Thesis Title	Removal of Sulfurdioxide in Flue Gas by Biological Process
	Part 1 : Anaerobic
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Candidate	Miss. Piyachut Locharoenkul
Supervisor	Assoc. Prof. Dr. Virote Boonamnuayvitaya
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Abstract

This thesis is one part of the processes in removing sulfur dioxide from flue gas. The objective of this work is to study the removal of sodium hydrogen sulfite, the product from the process of sodium hydroxide absorbing sulfur dioxide by microorganism in anerobic condition. *Desulfovibrio vugaris* bacteria was used to convert sodium hydrogen sulfite to sodium hydrogen sulfide.

The appropriate conditions of temperature and pH for the growth of bacteria using substrate of sulfate were investigated. Temperatures were varied in the range of 30 to 42 degree celcius and pH from 5.8 to 8.8. It was found that the temperature at 37 degree celcius and pH 6.8 were the optimum conditions for the cell growth. After that, the study will find the quantity of sulfite in substrate formula 2 that will affect to the growth of bacteria.

Kinetic growth of bacteria was studied using four types of substrate. Substrate formula 1 contained the composition of sulfate, substrate formula 2 contained the composition of sulfite, substrate formula 3 contained both of sulfate and sulfite, and substrate formula 4 contained the same composition as of substrate formula 3 but with the absence of ferrous chloride.

The experimental results showed that *D. vulgaris* grew well in the substrate containing sulfate (substrate formula 1 and 3). The substrate containing sulfite seemed to inhibit the cell

growth when the concentration was more than 300 mg/l. Among the three substrates (substrate formula 2, 3, 4) we found that the rate of sulfite consumption in substrate formula 2 was the highest. The growth rate was also highest in substrate formula 2.

The growth models of *D. vulgaris* in each substrate with and without inhibition were determined as follows:

The growth model without inhibition when substrate formula 1 was used

$$\mu = \frac{0.27 * S}{573 + S}$$

The growth model with inhibition when substrate formula 2 was used.

$$\mu = \frac{0.2 * S}{(15.68 + S) * (1 + \frac{S}{620.12})}$$

The combined growth model with inhibition when substrate formula 3 was used.

$$\mu = \frac{0.27 * S}{573 + S} + \frac{0.2 * S}{(15.68 + S) * (1 + \frac{S}{620.12})}$$