

Antimicrobial activity of transcarpathian clinoptilolite modified with salts of transition metals

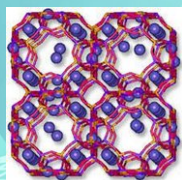


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The antimicrobial properties of highly dispersed (particle size $\leq 100 \mu\text{m}$) of Ukrainian transcarpathian clinoptilolite (CL) compositions with transition metal ions such as Mn^{2+} (Mn-CL), Cu^{2+} (Cu-CL) and Co^{2+} (Co-CL) were studied. The concentration of metal ions in the compositions: Mn^{2+} - 560 $\mu\text{g/g}$, Cu^{2+} - 670 $\mu\text{g/g}$, Co^{2+} - 1800 $\mu\text{g/g}$. The sorption of transition metals on clinoptilolite was carried out at the dynamic conditions from the weakly acidic, neutral and weakly alkaline solutions (Table).

Bacterial and yeast strains including *Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 25923, and *Candida albicans* ATCC 885-653 were used as indicator pathogens. Antibacterial activity was evaluated by incubation of indicator pathogens ($1-2 \times 10^5$ cells per 1 ml of solution) for 2 min in the presence of suitable compositions in concentrations 0.1, 0.5, and 1.0 mg/ml. In fact, CL has a very weak antimicrobial effect. Cu-CL in increasing concentrations delayed the growth of *S. aureus* from 50 to 35%, *E. coli* - from 17 to 3%, *C. albicans* - from 11 to 1%. Co-CL and Mn-CL had a stronger antimicrobial effect. In particular, at a maximum concentration (1.0 mg/ml), these compositions reduced the survival of *S. aureus* to 10-11%, *E. coli* - to 0.3-0.5%, *C. albicans* - 0.1-0.2% (Fig.). Although the action of these compositions is weaker than the action of Ag-CL that was described earlier [4], they can be considered as a basis for the development of antimicrobial drugs for the treatment of skin lesions, in particular, due to their lower cost.

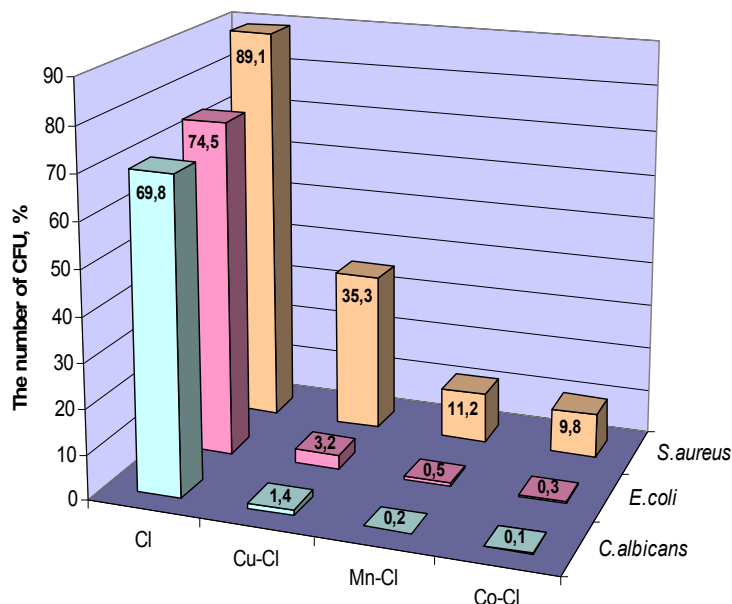


Fig. The antimicrobial properties of highly clinoptilolite compositions with transition metal ions

Table. The optimum pH values of solutions during the sorption of transition metals on clinoptilolite

Metal	pH	References
Cu(II)	7,1	1
Co(II)	7,0	2
Mn(II)	5,8	3
Ag(II)	8,0	4

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