Influence of chocolate frosts on their qualities and usage in food industry

Mariia Zemelko[1], Valeriy Mank[2], Oleh Chervakov[1]

1 – Ukrainian State University of Chemical Technology, Dnipropetrovsk, Ukraine
2 – National University of Food Technologies, Kyiv, Ukraine

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Corresponding author:

Mariia Zemelko
E-mail:
zemelko-m@mail.ru

Abstract

Introduction. The aim of this work was to get surface active substances on the basis of fat and vegetable origin for reducing their viscosity in chocolate frosts

Materials and methods. Chocolate frosts composed of cocoa products, whey powder and fruit concentrate. Surface-active substances obtained from waste palm oil and fat, having got by the method of glycerolysis.

Results and discussion. Addition 0.4% of lecithin and mixture MG, DG, TG of fat allow to decrease the viscosity of chocolate frosts to needed characteristics (2500–2900 mPa·s), but at the addition of mixture MG, DG, TG of palm oil this result is achieved already at 0.2%. Addition 0.4% mixture MG, DG, TG of fat allows to reduce the viscosity of chocolate frosts with whey powder till 2690 mPa·s, but adding lecithin or mixture MG, DG, TG of waste palm oil this result is achieved already at 0.3% SAS.

When adding 1% SAS the most reducing of viscosity of chocolate frosts with fruit concentrate is achieved with the usage of mixture MG, DG, TG of fat (3400 mPa·s). With the usage of lecithin the result was 3900 mPa·s, but with the mixture MG, DG, TG of waste palm oil was 3600 mPa·s.

Surface-active substances reduce viscosity but don't influence the taste and feeling of melting in the mouth researched items of frosts and whey powder and fruit concentrate enriched taste and aroma of chocolate frosts.

Addition of mixture MG, DG, TG of waste palm oil and fat made it worse the stability of chocolate frosts as to the turning gray, especially frost with whey powder.

Lecithin and surface-active substances obtained on the bases of waste palm oil and fat have thinning ability more than 0.8%.

Conclusions. Surface active substances from waste palm oil and fat, received by this method are preferably to be used in the recipes of chocolate frosts to reduce the viscosity qualities of the prepared product.

Introduction

Nowadays there is a great assortment of confectionery, which is under the process of chocolate frosting. But there is a problem of working out new recipes in order to enrich and to improve the taste of finished articles.

By using a chocolate frosts the terms of storage of confection can be improved also as a physical configuration with a hiding of some defects. The committing of that way provide to cost saving in production.

To characterize the chocolate frosts they make definitions which show the rheological properties, to be exact, its viscosity. If viscosity is rather high (more than 12 Pa·s), the lay of frosts is rather thick, but if it is low (less than 2 Pa·s), then frosts become watery and the layer becomes too thin. One of the main organoleptic evaluations of the chocolate frosts is the feeling of fusibility just in the mouth, as due to it one can feel their real taste. As for taste and aroma of the frosts it must be like original chocolate without any strange scent or taste. Its color may be from light brown to dark brown but in harden state it may be turn grey inside and outside.

Consistence must be at temperature 16 °C – hard, but at temperature above +40 °C – fluid.

Viscosity reducing for all recipes of chocolate frosts is necessary, because it leads to increasing the currents of frosts and in the long run, they will cover equally the confectionery.

This process will make frosting better. These investigations are thought to develop the recipes of chocolate frosts aiming to reduce their basic prices, but to keep their biological value, the figures of quality and characteristics, which respond to modern standards, having been used in food industry.

Hence of it, with a purpose of partial substitution of cocoa butter, the fruit juice is added together with whey and surface active substances (SAS). The necessary deterioration of viscosity is reached with (SAS in mixture) 0.4 -0.6%.

Materials and methods

To get SAS they used waste palm oil (AN=1.9mgKOH/g, IN=50.1gI_2/100g, melting point=25 °C, congelation point=35 °C) and fat (AN=2.0mgKOH/g, IN=33.0gI_2/100g, melting point=23 °C, congelation point=28 °C).

To analyze the mixtures mono-, de-, threeglicerides of fat acids were used having got by the method of glycerolize [1], the indices of quality were given in table 1.

Table 1

Physicochemical properties SAS

Index	Mixture MG, DG, TG:	
	Waste palm oil	Fat
acidic number, mgKOH/g	7.19	8.87
peroxide number, mmol ½O/kg	50.3	49.46
iodine number, gI_2/100g	53.71	43.15
melting point, °C	29	33
congelation point, °C	20	26

The investigation was made for influence of all the mixtures (MG, DG, TG) exhausted palm oil and fat as to the viscosity of chocolate frosts without any whey powder (2%) and fruit concentrate (3.25%). For these investigation all the frosts were chosen in table 2.

Table 2

Recipes of chocolate frosts

Chocolate frosts	Cocoa butter, %	Coca powder, %	Sugar powder, %	Whey powder, %	Fruit concentrate, %
Without addition	18.42	42.48	39.1	–	–
With whey powder	18.42	42.48	37.1	2	–
With Fruit concentrate	18.5	42.5	35.75	–	3.25

As a standard SAS was choosed a lecithin which is used in the food industry.

