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THE EFFECT OF ALKALINE AND ADSORPTION REFINING ON SOYBEAN OIL OF LOCAL ORIGIN

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Annotation

The article discusses advanced technologies of soybean oil purification, as well as the physicochemical properties of soybean oil after alkaline hydration were studied.

Keywords: soybean oil, hydration, oil-fat, soapstock, phospholipids, forpress, extraction, alkaline.

Introduction

In the Republic, oil-fat enterprises process an average of 100,000 tons of soybean seeds per year, with an average oil yield of 18.07% and produce about 18,000 tons of soybean oil. Effective purification of this amount of soybean oil is very important and requires reducing losses, optimizing the use of auxiliary materials and energy. Currently, due to the fact that the process of alkaline purification of soybean oil without hydration is carried out at oil-fat enterprises, large amounts of food phosphatides are converted into soapstock and are not used for useful purposes. In addition, the high content of phospholipids in the soapstock complicates the process of soapstock soaping, working with acid and obtaining crude fatty acids. Therefore, it is considered advisable to first hydrate forpess and extraction soybean oil and then alkaline refining, since the theoretical and practical significance of this issue is very large, and the economic efficiency is high. In their work, V.N. Martovshuk et al. [80, pp. 35-46] refer cottonseed and soybean oil to hardly refined vegetable oils. In this regard, in the process of refining soybean oil, it is necessary to use such a rational step-by-step refining technology that allows you to consistently obtain the accompanying substances in soybean oil.

Technological processes of oil-producing enterprises are often organized in such a way that only the main component is extracted from the raw materials. Due to the emerging trend of increasing demand for phosphatide concentrate and lecithin, the issue of increasing their production becomes relevant. An economically feasible solution to

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this problem is phosphatide concentrate. Thus, installations for the production of phosphatide concentrate (under the abbreviation "lecithin") were installed at a number of oil-producing enterprises. At the same time, it is necessary to note the increased demands of consumers for high-quality indicators related to the import of phosphatide concentrate (lecithin) with high consumer properties.

Currently, numerous methods have been developed to improve the quality indicators of phosphatide concentrate. For example, phosphatide concentrate is processed by peroxide-enzyme re-dissolution in deodorized oil. This makes it possible to obtain a phosphatide concentrate with an acid number of the oil extracted from it - less than 10 mg KOH, a color number - less than 3 mg J_2. As a result, the production of phosphatide concentrates on in oil-producing plants, it allows increasing the oil yield in the main process and obtaining a full-fledged, multifunctional product - phosphatide concentrate at the same time, any vegetable oil can be enriched with phosphatidic acids using side processes of transesterification with low molecular weight alcohols in the presence of phosphoric acid.

To maximize the separation of phospholipids in soybean oil, we used a laboratory device recommended by Vishnevsky, which allowed the mixer to change the rotation frequency in a wide range. Freshly prepared pressed oil was obtained for the experiment. Indications of hydrated oil in experiments: acid number -2.312 mg KOH / g, color - 60 mg J_2 content of phosphorus-containing substances - P - 0.0085%, P_2O_5 - 0.04227%, phosphatides - 0.47980. The experimental results are shown in table 1. The consumption of distilled water for the hydration process was 0.8-5.0% by weight of oil.

Table-1

Alkali concen tration g/l	Excess amount of alkali %	Alkali consump tion, kg/t	Soapstock yield, %	Refined oil indicators			
				oil yield %	color J_2 mg	Acid number, mg KON	Note 2%-H_2O
240.0 40.0	192.0 50.0	5.0 1.94	11.16 5.5	93.85 97.33	45 55	0.29 0.371	2%-10% NaCl
40.0	75.0	2.26	8.56	95.86	55	0.29	2%H_2O
40.0	75.0	2.26	6.42	96.16	55	0.28	2%-10% NaCl
180.0	100.0	2.58	6.04	94.69	50	0.28	2%H_2O
180.0	150.0	3.23	6.77	94.01	50	0.27	2%H_2O
240.0 240.0	100.0 75.0	2.58 2.26	8.77 7.58	94.95 95.60	45 50	0.28 0.26	2%-10% NaCl
60.0	100.0	2.58	7.8	95.21	55	0.27	2%H_2O

