M. H., & Karimah, S. (2019). Pembuatan Virgin Coconut Oil (VCO) Kajian Suhu Inkubasi dan Konsentrasi Enzim Papain Kasar. Industria: Jurnal Teknologi dan Manajemen Agroindustri, 8(3), 238-246.

Pramitha, D. A. I., & Juliadi, D. (2018). Pengaruh suhu terhadap bilangan peroksida dan asam lemak bebas pada VCO (Virgin Coconut oil) hasil fermentasi alami. Cakra Kimia (Indonesian E-Journal of Applied Chemistry), 27(2), 149-154.

Pramitha, D. A. I., & Karta, I. W. (2021). Analysis of Fatty Acids in Virgin Coconut Oil Frying at Various Temperatures. JST (Jurnal Sains dan Teknologi), 10(1), 104-111.

Robinson, P. K. (2015). Enzymes: principles and biotechnological applications. Essays In Biochemistry, 59(0), 1–41.

Rohyami, Y., Hidayat, H., Wijaya, A. R., & Fatimah, I. (2022). Papain Enzyme Assisted Extraction of Virgin Coconut Oil as Candidate In-House Reference Material. Processes, 10(2), 315.

Silalahi, J. (2020). Nutritional values and health protective properties of coconut oil. Indonesian Journal of Pharmaceutical and Clinical Research, 3(2), 1-12.

Singh, P. K., Shrivastava, N., & Ojha, B. K. (2019). Enzymes in the Meat Industry. Enzymes in Food Biotechnology, 111–128.

Soo, P., Ali, Y., Lai, O., Kuan, C., Tong, T., Lee, Y., & Phuah, E. (2020). Enzymatic and Mechanical Extraction of Virgin Coconut Oil. European Journal of Lipid Science and Technology, 1900220.

Subajiny, S., Dilini, B., & Terrence, M. (2018). A comparative study on stability of different types of coconut (Cocos nucifera) oil against autoxidation and photo-oxidation. African Journal of Food Science, 12(9), 216–229.

Sundrasegaran, S., & Mah, S. H. (2020). Extraction Methods of Virgin Coconut Oil and Palm-pressed Mesocarp Oil and their Phytonutrients. *EFood*, *1*(6), 381-391.

Suryani, S., Sariani, S., Earnestly, F., Marganof, M., Rahmawati, R., Sevindrajuta, S., & Fudholi, A. (2020). A comparative study of virgin coconut oil, coconut oil and palm oil in terms of their active ingredients. Processes, 8(4), 402.

Verma, Ashish, S., & Anchal, S. (2014). Laboratory Manual for Biotechnology. S CHAND publishing.

Winarti, S., Jariyah, J., & Purnomo, Y. (2012). VCO (Virgine Coconut Oil) preparation by enzymatic Method Using Crude Papain. *Jurnal Teknologi Pertanian*, *8*(2).

Wong, Y., & Hartina, H. (2014). Virgin Coconut Oil Production by Centrifugation Method. Oriental Journal of Chemistry, 30(1), 237–245.

Yildiz, Y., Alfeen, M. A., & Yildiz, B. (2019). Determination of iodine value in triisocetyl citrate (Citmol-316) by United Satates Pharmacopeia Hanus Method. IJCPS, 72, 38-41.

Appendix 1. Normality Test of Moisture Content of Coconut Milk

Tests of Normality

	Concentration	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Moisture	0% - Control Negative	.283	9	.037	.761	9	.007
	0% - Control Positive	.186	9	.200[*]	.962	9	.818
	0.5%	.219	9	.200[*]	.877	9	.144
	1%	.262	9	.076	.856	9	.087

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Appendix 2. Kruskal-Wallis Test and Pairwise Comparison for Moisture Content of Coconut Milk

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Moisture is the same across categories of Concentration.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
0% - Control Positive-0% - Control Negative	7.667	4.965	1.544	.123	.735
0% - Control Positive-0.5%	-8.111	4.965	-1.634	.102	.614
0% - Control Positive-1%	-20.889	4.965	-4.208	.000	.000
0% - Control Negative-0.5%	-.444	4.965	-.090	.929	1.000
0% - Control Negative-1%	-13.222	4.965	-2.663	.008	.046
0.5%-1%	-12.778	4.965	-2.574	.010	.060

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.
Significance values have been adjusted by the Bonferroni correction for multiple tests.

