



FLOTATION TREATMENT OF INDUSTRIAL WASTEWATER

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ANNOTATION

Flotation treatment of industrial wastewater The article deals with flotation treatment of industrial wastewater. The application and principles of operation of horizontal, vertical and radial flotator are studied.

KEYWORDS: *flotation, gas and air bubbles, flotator, reservoir, vacuum, pressurized, mechanical (impeller), biological flotation.*

INTRODUCTION

Flotation refers to the process of molecular bonding of fragments of partially dissolved and insoluble compounds into gas or air bubbles (then the sticky pieces are removed).

Flotation varies depending on the type of contaminants in the wastewater, i.e. pressurized and non-pressurized. This method is used to remove waste oil and oil products, oils, paper and cellulose fibers, etc. from the wastewater. [1]

OBJECTIVES

The flotation device is used to remove suspended solids, PAV, petroleum products, oils, gums and other substances in wastewater, as well as before biological treatment of wastewater, removal of active sludge from secondary clarifier, deep treatment of biologically treated wastewater and others. Pressurized, vacuum, non-pressurized electroflotations are used when the suspended solids in the effluent are more than 100 - 150 mg / l. When the value of suspended solids is small, foam separations for petroleum products, PAV, etc., air-permeable devices spread with impeller pneumatic and porous materials are used. [2]

METHODOLOGY

Depth of flotation device is $h_f = 1-3$ m, and the depth of the foam collector $h_{ke} = 0.2-1$ m, depth of

sedimentation zone is $h_{q3} = 0.5-1$ m. The following is used in the design of flotation devices:

- Flotation time 20-30 min;
- Air consumption during flotation 0.1-0.5 m^3/m^3 ;
- Air consumption in foam separation mode 3-4 m^3/m^3 ;
- Depth of water in the flotation section 1.5-3 m;
- Speed around the impeller 10-15 m/h. [3]

The effectiveness of this method is increased when the flotation method is used after settling and cleaning of floating and suspended bodies. The process is carried out on special devices - flotators. After flotation, the wastewater is sent for filtration in a circulating water network or for deeper treatment. [4]

Depending on the method of dispersion:

- Vacuum flotation;
- Pressure flotation;
- Mechanical (impeller) flotation;
- Biological flotation;
- Electroflotation methods are used.

Mechanical and pressure flotation are more commonly used.

Multi-chamber radial flotators, sedimentary flotators are widely used for industrial wastewater treatment. The capacity of the multi-chamber flotation device (Fig. 1) is from 5 to 50 m^3 / h - the multi-chamber flotator consists of a reservoir, reagent

farm, water-air saturation device, pumps and other elements. [5]

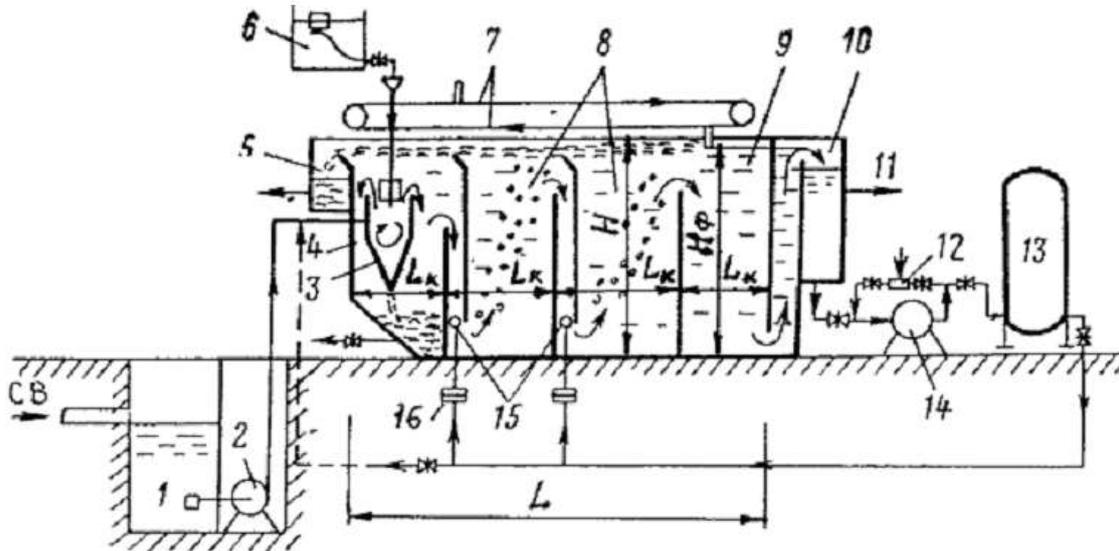


Figure-1. Schematic of a multi-chamber flotation device.

