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Modification of the adsorbent used in the adsorption Purification of vegetable oil

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Annotation. In Uzbekistan, there are 200 deposits of natural minerals that are rich in kaolin, bentonite, and flask. Today, these natural minerals have not found their practical application in any food production. Natural minerals for the purification of vegetable oils must undergo acid and thermal activation, while impurities are removed from their composition and pores, the pores are cleared, as a result of which their adsorption and selective properties are increased. To obtain an adsorbent from local natural minerals of Uzbekistan for the purification of vegetable oils, the author applied kaolin Sultan-Uvais, bentonite Bazirgan, kaolin Angren. The main technological parameters have been developed for the purification of traditional vegetable oils in the world's diet with adsorbents obtained from minerals of Uzbekistan. The optimal parameters for the regeneration of oily bleaching clay obtained from kaolin Sultan-Uvais have been developed.

Key words. Mineral, kaolin, bentonite, practical, food, vegetable, acid, thermal, activation, composition, pores, admixture, purification, adsorption, adsorbent, properties, parameter, regeneration, bold.

Uzbekistan has 200 deposits of natural minerals that are rich in kaolin, bentonite, and flask. Today, these natural minerals have not found their practical application in any food production. Natural minerals for use in particular when refining vegetable oils must be mined from the quarry, crushed, and undergo acid and thermal activation. In the process of activation, impurities are removed from their composition and pores, pores are cleared, and subsequently their adsorption properties increase. To obtain an adsorbent from local minerals of Uzbekistan for the purification of vegetable oils, the author applied the activation of natural minerals kaolin Sultan-Uvais, bentonite Bazirgan, kaolin Angren [1, p 240].

For the acid activation of minerals, the author applied sulfuric acid PH = 2 which was left to waste from the soap-making workshop of the oil and fat industry. In the process of acid activation, the author applied a new method for improving the process, in particular, the ultrasonic method of heating and mixing. When ultrasound was used, acid activation lasted 45 minutes at a temperature of 50 ° S. The laboratory setup for sulfuric acid activation of natural minerals is given in Figure 1.

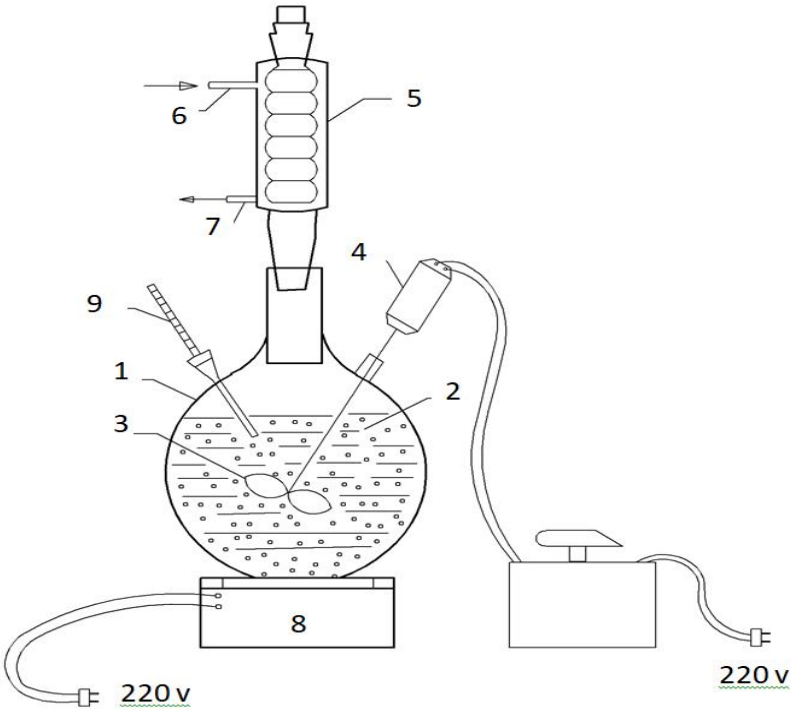


Figure 1. Laboratory installation of sulfuric acid activation of natural minerals.

1-flask. 2-natural mineral with sulfuric acid. 3-stirrer. 4-motor. 5-water cooler. 6-inlet of cold water. 7- warm water outlet. 8-ultrasonic apparatus. 9-thermometer.

For thermal activation, natural minerals in powdered form are heated at 250-300 ° S for 2 hours. The analyzes carried out by the author of the obtained adsorbents from natural minerals of Uzbekistan gave the following positive indicators: 1. The adsorbent did not react with vegetable oil. 2. Oil absorption of adsorbents is low. 3. Maximum cleaning of vegetable oil. 4. Easy separation of the adsorbent from vegetable oil. 5. The cost of adsorbent is low. The laboratory furnace for the thermal activation of natural minerals is given in Figure 2.

