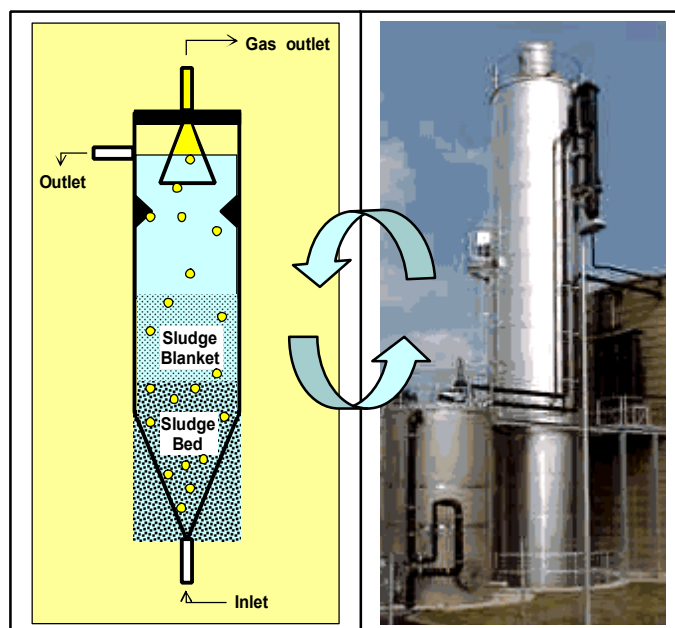


# START-UP AND OPERATION OF UPFLOW ANAEROBIC SLUDGE BLANKET REACTORS UNDER DIFFERENT WASTEWATER SOURCES AND RUNNING PARAMETERS

A MASTER THESIS



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## Abstract

*Two identical laboratory-scale UASB reactors were used in this study to investigate the effects of different wastewater sources on the start-up phase of UASB reactors, and to investigate the effects of changing wastewater sources and running parameters such as the organic loading rate, the hydraulic retention time, and the temperature on the operational performance of UASB reactors.*

*During the initial loading, the UASB reactor treating sucrose-containing wastewater needed a longer time to reach stable operation as compared to UASB reactor treating lactose-containing wastewater. For the initial organic loading rate of approximately  $0.5 \text{ kg COD / m}^3 \cdot \text{d}$ , reactor R1 needed 3 weeks to reach 80 % COD removal efficiency while reactor R2 needed 5 weeks.*

*Changing the operation of a UASB reactor from one wastewater type to another, especially wastewater with almost similar characteristics did not give any relevant impact. However, sucrose-degrading granular sludge of an UASB reactor needed time of acclimatization to lactose-containing wastewater to reach a stable level of operation, presumably due to the lack of  $\beta$ -galactosidase-producing bacteria, which was required for lactose degradation. Since the methanogenic bacteria are strictly anaerobic organism and live at an optimal temperature range of  $36^\circ\text{C}$  to  $40^\circ\text{C}$ , lower temperature and introduction of oxygen into the reactor system will decrease the performance of UASB reactor. The accumulation of fatty acids was also observed, indicating that there were unbalanced activities of acetogenic bacteria and methanogenic bacteria.*

**Keywords:** *UASB reactor, anaerobic wastewater treatment, organic loading rate, hydraulic loading rate, COD removal, anaerobic granular sludge*

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