1-receiving tank; 2-nasos; 3-hydrocyclone; 4-cleaning chambers; 5-oil collector pockets; 6-coagulant tank; 7-cleaning device; 8-flotation chambers; 9-interrogation chamber; 10-purified water collection chamber; Transfer of treated water to the 11th circulation water network; 12-ejector for saturation of recirculating water; 13-pressure tank; 14-recirculation pump; 15-recirculating water transmission pipes; 16-Diaphragm to reduce pressure.

SUGGESTION

The multi-chamber flotator is an open right-angled reservoir consisting of 4 chambers interlocking and arranged in series. Each chamber contains water for 4 to 6 minutes. [6] Water purification time - 20 minutes. The water is fed to the flotator from the distribution tank. The volume of the tank should be equal to the waste water transferred for 5-10 to 20-30 minutes. Chamber 1 is the primary wastewater treatment chamber; Chambers 2 and 3 are

flotation, 4 are chambers. A flotator is a combination structure of a flotation chamber (Fig. 2), which consists of a radial separator and a flotation chamber. [7]

They are used to purify atmospheric water from the territory and industrial water. The principle of operation of the device is as follows: wastewater enters the water distribution device. This device receives recirculating water from a pressure tank. [8] The mixture leaving the distributor is cleaned with recirculating water and comes to a suspended flotation chamber, where it stands for 20 minutes. In this case, light particles of the mixture stick to the air bubbles, floating to the surface of the water in the flotation chamber. The mixture rising from the flotation chamber forms a foam. The water then enters the settling chamber, where the suspended bodies of water are deposited in the settling chamber. [9]

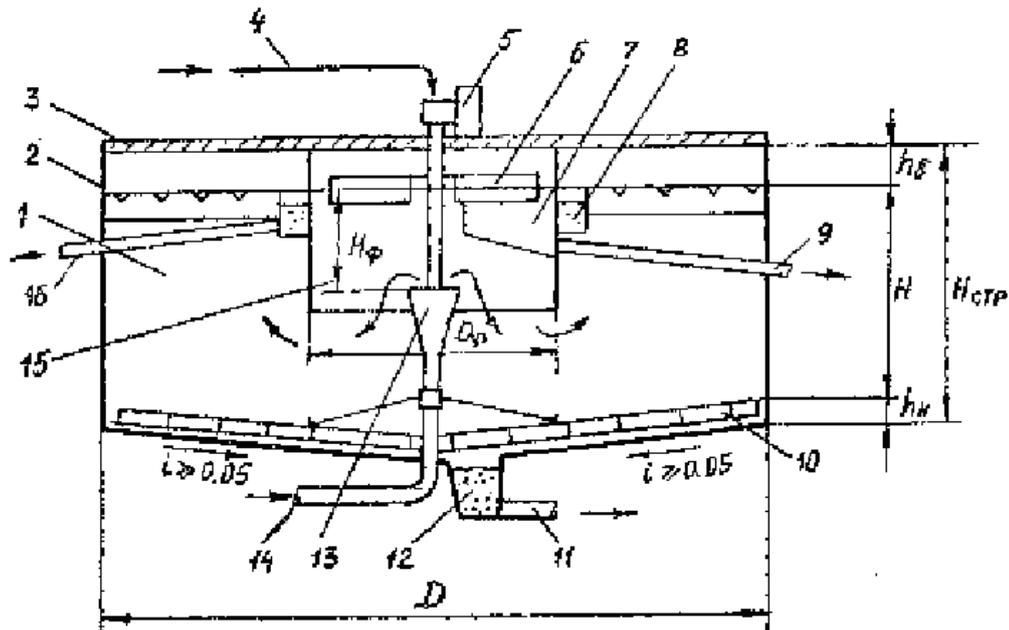


Figure-2. Flotator cooler.

1-interlocking chamber; 2-toothed water collector; 3- device service point; 4-recirculation water pipeline; 5-electric drive; 6-foam removal device; 7-rising foam removal device; 8-cycle water collector; 9-sewage pipeline; 10-tube cleaning device; 11-sediment removal pipeline; 12- sediment outlet; 13-water distributor; 14-water treatment device; 15-flotation chambers; 16-clean water pipe.

RESULTS

Radial flotators are designed to treat large volumes of wastewater (greater than 100 m³/h). They are similar in design to a flotation chamber, but the flotation chamber is located at the bottom of the device, which does not have a bottom cleaning device. In addition to the pressure flotation method, mechanical (impeller) methods are used in various industries to clean petroleum products from resins, oils and small mechanical impurities. In this method, the saturation of water with air bubbles occurs mechanically. In practice, wastewater can again be treated by bubbling air through a porous material and using electroflotation. Electroflotation is an electrochemical cleaning method that includes the following methods:

- Electrocoagulation;
- Electrolysis;
- Electrophoresis;
- Electrodialysis and others.

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