EXPERIMENTAL JUSTIFICATION OF DESIGN DEVICES FOR ELECTROCHEMICAL PROPERTIES CHANGES OF AQUEOUS SOLUTIONS (FOR EXAMPLE GALVANIC)

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During electrolysis of water and aqueous media at potentials above the decomposition potential of water (1.23 V), the occurrence of a number of typical electrochemical and chemical reactions. Thus, if this process is carried out, for example, in a two-chamber electrolytic cell with a partition membrane neutral type, the cathode chamber of the electrolyzer generated valence-unsaturated species (radicals) Nads, Oads and OH-ions in the anode chamber - ONads, Oads and H ions. It is also possible the formation of hydrogen peroxide and ozone, it depends on the electrode material and the electrolysis potential. Thus formed valence-unsaturated particles (radicals) have an increased reactivity. Furthermore, the electric current behaves as a strong oxidizer (or reductant) which is stronger than, for example, hydrogen peroxide or potassium dichromate or barium. Phenomena associated with the formation of a mixture of different valence-unsaturated particles (radicals) by an electric current, called electrochemical activation of water solutions. This phenomenon can be used to intensify the processes of electrochemical water treatment.

The purpose of research - study design electrolysis unit electrochemical changes in the properties of aqueous solutions.

Materials and methods of research. Currently, heavy metals occupy a leading position among the most dangerous factors in the overall environmental pollution. A serious danger is the discharge into water, especially slowly flowing (lakes, reservoirs), wastewater contaminated with nutrients (nitrogen and phosphorus compounds). The water containing organic matter and nutrients, there is intense proliferation of microscopic blue-green algae. At times the water surface is covered with a solid layer of algae poisonous green, flowering occurs reservoirs. Some blue-green algae in the water emit toxic substances. Otmiraya, blue-green algae is completely deoxygenated water pond and contaminate its degradation products.

Significant pollutants of wastewater with heavy metals is electroplating. Wastewater electroplating distinguish the composition of pollution, dumping and concentration regime. In reset mode divided into drains constantly coming dilute water flow from bath after washing them in detail; washings and periodically discharged from a stagnant bath; Concentrated spent electrolytes and solutions. On the composition of the waste water pollution are divided into four groups: the acid-alkaline, tsiansoderzhaschie, chromite, fluorinated.

The most common method consists in cleaning galvanic transfer of soluble substances insoluble in aqueous solutions of pH correction. To solve this problem you can use one of their types of electrolyzers - pH-correctors.

This takes into account the need for further removal from the wastewater stream of synthesized hydroxides of heavy metals and fine impurities. To do this, use the process provided elektroflotokoagulyatsii. We also need the reverse pH correction - to bring the wastewater to the regulatory requirements regarding discharge.

As the acidic aqueous solutions of real waste water galvanizing lines and nickel. To solve the problem was designed experimental flow multi-chamber diaphragm electrolyzer.

Anode material - combined: Art. 3 and graphite; cathode - stainless steel. Principle of operation - a closed circulation loop. The interelectrode distance - 3 mm.

The results of the experiments. As a result, preliminary experimental studies found that hydroxides of heavy metals polluting wastewater respective production lines chosen by the company formed when the pH is increased to 9.5. Time complete flocculation at a pH - 2 minutes.

Therefore, the problem of pH-corrector - provide guaranteed value wastewater above 9.5, preferably - over 11. It is necessary to generate anolyte and - to further neutralize the wastewater.

In the first step conducted studies functional features: as a model solution for tap water (t = 25 0 C) to which was added a solution of NaCl (16.7 g / L) - for maintaining labor current; as well as change the speed of the water flow between the electrodes.

The experiments on the model solution was confirmed the effectiveness of design.

Then a pH corrector filed electroplating wastewaters (without the addition of an aqueous solution of NaCl, Temperature - 25 0C). The following results:

Input pH - 3.4;

current - 1.3 - 1.35 A;

pH (anode area) - 3-3.3;

pH (cathode zone) - 10,2-10,3;

flow rate - 0.8-0.9 m / s.

Thus, confirmed the efficiency of electrochemical activation of water solutions in problems of water treatment, the example of the developed pH-corrector galvanic, allowing directionally change the composition of dissolved gases, acid-base and redox properties of water within a much larger than an equivalent chemical regulation allows synthesis of water and solutes chemical reagents (oxidizing or reducing) in a metastable state.

Conclusions

The design of the electrolysis unit, whose effectiveness is confirmed experimentally by the example of directional changes galvanic properties, has a practical interest, while providing a number of other processes: enlargement of the reaction products of complexes of heavy metals and other contaminants; extracts the required reaction time and separation of flows of solutions (centrifuges, hydrocyclones); final filtration of contaminants.