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Treatment Of Textile Production Wastewater Using Dynamic Membranes

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Annotation: The textile industry is one of the most water-intensive sectors of the national economy. Large amounts of water are consumed in the technological processes of washing, dyeing, printing and finishing fabrics. As a result of these processes, wastewater of complex composition is formed, containing mainly dyes, surfactants, mineral salts and other impurities. Discharging wastewater into water bodies without bringing its composition to accepted sanitary standards is unacceptable.

Introduction

The cleaning methods that currently exist at textile industry enterprises, such as adsorption, flotation, coagulation, ozonation, etc., require large capital and operating costs and do not always provide the required effect. Most methods make it practically impossible to preserve or capture useful components from wastewater for reuse. Therefore, recently, both in Uzbekistan and abroad, extensive research has been carried out and new physical and chemical methods of water treatment have been developed, among which reverse osmosis and ultrafiltration occupy a special place. The "Main Directions of Economic and Social Development of Developing Countries" notes the need to accelerate the pace of construction of water protection facilities and increase the capacity of water recycling and reuse systems, develop and implement drainless water use systems at enterprises, improve the protection of water sources from depletion and pollution , as well as the creation of automated control systems for water management complexes.The implementation of these tasks largely depends on the correct use of the country's water resources, their protection from pollution by wastewater from industrial enterprises and the rational organization of water purification processes [28].

The textile industry is one of the largest consumers of water. At textile industry enterprises, the main amount of water is consumed in dyeing and finishing industries. The large consumption of water per unit of output, the consumption of chemical reagents, the complex composition of wastewater, and high requirements for the quality of the water used make the task of treating wastewater from textile industry enterprises extremely difficult. One of the ways to solve this problem is to reuse residual dyeing solutions, reduce the consumption of chemical reagents, improve the washing system for processed materials, and create local in-shop wastewater treatment systems that facilitate the transition to closed water consumption systems.

The efficiency of ion flotation of dyes is affected by the pH value of the solution. The improvement in cleaning performance is explained by an increase in the degree of electrolytic dissociation. interacting components of the solution. In an acidic environment, nonionic surfactants of the OP-IO type behave like cationic ones due to the formation of oxonium compounds in water.

Disperse and vat dyes practically do not float in the presence of anionic surfactants due to their high hydrophilicity [35].

The effect of purification by flotation method according to data [36] is: for suspended solids 50-70% COD = 26-30%;

BOD full =28-32%; at the same time, the concentration of nonionic surfactants decreases by 60%, anionic - by 42%, and their mixtures - 47-50%.

The estimated cost of treating 1 m3 of wastewater is $23. USA., and when using secondary heat in hot water supply systems - $6.5 cents. USA. [36]

1.1.2. Wastewater treatment by adsorption method

The adsorption method is based on the extraction of dissolved organic substances from solutions by the surface of solids - adsorbents. This method is effective in the treatment of incompletely treated wastewater, when the extraction of specific contaminants by other methods is impractical or impossible. Adsorption of a solute is the result of the transfer of its molecules from the volume of the solution to the surface or into the volume of the adsorbent under the influence of the force field of the surface.

Adsorption occurs most actively in the presence of double conjugated bonds and aromatic structures in the molecules of the dissolved organic substance. The ability to adsorb increases with increasing molecular weight of the substance, therefore dyes, synthetic surfactants and finishing preparations with long hydrocarbon radicals or with an aromatic base - colloidal electrolytes associated in the presence of mineral salts into large micelles - are sorbed from aqueous solutions with significantly greater energy » than single molecules. The adsorption ability of a particular sorbent is assessed

the value of Fads is the difference between the sum of the adsorption forces acting in the system and the value of the hydration energy.

Along with the chemical nature of the extracted substance and the physicochemical characteristics of the adsorbent, the amount of substance adsorbed from the solution is determined by the process conditions: the concentration of the extracted substance, the temperature and active reaction of the medium, the ratio of the areas occupied on the surface of the adsorbent by molecules of the substance and water, changes in the activity of the components of the solution, etc. The assessment of the influence of all these factors is based on the developed theory of adsorption (in particular, on the provisions of Langmuir's theory of monomolecular adsorption, etc.) [35] One of the simplest methods of adsorption wastewater treatment is filtering from bottom to top through a layer of activated carbon (with mandatory preliminary separation of suspended substances from water).

	Неионогенного ПАВ	красителей	
200	Объем раствора, прошедшего через слой 1 кг угля, л	Концентрация, мг/л	Эффективность извлечения красителей, %
230	0,8	3,5	85
265	1,7	4,0	84
300	2,8	4,0	84

The results of studies on the decolorization of colored wastewater from textile and knitting industry enterprises using the chemical reduction method are described in the literature [37].

The essence of the method is the reduction of biochemically stable azo and nitro compounds that are part of most dyes to amino compounds, followed by their oxidation. This method is also called destructive

The main reducing agent is atomic hydrogen, released during the interaction of wastewater acidified with sulfuric acid with iron filings.

Oxidation and mineralization of unstable amino compounds is carried out in an alkaline environment (pH 8-9) with a suspension of lime. The sediment that falls out during subsequent settling of wastewater contains CASO4, (OH)2, FE(OH)3 and, in addition, organic contaminants adsorbed on iron hydroxide flakes that are not subject to destruction by hydrogen - synthetic surfactants, finishing preparations, etc.

The choice of the most effective of the used physicochemical methods (destruction by oxidizing and reducing agents, electrochemical treatment, ozonation) is based on the physicochemical properties of specific wastewater contaminants and depends on their relative quantities.

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