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ANALYSIS OF WASTEWATER CONTENT IN THE SOAP INDUSTRY

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ABSTRACT

The issues of environmental protection, including wastewater treatment, are of great importance for the functioning of soap production. Soap production generates waste that must be treated before being dumped into the sewer. An important component of soap are alkalis, mainly sodium (in the production of solid soaps) and potassium (in the production of liquid and ointment soaps). Salts of alkaline earth and heavy metals in the composition of household soaps: are a harmful impurity.

Keywords: Soap stock, crude fat acid, alkali, acid waste water

INTRODUCTION

Obtaining soap in some domestic soap production is carried out in a periodic mode by loading the necessary ingredients into the digester. At the same time, the bulk of the waste generated in such industries comes from the soap shop (60%).

Soap making technology is of particular importance in the oil and fat industry. Indeed, at the last stage of alkaline refining of black oil, a pasty oily sediment is formed - soap stock. Soap stock is the main raw material in the production of crude fatty acids (CFA), which is

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obtained on their basis of detergents, especially laundry soap, pharmaceuticals, cosmetics, lubricants, glycerin, etc. But the technology of processing soap stock, especially from cotton, is very complicated. The fact is that cotton soap stock contains saponifiable (neutral fat) and unsaponifiable (waxes, proteins and dyes) substances that require special attention in technology. Since all of these substances make up a complex colloidal system of soap stock.

In this regard, there are two schemes for processing soap stock to obtain fatty acids. These are glutinous and sound modes [1]. They differ in the initial stage of processing, where in the glue method the soap stock is first subjected to saponification, and in the case of the sound method, the process includes, after saponification, a salting-out procedure (NaCl), followed by settling and the release of soapy liquor. Both methods, after the initial treatment, the saponified raw material undergoes sulfuric acid decomposition, i.e. deoxidation followed by distillation of CFA and cooking soap with addition of ingredients for the intended purpose. It should be noted that this method, in contrast to the sound method, the entire mass after saponification without sediment is transferred for decomposition. Hence it can be seen that the process as a whole is carried out in a complex alkaline-acid treatment of soap stock.

METHODS

The problem is aggravated by the fact that the sulfate content is several times higher than the maximum permissible concentration (MPC). For example, in Russia, in the enterprises of the oil and fat industry, the concentration of sulfates is 50,000 mg / l at the MPC norm of 500 mg / l. In Uzbekistan, MPC for sulfates should not exceed 250 mg / l [4, 5].

So what measures have been taken to efficiently process soap stock or utilize acidic waste water from the CFA production plant?

The work [6] presents the results of a study on the production of detergents from saponified soap stock at the enterprise JSC "Shymkentmay". Good quality detergents received. However, the issue of utilization of acid waste from soap stock processing has not been resolved here. In work [4], a reagent-free method for processing soap stock is proposed. When splitting, the ratio of water to soapstock fat should be maintained within 1: 0.55-1: 0.6, the process temperature is up to 94^{o}C, the duration of the splitting process is 6 hours, the process is carried out in phase III and the introduction of 55-60%, based on the mass of fat mixtures of water for each phase of cleavage, which ensure

the production of fatty acids and glycerin of satisfactory quality. However, at the same time, the depth of fat splitting and the acid number of the obtained fatty acids is 88.87-88.94 % and acid number 177.7-178.9 mg KOH / g, respectively. Also, the consumption of sulfuric acid in acidic waters reached 15.38%. The developed approach cannot be avoided from the aggressive effects of acidic water and does not lead to its utilization.

In work [2], acidic water and lye underwent reagent-free treatment using membrane filters under ultrafiltration conditions. They also propose a method of wastewater burnout in spray dryer installations at 700-800 ° C. The author managed to prevent the intake of sulfuric acid, sulfate and sodium chloride and to obtain waste water meeting the MPC standard in terms of quality. In work [4,5], researchers propose to neutralize acidic water under CFA after the first settling with a defect with a coal composition, waste of sugar production. Clear waste water was obtained. However, the issue of utilization of secondary solid waste - sludge after disinfection has not been resolved.

The practice of processing soap stock shows that in many enterprises and studies the process is carried out using sulfuric or other mineral acids. Unfortunately, none of them fully indicates the rational utilization of acidic water before or after its disinfection.