Results and discussion

The main criteria of chocolate frosts are their rheological properties which are under the influence of SAS. The dependence of viscosity of chocolate frosts from content of SAS is on the figure 1.

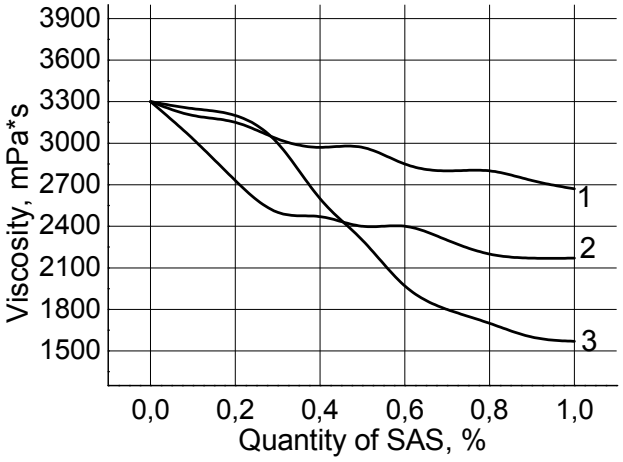

Figure 1. Dependence of viscosity of chocolate frosts on the content of SAS: 1 – frost with lecithin, 2 – frost with MG, DG, TG of waste palm oil, 3 – frost with MG, DG, TG of fat

It can be observable that addition 0.4% of lecithin and mixture MG, DG, TG of fat allow to decrease the viscosity of chocolate frosts to needed characteristics (2500-

2900mPa•s), but at the addition of mixture MG, DG, TG of palm oil this result is achieved already at 0.2%.

The results of influence of SAS at viscosity of chocolate frosts with whey powder are at figure 2.

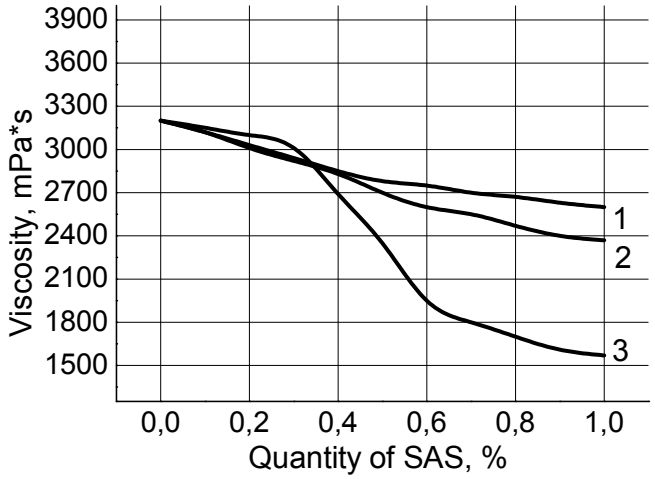

Figure 2. Dependence of viscosity of chocolate frosts with whey powder on the content of SAS: 1 -frost with lecithin, 2 – frost with MG, DG, TG of waste palm oil, 3 – frost with MG, DG, TG of fat

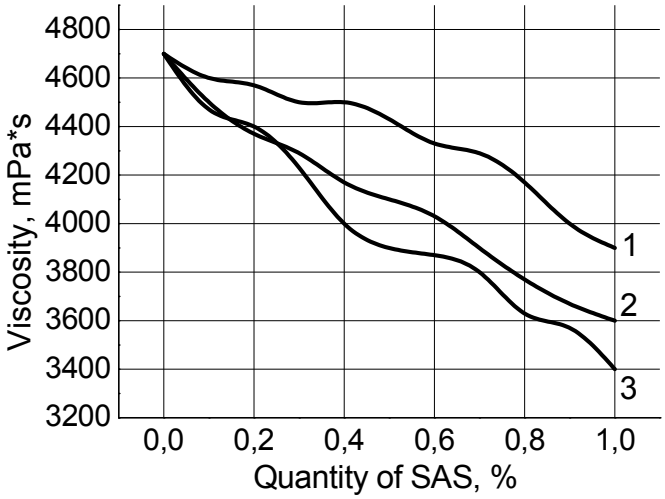

Figure 3. Dependence of viscosity of chocolate frosts with fruit concentrate on the content of SAS: 1 -frost with lecithin, 2 – frost with MG, DG, TG of waste palm oil, 3 – frost with MG, DG, TG of fat

It is seen that with the addition of whey powder, viscosity reduces to 3200 mPa·s in the comparison with viscosity of frosts without any additions which 3300 mPa·s. Addition 0.4% mixture MG, DG, TG of fat allows to reduce the viscosity of chocolate frosts till 2690 mPa•s, but adding lecithin or mixture MG, DG, TG of waste palm oil this result is achieved already at 0.3% SAS. Thus, the most effective SAS for chocolate frosts with whey powder is mixture MG, DG, TG of waste palm oil.

The results of the investigations of dependence viscosity chocolate frosts with fruit concentrate and various kinds of SAS are given at figure 3.

