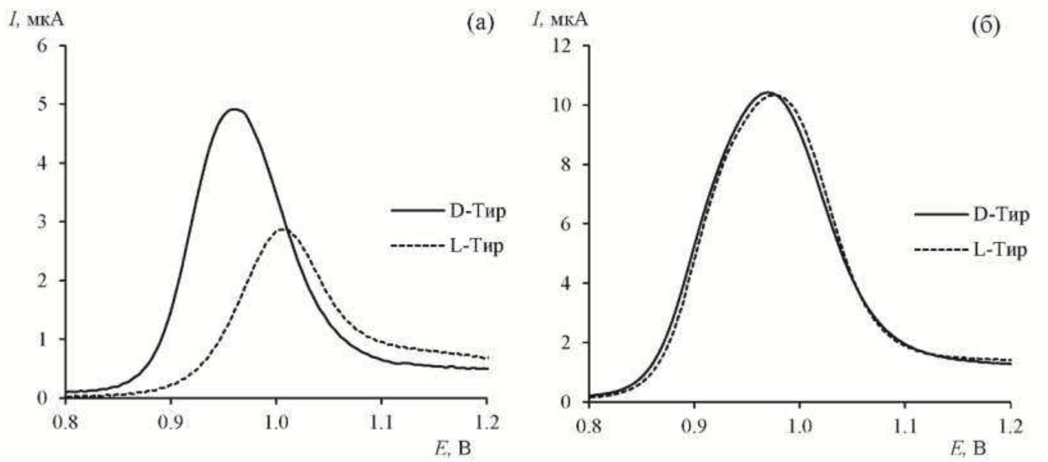

Fig. 1. DPVs of 1.0 mM solutions of D- and L-Tyr enantiomers in Britton-Robinson buffer solution of pH 2.10 on the CPE modified by CA (a) and the bare CPE (b) at a scan rate of 20 mVs^{-1}.

Thus the voltammetric sensor based on graphitized carbon black paste electrode modified by self-assembled supramolecules of cyanuric acid can use as chiral selector for tyrosine enantiomers.

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METHODS OF CONTROL AND MONITORING OF POLLUTANTS IN GROUNDWATERS

Pollution of water objects - sources of drinking water supply - due to the inefficient operation of water treatment plants entails deterioration of drinking water quality. Groundwater resources are less polluted than surface water resources. However, as a result of anthropogenic activities, pollution also occurs in groundwater resources. The most polluted areas are mainly located near large industrial and agricultural sites, as well as settlements.

In case of using groundwater as a drinking water source, it is necessary to treat it from compounds of iron, fluorine, manganese, ammonia, and also mineral salts, in particular, salts of hardness. Pesticides, nitrogen compounds, nitrates and nitrites reach the ground sources due to contamination with fertilizer residues and sewage of livestock farms.

Today, practically there are no control and monitoring systems that would ensure a steady control of pollutants in the environment in the area of man-caused factors influence, particularly means of transport, would allow to evaluate measures to reduce the impact of these hazardous sources on the environment, would predict possible consequences of intensive exploitation of ecosystem objects, in particular fauna and flora, and in the first place, for people in zone of pollutants sources influence [1]. Therefore, the development of control and monitoring systems that would fulfill the above tasks is extremely necessary and is the aim of the research.

The control and monitoring system of pollutants in the environment should include the construction of a measuring network by presenting it in the form of a Peano curve, which ensures continuous monitoring of the researched system and the absence of jumps between individual points of observation. After determining the structure of the measuring network, the amount of the samples (measurements) is optimized in order to exclude the possible influence of random obstacles.

When forming a fractal structure, it is necessary to take into account that there is a rigid dependence of the height of an equal approximating triangle on the length of the segment of approximation L. This forces the length of the initial approximation interval L_0 to be chosen such that the amplitudes of the maximum deviations of the real values of the actual distribution $F^{(R)}(f_i)$ from the approximating line segment on this segment were compatible with the height of the triangle $h_{10} = (L_0 / 3) \sin 60^0 = 0.288 L_0$.

In order to eliminate this disadvantage, it is proposed to use a modified fractalization algorithm, which involves the creation of a dichotomous fractal structure. The result of fractalization (a model that approximates the "chaotic" process on the segment of approximation) can be written as the fractal value $L_m = L_0 (2^{m-1})^{-1}$, where m is the number of steps performed during the construction of the fractal structure, as well as a set of 2^{m-1} values of coordinates of fractals.

The groundwater system is an object with distributed parameters, so the measurement network of such a monitoring system should be formed as a matrix structure [2]. Each node of the matrix should contain a content indicator and concentration of pollutants in the soil (e.g. dioxin concentration) and groundwater quality indicator (for example, toxicant concentration). Such monitoring system allows to instantly reflect the actual state of soil pollution in zone of technogenic object or transport influence. In case of direct exposure of pollutants to soil and to groundwater, concentration of pollutants significantly exceeds the maximum permissible concentrations (MPC). In order to detect hazardous discharges and emissions to the environment, to react quickly and to prevent further violations of environmental standards, information about such exceeding or zones in which the pollutant's concentration is reached MPC or is equal to several or dozens of MPC is required. In this case, the monitoring system monitor should not display the absolute value of the pollutant, but the signal, aliquot to the MPC. At the same time the database system of the system must enter the absolute values of the parameters that are observed. Then, the monitor will cover the control zones of each detector, indicating the relative (relative to MPC) pollutant concentration (Fig. 1).