RESULTS

About 30% of wastewater comes from the fat sump of shop No. 3 and about 10% from shop No. 1. An approximate waste collection scheme is shown in Fig. 1

Wastewater is treated by feeding it into a grease trap, which is a sectioned sump. The principle of operation of the grease trap is as follows: when the wastewater settles, the fat-soluble fraction (fat, soap) emerges. As this fraction accumulates in the upper part of the fat trap, it is removed by sucking it in with a vacuum and feeding it into the digester (shop No. 2). The temperature of the mass in the grease trap is maintained within 60-70 °C. The liquid clarified in the grease trap is then discharged into the well, from which it is directed to the city sewer.

Chemical analysis of wastewater from the soap factory before and after treatment was carried out for a number of indicators, including the determination of COD, suspended solids, fat and soap.

The composition of wastewater was determined using methods used in laboratory practice for the analysis of industrial wastewater.

As a result of the analysis of the initial wastewater, the following data were obtained (Table 1,2). [7,8]

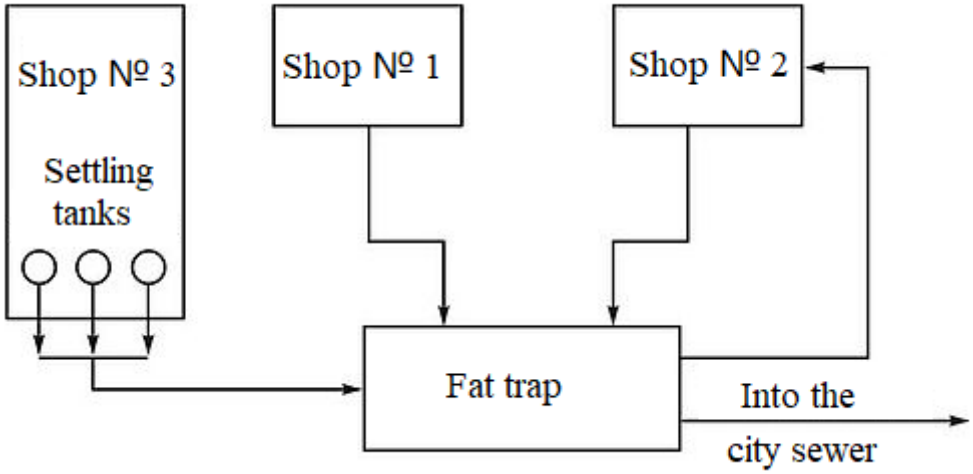

Fig. 1: Principal production scheme of soap production

Table 1. Indicators of waste water from the first settling process of the deoxidation plant for saponified soap stock

pH of AWW	Clarity	Taste	Color	Odour	Biological oxygen demand, mgO_2/l	Chemical oxygen demand, mgO_2/l	Hardness meq / l		Dry residue mg / l		Suspended substances, mg / l
							Carbonate	Non-carbonate	Experimental	Estimated	
2.0	Reddish	Brine	Brown	Specific	380.0	947.2	56.50	108.50	140.51	134.24	6185

Table 2. Chemical composition of waste water from the first sedimentation process of the saponified soap stock deoxidation workshop

Cations	mg/l	meq / l	% -eq / l	Anions	mg/l	meq / l	% -eq / l
H^+	100	100	87	Cl^-	38116	1075	50
Na^+	43158	1876.46	-	SO_4^{2-}	48145	1003.03	47
K^+	-	-	-	NO_2^-	20.01	-	-

NH_4^+	100	5,54	-	NO_3^-	840	13.55	-
Ca^{2+}	300	15	1	CO_3^-	-	-	-
Mg^{2+}	1824	150	7	HCO_3^-	3446	58.50	3
Fe^{3+}	0.3	0.01	-	Total		2148.08	100
Fe^{2+}	30	1.07	-				
Total		2148.08	100				

DISCUSSION

According to chemical analysis data, soap production wastewater has a high degree of pollution. This is mainly pollution with organic substances, to a greater extent - with soaps. In appearance, the sample of untreated effluents is a viscous and soapy brownish liquid to the touch. When cooled to room temperature, it thickens to a paste-like state.

CONCLUSION

Research shows that it is not advisable to divert wastewater from the soap industry directly to the municipal sewage system. In our next work, we will consider the application of the process of wastewater treatment by flotation or coagulation. This way we will be able to prevent environmental pollution and land salinization.

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