EVALUATION OF INFLUENCE OF ZINC AND COPPER NANOAQUACITRATE ON GROWTH DYNAMICS OF YOUNG CYPRINUS CARPIO L.

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The general regularities of zinc and copper nanoaquacitrate influence on the change of mass and growth rate of young C. carpio L has been established. The application of specific growth rate indicator in ecotoxicological monitoring of nanomaterials has been justified. The possibility of nanoaquacitrates usage for practical purposes has been assessed.

Nanoaquacitrate, hydroecosystems, toxicity, fish, specific growth rate.

Nanotechnology is applied in biology, medicine, ecology. More than 2000 kinds of nanomaterials are industrially produced in the world. Nanoaquacitrates of transition metals obtained through erosion and explosive nanotechnology has become widespread in Ukraine. Fish are the most convenient test-object of hydro monitoring.

Fish as higher order consuments and sufficiently long-lived organisms have the highest capacity for bioaccumulation of xenobiotics that allows registering the effects and consequences caused by short or long-term chronic exposure to adverse environmental conditions. Thus, changes in fish is an integral factor of environmental and biosafety compounds. The aim of research - analysis the effect of different concentrations of copper and zinc nanoaquacitrates to changes of weight and specific growth rate in larvae in *C. carpio L*.

Fortnightly C. carpio were collected for the experiment. The experimental group of fish kept in an environment formed by adding nanoaquacitrates of copper and zinc at concentrations that have antibacterial properties, and at the same time did not cause lethal effects (0.01 to 0.1 mg / dm^3), 2 aquariums were used as control - variant without compounds. Conditions of control organisms did not differ from experimental.

Growth fish at concentrations of 0.01, 0.05 and 0.1 mg/dm^3 copper nanoaquacitrates was almost the same that the body weight of fish in the control aquarium.

Significant changes in the dynamics of growth were recorded only in the variant at concentration nanoaquacitrates copper of 0.1 mg/dm^3 during the fourth week of the

experiment, although by the end of the experiment uniform trend of fish weight was remains.

Similar values were recorded for the actions of zinc nanoaquacitrates. In all experimental variants fish weight gradually decreased relative to controls after the third week. At the same time, tendency to body weight grow were marked in each variant.

Therefore, determine the toxicity nanoaquacitrtates to the changes of fish weight body is impossible because growth dynamics were observed throughout the experiment

Unlike graphics of weight change at the impact of copper nanoaquacitrates, specific growth rate is characterized a significant amplitude fluctuations.

During the first two weeks of the experiment the specific growth rate increases rapidly in control variants and in aquariums with concentrations of 0.01 and 0.05 mg / dm^3 copper nanoaquacitrtates, during the third week specific growth fell and again increased during the last week.

The value of specific growth rate in the presence of 0.01 mg /dm^3 zinc concentrations and in the control variant are oscillatory, similar to the graphs obtained by the action copper nanoaquacitrates.

Meanwhile, there was a sharp deviation of values in aquariums with 0.05 mg /dm^3 and 0.1 mg / dm^3 of zinc nanoaquacitrates compared with a control variant. Permanent reduction of specific growth rate was points to presence of additional limiting factors besides deficits of food. Thus, the results testified to toxic effects of of 0.05 and 0.1 mg / dm^3 zinc nanoaquacitrates to young *C. carpio L*.

Conclusions. It was determined that the concentration of 0.01 mg / dm^3 copper and zinc nanoaquacitrtes did not have the toxic effect to *C. carpio*.

It was established that the change of body weight may not fully reflect all impact to the nanoaquacitrtes of transition metals in organisms fish

It was proven the value of the specific growth rate appropriate to use in ecotoxicological monitoring of nanomaterials.

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