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IMPROVEMENT OF WASTEWATER TREATMENT TECHNOLOGY OF THE GALVANIC MANUFACTURE

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Abstract

Wastewater treatment technology of the galvanic manufacture based on their post-treatment by the method of ion exchange for to reduce of the pollutants content to the norms that allow returning the purified water to the technological process is improved.

Keywords: galvanic manufacture, wastewater, pollutants, resource-saving technology, ion exchange purification.

Анотація

Вдосконалено технологію очищення стічних вод гальванічного виробництва на основі їхньої подальшої обробки методом іонного обміну для зниження вмісту забруднюючих речовин до норм, які дозволяють повертати очищену воду в технологічний процес.

Ключові слова: гальванічне виробництво, стічні води, забруднюючі речовини, ресурсозберігаюча технологія, іонообмінне очищення.

Introduction

In mechanical engineering, the main sources of pollution of surface reservoirs are processes associated with the preparation and processing of the products surface by chemical and electrochemical methods: etching and galvano-technical processes.

Contaminated industrial effluents are a threat to the state of water objects, since they contain highly toxic substances, among which the compounds of heavy metals are the most dangerous.

The prevention of the water objects pollution by wastewater is closely related to the reduction of water consumption for the technological needs of the production and, accordingly, a reduction of wastewater discharge. One of the most rational ways to achieve this goal is to use purified wastewater in the system of the closed water supply.

The aim of the work is improvement of the wastewater treatment technology of galvanic manufacture based on their post-treatment by the method of ion exchange for to reduce of the pollutants content to the norms that allow returning the purified water to the technological process.

Results of research

Galvanic manufacture is inextricably linked with discharge of the flushing wastewater. The specific water consumption depends on the equipment used and varies in a wide range from 0.2 to 2.3 m^3 per 1 m^2 of the treated surface [1].

The wide nomenclature of technological processes associated with the use of water and the formation of contaminated wastewater, the main mass of which cannot be discharged into the municipal sewer system or into surface reservoirs without preliminary purification on local treatment facilities is used in modern manufacture.

General requirements for the quality of technical water for the preparation of technological solutions, electrolytes and flushing operations in galvanic manufacture, to the methods for its rational use and the use of flushing schemes with low water consumption and small amount of the waste obtained are established in accordance with the standard "State Sanitary Rules and Norms 8.8.1.2.3.4-000-2001" [2]. The fulfillment of the requirements of this standard provides the reducing the consumption of water, reagents for the neutralization galvanic effluents and decreased load on wastewater treatment facilities.

In galvanic manufacture, the systems of reusable water use should be applied, which in such cases provide water purification to the required quality and (or) the extraction of the valuable components.

Based on the requirements that are presented for the technical water quality for the galvanic manufacture, the improved technological scheme of wastewater treatment was developed, which based on their post-treatment through the ion-exchange filters system. The improved technology of wastewater treatment of the

galvanic manufacture based on their post-treatment by the ion exchange method is shown in Figure 1.

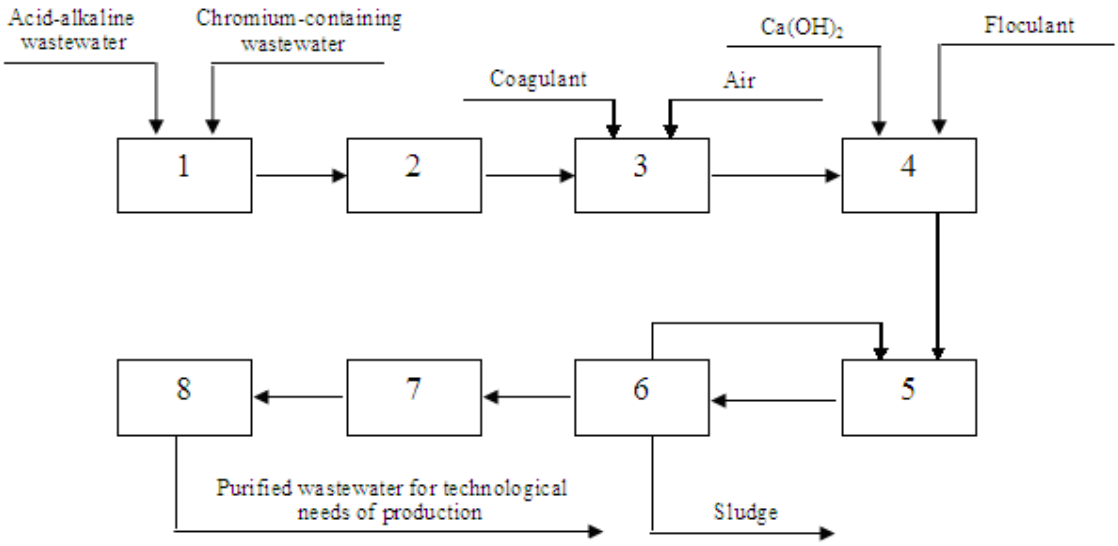

Figure. 1. The improved technology of wastewater treatment of the galvanic manufacture based on their post-treatment by the ion exchange method

1 – averaging wastewater; 2 – electro-coagulator; 3 – reactors; 4 – intermediate container; 5 – settler; 6 – vacuum-filter; 7 – cationic filters; 8 – anionic filters

Wastewater after standard treatment facilities of the galvanic manufacture is sent to the ion exchange filters – cationic 7 and anionic 8, after which returns for the technological needs of the enterprise.

Ion exchange purification is used to extract from wastewater of the galvanic manufacture of the salts of heavy, alkaline and alkaline-earth metals (zinc, copper, chromium, nickel, lead, cadmium and other), free mineral acids and alkalis, as well as some organic substances. This treatment method allows extracting the valuable substances with a high degree of water purification.

Suspended particles remaining after mechanical purification, organic compounds, heavy metal ions, nitrates, sulfates, chlorides and others are removed from the water at this stage. In addition, water desalination occurs and its discoloration.

Conclusions

The wastewater treatment efficiency of the galvanic manufacture on the ion exchange filters from cations and anions is 99.99% of the initial concentration of polluting ions. At the same time, the concentrations of pollutants after the post-treatment on the proposed wastewater treatment technology does not exceed of the norms that are presented to the technical water of the 3rd category in accordance with the standard “State sanitary rules and norms 8.8.1.2.3.4-000-2001”. This will make it possible to create a system of the closed water circulation in the enterprise, as a result up to 95% of purified water will be returned on own production needs for the preparation of electrolytes and flushing before processing in electrolytes (solutions).

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