

Mushrooms as sorbents of cadmium ions

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Abstract

It is known that fungal chitin exhibits high sorption properties with respect to heavy metal ions, while it is practically not absorbed in the human body, which makes it a promising sorbent. The aim of this work was to evaluate the sorption abilities of the mushrooms of *Agaricus bisporus* and *Russula atropurpurea* with respect to cadmium ions. The use of the potentiometric method for measuring the potential of the ion-selective electrode, which depends on the concentration of cadmium ions in solution, made it possible to register in detail in real time the kinetic curves of sorption of cadmium ions by mushrooms.

During the experiment, it was found that the kinetics of sorption of cadmium ions from a solution with initial concentrations $(0.2-2.0) \cdot 10^{-5}$ M by the preparations of fruit bodies of mushrooms *A. bisporus* and *R. atropurpurea* is well described by the pseudo-second order equation, according to which the limiting stage of the process is chemical interaction of sorbent and sorbate (1:1 ratio). At relatively low initial concentrations of cadmium ions in solution $((0.2-0.6) \cdot 10^{-5}$ M), the sorption rate was 1.5-2.5 times higher for *R. atropurpurea* compared to *A. bisporus*. At higher concentrations of cadmium ions in solution $((0.8-2.0) \cdot 10^{-5}$ M) the speed and capacity of sorption were very close for different types of mushrooms. Moreover, the rate of sorption by mushrooms exceeds 5-10 times the rate of sorption of activated carbon and micromycetes of the genus *Fusarium*.

It was revealed that the sorption isotherm of cadmium ions by mushrooms is well described by the Dubinin-Radushkevich equation, according to which *R. atropurpurea* is characterized by the highest sorption compared to *A. bisporus*. Thus, *R. atropurpurea* has the highest sorption activity with respect to cadmium ions.

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