OXYGEN REMOVAL OPERATION IN PILOT SCALE PRODUCTION OF COCONUT WATER BASED ISOTONIC DRINK

By

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

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Low temperature deoxygenation process is investigated to acquire the critical parameters that can be used in the upscaling process. Process is expected to be able to produce coconut water with dissolved oxygen concentration below 5 ppm while maintaining the original organoleptic properties of coconut water. The research was done by first investigating and constructing a pilot-scale deoxygenator unit followed by experiments using coconut water. The experiments was performed to find the effect of residence time and sparging gas flow rate to level of dissolved oxygen in the product. The deoxygenator unit is designed to work with a packed column using 25.4 mm glass spheres as the packing material and a water pump to induce vacuum. The product will reach stability at 1.05 ppm after approximately 90 seconds. From the data, a mathematical model for scale-up of this particular deoxygenator design was also acquired in terms of oxygen removal ratio as a function of mass transfer coefficient, volume-to-surface area ratio, initial oxygen concentration, nitrogen flow rate, and pressure inside the tank.

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DEDICATION

I dedicate this thesis to my family, my advisor and co-advisor, and all my friends who have kept their faith in me during the nadir in my life within the period of this thesis research, and especially for those that kept on cheering me up, urging me to stay focused and move forward in life.

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