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RECENT SCIENTIFIC INVESTIGATION



OSLO, NORWAY

11-12.06.2021



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NATURE MANAGEMENT, RESOURCE SAVING AND ECOLOGY

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THE PROSPECT OF USING BACTERICIDAL FILLERS IN COATINGS TO PREVENT CROSS-CONTAMINATION WITH E. COLI

It is a well-known fact that *Escherichia coli* is the most frequent causative agent of upper respiratory and ENT diseases, infectious complications in cancer patients, blood poisoning, and gynecological diseases. *Escherichia coli* (*E. coli*) is a bacterium usually found in the lower intestines of warm-blooded organisms. Most strains of *E. coli* are harmless, but some strains can cause severe food poisoning. *E. coli* is transmitted to humans mainly by eating contaminated food, such as raw or undercooked ground meat products and raw milk.

There is also cross-contamination during cooking (through beef and other meat products, contaminated work surfaces, and kitchen utensils). [1] Fecal

contamination of water, from food products, causes environmental contamination. The prospect of using bactericidal agents to inhibit the growth and reproduction of bacteria has long been known. At the same time, the use of materials that can be used as a coating of work surfaces by their mechanical and bactericidal properties, as well as which are characterized by chemical stability, will reduce the entry of *Escherichia coli* culture in the wastewater when washing work surfaces. In this work we used testing materials based on glass enamel compositions with different bactericidal fillers and different content of their bactericidal properties by the test object - the pure culture of *Escherichia coli* strain B (hereinafter - *E. coli*). Glass composite materials by their characteristics (mechanical, physical and chemical, etc.) in our opinion are more promising as a coating for working surfaces. Evaluation of the bactericidal properties of the studied samples was carried out by two methods: disk diffusion and biochemical.

– diffusion method, based on the diffusion of ions of the material of the samples under study into a dense nutrient medium and the effect on the growth of the test object in its zone of action;

– biochemical method based on determining the enzymatic activity of the test object in interaction with the test samples.

The results of the study of the biocidal properties of glass composite samples using the diffusion method revealed the presence of pronounced growth retardation zones up to 2.5 mm (Fig. 1 a), except for the control sample (without bactericidal filler) - overgrowth with biomass was observed (Fig. 1 b).

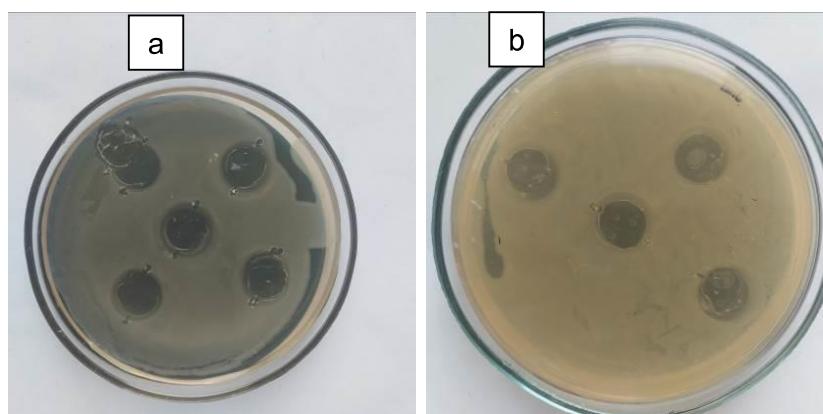


Fig. 1 **Contact of samples with *Escherichia coli* biomass**

Biochemical measurement of *E. coli*. DGA was performed from 6:00 and 24 hours of growth (culturing). The 6:00 growth (exponential growth phase) was the period characterized by the maximum rate of multiplication of the *E. coli* population and an increase in the number of cells in geometric progression and, consequently, an increase in DGA. This was observed in the culture control, that is, in an *E. Coli*, which was not in contact with the studied samples. But in the later variants, when *E. coli* was in contact with the samples, inhibition of bacterial growth was observed, which was expressed in a decrease in their DGA relative to the DGA of the bacteria in the control. This can be explained by the bactericidal (bacteriostatic) action of the studied samples. Thus we can conclude that further research in the direction of creating materials with bactericidal properties for the working surfaces of the canteen is promising. Obtaining and introducing such materials will reduce the incidence of *E. coli* getting into the wastewater along with flushing surfaces, as well as reduce the percentage of infection and transmission of the disease.

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