CONDITIONING AND UTILIZATION OF CO_2 FROM FERMENTATION INDUSTRIES FOR THE CULTIVATION OF MICROALGAE

Dr. V. Covaliov, Dr. O. Covaliova

Moldova State University, Research Center of Applied and Ecological Chemistry, Chisinau, Moldova

Carbon dioxide emissions are known to be among the main sources of climatic changes on Earth. CO_2 emissions from the fermentation processes are not considered as important atmospheric pollutants, however, its high emitted contents become more obvious. Meanwhile, carbon dioxide may become an useful product in many spheres of economy.

Fermentation processes, as well as the systems of anaerobic biomass digestion for biogas production are the main emission sources of carbon dioxide. Biogas emissions contain up to 20-50% CO_2. Its presence in the biogas composition reduces its caloricity in the production of heat and electric energy. The annual CO_2 emissions from the wine-producing sector in Moldova is responsible for over 500 bln. m^3 emissions. This amount includes the carbonic acid emissions from bioethanol production for motor transport.

At the same time, CO_2 can be utilized in the production of liquid or dry carbonic acid or fertilizing mixtures, or other scopes. Still, the share of utilized gas does not exceed 2-3% of the overall produced amount.

There are also non-traditional utilization ways of carbon dioxide, among them year-round cultivation of microalgae for growing of protein biomass. Under photo-synthetic conditions, protein contents in the micro-algae of spirulina type (*Spirulina platensis*) and/or duckweed (*Lemna*), and/or chlorella (*Chlorella pyrenoidosa*) makes up to 70%, making them the valuable forage additive for animals [1]. For illumination, the energy-saving LED lamps with white flow with 1000-2000 Lumen can be used, or 5G LED GROW lamps with red light with the wavelength λ=660 nm and blue light with λ=470 nm. For the further improvements of this technology a series of innovative approaches have been proposed, including the gases purification and conditioning systems, integrated reactors and other solutions [2, 3], which contribute to the development and broader application of this technology.

This work is being implemented under the Bilateral Moldo-Romanian Research Project ASM-ANCSI, «Microalgal systems used for the reduction of CO_2 emissions from biomass fermentation» 16.80013.5807.11/Ro.

References:

1. Covaliova O., Covaliov V. Reduction of CO_2 emissions and its utilization from fermentation processes. Intellectus, Nr.2, 2016, pp. 109-116.
2. Patent MD nr.4130. Equipment for biogas purification / Covaliov V., Covaliova O., Ungureanu D., Nenno V. / Publ. BOPI 10/2011.
3. Patent MD nr.4418. Integrated equipment for the selective removal of CO_2 from biogas and microalgae cultivation / Covaliova O., Covaliov V., Morari Iu., Timofte N. / Publ. BOPI, 5/2016.