

IMPROVEMENT OF THE VEGETABLE OIL DEODORIZATION TECHNOLOGY USING ELECTROMAGNETIC FIELD INFLUENCE

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Abstract:

The technology of deodorizing vegetable oil using electromagnetic field influence has been studied. The optimal field intensity parameters that improve the quality of the final product have been determined. The reduction of losses and costs in the deodorization technology has been achieved.

Keywords: vegetable oil, deodorization technology, electromagnetic apparatus, field intensity, quality indicators.

Introduction:

The process of deodorizing vegetable oils and fats is the final stage in the refining of raw materials [1-3] used today. The methods of deodorization of oils have many shortcomings [4], as well as significant losses and costs [5]. Therefore, the development of improved deodorization technologies for oils is of both scientific and practical interest. In this regard, considerable attention is being paid to the use of electromagnetic methods of influence. This work explores these issues.

Research Methods:

The improvement of cottonseed oil deodorization technology was achieved by applying an electromagnetic field to the deodorized raw material. A well-known apparatus for electromagnetic processing was used. The influence of the electromagnetic field intensity on the reduction of key accompanying substances in deodorized oil was studied. The intensity of the electromagnetic field was controlled by the rectifier (Figure 1).

The deodorization technology of cottonseed oil samples was carried out at a temperature of $220 \pm 5^\circ\text{C}$ under vacuum ($P=0.5$ kPa or 50 mm Hg). The deodorization duration was 40-45 minutes. The substances removed during deodorization were collected in a separate container.

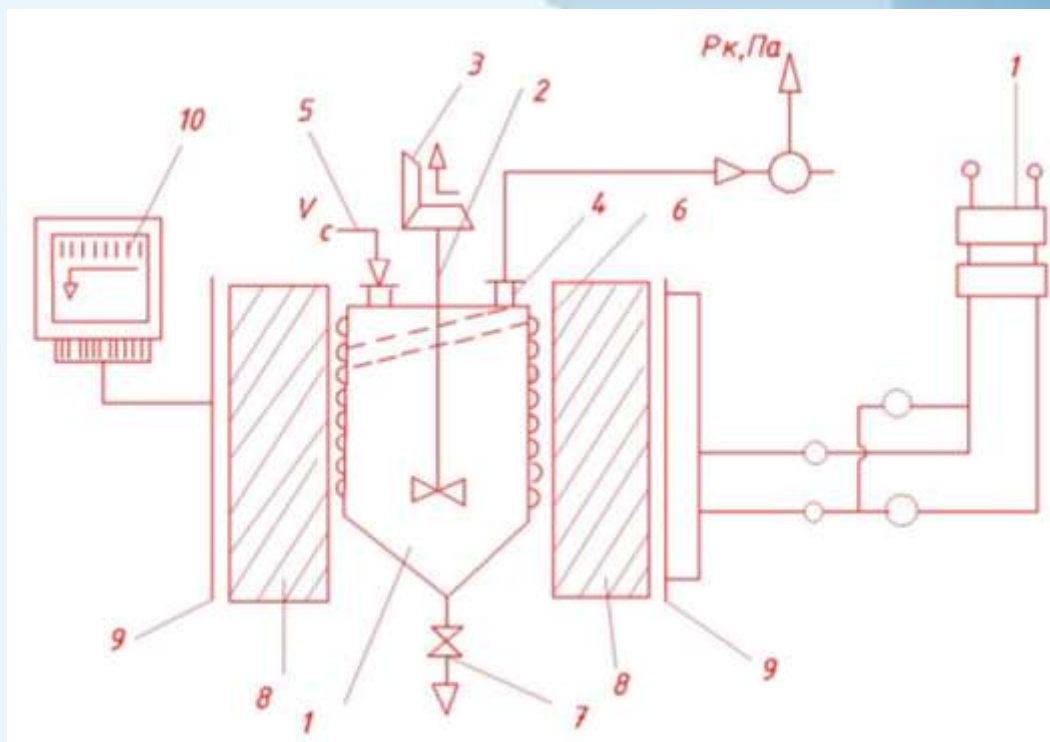


Fig. 1. Cottonseed oil deodorization unit using electromagnetic field influence..

Deodorization vessel; Mixer; Electric motor; Vacuum inlet; Raw material inlet; Spiral electric heater; Drain outlet; Electromagnetic apparatus; Holder-support; Current intensity meter; Voltage regulator.

Oil sample from seed variety	Quality indicators						
	Acid number, mg KOH/g	Color intensity, % J ₂	Refractive index, n _D 20°C	Content %			
				Tocopherols	Ash content	Sterols	Hydrocarbons
I	0,13	4	1,4574	0,01	0,90	0,35	0,06
II	0,21	6	1,4576	0,04	1,01	0,66	0,11

III-IV	0,29	10	1,4580	0,09	1,76	0,83	0,17
Non-standar dized	0,35	17	1,4580	0,16	2,83	1,04	0,26

The physicochemical characteristics of the deodorized cottonseed oil samples are presented in Table1.

The data presented in Table 1 indicate that during the deodorization of cottonseed oils, there is a significant reduction in the content of accompanying

Electroma gnetic field intensity, A/m	Quality indicators						
	Acid number, mg KOH/g	Color intensity , % J ₂	Refractiv e index n _D 20°C	Content %			
				Tocoph erols	Ash conten t	Stero ls	Hydroca rbons
0,4	0,17	6	1,4572	0,020	0,95	0,57	0,080
0,8	0,16	5	1,4572	0,020	0,90	0,54	0,072
1,2	0,15	4	1,4572	0,015	0,83	0,51	0,068
1,6	0,13	3	1,4572	0,010	0,75	0,40	0,061
2,0	0,13	3	1,4574	0,009	0,73	0,37	0,060
2,4	0,14	3	1,4574	0,009	0,70	0,36	0,060

substances. The highest indicators were observed in the deodorization of cottonseed oil obtained from seeds of grades I-II. A decrease in the seed grade negatively affects the reduction of accompanying substances. The effect of electromagnetic field intensity (0.4–2.4 A/m) on the reduction of accompanying substances in the oil during deodorization technology was studied. In this case, cottonseed oils obtained from cottonseed of grades I-II were subjected to deodorization. The research results are presented in the table.2.

Table 2

Physicochemical Characteristics of Deodorized Cottonseed Oils

As seen from the data in Table 2, electromagnetic processing of the raw material in the oil deodorization technology significantly affects the reduction of accompanying substances in the oil. The most acceptable results were achieved at an electromagnetic field intensity of 1.6 A/m. Further changes to this factor do not significantly affect the physicochemical characteristics of the deodorized oil. Thus, a fundamentally new technology for the deodorization of cottonseed oil derived from mixed raw materials has been developed.

The use of electromagnetic processing technology of cottonseed oils from mixed raw materials in the deodorization process allows for improving the quality and enhancing the physicochemical characteristics of the final product. The highest performance is observed when the electromagnetic field intensity is equal to 1.6 A/m.

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