

Varunyou Smerasuta 2006: Development of Relative Humidity Enhancer For Solid-state Fermentation. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Penjit Srinophakun, Ph.D. 91 pages.
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The purpose of this thesis is to develop the humidifier in order to apply in the solid-state fermentation. There are 3 types of humidifier. The water is sprayed from the top for the first type of humidifier while the water is sprayed from the bottom to the top for the second and the third type of humidifier. The third type of humidifier is designed to have three baffles inside in order to control the air direction (upward / downward) and increase the residence time of air flow in the humidifier. Note that the air is flown from the bottom to the top in all types of humidifier. After the test of the three humidifiers by flowing 34.62 cubic meter per hour-air flow rate (air velocity in pack-bed is 0.1 meter per second), the first type of humidifier can increase the relative humidity to 79% while the second type can increase to 85%. However the third type can increase the relative humidity up to 98.1% and maintain the relative humidity level above 90% at all time.

When testing all type of humidifiers in *Rhizopus oligosporus* fermentation, using the mixture of cassava waste and rice bran in the proportion of 70:30 at 55% initial moisture content, in the two layer pack-bed fermentor and ventilation after 12th hour of fermentation at 0.1 meter per second-air flow rate, the result of the third type of humidifier illustrated the best growth of *R. oligosporus*. At the fermentation time of 98 and 84 hours, *R. oligosporus* gave the highest glucosamine content in the upper and lower bed of 33.05 and 50.64 mg / g dry substrate respectively. After increase air flow rate in the pack-bed from 0.1 to 0.15 meter per second, the glucosamine content increased to 44.31 mg / g dry substrate in the upper bed and 49.46 mg / g dry substrate in the lower bed. Lastly, the third humidifier was tested with *Aspergillus oryzae* fermentation in one layer packed bed fermentor using the best condition of *R. oligosporus* cultivation, the results showed that the highest glucosamine content was 41.20 mg / g dry substrate at 108 hours of fermentation.

Student's signature

Thesis Advisor's signature

