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Материал 18.01.2021 ж. баспаға түсті.

МРНТИ: 65.13.13

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DETERMINATION OF BROOKFIELD PIG FAT WISCIMETER

Abstract: *In this article, the process of centrifugation to divide fat from squall is considered. Centrifuges are peculiar and specific devices and in terms of their design. Rotor centrifuges are fast – repair nodes, individual structural elements in which progressive movements are also present. The high speed of rotation of the rotor avoids high requirements for their strength and stability of the structure. A special and specific task of dynamics is the question of the periodic interference of the centrifugal field and the fluctuations of the rotor, as in vibrational centrifuges. The latest achievements in the creation of perforated sieves with the lowest size led to achievements in the design of filter centrifuges by unloading the sedimentary screw. Many of the designs of these centrifuge are produced. In some specific industries, there is already a tendency to displace them with vibrational centrifuges. The development of the latter depends on the improvement of the design of the pathogen.*

Key words*: centrifuge, squirrel, fat, heterogeneous systems, centrifugation, separation, viscosity, pork fat.*

Introduction: centrifugation, or fugging, is called the separation of heterogeneous systems using centrifugal forces. It is carried out in machines (more precisely, devices) called centrifuges. One of the valuable achievements in the history of science is the creation and use of centrifugal forces, which turned out to be very effective in the separation of non-corner machines called centrifuges. Such a separation, which has become the name of centrifugation, is the basis of many new industrial processes. With the help of centrifuges, a fairly clear and at the same time rapid separation of various heterogeneous liquid systems is achieved. Such systems include various products such as raw oil and sugar ink, lubricants and fruit juices, coal slopes and starch suspension, transformer oil and animal blood. It is known that at the end of the last century, centrifuges were used by Pirkovsky and Puchsky at the end of the last century. The experience of these inventors was unsuccessful, and only thanks to the increased opportunities due to the possibilities of increasing the speed of rotation was extremely important. The centrifugation of the thin layer was used at the end of the last century in Lavalian separators. The use of these machines caused a radical change in many artisanal technological processes and the occurrence of industrial production methods [1]. In Russia, technical thought in centrifugal technology, as in many other areas, was an independent direction. So, in 1889, Russian scientists Piontkovsky and I. Shugenovsky first proposed a continuously acting centrifuge with inertial unloading of the sediment, which was additionally tested and improved.

In 1913 A.V. Dumanskiy for the first time applied centrifuge for quantitative study of the dispersion of solutions [2]. Recently, the theory of centrifugation has been noticeable. All new different structures of centrifuges have been created, which allows you to constantly perform processes with complete automation.

Relevance: Currently, scientific research of the Squar is a priority, namely, the squall is intended for feed flour of livestock CATTLE and SMALL CATTLE, one of the main conditions for the implementation in all sectors of the agro-industrial complex, including in the meat industry. The

task has been set-due to the introduction of non-waste and low-waste technologies to process livestock products with maximum efficiency, reduce and exclude losses at all processing stages, constantly increase the range, and improve the quality of finished products. In the meat industry, during the processing of animals, not only food, but also technical products, including dry-animal feed, are obtained.

Progressive technology in the production of dry animal feed, which allows intensify the process, increase the output, improve the quality of finished products, is a technology using centrifuge for degreasing meat squirrels – a semi-finished product obtained after thermal processing of raw materials. In the production of fodder flour, namely, the separation of fat from squad is the most important processes. Analysis of centrifuged equipment at the present stage allows us to state that an effective means of intensification and improving the quality of centrifugation is centrifugal filtration. The use of centrifugal filtration is most effective when it is necessary to get a product with the least humidity. During the process of centrifugal filtration, we get a dry sediment of the squad.

Purpose: The purpose of the dissertation work is to improve a centrifuge for separating a liquid inhomogeneous system.

