Cotton Oil Shortenings And Optimal Parameters Of Their Temperature Process

Sabirova Nargiza Nusratovna

PhD, Bukhara Engineering-Technological Institute, Bukhara City, Uzbekistan

Journal Website:

<http://usajournalshub.com/index.php/tajet>

Copyright: Original content from this work may be used under the terms of the creative commons attributes 4.0 licence.

ABSTRACT

The tempering properties of shortening of fats based on cottonseed oil and products of its processing were studied. It has been experimentally established that the tempering of hard shortening has several advantages. The tempering temperature is carefully selected to obtain the desired crystal matrix in shortening. In the absence of this step, the crystal structure in the product continues to change with time and temperature during storage and transportation. The consistency of the shortening changes at influence of high or low temperatures even with proper tempering. However, there is always some recovery of consistency when the product returns to its primary storage temperature. Properly tempered shortening shows plasticity over a wider temperature range, as well as storage temperature fluctuations.

KEYWORDS

Cottonseed oil and products of its processing, shortening of fats, tempering properties, crystal structure, temperature modes

INTRODUCTION

Fats and shortenings have different types and sizes of solid crystals, which must be mixed before use to

form a homogeneous liquid. This process is called fat and shortening tempering and is used primarily in

many margarine plants. In foreign countries, such fats are made on the basis of solid fats of vegetable origin, in particular, palm and palm kernel oils [1-7]. Shortening fats are used to prepare a wide range of food products [8-10]. The use of cottonseed oil and its processed products for the production of shortenings is of scientific and practical interest. We have proposed [11-12] shortening fats based on the products of catalytic modification of cottonseed oil. In connection with this, the task was set to study the tempering properties of solid shortening fats.

METHODS

The crystalline structure of fats is determined by melting them at different temperatures. The temperature of shortening fats was measured in °C. Modern methods of physical and chemical research were used.

RESULTS AND DISCUSSION

It has been found experimentally that tempering solid shortening has several advantages. The tempering temperature is carefully selected to obtain the desired crystalline matrix in shortening. In the absence of this step, the crystal structure in the product continues to change with time and temperature during storage and transport. The consistency of shortening changes even when properly tempered, when exposed to high or low temperatures. However, there is always some recovery in consistency when the product returns to its original storage temperature. Correctly tempered shortening exhibits ductility over a wider temperature range as well as fluctuating storage temperatures.

The data in Figure 1-3 illustrate the effect of tempering temperatures on shortening solids. These figures also demonstrate the effect of storage temperature on consistency as well as the ductility of shortening.

Figure: 1. Tempering at 29°C

Figure: 2. Tempering at 32°C

Figure: 3. Tempering at 21°C

Three temperatures have been chosen for tempering the product:

29 ° C, i.e. average temperature in storage warehouses. 32 ° C and 21 ° C were selected to demonstrate the effect of tempering temperature on the consistency of the same product.

In the studies, the product was kept at 32 ° C temperatures for 48 hours. The products were then left at 10, 16, 21, 27, 32 and 38 ° C overnight to equilibrate at these storage temperatures. Penetrations were measured at various storage temperatures. All product samples were removed from their respective storage facilities and placed at 21

° C overnight for equilibration. Penetrations were measured on all samples. This is referred to as "Penetration Restoration". Penetration and recovery data are shown in Table 1, and graphs are shown in Fig. 1. (29 ° C), Fig. 2 (32 ° C) and Fig. 3 (21 ° C).

Compared to the sample tempered at 29 ° C, the other samples gave different results.

Tempered at 21 ° C in the sample, the following observations were made.

The sample had a softer consistency (higher penetration values) at all storage temperatures. Penetration recovery indicated that the same sample

had a shorter plasticity range (penetration recovery remained flat over a narrower temperature range).

Table 1.

Penetration and Penetration Recovery Data for shortening tempered at different temperatures

Temperature, °C	Tempered at 21°C		Tempered at 29°C		Tempered at 32°C	
	Penetration, mm/10	Penetration restoration, mm/10	Penetration, mm/10	Penetration restoration, mm/10	Penetration, mm/10	Penetration restoration, mm/10
10	230	300	180	250	170	230
16	270	300	220	250	200	230
21	300	300	250	250	230	230
27	350	270	280	250	260	230
32	420	250	330	230	320	235
38	540	220	450	220	360	180

The numbers in the table represent penetration and penetration recovery at 21 °C. This is because 21 °C is a significant temperature for shortening storage and use times.

The sample tempered at 32 ° C had a harder consistency (lower penetration values) at all storage temperatures. Penetration recovery indicated that the same sample had a shorter plasticity range (penetration recovery remained flat over a narrower temperature range).

The possibility of using cottonseed and soybean oils and their hydrogenation products for obtaining shortening fats resistant to oxidation during their long-term storage is shown. It was found that tempering the fat mixture prior to its crystallization makes it possible to increase the proportion of

homogeneous crystals that provide the plasticity of the shortening fats obtained.

CONCLUSION

Thus, the sample tempered at 21 ° C had a softer consistency (higher penetration values) at all storage temperatures. The sample tempered at 32 ° C had a harder consistency (lower penetration values) at all storage temperatures.

REFERENCES

1. Stopskiy V.S., Klyuchkin V.V., Andreev N.V. Khimiya zhirov i produktov pererabotki zhirovogo syrja [Chemistry of fats and fat stock processing products]. - M.: Kolos, 1992. 286 p.

2. Grinberg G., Schepanskaya G. Modifitsirovannye zhiry [Modified fats]. - M.: Food industry, 1973. 104 p.
3. Haumann. B. R. The goal, tastier and «healthier» fried foods // INFORM, 1996, 7, pp.320-334.
4. O'Brien, R.D.Shortening technology // Introduction to Fats and Oils Technology / O'Brien, R.D., Fair, W.E., Wan, P.J., eds.-2nd ed.-Champaign, IL:AOCS Press, 2000. pp.422-426.
5. Oil Crops Situation and Outlook Yearbook/USDA-Washington, D.C.:U.S. Department of Agriculture Economic Research Service, 1985.
6. Oil Crops Situation and Outlook Yearbook/USDA-Washington, D.C.:U.S. Department of Agriculture Economic Research Service, 2000. 50 p., 63.
7. Haumann, B.F. The goal: tastier and “healthier” fried foods//INFORM, 1996, 1, pp.320-334.
8. Weiss, T.J. Shortening: introduction // Food Oils and Their Uses-2nd ed.-Westport, CN: AVI Publishing, 1983. pp.129-130.
9. Paulicka, F.R. Shortening products // Edible Fats and Oils Processing: Basic Principles and Modern Practices, Word Conference Proceedings / Erickson, D.R., ed.-Champaign, IL: AOCS Press, 1990. pp.205-206.
10. Stauffer, C.E., Bakery product applications // Fats and Oils / Stauffer. C.E., ed.-St. Paul, MN: Eagan Press, 1996. 73 p.
11. Sabirova N.N., Majidov K.X., Characteristics of new kinds of shortenings. - Austrian Journal of Technical and Natural Sciences, 2018, no. 11 12, pp.16-19.
12. Sabirova N.N., Mazhidov K.Kh. Development of the composition and study of the characteristics of new types of shortenings // Uzbek Chemical Journal. 2018, no. 6, pp.58-62.