UDC 665.3.011.002.5

IMPROVING THE PROCESS OF OBTAINING GROUND KERNELS FROM LOW-GRADE COTTON SEEDS

Akhmedov Azimjon Normuminovich,
Candidate of technical sciences, the chairman of the department "Chemistry" in Karshi engineering economic institute, City of Karshi, Uzbekistan
Abdurakhimov Saidakbar Abdurakhmonovich,
Doctor of technical sciences, professor of Tashkent chemical technological institute, City of Tashkent,Uzbekistan
Farmonov Jasur Boykarayevich,
Senior Lecturer of the department "Chemistry" in Karshi engineering economic institute, City of Karshi,Uzbekistan
Azimov Yusuf Khidirovich,
the assistent of the department "Chemistry" in Karshi engineering economic institute, City of Karshi, Uzbekistan
Majidov Bakhodir Shokirovich
the assistent of the department "Chemistry" in Karshi engineering economic institute, City of Karshi,Uzbekistan

Abstract. It has been established that in the process of grinding the kernel of cotton seeds, partial destruction of the globules and spheres of the oil occurs before their rolling. At the same time, their greatest destruction is observed during the processing of mixtures of cotton seeds of I and II varieties and vice versa, the least during processing of mixtures of III and IV varieties, where the content of defective seeds varies from 25-33% cotton.

Аннотация. Установлено что в процессе измельчения ядра семян хлопчатника перед их вальцеванием происходит частичное разрушение глобул и сферосом масла. При этом наибольшее их разрушение наблюдается при переработке смесей семян хлопчатника I и IIсортов и наоборот, наименьшее при переработке смесей III и IV сортов, где содержание дефектных семян колеблется хлопчатника от 25-33%.

Keywords: cotton core, rushanka, petal, rolling, specific surface, bulk density, moisture, oil content, degree of destruction of globules and spheres, degree of grinding

Introduction: It is known that triglycerides, also oils in oil-containing materials (core, petal, etc.) are localized in separate globules and spherosomas, which have protective shells made from natural polymers. For their destruction, various methods of action are sought, most of which are mechanical (crushing, rolling, etc.).

In the known technologies for the production of vegetable oils (in particular cotton) the core extracted from seeds is crushed in crushers to obtain a ruschanka with the required particle sizes [1, p. 213].

The optimal sizes of the crushed particles (R) ensure maximum destruction of the globules and spheres of the oil during their rolling. Unfortunately, their values for I and II varieties, as well as for III and IV varieties of cotton seeds have not been found in the literature, which makes it impossible to regulate them in the corresponding technologies.

Aim of the research: studying the process of rolling kernels obtained from various sorts of cotton seeds.

Objects and research methods: cotton kernel and petal, methods for analyzing humidity, oil content, degree of destruction of globules and spheroids of oil, degree of grinding of pellet [2, p. 114, 3, p. 347].

Results and discussion:

We, to fill this gap, studied the sizes of particles of crushed kernels of seeds of cotton I and II varieties, as well as for III and IV varieties. In this case, a sedimentimetric analysis was used using the Figurovsky weights, the deformation of the beam of which was recorded using a reading microscope.

Fig. 1. shows the change in the content of particles of a certain particle size (R) of a cotton rushanka.

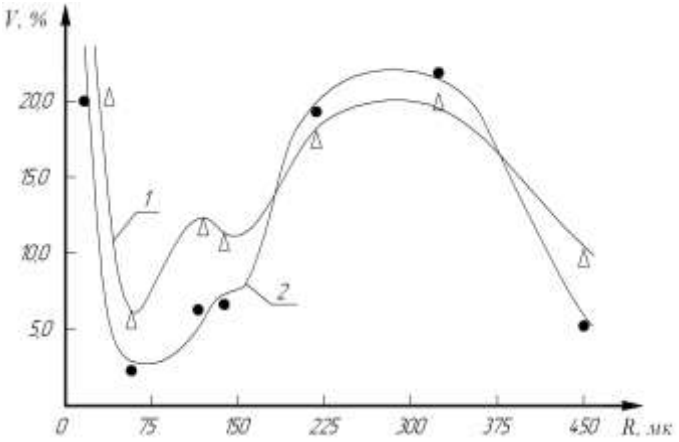

Fig.1. The change in the content of particles of a certain size depending on the identified equivalent particle sizes (R) of the Ruscher, obtained from grades I and II (curve 1) and III and IV grades (curve 2) of cotton seeds