Materials and methods

Determination of the viscosity of pork fat. As you know, analog viscometers with a circular scale are simple and convenient to use. To conduct viscosity measurements, it is necessary to fix the main working body of the viscometer on a vertical cylindrical rod. In the body of the viscometer, the rotor is attached to the output shaft of the electric motor. The speed of rotation of the rotor speed controller is in the range from 0 to 100 rpm. A circular dial with a division scale is located on the viscometer case in accordance with Figure 1 [3]. Preparation of pork fat, pour it into a metal dish with a volume of 1.5 times larger than a discosimometer disk.

1 – bar; 2 – bed; 3 – clamp; 4 – rotor; 5 – speed regulator; 6 – screw; 7 – circle scale; 8 – protective frame

Figure 1 – Brookfeld analog viscosimeter with a circular scale

Results and discussion: The choice of the right rotor tip and its fastening to the output shaft of the rotor. The type of required tip is determined depending on the viscosity of the test fluid. In order to conduct measurements in gel – like environments, it is necessary to use the tip of the rotor No. 6. The use of other types of tips that do not correspond to the type of measured mixture will not give adequate measurement results.

The room of the working element in the test examined.

1. The inclusion of the viscometer.

2. Determination of the necessary speed of rotation of the rotor.

3. Stabilization of the indications (stabilization time is determined on average after 5 revolutions of the rotor and is directly dependent on the speed of rotation and the characteristics of the test fluid).

4. Removing readings from a circular scale.

In accordance with the number of the rotor used and the speed of rotation, the tabular coefficient is determined, on which you need to multiply the testimony from the circular scale of the

viscometer. If you need to get data in MPA-S, data from the circular scale of the viscometer must be multiplied by factor F (tabular coefficient) corresponding to a specific rotor [4].

The estimated average viscosity values for each experience are determined in accordance with table 1.

Table 1 – Indicators of the viscosity value of pork fat

Pig fat temperature t, ℃	The speed of rotation of the rotor of the viscosimeter, ω, c^{-1}	The viscosity of pork fat,η_1, Па·с	The viscosity of pork fat, η_2, Па·с	The viscosity of pork fat, η_3, Па·с	The viscosity of pork fat, η_4, Па·с	The viscosity of pork fat, η_5, Па·с	The viscosity of pork fat, η_{cp}, Па·с
30	100	40	40	40	40	40,4	40,4
40	100	32	32	32	32,2	32,2	32,2
50	100	26	26,2	26,2	27	27	27
60	100	20	23	21	21	20	20
70	100	8	8,4	8,4	8,4	8,4	8,4
100	100	15	14,4	12	15	13	14
150	100	15	15	14	14	14,4	14,4

Dependencies in the viscosity of pork fat on the temperature and the same rotation frequencies of the viscometer rotor on the experimental installation. We subtract by the formula 1:

$$\eta = \frac{K \cdot \varphi}{\omega} \qquad (1)$$

Table 2 – Valid values of pork fat

Pig fat temperaturet, ℃	Rotor speed of a viscosimeter rotor, ω, c^{-1}	The viscosity of pork fat, η_1, Па·с	coefficient, K	Angle of rotation
30	100	20,1	100	20,1
40	100	16,5	100	16,5
50	100	13,3	100	13,3
60	100	11,5	100	11,5
70	100	10,5	100	10,5
100	100	7,15	100	7,15
150	100	4,8	100	4,8

Conclusion. After processing the experimental data, a graph was built, where viscosity of the viscosity on the temperature of the pork fat is clearly visible when the temperature decreases the viscosity of the liquid fraction, at low temperature, poor centrifugation occurs, and from t= 100-150 ^{0}C is a horizontal line, it gives us an ideal option for separation of fat from the squall**.**

