

## Wastewater treatment in a hybrid barbotage reactor with continuous aeration

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### ABSTRACT

Barbotage reactors are the subject of many research papers and have gained prominence in industrial and bioengineering applications. Hybrid barbotage reactor solutions can be used for transport and treatment of small volumes of pretreated wastewater. The subjects of the present study were two hybrid barbotage reactors featuring wastewater circulation and aeration nozzles, which were packed with a moving bed to 20% of their volume. The nozzles were installed at two different heights of 34 and 84 cm. Based on the results, reactor oxygenation curves were prepared, the reactor's wastewater treatment efficiency was calculated, and the amount of energy used for wastewater treatment and transport was determined. The impact of hydraulic conditions on the reactor's contaminant removal efficiency was determined as well. The position of the nozzle affects the efficiency of contaminant removal in the reactor and mixture circulation velocity. The degree of reduction for biodegradable carbon compounds expressed as 5-day biochemical oxygen demand was approx. 49% (H34W20) and 32% (H84W20), while for chemical oxygen demand it was approx. 31% and 20%. The nozzle submergence affects gas holdup and oxygen conditions in the reactor. The gas holdup ratio for the H34W20 model was significantly higher compared to H84W20. The difference in the reactor's bubble column reactor zone was 46% while in the airlift reactor zone it was 31%.

*Keywords:* Wastewater treatment; Oxygenation; Barbotage reactor; Moving bed; Airlift reactor; Bubble column reactor

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