



## Cold UV sterilization or how to reduce expenses

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Very often by production of this or that food product the producer faces a problem of microbiological infection of initial raw materials. As a rule, this problem easily and quickly is solved thermal treatment. For what sub-standard raw materials are placed in special sterilizers or pasteurizers and make his heating to temperature, necessary for destruction of microorganisms. It would seem, the problem is solved. Besides that the method of thermal treatment is known more than 100 years. However, at thermal treatment of raw materials or a ready-made product we face big expenses of thermal energy. This energy goes not only for process of heating of a product up to the temperature of pasteurization or sterilization, but also for process of maintenance of the corresponding temperature for several tens minutes, i.e. throughout time, providing necessary efficiency of disinfecting. By drawing up thermal balance of technological process it is also necessary to consider also expenses of thermal energy which is spent for cooling of a heated product to room temperature, i.e. up to the temperature at which packing of a ready-made product is carried out. All this leads to the fact that costs of process of thermal disinfecting of production make hundreds and thousands of kW · h. Therefore now search of the most economic, but not less effective methods of disinfecting is conducted.

Methods which are based on impact on the disinfected product of short-wave ultra-violet (UV) radiation and ozone concern to one of such effective and nameny expensive methods of disinfecting. UV radiation, also as well as ozone possess a pronounced bactericidal factor. Under the influence of UV beams there is a destruction of bacteria and viruses, including: colibacillus, salmonella, staphylococcus and other causative agents of dangerous intestinal diseases. Ozone, having high oxidizing ability, effectively influences mold mushrooms and yeast. Combined use of UV radiation and ozone provides mutual strengthening of the disinfecting factors. So, ozone, getting deep into the disinfected product, it is capable to provide the necessary level of disinfecting in those places where UV radiation doesn't get. And radiation provides to UV effective destruction being on a surface of the disinfected product of microorganisms (i.e. provides the disinfecting effect in the most infected places).

Without stopping on the detailed analysis of the main merits and demerits of the offered disinfecting method, we will note the following.

### **Advantages:**

- ✓ *possibility of disinfecting of dry foodstuff without heating and with an atmospheric pressure;*
- ✓ *possibility of achievement of high efficiency of disinfecting which is defined by the power of the established bactericidal UV lamps, amount of the produced ozone and processing time;*



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- ✓ increase in time of processing allows to improve considerably sanitary indicators of the disinfected production and doesn't change her flavoring and nutritious indicators;
- ✓ the profitability, *specific expenses of electric energy* necessary for implementation of disinfecting make  $0.01 \text{ kW} \cdot \text{h/kg}$  **that in tens and hundreds of times less**, than at application of thermal methods of disinfecting.

### **Disadvantages:**

- ✓ the disinfected production has to have low humidity and the small sizes;
- ✓ big difficulties in achievement high (more than 65%) efficiency of disinfecting of fine fractions (for example, pepper of a fine crushing, cocoa powder, flour, etc.);
- ✓ difficulties in disinfecting of "live" products (for example, grains of the sprouted wheat, etc.).

*Analyzing above-mentioned merits and demerits of a method of "cold UV sterilization" it is possible to draw a conclusion on rather high efficiency of application of this method for disinfecting of spices of a coarse and average grinding, grain, dried fruits, the dried-up seafood, compound feeds and other dry products.*



It is necessary for providing rather high extent of disinfecting that the disinfected production was in the closed space, contained few moisture and its dimensions would allow to make with it some mechanical manipulations (for example, hashing). All these conditions are implemented in drum UV sterilizers of the OBP09SN series developed by «KHARKIV ELECTROTECHNICAL COMPANY».

Drum UV sterilizers of the OBP09SN series are intended for disinfecting ("cold UV sterilization") of spices (coarse grinding), grain, dried fruits, the dried-up seafood, compound feeds and other dry products. Disinfecting is made at complex influence of UV radiation and ozone. Efficiency of disinfecting depends on the size of the disinfected product and makes: on the bacteria of groups of colibacillus (BGC) – 90 – 99%, on MAFAM – 95 – 99%, on a mold and mushrooms – 75 – 95%.

Drum UV sterilizers consist of the cylindrical camera of disinfecting, a frame, the control panel, the electric drive, two hatches for loading and unloading of production, a tray for unloading of the processed production, a source of the ultra-violet radiation (irradiator), an ozonizer. The case of the camera of disinfecting and a tray are made of qualitative stainless steel. Design of the camera of disinfecting allows to make her sink hot water.



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The disinfected production via the open hatch is loaded in the disinfecting camera where it is irradiated with short-wave UV radiation and processed by ozone. For implementation of uniformity of processing production smoothly mixes up in the rotating disinfecting camera. Through the period set by the operator the disinfected production is unloaded in a reception tray.

In a UV sterilizer the low-speed reverse operating mode of the camera of disinfecting is applied that allows to exclude or reduce mechanical damages of the processed production to a minimum. For ensuring convenience of loading and unloading of production the camera of disinfecting is equipped with two hatches – the main and auxiliary. Installation is equipped with modern energy saving UV lamps with the raised operation resource. Control of work of a UV sterilizer is exercised in the semi-automatic mode.

### **Main advantages of drum UV sterilizers of OBP09SN:**

- ✓ possibility of disinfecting of dry foodstuff at the room temperature and atmospheric pressure;
- ✓ profitability, specific energy consumption make 0.01 – 0.02 kW · h/kg;
- ✓ a UV sterilizer is equipped with special energy saving UV lamps with the increased operation term (13 – 16 thousand hours);
- ✓ simplicity and reliability of operation.

Application of drum UV sterilizers provides rather high efficiency of disinfecting (pasteurization) of dry large and average disperse products **without heating and with an atmospheric pressure**. At the same time specific energy consumption makes 0.01 – 0.02 kW · h/kg that **in tens and hundreds of times less**, than at application of thermal methods of disinfecting.

Efficiency of application of drum UV sterilizers is proved by their long-term work at the enterprises of the food industry. So, by means of drum UV sterilizers of the OBP09SN series the dried seafood known under «Marine» trademark, dried spices and herbs, grain and other production of food appointment are disinfected.



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