It is seen that viscosity of the frosts with fruit concentrate has increased till 4700 mPa·s, in comparison with viscosity of frosts without any additions. When adding 1% SAS the most reducing of viscosity is achieved with the usage of mixture MG, DG, TG of fat (3400 mPa·s). With the usage of lecithin the result was 3900 mPa·s, but with the mixture MG, DG, TG of waste palm oil was 3600 mPa·s. Thus, the most effective SAS for chocolate frosts with fruit concentrate is mixture MG, DG, TG of fat.

The organoleptic characterists are shown in table 3.

Table 3

The research of organoleptic data of chocolate frosts

Chocolate frosts	Fusibility	Testle	Scent
Without addition: - without SAS; - with lecithin; - with the mixture MG, DG, TG of waste palm oil; - with the mixture MG, DG, TG of fat.	average good average good	Bitterly-sweet	Typical chocolate frosts without any foreign scent
With whey powder: - without SAS; - with lecithin; - with the mixture MG, DG, TG of waste palm oil; - with the mixture MG, DG, TG of fat.	average good average good	Sweet with milk	Typical chocolate frosts without any foreign scent
With fruit concentrate: - without SAS; - with lecithin; - with the mixture MG, DG, TG of waste palm oil; - with the mixture MG, DG, TG of fat.	average good good good	Sour-sweet	Typical chocolate frosts without any foreign scent

From given results at table 3 it is evident, that SAS reduce viscosity but don't influence the taste and feeling of melting in the mouth researched items of frosts and whey powder and fruit concentrate enriched taste and aroma of chocolate frosts.

The appearance of frosty confectionery is also important. But turning grey is available, but not desirable. That's why it is necessary to investigate the stability to turn grey the made chocolate frosts. The results of these investigations are at table 4.

Table 4

Stability investigation of the chocolate frosts to turn grey

Chocolate frosts	Stability investigation of the chocolate frosts to turn grey
without addition:	
- without SAS;	process are not done
- with lecithin;	process are not done
- with the mixture MG, DG, TG of waste palm oil;	
- with the mixture MG, DG, TG of fat.	minor change minor change
with whey powder:	
- without SAS;	process are not done
- with lecithin;	minor change
- with the mixture MG, DG, TG of waste palm oil;	
- with the mixture MG, DG, TG of fat.	minor change minor change
with fruit concentrate:	
- without SAS;	process are not done
- with lecithin;	process are not done
- with the mixture MG, DG, TG of waste palm oil;	
- with the mixture MG, DG, TG of fat.	minor change process are not done

From given results at table 5, is clear that the addition of mixture MG, DG, TG of waste palm oil and fat made it worse the stability of chocolate frosts as to the turning gray, especially frost with whey powder. It's also established that taste, scent and melting point of chocolate frosts in the mouth did not change after their saving.

In table 5 there are data as to the appearance and quantity SAS, effective to each example, and to the main results of the received products.

The effect of SAS under the production of chocolate frosts is characterized also by its thinning ability. It's taken by the quantity of cocoa butter, necessary to reduce viscosity at 0.4% SAS [2].

The compared characteristics thinning ability of used SAS are shown in table 6.

Table 5

The components and quality results of chocolate frosts

Index / Model of frosts	Types of SAS	Content of SAS, %	Viscosity, mPa·s	Temperature of freezing, °C	Temperature of fusibility, °C
without addition	mixture MG, DG, TG of waste palm oil	0.2	2530	23	29
with whey powder	lecithin	0.3	2940	22	33
with fruit concentrate	mixture MG, DG, TG of fat	1	3400	21	35

Table 6

Thinning ability of received SAS

Types of SAS	Thinning ability, %
lecithin	0.80
mixture MG, DG, TG of waste palm oil	0.85
mixture MG, DG, TG of fat	0.85

It's clear from these figures that lecithin and SAS obtained on the bases of waste palm oil and fat have thinning ability more than 0.8%.

The results can be related to the peculiarity of the molecular structure of palm oil and fat. Also special is the impact of the ratio of MG, DG and TG in the SAS.

It's evident that they are effective SAS for reducing viscosity of chocolate frosts and give the possibility to economize nearly 1% of cocoa butter in the ready to use product.

Conclusions

The results of those investigations are shown that with addition of whey powder and fruit concentrate the gustatory sense of made frosts is increasing. It is enriched with the vitamins, micro-elements necessary for a man. Besides, the physical data is also is improving. For example, frosts with whey powder the melting point is more than 33°C, and viscosity of frosts reduce to 2940 mPa·s. With the addition of fruit concentrate congelation point are reduce to 21 °C. At the sometime viscosity of the frost significantly increase, that why it's necessary to add SAS to reduce these characteristics until 3400mPa•s. But the addition of the fruit concentrate provide to eliminate the turn gray and makes tasty qualities better and to use the lecithin, mixture MG, DG, TG of waste palm oil and fat is also good for ready to use product.

As a SAS are need to use lecithin, mixture MG, DG, TG of waste palm oil or fat in depending of components of final product.

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