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**INFLUENCE OF AN ALUMINUM-SILICON  
SORBENT  
ON THE VIABILITY OF LACTOBACILLUS  
AT DIFFERENT pH VALUES OF THE  
INCUBATION MEDIUM**

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# Motivation and Aim

- Comprehensive health measures are applied not only to patients, but also to healthy people. One of such measures is the use of sorbents and sorption technology of enterosorption [1-3].
- The purpose of this work is to study the effect of a new porous aluminum-silicon sorbent TAGA in powder form, on the cells of lactobacilli when they come into contact with the sorbent in an aqueous solution at different values of the hydrogen pH index.

## Results

**The study of physical, chemical and technological properties** of a porous aluminum-silicon sorbent was carried out using generally accepted methods for determining the porous structure and adsorption activity. It is shown in Table 1.

Table 1.

**Physical-chemical and technological properties of aluminum-silicon sorbent TAGA with a particle size of 0.04mm.**

Sample	S, m <sup>2</sup> /g	V cm <sup>3</sup> /g	P, g/cm <sup>3</sup>	pH	MB mg/g	F g/s,
Aluminum-silicon sorbent (TAGA)	100±0,01	0,18	1,1	7,8± 0,02	13,0 ± 0,02	9,0 ± 0,5
The initial carrier -thermally activated aluminum hydroxide	100± 0,01	0,18	1,06	8,8± 0,02	3,9 ± 0,02	0,8 ± 0,1

Key: S - specific surface, m<sup>2</sup>/g; V - total pore volume, cm<sup>3</sup>/g; P - bulk density, g/cm<sup>3</sup>; pH -hydrogen index of water extract from the sorbent; MB - sorption of methylene blue dye, mg/g; F - powder flowability, g/s

**The biological properties** of the sorbent were evaluated by the viability of lactobacilli cells upon contact with the sorbent in an aqueous solution under conditions close to the pH value of the physiological values of the gastrointestinal tract (pH: 1.2, 7.0, 8.0). In the prepared cell suspension, to obtain a composition with the sorbent, the cell concentration was  $5.0 \times 10^8$  CFU/ml. Table 2 presents the obtained data on the ‘swab’ of lactobacilli from the composition of the sorbent composition with lactobacilli during stirring (exposure) in a shaker for 10, 20 and 30 minutes. Data on the ‘swab’ was expressed in titers of lactobacilli (CFU/ml). As a control, the same solutions were used, but without the added sorbent.

# Results (continue)

**Table 2.**  
Lactobacillus cell concentration with the aluminum-silicon sorbent in 'swabs' based on time of joint exposure in a suspension medium at pH 7.0, 8.0 and 1.2.

№ p/p	Sample	Exposure time (min) / Lactobacillus titer (CFU/ml)		
		10	20	30
1	<b>Sorbent</b> <b>pH 7</b>	$2,7 \times 10^5$	$1,4 \times 10^5$	$1,1 \times 10^5$
2	-<<-	$1,1 \times 10^5$	$1,2 \times 10^5$	$1,3 \times 10^5$
3	-<<-	$1,5 \times 10^5$	$1,2 \times 10^5$	$8,0 \times 10^4$
4	<b>Control</b> <b>pH 7</b>	$4,0 \times 10^7$	$5,0 \times 10^7$	$4,0 \times 10^7$
5	-<<-	$4,0 \times 10^7$	$3,0 \times 10^7$	$3,0 \times 10^7$
6	<b>Sorbent</b> <b>pH 8</b>	$1,4 \times 10^2$	$1,3 \times 10^2$	70
7	-<<-	$3,8 \times 10^2$	$3,5 \times 10^2$	$1,3 \times 10^2$
8	-<<-	$2,9 \times 10^2$	$2,7 \times 10^3$	60
9	<b>Control</b> <b>pH 8</b>	-	$8,0 \times 10^6$	$6,0 \times 10^6$
10	-<<-	-	$1,4 \times 10^7$	$9,0 \times 10^6$
11	<b>Sorbent</b> <b>pH 1,2</b>	20	0	0
12	-<<-	10	0	0
13	-<<-	100	10	0
14	<b>Control</b> <b>pH 1,2</b>	$3,1 \times 10^6$	$1,0 \times 10^6$	$9,0 \times 10^5$
15	-<<-	$1,6 \times 10^6$	$1,4 \times 10^6$	$1,1 \times 10^6$

Notes: the lactobacilli titer at the starting point of the experiment in samples 1, 6, 11 (0 is the exposure point) was:  $3.0 \times 10^5$  CFU/ml, (control sample № 4 -  $3.8 \times 10^3$  CFU/ml),  $2.4 \times 10^4$  CFU/ml (control sample № 7 - the number of cells within  $8.0 \times 10^6$  -  $1.4 \times 10^7$  CFU/ml),  $2.6 \times 10^3$ .

# Conclusion

The potential of using the porous space of the sorbent as a transporting container for delivering microorganisms to the zone of therapeutic action during enteral use with the simultaneous fulfillment of the functions of a detoxifier has been shown.

The values of the hydrogen index upon contact of the sorbent with water are within the normal physiological parameters of the body. With the external asymmetric shape of the sorbent particles, electrification phenomena was not observed, as evidenced by the high flowability index of the sorbent. This circumstance eliminates the need to use antifriction agents in the development of drugs for use. Assessment of the effect of the sorbent on the viability of lactobacilli cells under conditions close to physiological pH values showed that the least suitable was the acidic medium (pH 1.2).

## REFERENCES

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