In order to estimate necessary amount of detectors for reliable control of environment there is a method, based on analysis for relation of probability of registration of the anomaly *P(n)* and the value of the control system *N(n)*. This relation *F(n)* has a maximum that measures the optimal amount of detectors. Usually, the cost of a data center N_c insignificantly depends on the amount of detectors and can be taken as a constant. Similarly, the cost of one detector N_d does not depend on the amount of detectors in the system. Herewith

$$N(n) = N_c + nN_d, \quad (1)$$

$$F(n) = P(n)/N(n) = Nc\text{-}1P(n)(1 + Nd\ Nc\text{-}1n)\text{-}1 \quad (2)$$

In case of zeroing the derivative *F(n)* by *n*, we can obtain the expression for the optimal number of detectors n_0:

$$N_d N_c^{-1} = [(1-p)\ n_0 - 1][(1-p)\ n_0\ l\ n(1-p)]^{-1} - n_0, \quad (3)$$

$$P(n) = 1 - (1-p)^n, \quad (4)$$

where: $p = S_B/S_0$ - probability of detecting an anomaly by one of detectors when contamination distributes over the S_B area, S_0 – area, where reliable control of contamination is provided.

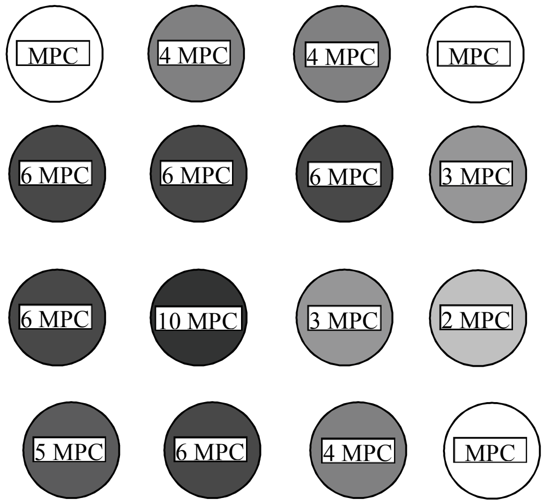

Fig.1. Measuring matrix (location of pollution detectors): MPC - maximum permissible concentration; nMPC - multiplicity of the MPC

Usually, the value of $P(n)$ is determined, then value of n is determined approximately, and finally, ratio N_d/N_c is found while $n = n_0$.

If the anomalous situation in the technogenic landscape is extended sufficiently and the anomalous centre covers the whole region S_0, there is a problem of assessing the representativeness of data on the region S_0 pollution according to data from n detectors, which is finally determined as ratio of area S covered by means of control to area S_0. The expression for R, which replaces $P(n)$, can be represented as:

$$R = 1 – exp(-S_1\ n\ S^{-1}{}_0), \quad (5)$$

where: S_1 – area controlled by one detector.

Using the value R instead of $P(n)$, we get another expression to determine the optimal number of detectors:

$$N_c/N_n = p^{-1}k\ [exp\ (p_k n_0) - 1] – n_0, \quad (6)$$

where: $p_k = S_k/S_0$ is relative size of area to which the data can be distributed from one detector.

The consistent implementation of the above-mentioned stages of the information evaluation ensures the reliability of data obtained for decision-making in environmental management. The developed system of environmental control and monitoring of groundwater allows developing basis of steady control of state of the environment, evaluating measures to reduce the technogenic impact and predicting its consequences.

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THE COMPARATIVE CHARACTERIZATION BETWEEN SORPTION REMOVAL OF Pb^{2+} AND Cd^{2+} BY BENTONITE CLAYS

Sorption is the most efficient way keeps to defuse industrial waste waters and to return purified water and valuable components to industry. Besides, sorption purification is cheap expressive method keeps to remove wide spectra of pollutants with different phase and dispersion composition including ionic degree of dispersion.

Pb^{2+} and Cd^{2+} are toxic substances of complex action. MPCs of Pb^{2+} and Cd^{2+} in drinking tap water (according to STATE STANDARTS 2.2.4-171-10) are 0,01 mg/L and 0,001 mg/L respectively [1]. Accumulation of Pb^{2+} in organism by hitting from drinking water eventually penalized functions of brain and central nervous system causing coma, convulsions and even death. Cd^{2+} is carcinogenic substance [2]. That's why scientific foundation and working of new and improving existing methods of water purification from Pb^{2+} and Cd^{2+} is an actual task.

Following reactants had been used for the experiment: $Pb(NO_3)_2$ (net analysis, STATE STANDART 4236-77), $CdCl_2$ (net analysis, STATE STANDART 4236-77), sodium etylendyamintetraacetate (net analysis, STATE STANDART 10652-73), acetate buffer mixture (pH 5,6), xylenol orange (net analysis, SPECIFICATIONS 6-09-1509-78), ammonia buffer mixture (pH 11), murexide (SPECIFICATIONS 6-09-13-945-94), bentonite.

Analysis of residual quantities of Pb^{2+} in water solutions had been made by titrimetric method of analysis. Pb^{2+} model water solutions had been prepared by dissolving of $Pb(NO_3)_2$ sample.