### UNIVERSITI TEKNOLOGI MARA

# CULTIVATION OF MICROALGAE, CHLORELLA SOROKINIANA IN REPLETE NITRATE CONCENTRATION FOR PRODUCTION OF LIPID

# NOOR AMELINA BINTI ABDUL RAHIM

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**Faculty of Chemical Engineering** 

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#### ABSTRACT

The impact of various nitrate replete concentration is investigated in terms of biomass yield, cell concentration and nitrate concentration. The media used in this study is Bold's basal Medium as the medium contain nitrate that act as nutrient and varied for the purpose of finding best concentration to produce high biomass yield. The chemical used for the medium is fairly easy to obtained thus used as the media. The nitrate concentration is varied as 30 g nitrate/L, 35 g nitrate/L, 40 g nitrate/L,45 g nitrate/L and 50 g nitrate/L concentration. The sample is culture in Schott bottle with light presents and aerated with air compressor. The results show that the best concentration gives highest optical density reading at day 9 with 2.100  $\pm$  0.070 and also shows the highest cell concentration with 703  $\pm$  29 x 106 cells/mL. The dry algae produced by 45 g nitrate/L concentration. As the biomass yield is already increased using 45 g nitrate/L concentration, other methods to increase lipid content can be pair with nitrate replete method and can be further studied in future.

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## CHAPTER 1 RESEARCH BACKGROUND

#### 1.1 BACKGROUND STUDY

In recent years, biofuels have been an alternative to gasoline or fossil fuels. For that purpose, lots of research have been done to provide the most suitable biofuels. Biofuels is divided into three generation. The first generation, are biofuels extracted from feedstocks that can also be consumed as human food; such as sugar, soybean seed and many more. The second-generation biofuels are made from non-human consumption such as agricultural waste, woody crop and forest materials. This generation also known as advanced biofuels as advanced conversion technology is used to extract the biofuels. The third and most promising generation will be third generation biofuels which are made from algae. Algae capable to produce an impressive diversity of fuels such as biodiesel, gasoline, butanol and even jet fuels. Furthermore, third generation biofuels have a higher yield than the previous generations. As third generation biofuel shows an interesting result, more research is done so that the third-generation biofuels can be produced in commercial scale. In this research, green microalgae *Chlorella Sorokiniana* was cultivated for biodiesel production that needs high biomass and lipid content.

Biodiesel is a common biofuel in Europe, which can be used in any diesel engine when mixed with mineral diesel. There are few types of biodiesel used in Europe such as B100 and B5. B100 is 100% pure biodiesel while B5 is 5% of biodiesel mixed with diesel. It is environmentally friendly than diesel as biodiesel reduced greenhouse emissions. Greenhouse emissions such as NOx and others have proven harmful to the environment. As current trend is moving toward sustainability, more environmental friendly alternatives such as biodiesel is preferred. Biodiesel has shown good results when used for vehicular transportation. In Europe, many companies such as Mercedes-Benz and Volkswagen have accepted a certain biodiesel for their engine. Biodiesel has also been used for railways usage. As it has many applications on various field, biodiesel production is a promising field to explore.