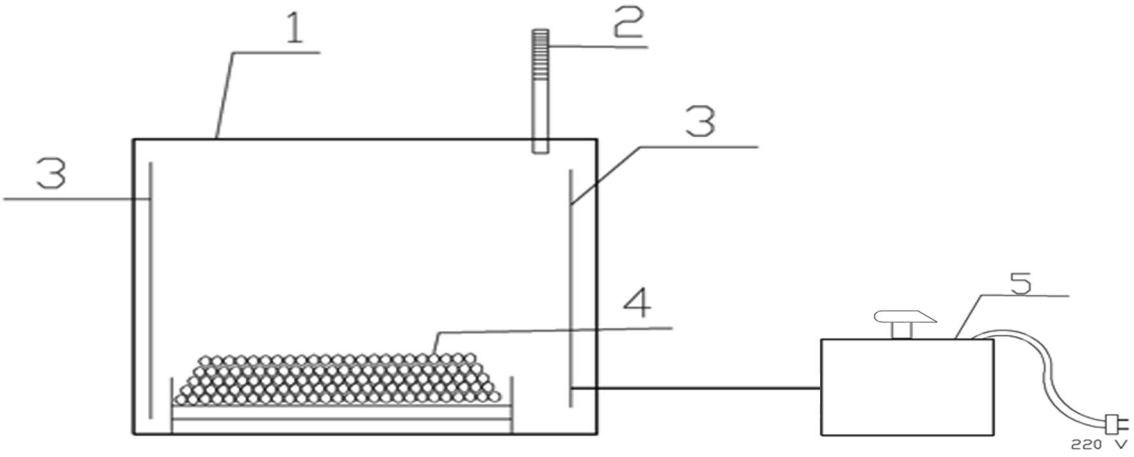


Figure 2. Laboratory furnace for the thermal activation of natural minerals.

1-thermal activation furnace. 2-thermometer. 3-electric heater. 4-natural mineral. 5-switch (automatic).

The main technological parameters have been developed for the purification of traditional vegetable oils in the world's diet with adsorbents obtained from minerals of Uzbekistan, given in «Table 1» [1, p. 240. 2, p. 320].

Table 1.

The main technological parameters when cleaning traditional vegetable oils in the world's diet with adsorbents obtained from natural minerals of Uzbekistan

Name of oils	Oil temperature during cleaning, ^{0}S	The amount of adsorbent during cleaning, %
Sunflower	90	2-4
Olive	40-50	2-4
Palm	140	4-12

According to table 1, we can say that during the purification of vegetable oils, the temperature of oil purification and the amount of adsorbent are different since the optimal adsorption mode, related substances and the chemical composition of the oils are different.

For repeated use of auxiliary materials, to save resources and protect the environment, the author performed the regeneration of oily bleaching clay used in the adsorption purification of vegetable oil obtained from Sultan-Uvais kaolin, while extraction gasoline was used as a solvent.

Extraction gasoline and oily bleached clay were poured into the flask in an amount of 20% of the volume of gasoline, using a laboratory ultrasonic apparatus, stirred for 30 minutes by heating at a temperature of 45-50 ° S. The resulting miscella (a mixture of gasoline, oil and related substances) is assembled in a miscellar collector. It was studied that after regeneration, 80–85% of bleaching clay activity was restored [3, p. 152].

The optimal parameters for the regeneration of oily bleaching clay obtained from kaolin Sultan-Uvais have also been developed and are given in «Table 2».

Table 2. The optimal parameters for the regeneration of oily bleaching clay obtained from kaolin Sultan-Uvais

Name of bleaching clay	The amount of oily bleaching clay in the extraction gasoline, %	The temperature of the regeneration process, °S	The duration of the regeneration process, minutes
Fatty kaolin Sultan-Uvais	20	45-50	30

According to the data in Table 2, we can say that at 20% amount of oily bleaching clay in extraction gasoline, oil and associated oil substances are optimally dissolved and removed from the

adsorbent and the adsorbent is completely cleared. When the temperature rises above 60-70 ° S, gasoline begins to evaporate as much as possible and the regeneration process stops. The duration of regeneration of more than 30 minutes is impractical because it leads to excessive energy costs which affects the cost of regenerated finished products [4, p. 451. 5, p. 288].

The author determined the optical characteristics of vegetable oils not purified and purified by adsorbents obtained from natural minerals of Uzbekistan on a CPECORD 50 spectrophotometer. Detri lamps were used in the analysis and 96% alcohol was used with a standard solvent. Indicators of optical characteristics of vegetable oils are given in “table 3”.

Table 3.

Indicators of optical characteristics of vegetable oils

№	Oil name	Oil color, red units	λ- Wavelength, Nanometer	A- Optical density
1	Sunflower	3	272	0,442
2	Cotton refined deodorized	6	272	1,007
3	Cotton refined deodorized	7	272	1,203
4	Unrefined Cotton Refined	8	272	1,783
5	Unrefined cotton	10	272	8,000
6	Cotton technical	33	272	8,000

According to table 3, we can say that in oils, the more red units there is in color, the greater the optical density indicates the amount of remaining associated coloring substances of vegetable oil which must be cleaned to obtain edible oil.

List of references

1. Arutyunyan I.S., Arisheva I.S., Yanova L.I., Zakharova I.I., Melamud N.L. Fat processing technology. Moscow 2001, 320 p.
2. Zaitseva L.V., Nechaev A.P. Fats and oils are modern approaches to the modernization of traditional technologies. Tutorial. M. De Lee plus. 2013. 152 p.
3. Arutyunyan I.S., Kornena E.P., Yanova A.I. and other technology of processing fats. Textbook. 2nd ed. M. Pishchepromizdat. 1998. P 45.