In Fig. 1. it can be seen that initial Ruschanka contains up to 25% of large particles, then their number drops sharply to 3-5% and then, starts to rise to 20-25%. In this case, particles with a size of more than 400 microns are greatly reduced to 5-8%. Such uneven grinding of the rushanka can be explained by the different composition of kernels isolated from a mixture of cotton seeds of I and II varieties, and III and IV varieties.

The most efficient grinding of the Ruschanka is achieved by using kernels obtained from a mixture of I and II varieties of cotton seeds (relative to Ruschanka obtained from a mixture of III and IV varieties of cotton seeds).

In our opinion, the presence of defective seeds in a mixture of III and IV varieties of cotton more than 11-33% and importance (more than 12%) adversely affects the quality of grinding their kernels [4, p.7-8]. Another, no less important indicator of

grinding oil-containing materials is their specific surface, which is determined by the standard method on the Deryagin instrument [5, p.319].

We have studied this indicator when grinding kernels obtained from various mixtures of cotton seeds (at a moisture content of 10-11%).

The results are presented in Fig. 2 and 3.

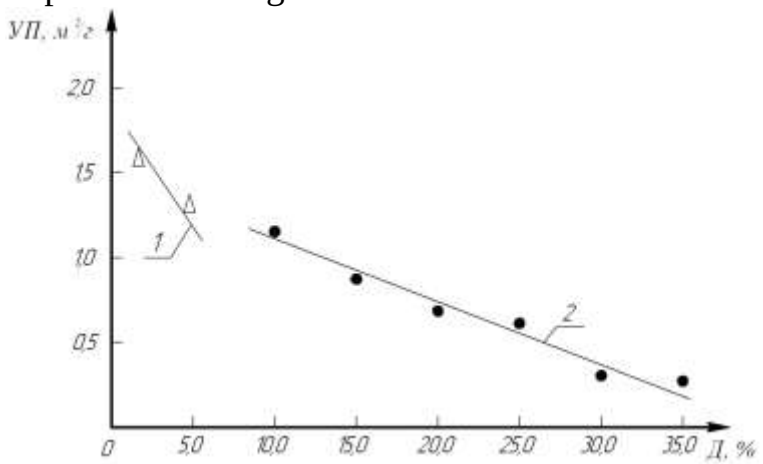

Fig. 2. The change in the specific surface of the crushed kernels (rushanka) depending on the mass fraction of defective cotton seeds: 1-curve for grades I and II, 2-curve for grades III and IV

In Fig. 2, it can be seen that in both cases, with an increase in the mass fraction of defective seeds (up to 35%), the specific surface of the rushanka directly decreases, which confirms the unsatisfactory destruction of globules and spheres of the oil.

That's why, despite of the identity of the technology and conditions for obtaining cottonseed oil, when processing a mixture of seeds of III and IV varieties its yield is much (2-4%) lower than I and II varieties. Undoubtedly, the humidity of the kernel affects the specific surface of the rushanka, which varies depending on the variety of cotton seeds and their storage conditions.

Taking this into consideration, we studied the effect of moisture on the core on the specific surface (UE) of the obtained rushanka by the above-mentioned method.

The results are illustrated in Fig. 3.