Appendix 3. Normality Test of pH Value of Coconut Milk

Tests of Normality

	Concentration	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
pH	0% - Control Negative	.360	9	.001	.685	9	.001
	0% - Control Positive	.374	9	.001	.719	9	.002
	0.5%	.284	9	.036	.853	9	.080
	1%	.303	9	.017	.752	9	.006

a. Lilliefors Significance Correction

Appendix 4. Kruskal Wallis Test for pH Value of Coconut Milk

Tests of Between-Subjects Effects

Dependent Variable: Unstandardized Residual

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	92.202[a]	2	46.101	1.344	.280
Intercept	.000	1	.000	.000	1.000
Concentration	92.202	2	46.101	1.344	.280
Error	823.393	24	34.308		
Total	915.595	27			
Corrected Total	915.595	26			

a. R Squared = .101 (Adjusted R Squared = .026)

Appendix 5. Quade's Test of Moisture Content of Coconut Milk to FFA of Resulting VCO

Tests of Between-Subjects Effects

Dependent Variable: Unstandardized Residual

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	901.344[a]	2	450.672	15.902	.000
Intercept	.000	1	.000	.000	1.000
Concentration	901.344	2	450.672	15.902	.000
Error	680.193	24	28.341		
Total	1581.537	27			
Corrected Total	1581.537	26			

a. R Squared = .570 (Adjusted R Squared = .534)

Appendix 6. Quade's Test of pH Value of Coconut Milk to FFA of Resulting VCO

Tests of Between-Subjects Effects

Dependent Variable: Unstandardized Residual

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	153.457[a]	2	76.728	1.241	.307
Intercept	.000	1	.000	.000	1.000
Concentration	153.457	2	76.728	1.241	.307
Error	1483.401	24	61.808		
Total	1636.858	27			
Corrected Total	1636.858	26			

a. R Squared = .094 (Adjusted R Squared = .018)

Appendix 7. Quade's Test of Moisture Content of Coconut Milk to IV of Resulting VCO

Tests of Between-Subjects Effects

Dependent Variable: Unstandardized Residual

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	52.338[a]	2	26.169	.823	.451
Intercept	.000	1	.000	.000	1.000
Concentration	52.338	2	26.169	.823	.451
Error	763.059	24	31.794		
Total	815.398	27			
Corrected Total	815.398	26			

a. R Squared = .064 (Adjusted R Squared = -.014)

Appendix 8. Quade's Test of pH Value of Coconut Milk to IV of Resulting VCO

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of pH is the same across categories of Concentration.	Independent-Samples Kruskal-Wallis Test	.307	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Appendix 9. Normality Test of FFA for Control Negative and Control Positive

Tests of Normality

	Treatment	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
FFA	Control Negative	.176	9	.200*	.954	9	.737
	Control Positive	.317	9	.010	.873	9	.132

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Appendix 10. Mann-Whitney Test of FFA for Control Negative and Control Positive

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of FFA is the same across categories of Treatment.	Independent-Samples Mann-Whitney U Test	.000[1]	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

[1]Exact significance is displayed for this test.

Appendix 11. Normality Test of IV for Control Negative and Control Positive

Tests of Normality

	Treatment	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
IV	Control Negative	.261	9	.077	.889	9	.193
	Control Positive	.219	9	.200*	.851	9	.077

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Appendix 12. Mann-Whitney Test of IV for Control Negative and Control Positive

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of IV is the same across categories of Treatment.	Independent-Samples Mann-Whitney U Test	.863[1]	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

[1]Exact significance is displayed for this test.

Appendix 13. Normality Test of FFA For Different Papain Enzyme Concentrations

Tests of Normality

	Concentration	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
FFA	0%	.317	9	.010	.873	9	.132
	0.5%	.192	9	.200[*]	.926	9	.447
	1%	.324	9	.007	.841	9	.060

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Appendix 14. Kruskal-Wallis Test and Pairwise Comparison of FFA for Different Papain Enzyme Concentrations

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of FFA is the same across categories of Concentration.	Independent-Samples Kruskal-Wallis Test	.001	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
0%-0.5%	-2.167	3.679	-.589	.556	1.000
0%-1%	-13.167	3.679	-3.579	.000	.001
0.5%-1%	-11.000	3.679	-2.990	.003	.008

Appendix 15. Normality Test of IV for Different Papain Enzyme Concentrations

Tests of Normality

	Concentration	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
IV	0%	.219	9	.200[*]	.851	9	.077
	0.5%	.209	9	.200[*]	.909	9	.310
	1%	.344	9	.003	.786	9	.014

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Appendix 16. Kruskal-Wallis Test of IV for Different Papain Enzyme Concentrations

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of IV is the same across categories of Concentration.	Independent-Samples Kruskal-Wallis Test	.301	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Appendix 17. Turnitin Plagiarism Check