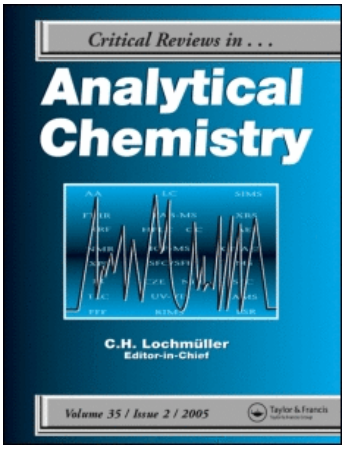

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INVESTIGATIONS OF EFFECTS OF HEAVY METALS ON CRUSTACEANS

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Heavy metals are naturally found in nature and they get into environment as pollutants too. Heavy metals, heaving got into water as pollutants, cause changes of water quality and in turn affect the quantitative and qualitative parameters of ecosystems.

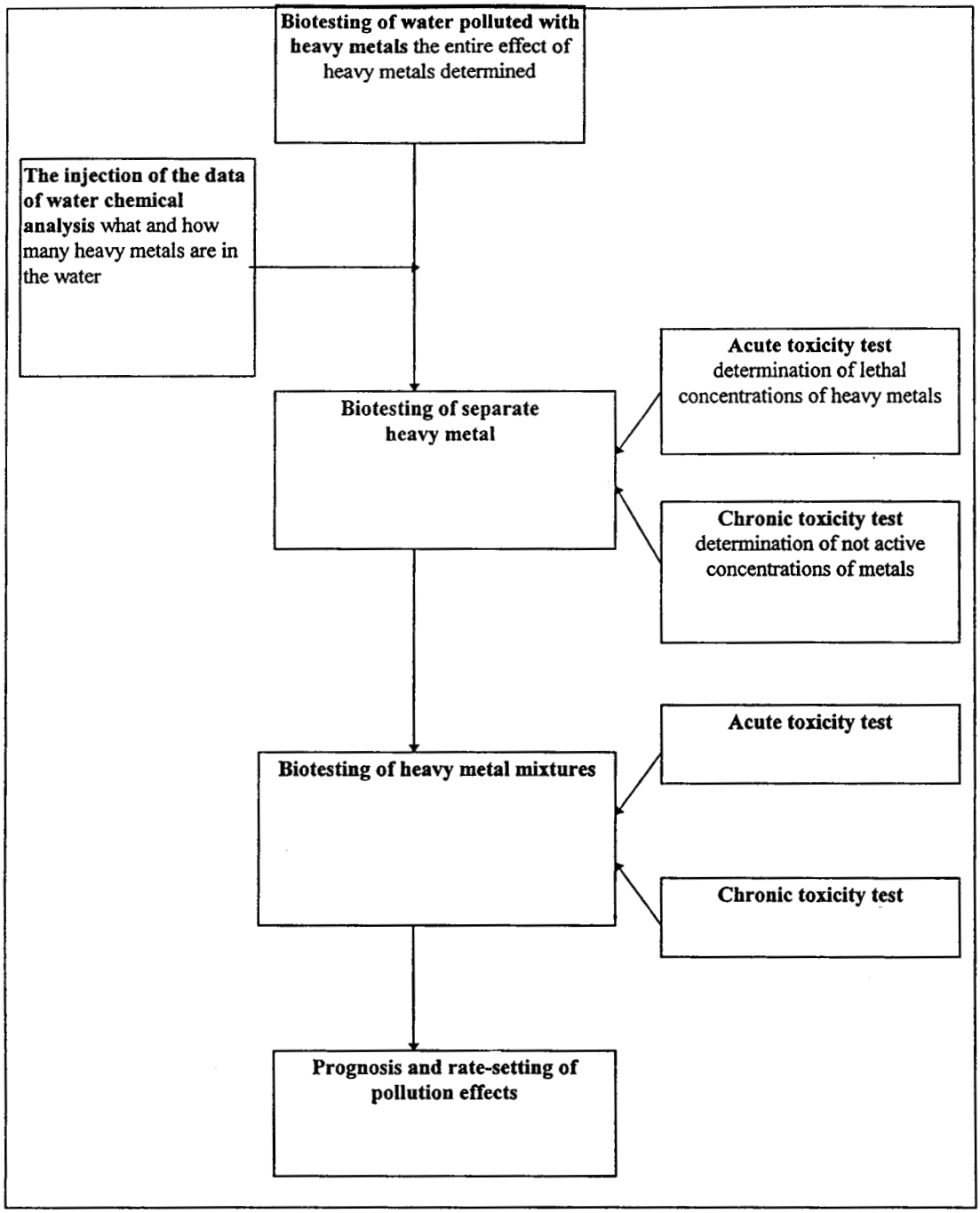
Alternations of the quality of water polluted with heavy metals can be measured with the help of chemical methods and the use of physical equipment. When parameters of water quality before appearance of the source of pollution are known it is possible to express quantitatively alternations of water quality - if concentration of heavy metals increased n% or alternated from n to m mg/l. But these alternations of water quality do not reflect the effect of heavy metals on members of water ecosystems and do not account for the mechanism of pollution affect. The direct effect of heavy metals can be estimated only in case of an accident or a criminal action. Then the concentration of heavy metals in a water body during a short period increases thousands of times and mass death of hydrobionts can be observed. By counting the dead animals and plants it is possible to estimate and calculate the damage made to nature. This method is used by Environmental Protection services.

