The Effect of Nitrogen, CO$_2$, and Salinity on Increasing Lipid Content in *Chlorella vulgaris* and *Botryococcus braunii* and The Role of *Chlorella vulgaris* and *Botryococcus braunii* in Decreasing The COD of PT. SIER Wastewater

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**ABSTRACT**

Energy demand nowadays has been increasing. This leads to the research and the development in sustainable energy resource, which one of them is biodiesel. One of the potential energy resource to be developed is microalgae. In this research, *Chlorella vulgaris* and *Botryococcus braunii* were used. The lipid content in those microalgae can be increased by giving stress to those microalgae. The media used was PT. SIER wastewater. This research was not only to determine the effect of nitrogen, CO$_2$ and salinity in increasing lipid of *Chlorella vulgaris* and *Botryococcus braunii*, but also to determine the decrease of COD of PT. SIER wastewater by those microalgae.

From the research, it’s determined that high nitrogen, CO$_2$ and salinity content led to high lipid content. The highest lipid reached by *Chlorella vulgaris* was 45% dry weight at KNO$_3$ 0,0003%, CO$_2$ 20% and 0,02 g NaCl additions, while the highest lipid reached by *Botryococcus braunii* was 55% dry weight at KNO$_3$ 0,0003%, CO$_2$ 20% and 0,02 g NaCl additions. For COD, it’s determined that high nitrogen content led to low COD. Also, high CO$_2$ and salinity content led to high COD. The lowest COD reached by *Chlorella vulgaris* was 101
mg/l O₂ at KNO₃ 0.0003%, CO₂ 17% and 0 g NaCl additions, while the lowest COD reached by *Botryococcus braunii* was 57 mg/l O₂, at KNO₃ 0.0003%, CO₂ 15% and 0 g NaCl additions.

**Keywords:** Biodiesel, *Chlorella vulgaris*, *Botryococcus braunii*, lipid, nitrogen, CO₂, salinity, COD, stress, PT. SIER wastewater