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Studying the Chemical Compositions of Waste Water Units of Oil-Fating Enterprises and Manufacture of Cellulose

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ABSTRACT: In the article discusses the state of wastewater of the units of oil and fat enterprises of the Republic of Uzbekistan and the production of pulp from rice and wheat straw. The chemical and material composition of wastewater of the units of the Tashkent and Yangiyul oil and fat plants was studied. The composition and content of water impurities — organic chemicals such as fats, oils, fatty acid residues and soaps, gossypol and its derivatives, protein substances, and single and polyvalent metals — have been determined.

KEYWORDS: waste water, organic impurities, inorganic impurities, fats, oils, fatty acid and soap residues, gossypol and its derivatives, protein substances.

I. INTRODUCTION

The modern oil and fat industry in the process of using pure drinking water for the processing of cottonseed oil, there is a problem of its pollution by substances of an organic and inorganic nature. Contamination can be caused by the oil itself, soaps, fatty acids, protein substances and other additives, as well as in the washing of equipment and premises, as well as during the normal movement of water through pipes or in a shirt, as a coolant. The success of solving the problem of water treatment is primarily based on the development of scientific achievements in the country [1].

The Republic of Uzbekistan regularly monitors the state of wastewater [2, 3]. Regular observations are carried out in accordance with the List of industrial enterprises included in the Program for monitoring sources of environmental pollution [4]. The list includes enterprises working with the most environmentally hazardous substances and which are special sources of pollution of natural waters, taking into account:

- the presence of wastewater discharged into surface waters of enterprises, treatment plants with a capacity of more than 0.2 thousand m³ / day;
- natural watercourses and bodies of water having wastewater discharges not lower than III and IV pollution class according to the pollutant indices (WPI);
- toxic signs of substances related to I and II hazard class.

Water is polluted by anthropogenic impact, introducing into the water impurities from various sources: industrial and domestic activities [5]

The composition of natural waters depends on the composition and nature of the underlying soil, the composition of the atmosphere, precipitation, flowing sewage, wind speed, flow velocity and terrain [6].

In 1999, a list of fishery standards for maximum permissible concentrations (MPC) and tentatively safe exposure levels (SEC) of harmful substances for water and water bodies of fishery importance was published. It consists of 4 tables. Tab. 1 contains general requirements for the composition and properties of water of water bodies used for fishery purposes; Tab. 2 contains MPC of 1204 substances and their limiting indicator of harmfulness (LPV). Tab. 3 contains MPC by region. Tab. 4 includes 2 highly harmful substances (MPC = 0.00001-0.00002 mg / l), which are imported from abroad [7].

Characteristics and comparative analysis of wastewater treatment methods of oil and fat enterprises of Russia based on sunflower oil and its products are given. It is shown that the complex chemical composition and instability of industrial effluents of these enterprises do not yet allow the establishment of a specific regulatory document for the composition of wastewater in [8, 9].

The qualitative and quantitative characteristics of oil and fat-containing wastewater from dairy production depend mainly on the consumption and composition of the processed product, equipment washing and disinfecting solutions. The content of fatty impurities in the wastewater of dairy plants is in the range of 60-400 mg / l (or kg / m³) [10,11]. Fat extraction from wastewater of dairy production was carried out with carbon tetrachloride and chloroform. The effective extraction of fats from wastewater was high with the participation of chloroform 94%

The fat content of dairy products affects the fat content of wastewater generated by flushing equipment. In particular, the waste water from the dairy plants in St. Petersburg contains fats, depending on the type of fat-containing dairy products produced, from 0.17–13.2%, which corresponds to the fat content of the latter [12, 13].

Analysis of the literature review shows that wastewater, depending on the specifics of the product, the composition and content of its components, they will necessarily be included in the impurities of the wastewater of this production. This has found its place in our studies of wastewater from oil and fat and pulp production.

In the process of processing cottonseed oil, in many nodes, i.e., in processes: heating and heat exchange of equipment, oil refining, soap making, distillation of fatty acids, in the production of margarine and mayonnaise, cold, wastewater of various composition and degree of pollution is formed. These wastewaters are a complex mixture of inorganic and organic chemicals.

II. SIGNIFICANCE OF THE SYSTEM

In the article discusses the state of wastewater of the units of oil and fat enterprises of the Republic of Uzbekistan and the production of pulp from rice and wheat straw. The study of literature survey is presented in section III, methodology is explained in section IV, section V covers the experimental results of the study, and section VI discusses the future study and conclusion.

III. METHODOLOGY

The study of the composition and content of wastewater of oil and fat enterprises based on cotton oil was carried out for the first time. Elemental analysis of boron metals and nonmetal (B) was carried out in the central laboratory of the Ministry of Geology “Analit. Service” on a Specord instrument by atomic absorption spectroscopy (AAS), and the compounds by thin layer chromatography.