The investigation of reactions of animals (crustaceans included), that are members of water ecosystems, to heavy metal pollution may reveal the degree and mechanisms of metal toxic effect. In our toxic investigations we used several species of crustaceans that differ greatly biologically. One of them was Daphnia magna (Cladocera), a representative of Branchiopoda, the other - crayfish Astacus astacus (Decapoda), a representative of Malacostraca. Daphnia is a small planctonic crustacean that has a short life cycle. Crayfish Astacus astacus is benthonic , the largest one in our freshwater bodies.

The methods of bioindication and biotesting are used in defining the effects of heavy metals pollution. Bioindication shows the alternation of the composition of water ecosystems under the effect of pollution. Daphnia are used as bioindicators, the investigation of plankton samples do not need much expenditure and time. The question of the use of crayfish A. astacus for bioindication is complicated. For a long time and at present native crayfish A. astacus was considered to be the indicator of pure water in Lithuanian water bodies. The period of crayfish extinction in lakes and rivers coincided with wide and usually not rational use of chemicals in agriculture and with the increase of industrial pollution. In recent years agricultural and industrial pollution has decreased and the data of our investigations and interrogatories show that abundance of crayfish A. astacus in separate water bodies increases as well as the number of lakes and rivers inhabited by crayfish. The image of crayfish as of pure water indicator was correct as long as there was only one species of crayfish in Lithuanian water bodies. At present, when a new crayfish species of American origin, much more resistant to pollution of different origin, is spreading, it is impossible to affirm that crayfish is the indicator of pure water. The data about the appearance of crayfish in the river Sesupe, that is polluted heavily, most likely indicate the spreading of the new species of crayfish, but not decrease of pollution. The investigations of the bioindicating species do not reveal the effect of separate pollutants, but only a general pollutant effect. It is necessary to know biological features of the representatives of species indicators in order not to define the wrong correlation between pollution and its effect on species indicators.

By biotesting having chosen the most sensitive or characteristic representatives of a certain water body we may determine the degree of danger caused by the testing water or a

concrete heavy metal. Daphnia is one of the most frequently used object in biotesting. In the scheme the succession of biotesting of water polluted with heavy metals with the help of Daphnia is presented.



Having tested with the help of Daphnia water polluted with heavy metals we learned the degree of danger caused by the complex of pollutants. Then the data of chemical analysis about the heavy metals present in the water and their concentrations are needed. Separate heavy metals are tested in laboratory, their lethal concentrations are determined during acute test and not active (not causing effect) concentrations are determined by chronic tests. When toxic effects of separate metals are known it is possible to model mixtures and to investigate the effect of heavy metals interaction. These final data provide an opportunity to make

prognosis of the toxic degree of water polluted with heavy metals. The importance of chemical analysis increased as well, because after the complex biotesting investigations a kind of prognosis of the effect of heavy metals pollution's according to the data of chemical analysis becomes possible.