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CLEANING OF CONCENTRATED WASTEWATER PRODUCTION OF LEMONIC ACID

In order to preserve the hydrosphere of our planet from the final pollution and depletion, it is necessary to move to the rational use of water resources. One of the most pressing problems in this regard is the protection of water resources from pollution by concentrated sewage generated by food processing enterprises.

Particular attention is drawn to the citric acid wastewater. Up to 600 m^3 of wastewater is formed upon receipt of acid per tonne of finished product, a considerable part of which is characterized by an extremely high level of pollutants, and treatment constructions at most plants are either completely absent or ineffective [1].

Most economically and environmentally rational is a comprehensive processing technology that includes methane fermentation as the main stage of purification and aerobic purification.

The use of methane fermentation as the main stage of reducing the content of pollutants is due to the high reliability of the purification processes, as well as the fact that the fermentation of the effluent does not require prior preparation (the addition of biogenic elements).

The methane fermentation of the effluents having contamination by chemical oxygen demand (COD) of 13,300 mg O_2/dm^3 was carried out at a temperature of 45 °C in continuous mode at dilution rates from 0,42 to $1{,}04 \cdot 10^{-2}$ h^{-1}. Studies have shown that the greatest depth of purification, biogas yield, and methane content were recorded at the lowest of the dilution rates selected ($0{,}42 \cdot 10^{-2}$ h^{-1}). Waters after methane fermentation have a concentration of contaminants by the COD that does not exceed 2000 mgO_2/dm^3, which makes it possible to apply traditional aerobic treatment methods for purification [2].

As the rate of dilution increases, the amount of contamination supplied to the methane tank increases and this forces the existing association of microorganisms to adapt to new conditions. It is known that the growth rate of methane-forming bacteria is lower than that of the other part of the symbiosis, so an increase in the duct may alter the ratio between the symbionts toward a decrease in methanogens. As a result of system overload, the effect

of inhibiting the culture with excess nutrients or metabolism products formed during the decomposition of the former may be observed. Obviously, in these circumstances, these exact factors direct the process toward worsening fermentation [3].

The use of anaerobic-aerobic technology for the treatment of concentrated effluents for the production of citric acid provides almost complete removal of contaminants. Thus, the depth of wastewater treatment was 98,8 %. The biogas yield, with methane content up to 80 %, reached 9 dm^3 with 1 dm^3 of loaded waste water into methane tank. Therefore, the proposed treatment technology is an effective way to solve the problem of treatment and disposal of concentrated wastewater.

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