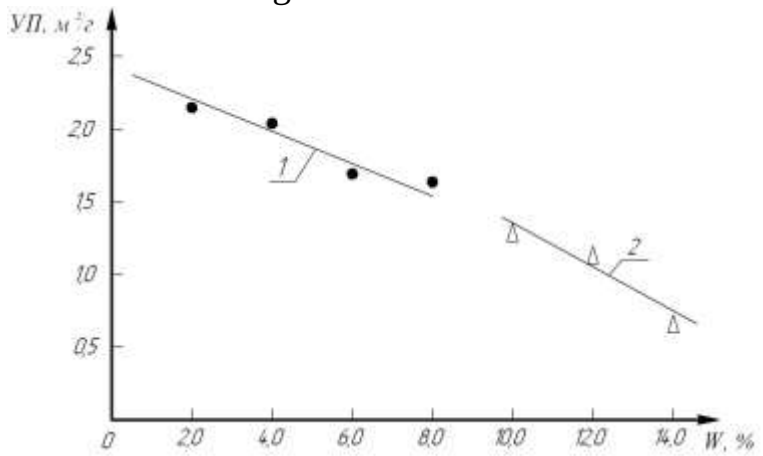

Fig. 3. The change of the specific surface of the Ruschanka depending on the moisture content of the kernel, obtained from the mixture of cotton seeds: 1-curve for grades I and II, 2-curve for grades III and IV

Fig. 3 shows that with an increase in the moisture content of the kernel, obtained from a mixture of cotton seeds of I and II varieties, the specific surface area decreases in a straight line, and when grinding kernels obtained from a mixture of cotton seeds of III and IV varieties more intensively. This suggests that for each mixture of cotton seeds there is its optimum for the moisture content of the core. In general, the entrainment of core moisture from 2.0 to 14.0, a decrease in the specific surface area from 2.5 to 0.75 m2 / g. Moreover, this decrease is characterized by two segments of straight lines: the first within the core moisture from 2 to 10%, and the other from 10 to 14%.

Long-term practice has shown that the oil content of the core complicates the processes of its grinding (crushing, rolling, etc.), due to the increase in its deformation. If we consider that mixtures of seeds of I and II varieties have a higher oil content than mixtures of III and IV varieties, it becomes clear about the need to study them in this direction of research.

We have studied the effect of the oil content of kernels obtained from a mixture of I-II varieties and III-IV varieties of cotton seeds on the specific surface of the Ruschanka obtained.

Fig. 4 presents the results of this study.

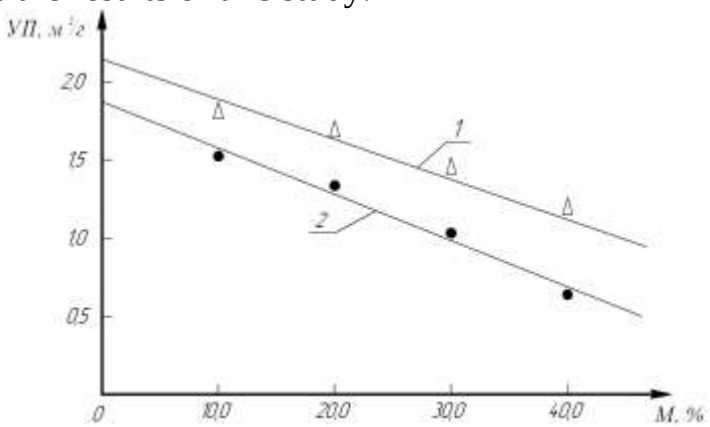

Fig.4. Change of the specific surface of the Ruschanka depending on the oil content of the kernel, obtained from cotton seed mixtures: 1-curve for grades I and II, 2-curve for grades III and IV

In Fig. 4, it can be seen that with an increase in the kernel oil content from 10 to 40%, the specific surface of the crustaceans obtained for both cotton seed mixtures decreases according to straightforward laws. For the practical oil content range from 30 to 40%, the specific surface of the crustaceans obtained from a mixture of I and II varieties ranges from 1.3 to 1.7 m2 / g, and III and IV varieties within.

Comparison of Fig. 3 and 4 shows that, compared to the oil content of the core, its moisture has a greater effect on the grinding degree of Ruschanka, which can be explained by the significant presence of water-soluble components in the latter [6, p.95].

During the study of obtaining a cotton rushanka, we studied the change in its bulk density, which is determined by the subsequent process of its processing (rolling, thermal-heat treatment, etc.). in this case, the kernels of mixtures of cotton seeds of I and II varieties, as well as III and IV varieties were used.

