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Influence Of pH on Biogas Production from Organic Waste at High Voltage Pulse Current

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Abstract: Providing the used biogas devices with regulators at the level of the anaerobic process demand, preventing anaerobiosis occurring in them, preventing the mixing of newly added biomass with organic fertilizer being processed, keeping the amount generated by organic waste sources in proportion to the amount of daily loading into the bioreactor, and the amount of biogas and fertilizer obtained information is given on the issues of ensuring that the quality does not decrease.

Key words: biogas, temperature, bioreactor, regulator, drum, biomass, biowaste.

Introduction. Decision PQ-3012 of the President of the Republic of Uzbekistan dated May 26, 2017 "On the program of further development of renewable energy in 2017-2021, measures to increase energy efficiency in economic sectors and social sphere" and May 5, 2019 "Renewable energy The practical and theoretical researches of recent times serve to a certain extent the scientific and technical implementation of the tasks in the legal documents [1,2,3,4] of the Law "ORQ-539" on the use of natural resources.

Methodology. At the experimental production plant[5,8], attention was paid to the composition of organic waste before loading it with impulse treatment and its acidic content, which is considered one of the main indicators. Small changes in the composition of organic matter when consumed by animals cause dramatic changes in bioreactors under moderately developed conditions. In experiments carried out in a laboratory device (Fig. 1), the successful effect of two types of CaSO4 (calcium sulfate) and CaCO3 (calcium sulfide) salts, which are completely harmless in Central Asian climatic conditions, are relatively high in the body part of plants given for animal consumption, is shown above [6 ,7]

Figure 1. General view of the laboratory device: 1 loading throat; 2nd technological unit; 3,4 -pulse current device charging and discharging;
5-sampling slot; 6-bioreactor; 7-temperature gauge; 8-gas head;
9- mixer; 10- control pipe; 11- organic fertilizer discharge pipe

It is necessary to take into account the fact that small amounts of drugs cause the anaerobic process to stop. In our initial experiments (from February 21 to May 5, 2021), we will conduct laboratory, experimental production in different temperature regimes and "Biogas and organic fertilizer production" at the Bukhara agrocluster livestock LLC in the Qarovulbazar district of the Bukhara region under the "TIQXMMI" MTU

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Bukhara Institute of Natural Resources Management. The disinfection carried out in the biomass barn (on May 24...26, 2022) in the barn, which was carried out to maintain the health of the cattle, showed that the organic waste collected from the barn fell into the bioreactor during the 17th...18th day of our experiments.
In these cases, it was possible to see that the high-voltage pulsed current had a positive effect and the time to return to moderate operation of the bioreactors was doubled (instead of 45...60 days). In order to prevent the above-mentioned situation, organic waste was not loaded into the biogas plant for two days during the disinfection conducted on August 18 of this year (Bukhara Agrocluster Livestock LLC) in order to study the use of pharmaceuticals and their effect on the anaerobic process. However, we have seen above that in the production process, along with studying the effects of harmful substances contained in livestock waste, it is necessary to pay great attention to the amount of pN (degradation of organic waste). It is known that the change of pN causes the increase of volatile fatty acids contained in organic waste. In addition, the amount of Na2CO3 (sodium carbonate) and MgCO3 (magnesium carbonate) taxic salts, which are organic waste organically related to pN, have a negative effect on the anaerobic process, taking into account that their reaction during the anaerobic process has a negative effect on the development of methanogens in the production of the pilot plant. experiments were carried out on the device and the results were compared.
Organic wastes brought from farms with similar methods of feeding organic waste, but different storage methods, were pre-prepared in an experimental bioreactor at the level of anaerobic demand and loaded into a pulse treatment device.
The values obtained as a result of studies in experimental production devices are presented in the form of a graph in Figure 2 for comparison with the results obtained in a laboratory device. In this case, the amount of biogas obtained from the experimental device was analyzed in the case of constant high-voltage impulse current amount at variable value of rN

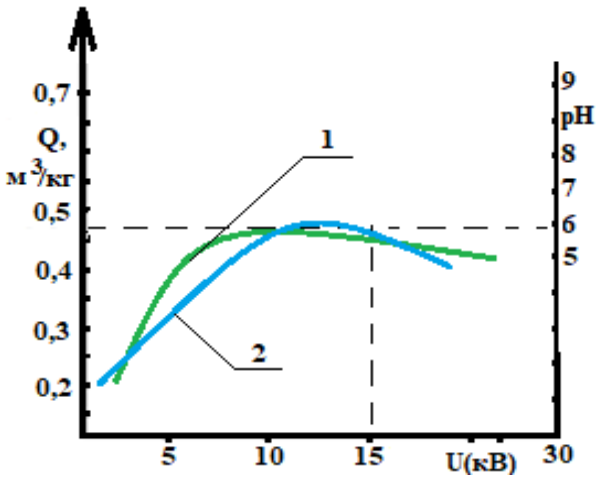

Figure 2. Dependence of the amount of pulsed current on the amount of biogas in the case of constant voltage (15 kV) and current strength of 15 ma in relation to rN: curve 1 - laboratory device; Curve 2 – experiment in production device

From Figure 1, it can be concluded that the content of agricultural wastes loaded into bioreactors, as the conditions and duration of their retention time lead to an increase in the amount of pN, and it can be seen that the organic waste is aged to a certain extent and does not have a significant negative effect on the anaerobic process. In this case, all parameters of the laboratory device were preserved in the experimental production device.
Summary. It was observed that the amount of biogas extracted from the useful volume of the bioreactor at different values of the pulsed current U (kV) in the experimental production device corresponded to the state of rN values of 6 ... 6.9. In addition to these, the equation that allows determining the volume change of the elemental substance being digested in the anaerobic process at the rate of biogas release from organic waste:

$$V_{эм} = V_{эмо} - 2\int_{\tau_0}^{\tau_{охир}} \varepsilon_2(\tau)\left[1 - e^{-\alpha_3(\tau_{охир} - \tau)}\right]d\tau \qquad (1)$$

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It becomes possible to obtain the solution of (1) in a practical comparison. t_?t_limits of the last integers, a_3 - the coefficient that takes into account the composition of the organic waste being treated; e_2 is the rate of evaporation of elements in the substance.

The analysis of the experiments carried out in the pilot plant shows that the initial temperature and pH of the organic matter introduced into the anaerobic process have a positive effect on the flow in the bioreactor. It can be seen that the amount of biogas obtained from 1 kg of organic waste increases by 15 ... 18 % in general. In addition, the reduction of the processing time of the liquid substance in the organic waste during anaerobic processing leads to a relative increase in the amount of biogas obtained.

Literature

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