All industries release specific substances into wastewater and pollute environmentally friendly waters. Among the above industries, a significant contribution to the pollution of environmentally friendly water is made by:

– Refining cottonseed oil–CBPM; –Soap making–UHMW; –Margarine–SVMarg; –Mayonnaise–SVMay; –Laundry office – SVPO; –Salomas–SVPS; –Fatty acid distillation–HFA.

The analytical control of wastewater chemicals is necessary, finding methods and methods for isolating and returning them to the appropriate production. Therefore, wastewater treatment to the maximum permissible concentrations of pollutants and even low from it is an urgent task and incompletely solved by the problem of modern production enterprises.

IV. EXPERIMENTAL RESULTS

To solve this problem, the primary task is to study the composition of wastewater. The results of chemical analysis of organic substances of the investigated wastewater are given in table.1

Table 1
The content of organic substances in the wastewater units MZhp

№	Name of wastewater facilities	Substance content, 10 ⁻³ kg/m ³			
		Fats and oils	Fatty acids and soap residues	Gossypol and its derivatives	Protein substances
1	SVRM (soap stock and flushing of the converter and equipment)	1,743	1,221	0, 343	1,068
2	UHMW (flushing the tub and equipment)	-	2,451	0,349	-
3	SVJK (flushing of the tub)	1,368	2,115	0,585	-
4	SVMarg (flushing of the tub and equipment)	0,875	0,876	-	0,612
5	SVMay (flushing of the	0,875	0,870		0,612

	tub and equipment)				
6	SVPB (washing)	2,579	1,358	-	1.112
7	SVPS (flushing auto-keyboard, etc.)	0,734	1,234	-	-

Table analysis 1 shows that the composition of the investigated wastewater contains organic substances such as cottonseed oil, fatty acids, the remains of soaps, gossypol and its derivatives and protein substances in a fairly large amount. It can be noted that while protein substances are not emitted from vats and soap making equipment, receiving salomas and DZhK, in other productions they are emitted. Gossypol and its derivatives are found in a sufficiently large amount during oil refining, in the production of fatty acids and soap making.

In addition, metals were discovered in the wastewater of oil and fat enterprises in its units. The results were checked 3 times and had the following average values of the metal content, which are given in table. 2.

Table 2
The metal content in the wastewater ash of oil and fat enterprises by units

№	Name of units	Metal content, mg/l					
		Ca	Mg	Na	Cu	Ni	Fe
1	SVNO	280,6	66,2	-	-	-	0,12
2	SVTO	250,4	63,2	200,0	-	-	0,12
3	CBPM	250,4	66,2	300,0	-	-	0,08
4	CBMB	220,8	63,3	384,2	-	-	0,10
5	SVJK	250,4	66,2	200,0	-	-	0,16
6	SVMarg	132,9	30,6	100,8	-	-	0,06
7	SVMay	132,8	30,6	100,0			0,06
8	SVPH	250,4	66,2	300,0	-	-	0,12
9	SVPV	250,4	66,2	300,0	-	-	0,12
10	SVPO	250,4	66,2	362,0	-	-	0,12
11	SVPS	250,4	66,2	100,0	0,002	0,012	0,12
12	MPC	180,0	40,0	0,0-0,01	0,001	0,010	0,05-0,1

From the table. 2 shows that the content of sodium cation exceeds the maximum permissible norm. Sodium cation is difficult to remove from the composition of wastewater, because all salts based on it are highly soluble in water and can only be separated by adding lime water or a coagulant solution containing cations of trivalent aluminum and iron metals. A comparative analysis of the wastewater of the oil and fat industry divisions shows that in terms of metal content, all but copper and nickel are almost 1,5 times higher than the MPC, which must be removed. Sodium metal in the form of alkali NaOH exceeds several thousand times. The calcium content in the form of a solution of Ca(OH)₂ as well as NaOH has a caustic effect on the hard surfaces of the equipment, on the skin and respiratory organs of staff.

V. CONCLUSION AND FUTURE WORK

Based on the foregoing material, the following conclusions can be drawn:

- analysis of the known literature does not allow us to consider stable the quantitative composition of wastewater from the oil and fat and pulp industries, since there are scattered information;
- 4 types of organic substances, such as fats and oils, fatty acids and soap residues, gossypol and its derivatives, protein substances, mucus and fiber, as well as 6 metal elements - calcium, magnesium, sodium, were found in the wastewater of oil and fat enterprises, copper, nickel and iron in various quantities;
- 4 types of organic substances, such as lignin, hemicellulose, polysaccharides and organosilicon substances, were found in the wastewater of cellulose production;
- 16 elements were detected in the composition of the sewage from cellulose production - silicon, aluminum, iron, sodium, calcium, magnesium, barium, boron, copper, nickel, cobalt, manganese, titanium, molybdenum, tin and strontium
- The contents of the elements of both wastewater are several hundred times higher than the MPC and SHOE;
- The wastewater of both industries requires targeted serious action for wastewater treatment;



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- The problem of treating such wastewater from these industries is a difficult task and requires the development of a set of methods to treat wastewater from oil and fat and other enterprises.

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