The results of these studies are illustrated in Fig. 5.

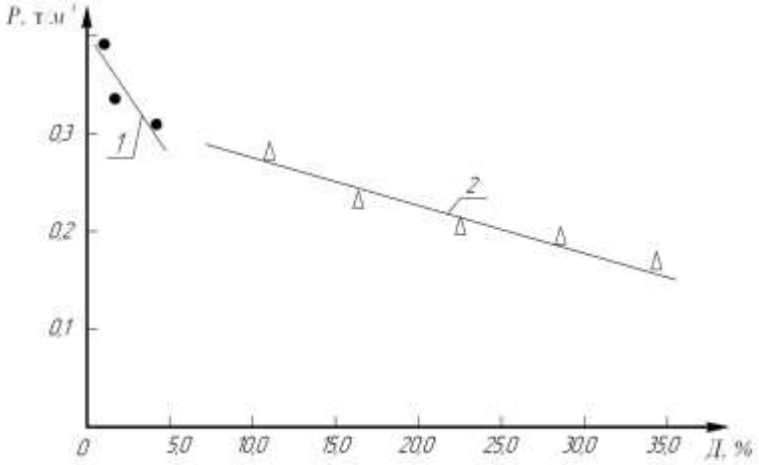

Fig. 5. The change in the bulk weight of Ruschanka (P) depending on the mass fraction of defective seeds (D): 1-curve for grades I and II, 2-curve for grades III and IV.

In Fig. 5. it can be seen that with an increase in the mass fraction of defective seeds by filling, the weight of the Ruschanka for both mixtures decreases according to a straight-line law. This suggests that the core obtaining mainly defective seeds is difficult to grind and their bulk density depends on their composition.

Conclusions. Thus, based on the analysis of the results of this study, we can draw the following conclusions:

1. In grinding the kernels obtained from mixtures of cotton seeds of II and II varieties, as well as III and IV varieties, particles with different sizes from 40 to 450 microns are formed. At the same time, their content varies along a complex curve consisting of several exponentials. Moreover, the content of particles with a size of up to 40 microns reaches 25%, more than 40 microns - up to 5-7% and more than 100 microns - up to 8-13%, more than 200 microns - up to 17-20%. The particle content of more than 250 microns reaches 19-22%, and more than 350 microns - up to 7-10%. Such a complex content of rushanka is due to the multicomponent composition of the ground kernel of cotton seeds.

2. The content of the mass fraction of defective seeds from which the core is extracted determines the specific surface of the resulting pears. With an increase in their share, the specific surface area of the received crustaceans decreases in a straight-line law.

3. With an increase in the moisture content of the core, the specific surface of the Ruschanka is also reduced, this is especially pronounced when processing mixtures of seeds of III and IV varieties.

4. The change in the oil content of the nucleus affects the specific surface of the Ruschanka obtained according to a straightforward law and its increase contributes to a decrease in the latter.

5. It has been shown that an increase in the mass of defective cotton seeds is accompanied by a decrease in the bulk weight of Ruschanka obtained from a mixture of seeds of I and II varieties, as well as III and IV varieties. In this case, the change is observed in a straight line characteristic.

List of literature sources

1. Kopeykovsky V.M., Danilchuk S.I., Garbuzova T.I., Mosyan A.K. Technology of production of vegetable oils. –M .: Light and food industrialization. 1982. -416 s.

2. Y. Kadirov., A.T.Ruzibayev. Laboratories for technology of plant oils industry . Coursebook. –T.: TKTI. pages 2013. - 130

3. Guidance on the method of research, process control and accounting of production in the oil and fat industry. / Ed. V.P.Rzhekhina et al. / L.:VNIIZH, -1967. T. II. Page 423.

4. UzSStandartization 596: 2014. Technical conditions. The cotton's technical seeds. - T.:, UASMS. 2014. – page 11.

5. Deryagin B.V. Instrument for determining the specific surface. –M .N. 1953. – page 421.

6. Goldovsky A.M. To the issue of the state of oil in seed cells. // Oil and fat industry. 1971. –page 395.