

**DEVELOPMENT AND TESTING OF UPSCALED SPRAY DISTILLATION  
FOR ETHANOL-WATER SEPARATION**

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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

### DEVELOPMENT AND TESTING OF UPSCALED SPRAY DISTILLATION FOR ETHANOL-WATER SEPARATION

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Spray distillation as the latest technique for the separation of ethanol and water has been demonstrated to function from preceding researches. With studies continuously made for the purpose of its optimization, the following research study aims to provide a functional design specification for a spray distillation unit which is able to handle high capacity operation. Not only a computer based simulation were done, but also various practical testing to obtain the most suitable design. The final upscaled unit has flexible design with a column diameter of 50 cm and height varying from 30, 60, to 90 cm. With operation running at 54 ml/min feed flow rate, heat and airflow were constantly provided inside the column. The research proved the Diffusion Model practically, along with its limitation. The result showed a higher productivity in terms of time efficiency and ethanol yield, though not purity. Therefore proving the overall limitation of spray distillation process that either targets high purity of high yield of ethanol, though not both parameters at the same time. This goes to then show that the process is not a stand-alone unit.

*Keywords: distillation, ethanol-water separation, separation technology, droplet evaporation*



## **DEDICATION**

This thesis is dedicated to anyone who finds  
love and excitement in engineering  
every single day.



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