

BIOLOGICALLY PRETREATED DAIRY WASTEWATER ULTRAFILTRATION

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Abstract

Since, dairy industry uses water almost in every processing steps, it produces a large amount of wastewater. This water contains many kinds of pollutants. The major ones are; organic matter, fats, suspended solids and nutrients. These different kind of substances and compounds result high organic content in dairy effluent. For a while, environmental agencies have been doing strict measures in order to reduce the emission of wastewater.

Our goal was to investigate a possible solution that may be effective in the treatment of dairy wastewater. A two-stage biological and physical process for the treatment of model dairy wastewater was investigated.

For biological treatment, both, aerobic and anaerobic treatments were carried out in biological fermentors. After that in the second stage, as a physical treatment, membrane separation was used. Aerobic biologically treatment and 10 kDa ultrafiltration (*UF*) membrane was found to be suitable for effective organic content decreasing. The samples were analyzed by pH, total dissolved solids (*TDS*), turbidity and chemical oxygen demand (*COD*) measurements.

It was found that the aerobic treatment was more effective compared to the anaerobic treatment. After 14 days biological treatment 66.8% and 12% *COD* decreasing were observed using aerobic and anaerobic conditions respectively.

The results of the one stage ultrafiltration tests showed that the *COD* membrane rejection was 60.2%. It increased to 92.9% when biological treatment was carried out before *UF*. Furthermore, it was 99% if it compared to the original wastewater organic content.

Membrane flux increased and the membrane total resistance values, reversible and irreversible resistances decreased with aerobic biological pretreatment: about 33% lower total resistance was observed. With biological pretreatment the distribution of resistances also changed.

Compared with the single *UF* and biological treatment process, this two-stage biological and *UF* treatment process had a higher efficiency and less membrane fouling.

Key words: ultrafiltration, biological treatment, dairy wastewater

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