

Intensification of the Process of Hydration of Cottonseed Oil

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Abstract

The article examines the effect of ultrasound and milk whey on the hydration of cottonseed, the main factors affecting the process.

Keywords: Whey; Ultrasound; Cottonseed Oil; Acid Number; Sediment; Color

Introduction

The food industry has a very wide range of methods and means of influencing raw materials to give them the required technological properties. Traditional options are well known and have proven themselves well: exposure to high and low temperatures, vibration treatment, chemical exposure, etc. However, there are more innovative solutions that are increasingly being used in modern reality: processing with infrared radiation, exposure to ultra-low temperatures, treatment with electric current, irradiation with microwave radiation and other interesting technologies.

Results and Discussion

When overcoming the economic consequences of the global financial situation in most countries of the world, incl. and Uzbekistan is taking measures to save energy and material resources, as well as the use of local raw materials. The production of cotton, oil and other products of their processing is growing every year, their range is expanding. Production of competitive vegetable oils of improved quality by improving the refining technology, providing a high degree of purification of substances accompanying triacylglycerols, and, above all, from phospholipids. Their isolation by the traditional method of hydration from fore press or extraction cotton oils takes a long time (3 hours or more) and is accompanied by significant losses of energy, materials, etc. In addition, there are

significant changes in the composition of the resulting phospholipids due to the addition of gossypol, chlorophyll and other related components of triglycerides.

The above-mentioned disadvantages of the known method of hydration of cotton oils include the introduction of oil and fat factories into the country, although experience shows that it is advisable to remove phospholipids from oils as much as possible, since they adversely affect subsequent processes. their purification, hydrogenation, etc.

To date, methods of precipitation of phospholipidophils under the influence of microwave radiation have been studied [1]. In vegetable oils, taking into account the conditions of their content, they have a different amount of phospholip, which is a complex group of polar lipids. Selection of an effective agent response to the action of the organization and the effectiveness of the activities carried out by the laboratory. For the first time the effectiveness of using aqueous solutions of milk whey in the elimination of phospholipids from unrefined sunflower oils was proved at the Kuban State Technological University [2].

The purpose of our research work is to determine the optimal indicators of hydration using milk whey, cottonseed oil obtained in Uzbekistan (Table 1).

Indicators of pressed cottonseed oil, used for hydration of phospholipids.

Method of obtaining oil	Acid number, mg KOH/g	Color at 35 yellow units in 1 cm layer	Peroxide number, % I ₂
Prepress	4,86-8,52	50-60 cr. units	0,01÷0,03

Table 1

The experiment was carried out using an ultrasonic device “Ultrasonic cleaner DSA 50-JY” with a frequency of 40 kHz and a built-in interfering device. Before testing, when assessing the safety indicators of milk whey, it was found that in terms of hygienic and microbiological indicators it meets the requirements of Ф3N⁸⁸ “Technical regulations for milk and dairy products”. Laboratory studies were carried out at temperature intervals of 25-60 °C, the amount of added milk whey for hydration was 1-6% of the oil mass.

As a result of the tests carried out, a graph of the curve of the dependence of the deposition of phospholipids relative to the added milk whey was obtained (Figure 1). (It should be noted that the composition of the precipitated mass includes phospholipids, oils, moisture, volatiles and brown pigments).

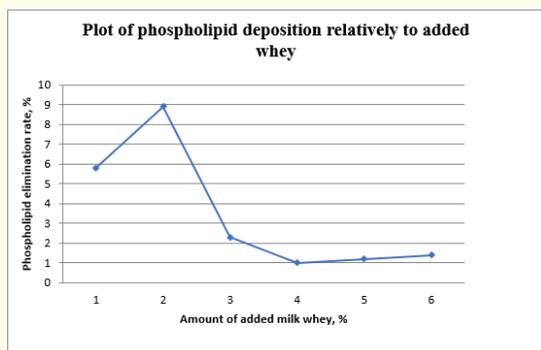


Figure 1

It was found that with an increase of more than 2% in the addition of whey, free moisture is formed in the hydrated oil.

A graph of the curve of the dependence of the change in acid number on the amount of added milk whey was obtained (Figure 2).

The initial color of the fore press oil was 56 crore units (with the color at 35 yellow units in 1 cm layer) after treatment (hydration) with whey in a 2% ratio was 22 crore units.

Figure 2

Figure 3

Thus, the following technological modes of the process of hydration of cottonseed oil using ultrasonic radiation with an oscillation of 40 kHz can be considered optimal: the amount of added milk whey - 2% of the weight of the oil; ultrasonic radiation time -15 min and oil stirring speed -60 rpm at a processing temperature of 55°C. Maintaining these modes allows you to get the maximum yield of hydrated cottonseed oil and phospholipids that meet the requirements of the standards.

Conclusion

On the basis of a set of theoretical and experimental studies and the results obtained on the hydration of cotton oils using milk whey and ultrasound, the following conclusions were made: It was revealed that the use of milk whey and ultrasound at a frequency of 40 KHz helps to reduce the coagulation time of phospholipid flakes from 3 to 5 hours (according to traditional technology) up to 15 minutes (depending on the composition of the hydrated oil).

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