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Growth Performance Of fresh Water Microalgae Chlorella sp. Exposed to Carbon Dioxide

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Abstract : It is generally recognized, that algae could be an interesting option for reducing CO_2 emissions. Based on light and CO_2, algae can be used for the production various economically interesting products. Current algae cultivation techniques, however, still present a number of limitations. Efficient feeding of CO_2, especially on a large scale, is one of them. Current methods for CO_2 feeding to algae cultures rely on the sparging pure CO_2 or directly from flue gas. The limiting factor in this system is the solubility of CO_2 in water, which demands a considerable amount of energy for an effective gas to liquid transfer and leads to losses to the atmosphere. Due to the current ineffective methods for CO_2 introduction into algae ponds very large surface areas would be required for enough ponds to capture a considerable amount of the CO_2. The purpose of this study is to assess technology to capture carbon dioxide (CO_2) emissions generated by industry by utilizing of microalgae Chlorella sp. The microalgae were cultivated in a bioreactor culture pond raceway type. The result is expected to be useful in mitigating the effects of greenhouse gases in reducing the CO_2 emissions. The research activities include: (1) Characterization of boiler flue gas, (2) Operation of culture pond, (3) Sampling and sample analysis. The results of this study showed that the initial assessment absorption of the flue gas by microalgae using 1000 L raceway pond completed by heat exchanger were quite promising. The transfer of CO_2 into the pond culture system was run well. This identified from the success of cooling the boiler flue gas from the temperature of about 200 °C to below ambient temperature. Except for the temperature, the gas bubbles into the culture media were quite fine. Therefore, the contact between the gas and the media was well performed. The efficiency of CO_2 absorption by Chlorella sp reached 6.68 % with an average CO_2 loading of 0.29 g/L/day.

Keywords : Chlorella sp., CO2 emission, heat exchange, microalgae, milk industry, raceway pond
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