As can be seen from the data in Table 1, as the amount of water supplied to the hydration process increases, the amount of hydrated sludge increases, the yield of the amount of hydrated oil decreases, the number of acids, P, P_2O_5, phospholipids decreases (based on stearooleolecitin), the moisture content of hydrated oil increases, and the color does not change. It should be noted that when 2.0% water is added to the oil, the process of separating the hydrated sediment from the oil accelerates, which is very important during the continuous hydration process. Thus, it is optimal to take 2% water relative to the oil to carry out the hydration process of pre-pressed soybean oil and is recommended for industrial use.

During the hydration of extracted soybean oil, the distilled water consumption was 1.0-6.0% of the oil weight. The hydration temperature was 45-50°C, the hydration time was 30 minutes, the coagulation temperature was 60-65 °C.

For the experiment, 100 g of oil was taken with an acid number content of:

-3.90 mg KOH/g;

-color-90 mg J_2;

-P-0.028%;

-P_2P_5-0.0643;

- phosphatides - 0.730%.

The experimental results are presented in Table 2 and Figure 1. Studies have shown that as the amount of water supplied to the hydration process increases, the yield of hydrated oil, the color, the amount of acids, the amount of phosphorus P_2O_5, phosphatides in hydrated oil decreases, the moisture content of hydrated oil increases. The yield and humidity of the hydrated sediment increase. It should be noted that the process of hydration of soybean oil extraction accelerates the separation of hydrated sediment from oil when 2% of the oil weight is used, the yield of hydrated oil is 98.23%, the yield of hydrated oil is high when 1% of water is used, but the hydrated process of separation of sediment from oil is very slow [132., 211-213 b., 133., 355-357 b.].

An in-depth analysis of the process of hydration of prepress and extraction soybean oil shows that the hydration depth of the prepress oil with the addition of 1.0% water was 76.30%, under the same conditions, the hydration depth of the extraction oil was 33.01%. i.e., the level of hydration depth in the prepress oil is 43.29% higher than the depth level in the extraction oil.

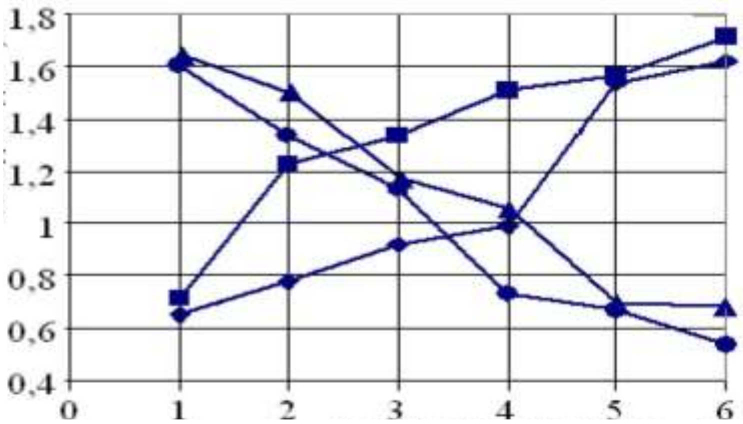

Figure -1. The effect of the amount of water supplied to the soybean oil extraction on the oil quality indicators. (quantitative yield of hydrate sediment, - quantitative yield of hydrated oil, - acid number of the oil, -oil moisture)

When 2.0% water was added to the hydration process, the hydration depth of the prepress oil was 77.76%, under the same conditions, the hydration depth of the extraction oil was 53.43%, i.e. the hydration depth of the prepress oil is 24.33% higher compared to hydration of the extraction oil. When 5.0% water was added to the hydration process, the hydration depth of the prepress oil was 21.20% higher than in the extraction oil. As the amount of water supplied to the process of hydration of prepress and extraction oils increases, the difference in the depth of hydration gradually decreases, i.e. 43.29%; 24.33%; 21.20%.

If we analyze the results obtained during the hydration of prepress and extraction soybean oil, we can conclude that the hydrated phosphatides in the prepress oil are higher than the hydrated phosphatides in the extraction oil.

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