

RESEARCH INTO THE STUDY OF SAFONIFICATION KINETICS IN THE EXTRACTION OF FATTY ACIDS FROM SOAPSTOCK

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ABSTRACT

Soapstock is regarded as a secondary product that is formed while neutralizing free fatty acids of oil in the presence alkali. When it comes to its content, it riches in colourful substances, such as carboxyl, carbonyl, hydroxyl groups. This gives it the opportunity to synthesize new types of competitive products for the national economy.

Keywords : soapstock, fatty acids, saponification, temperature

INTRODUCTION

Currently, many oil and fat enterprises are operating in the direction of oil and fat production, which is the leading network of the food industry in the Republic. In them, along with the main product in the process of production of vegetable oils and fatty acids, a large number of secondary products soapstock are formed. The traditional and effective direction of the use of soapstok composition, which is produced in the processing of cotton oil, is the production of household soap. It should be noted that this direction corresponds to the existing trends in the development of soap production,

including the use of renewable natural raw materials and secondary resources.

Methods for the separation of free fatty acids should meet the following conditions: selective exposure with reagents applied to neutralization should be maximum; ensure the greatest rate of neutralization reaction; ensure rapid and complete separation of the formed phases; ensure that the yield of neutralized oil is maximum.

These conditions are explained by the fact that the composition of triacylglycerins of various oils to be difficult to fulfill, as well as the content of additives varies within a large limit.

METHODS

In our research, the soapstock of JSC "Urganch yog'-moy" was used. Table 1 shows the soapstock component.

Table 1

Soapstock composition

Moisture and volatile substances,%	55,0
The content of neutral fat (NF),% of the mass of the soap stock	9,9
The content of total fat (FFA, unsaponifiable substances HB),% by weight	35,1

Fatty acids (FA) in the form of methyl esters were analyzed by GC on an Agilent 6890 N instrument with a flame ionization detector, using a capillary column 30 m x 0.32 mm with a stationary phase HP - 5, carrier gas - helium, programming temperature 150 - 270°C. The results of the analysis are presented in figure 1. and table.2.

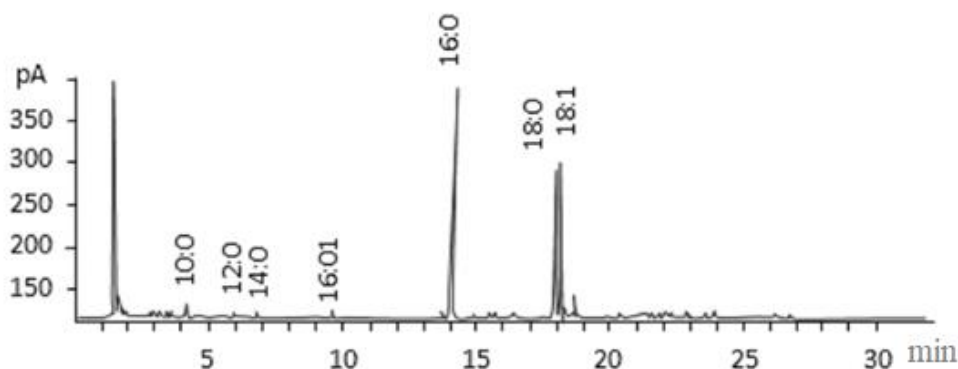


Figure 1. Chromatograms of the fatty acid composition of the control sample of the soap stock JSC "Urganch yog'-moy"

Table.2

The composition of soap stock fatty acids, GC, % by weight of acids

Fatty acid	Content
Myristic , 14:0	0.65
Palmitic, 16:0	25.69
Palmitoleic, 16:1	0.58
Margarine, 17:0	0.14
Stearic, 18:0	2.73
omega-9 Oleic, 18:1	25.24
omega 6 Linoleic , 18:2	42.80
Arakhin , 20:0	0.59
omega 11 Eicosene , 20:1	0.23
Begenovaya , 22:0	0.36
Lignoceric, 24:0	0.14
Hexacosan 26:0	0.85
∑ saturated LCDs	31.15
∑ unsaturated fatty acids	68.85

The presence of large amounts of unsaturated fatty acids in the soapstock reduces their solubilizing properties, which is an important component of the detergent effect of the detergent obtained from the soapstock and significantly determines the washing rate of impurities, as well as the relative washing ability. However, in soapstock, waxes and waxy substances with long enough hydrocarbon chains, as well as high molecular weight fatty acids and alcohols, tend to form mixed micelles that enhance their solubilizing properties.

RESULTS

Soapstock content analysis does not allow us to clearly recommend the most effective way to use it. Therefore, in the next stage of the analysis, the functional properties of the soap base from the soapstock were studied.

The saponification process was carried out at 95⁰C in a laboratory reactor equipped with a mixer and a shell. A 40% solution of sodium hydroxide was used as an alkalizing agent. According to preliminary experiments, 200% of the required amount of sodium hydroxide (NaOH) was obtained [1,2]. It was determined that the mass fraction of free alkali was constant for 15 minutes after the end of the process. The results of the experiment are presented in Table 3 and Figure 2.

Table 3

Soapstock saponification process kinetics

Time, min.	20	30	40	50	60	70	80	90
Free alkali content, %	0,3	0,22	0,15	0,12	0,1	0,1	0,1	0,1

These correlations show that the initial processing of soapstock using the developed modes increases the speed of the soaping process.

It was found that the maximum depth of soaping is achieved in 60 minutes, and the next 2 hours of resting provides a 30% separation of the soap alkali [3]. The main parameters of the soapy base of Soapstock are given in Table 4.

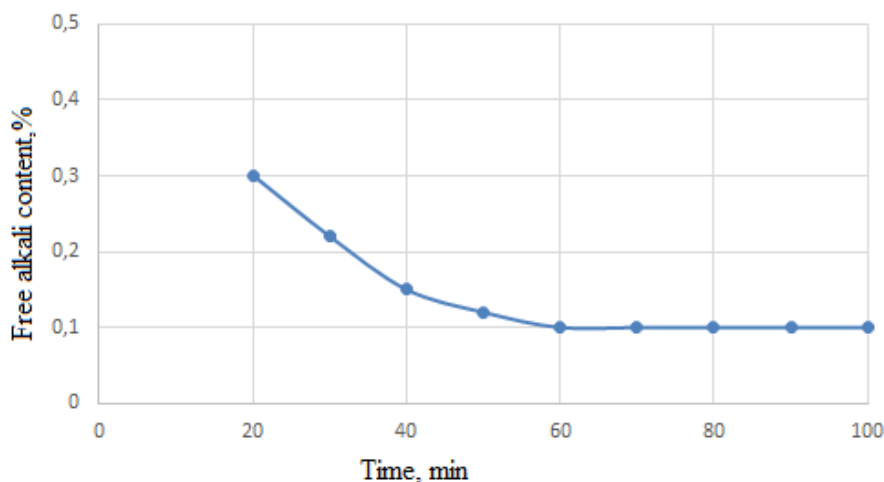


Figure 2. Soapstock saponification kinetics

Table 4

The main features of the soapy base of Soapstock

Index name	Performance characteristics
Color	Orange
Consistency	In gel form
Mass fraction, %:	
Fatty acids	33,20
Neutral oils	-
Wax and waxy substances	9,50
Free sodium hydroxide	0,09
Water	57,21



Taking into account the fact that the base of the soap is not completely separated, as well as the black color of the soap base, the next step is to develop a technology to improve it.

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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