

## Abstract

The influent wastewater characteristics ordain treatment technology type and layout of unit operations. In the Middle East countries the sewage is characterized by high concentration of pollutants (suspended solids, COD etc.). In the particular case of Palestine, neither adequate nor reliable characterization of domestic wastewater is available. This work aims at wastewater characterization as a tool for conceptual assessment of the applicability of one stage Up-flow Anaerobic Sludge Blanket reactor (UASB) as a new anaerobic treatment technology of domestic wastewater in the West Bank.

Three locations in Ramallah / Al-Bireh district (central part of the West Bank) were chosen to investigate their wastewater flow characteristics. These locations were Ramallah and Al-Bireh cities representing municipal wastewater type and Al-Jalazoon refugee camp representing domestic sewage. Time-interval composite samples were taken from the three locations every two hours from 10 to 4 p.m., three days per week for three weeks. Wastewater quality was experimentally assessed in terms of major polluting parameters, fractionation and calculation of some ratios. To the best of my knowledge, not only a new sampling method is used in this research work, but also new parameters are measured for the first time in Palestine such as biodegradability, volatile fatty acids, carbohydrate and COD fractions. In addition, data available from previous studies (local and international) were reviewed, compared and presented. Finally, the results obtained from this study are evaluated and inserted in model calculations to verify the applicability of the one stage UASB reactor system in Palestine as an alternative of anaerobic wastewater treatment.

The results showed that the wastewater of the three locations could be classified as a strong domestic type due to high concentration of pollutants like COD, TKN, phosphorous, sulfate ammonia and solids. This can be attributed mainly to the low water consumption rates in the region due to the inadequate water resources and low living standards. In Ramallah City, the industrial wastewater discharges increased the

strength of wastewater compared to the other two locations. It is concluded that the applicability of the one stage UASB reactor system in Palestine is not expected to be the optimal choice for sewage treatment. This is not only due to the high strength of the wastewater in the region but also due to the low temperature of the wastewater mainly during the wintertime. The results inserted in the model calculation showed that HRT was more than two days. This means a huge reactor volume and an increase in investment cost. Alternative treatment technology is the two-stage system or the modified UASB digester system. Two Ph.D. students (Halalsheh in Jordan and Mahmoud in Palestine) are investigating the two alternatives and the results are quite positive and satisfactory.

Finally it is recommended to impose pretreatment requirements for heavy polluters especially industries before direct disposal into municipal sewer to guarantee the stability of domestic wastewater coming to the treatment plant. This highlights the urgent need for issuing guidelines and regulations as well as enforcing the implementation of environmental regulations. Also it is necessary for planners and designers to use the reliable and representative wastewater characteristics as basis for design and selection of treatment technologies, not importing generalized design criteria from foreign textbooks or neighbor countries.