

**PRELIMINARY STUDY OF BIOHYDROGEN PRODUCTION USING COW
MANURE AND TEMPEH WASTEWATER**

By

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12018005

BACHELOR'S DEGREE
in

CHEMICAL ENGINEERING – SUSTAINABLE ENERGY AND ENVIRONMENT
ENGINEERING CONCENTRATION

FACULTY OF LIFE SCIENCE AND TECHNOLOGY



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Revision after the Thesis Defence on 1th July 2024

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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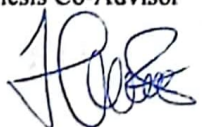
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ABSTRACT

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This study investigates two biohydrogen production scenarios using tempeh wastewater and cow manure: biogas conversion and dark fermentation. Process modifications, including pH adjustment to 6, temperature increase to 60°C, and chloroform pretreatment of cow manure, were implemented to enhance biohydrogen production. Comparative analysis revealed that while biogas conversion yielded a higher hydrogen volume (145.05 L H₂/kg substrate) with 82.73% energy efficiency, dark fermentation exhibited significantly higher productivity (143.96 L H₂/kg substrate/day) and superior energy efficiency (946.30%), despite a lower hydrogen yield (63.34 L H₂/kg substrate). The dark fermentation method demonstrated greater techno-economic feasibility due to its simpler process and lower energy input requirements, and the availability of suitable equipment for dark fermentation supports its practical implementation. This research advances sustainable energy solutions by enhancing biohydrogen production from agricultural waste, potentially reducing fossil fuel dependence and promoting a circular economy in the food processing and agriculture sectors.

Keywords: Biohydrogen, Biogas, Dark fermentation, Cow manure, Tempeh wastewater, Sustainable energy

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DEDICATION

I dedicate this work for my family, my advisor and co-advisor, the future of Indonesia.

ACKNOWLEDGEMENTS

First and foremost, I would like to sincerely thank God Almighty for His divine guidance and blessings, which have been a continual source of inspiration and motivation for me over the months that I have spent working diligently on my thesis. This research endeavour would not have been effectively finished if it weren't for His providence.

My sincere appreciation goes out to my thesis committee for their unwavering guidance, thoughtful support, and inspiration during this research project. Their combined expertise has been very helpful in managing this project's intricacy. I am particularly grateful to Sir Dr. Irvan S. Kartawiria, ST. MSc., my adviser, and Dr.-Ing. Evita H. Legowo, my co-advisor. Their invaluable knowledge, constructive inputs, and patient mentorship have greatly influenced the direction and quality of this thesis. Their support and belief in my ability has been a huge source of motivation.

My heartfelt gratitude also extends to my cherished family and friends. Their unwavering support, patience, and understanding have been the foundation of my resilience as I face the numerous challenges and responsibilities of my academic effort. Their unwavering support and belief in me offered the emotional strength and inspiration I needed to endure and accomplish.

Furthermore, I'd like to thank the Sustainable Energy and Environment department for creating an intellectually stimulating academic environment and offering critical resources for my research. The accommodating environment and availability of cutting-edge facilities have greatly aided the successful completion of this thesis.

Finally, I want to express my heartfelt gratitude to everyone who helped make this thesis a success. Each of you has played an important role in this amazing journey, for which I am eternally grateful.

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