

**INVESTIGATION OF THE EFFECT OF  
PREPROCESSING PARAMETERS ON THE EFFICACY  
OF CHLOROPHYLL REMOVAL FROM  
*MYCHONASTES HOMOSPAERA* FOR BIOFUEL  
PRODUCTION**

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Degree of Master of Science

Department of Chemical and Process Engineering

University of Moratuwa

Sri Lanka

November 2020

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Science in Chemical and Process Engineering

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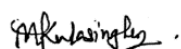
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November 2020

## DECLARATION

I declare that this is my own work, and this dissertation does not incorporate without acknowledgment any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and believe it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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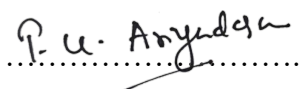
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The above candidate has carried out research for the Masters Dissertation under my supervision.



04/05/2021

Signature of the supervisor

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## **Abstract**

Microalgal lipids have become a potential candidate for biofuel production in recent years. High lipid accumulation and shorter doubling time enabling higher growth rate are foremost factors in microalgae to compete with first and second-generation biodiesel feedstocks. However, high levels of chlorophyll in feedstock limit its large-scale application. Chlorophyll makes oil more susceptible to photo-oxidation, decreases the storage stability, causes low-quality oil with a dull and dark color, and decreases the transesterification efficiency and combustion efficiency of biodiesel. This study aimed to develop a novel preprocessing method to identify the best solvent ratios, temperature, and reaction time for chlorophyll removal from the selected microalgae to synthesize high-quality biodiesel. *Mychonastes homosphaera* isolated from Beire Lake, Colombo, Sri Lanka with a doubling time, and the lipid accumulation of 2.89 d and 58 % (w/w) was selected for the study. The results indicated that the best solvent ratio (NaOH: ethanol), temperature, and reaction time were 7:3, 60 °C, and 90 min, respectively.

**Keywords** - biodiesel, biomass, chlorophyll, fatty acids, lipids, microalgae

## **DEDICATION**

**Dedicated to my mother, father and husband for their unconditional love, endless support, and encouragement**

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## **LIST OF ABBREVIATIONS**

| <b>Abbreviation</b> | <b>Description</b>             |
|---------------------|--------------------------------|
| BBM                 | Bold basal medium              |
| CN                  | Cetane number                  |
| CTAB                | Cetyltrimethylammonium bromide |
| ER                  | Endoplasmic reticulum          |
| FAME                | Fatty acid methyl esters       |
| FAS                 | Fatty acid synthesis           |
| FTL                 | Fischer-Tropsch synthesis      |
| GHG                 | Green House Gas                |
| GL                  | Glycerolipids                  |
| IV                  | Iodine value                   |
| LCSF                | Long chain saturation factor   |
| MUFA                | Monounsaturated fatty acids    |
| PL                  | Polar lipids                   |
| PUFA                | Polyunsaturated fatty acids    |
| SFA                 | Saturated fatty acids          |
| SMC                 | Sodium magnesium chlorophyllin |
| SV                  | Saponification value           |
| TAGs                | Triacylglycerides              |
| TL                  | Total lipids                   |
| USFA                | Unsaturated fatty acids        |