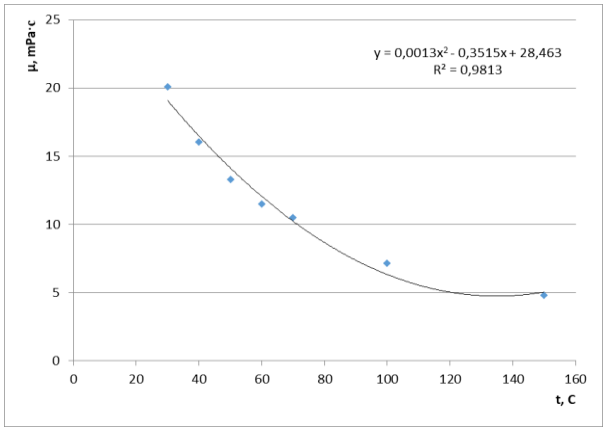

Figure 2 – The dependence of the viscosity of pork fat on temperature at the same speed of rotation of the viscometer rotor at the experimental installation

References

1. V.I. Sokolov, Modern industrial centrifuges / Publishing house «Machinostroyenie», Moscow 1961, 96 s.
2. M. M. Poplavskaya Artist A. R. Kosolapoe, Physical and colloidal chemistry / Vysshaya shkola, Moskow, 255 s.
3. V.I. Sokolov, Theory of centrifugation / Modern Industrial Centrifuges, Moscow 1961, 6 s.
4. A.L. Kasenov, M.E. Shamenov, S.N. Tumenov, A.E. Erengaliev, E.A.Shegebaev /// – Analytical review of the centrifuge for the separation of fat mass.

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ДОҢЫЗДЫҢ МАЙЫНЫҢ БРУКФИЛДА ТҰТҚЫРӨЛШЕУІШІНІҢ ҰЙҒАРЫМІ

Аңдатпа*: Бұл мақалада майды тыртықтан бөлу үшін Центрифугалау процесі қарастырылған. Центрифугалар-бұл ерекше және нақты құрылғылар және олардың дизайны тұрғысынан. Айналмалы центрифугалар – бұл жылдам жөндеу қондырғылары, прогрессивті қозғалыстар бар жеке құрылымдық элементтер. Ротордың жоғары жылдамдығы олардың беріктігі мен құрылымының тұрақтылығына жоғары талаптарды болдырмайды. Динамиканың ерекше және нақты міндеті – діріл центрифугаларындағыдай центрифугалық өріс пен ротордың тербелістерінің периодтық кедергісі туралы мәселе. Ең аз тесік өлшемі бар перфорацияланған електерді жасаудағы соңғы жетістіктер шөгінді бұранданы түсіру арқылы сүзгі центрифугаларының құрылысында жетістіктерге әкелді. Бұл центрифугалардың көптеген конструкциялары шығарылады. Кейбір нақты өндірістерде оларды діріл центрифугаларымен ауыстыру үрдісі бар. Соңғысының дамуы патоген роторының дизайнын жақсартуға байланысты.*

Түйін сөздер: *центрифуга, шыжық, май, аламық жүйелер, центрифугалау, фильтрлеу, тұтқырлық, доңыздың майының.*

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ОПРЕДЕЛЕНИЯ ВИСКОЗИМЕТРА БРУКФИЛДА СВИНОГО ЖИРА

Аннотация: *В данной статье рассмотрен процесс центрифугирования для разделения жира от шквары. Центрифуги являются своеобразными и специфическими аппаратами и с точки зрения их конструкции. Роторные центрифуги представляют собой быстроремонтные узлы, отдельные конструктивные элементы, в которых также присутствуют прогрессивные движения. Высокая скорость вращения ротора позволяет избежать высоких требований к их прочности и устойчивости структуры. Особой и специфической задачей динамики является вопрос о периодической интерференции центробежного поля и колебаний ротора, как в вибрационных центрифугах. Последние достижения в создании перфорированных сит с наименьшим размером отверстия привели к достижениям в конструкции фильтрующих центрифуг путем разгрузки осадочного винта. Многие из конструкций этих центрифуг производятся. В некоторых конкретных производствах уже существует тенденция вытеснять их вибрационными центрифугами. Развитие последнего зависит от улучшения конструкции ротора возбудителя.*

Ключевые слова: *центрифуга, шквара, жир, неоднородные системы, центрифугирование, фильтрование, вязкость, свиного жира.*

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Материал 02.02.2021 ж. баспаға түсті.