

## SOME ASPECTS REGARDING THE DEGREE OF CONSERVATION OF THE CREAM PACKAGED IN PLASTIC MATERIALS

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### Abstract

*The prolongation of the product shelf life is directly influenced by the quality of the relation established between the packing method, package and product. In this situation, the package properties play a primary role in ensuring the protection and preservation function. This paper's purpose is to present and analyze cream and types of plastic food package, in relation with the food product; plastic food package still being the most used for the packaging of dairy products. The cream packagings have been tested specifically: white polypropylene packagings and coloured sealing ends as well. The security of food stuff packaging materials is based on the insurance of the fact that while coming into contact with food, the unsafe chemical substances do not migrate into it. The substance quantity limit that can be transmitted to product must be determined and limited at a level that will not cause any changes in food stuff. Initially analyses on the product as well as on the package have been made. Then, analyses at 7 day- intervals during a month of storage have been made.*

Keywords: fermented cream compounds, global migration, polypropylene

## 1. INTRODUCTION

In relation between package and food stuff the primary role is reserved to the food product for it determines the choice of right material (according to its nature), the type of package and the proper ways of packaging. When selecting the materials for food stuff packaging it is necessary to take into account the fact that by their direct contact with product or by the chemical reactions occurred, the materials used can change food composition or produce microbiological or chemical contamination of products. [1]. It is necessary to combat the unwanted phenomena and the packaging materials to be wisely chosen, well cleaned and eventually sterilized.

The security of food stuff packaging materials is based on the insurance of the fact that while they come into contact with food the unsafe chemical substances do not migrate into it.[2]. The substance quantity limit that can be transmitted to product must be determined and limited at a level that won't cause any changes in the food stuff. Therefore, it is necessary to determine the materials stability degree through tests of components global migration and specific components migration by extracting liquid samples that imitate the extracting traits

of the food group which the final material (package) could come into contact with under sufficiently severe conditions for the packaging material to be submitted in practice. [3]

The substances having a toxic potential: monomers, starting substances, additives are restricted through limits of specific migration (LSM) expressed in ppm (mg of substance/ kg, food/ kg of food simulating items) or through the maximum allowed quantity of residual substance (CM in the material (or final package). [4]

## 2. MATERIALS AND METHODS

The following methods are used:

a. Methods of hygienic-sanitary analysis of packagings

b. Methods of quality verifying of the product: cream (including organoleptic, physico-chemical and microbiological properties).

a. *The method of compounds global migration* the global migration principle consists of hygienic- sanitary control methods for the materials which come into contact with food products. The SR EN 1186-1:2003 Standards and its other parts bring support to selection and testing conditions of the global migration

from plastic materials into food simulating items.

The migration test is performed on the finished material.

*Samples' preparation for the migration test.*

Before the extraction has been made, vials are cleaned with plain water, washed with distilled water and then dried with filter paper or air draft. The samples prepared this way are put into contact with food or food simulating item through filling (cans or bags).

The blank sample: all extractions are made in parallel (same temperature and time conditions) with the liquid samples that are simulating items which haven't come into contact with material samples.

*The determination of the compounds' global migration.* The compounds global migration representing the quantity of substance released from the tested sample material in the extraction environment or simulated item is determined analytically according to the simulating type. The liquid simulating items used in the case of dairy products are:

- Simulating item A: distilled water
- Simulating item B: acetic acid 3% (m/v)
- Simulating item C: ethanol 50% (m/v)

In the case of water content simulating items:

- through the simulating item's evaporation and weighing of residues: when the contact time ends, the extraction liquid is transferred to another glass from which 200ml are taken to determine the soluble released substances.

If the extraction liquid's total volume is lower than 200ml the entire quantity is taken for testing and is evaporated in small amounts until dry in a platinum capsule previously brought to a constant weight. Afterwards the complete evaporation drying is made in an oven at 105° C for one hour. Then the capsule is cooled in the dryer for one hour and the analytic balance is weighed with 4 decimals. The maintaining operations, cooling and weighing are performed until the capsule weight remains constant. These operations are also made for blank samples. In the case of using the refined olive oil as simulating item or any of its substitutes, one of the following methods is applied:

- the extraction test using simulating item D (refined olive oil or sun flower oil) involves the following operations: the material or object

sample is weighed before and after the contact with the simulating item; the difference between the initial and final weight represents the global migration of the examined sample.

- the alternate test in a volatile environment (isooctane) is similarly made by the test for liquid simulating items, presented above, through the simulating items' evaporation and residue weighing. The alternative test in a volatile environment is made according to SR EN 1186-15/ 2003: materials and products in contact with food stuff; plastic materials, part 15: Testing methods for global migration in fat simulating items by rapid isooctane and ethylic alcohol 95% extraction.

The results of compounds' global migration are expressed in mg/ kg or mg/ dm<sup>2</sup>, the limit of global migration imposed by the existing laws, respectively HG no 1197/ 2002 regarding approval of the Norms concerning materials and objects that come into contact with food stuff is of 10mg/ dm<sup>2</sup> (of material's surface) or 60ppm (mg free released compounds/ kg of food stuff).

The organoleptic test. The package's organoleptic test: the organoleptic properties analyzed (aspect, smell and where possible taste) for:

- food simulating items that have been in contact with packages as compared to blank liquids (food simulating items that haven't been in contact with the materials tested).

- the material samples subdued to extractions as compared to blank samples materials that haven't been in contact with foods or food simulating items).

The package and material samples coming into contact with food stuff (after extractions have been made under the conditions established according to their use) are not allowed to present visible changes of colour and appearance of surface as compared to blank samples. The food stuff or food simulating items should not present modifications of their colour, transparency (opalescence), smell, taste (where possible) as compared to blanks either.

The dye releases. The extractions are made according to the global migration methods and when the extraction time ends, a primary test is made. The SR EN 1186-1:2003 is used to select extraction conditions (simulating item B being the recommended one).

The primary test represents the comparison of the extract and blank colours (that have to be uncoloured) regarding the upper and lower liquid layers on a white background. Glass uncoloured vials or jars of identical type are used.

The test is made by diffuse light. If after the primary test a colour modification can be observed the liquid is submitted to the opened spectrophotometric test (400-750nm) taking as reference the same liquid which has not been in contact with the test sample (blank).

According to HG no 1197/ 2002 (the imposed limit): colour modifications of extraction liquids are not allowed, the dye releasing being practically absent.

*b. Methods of quality verifying of the product*

The sensorial analysis. The organoleptic properties analysis (appearance, smell and taste) is carried out after the analyzing sample has been harvested from the analyzed samples. The organoleptic characteristics of the daily cream are taken into account for evaluation (table 1):

**Table 1. The organoleptic characteristics of the daily cream**

Characteristics	Daily cream
Appearance and consistency	Homogenous, fluid for sweet cream and viscous for the fermented one. No piled-up fat or protein substances.
Colour	White to yellowish-white
Taste	Specific to assortment
Smell	No strange smell

The acidity's determination. The method's principle is the following: the acidity from certain prepared sample volume is neutralized by titration with sodium hydroxide solution 0.1n, in the presence of phenolphthalein as indicator.

**3.RESULTS AND DISCUSSION**

Initially analyses on the product as well as on the package have been performed. Then analyses at 7 day- intervals during a month of storage have been made.

The product analysis.

The sensorial analysis. 30 day-determinations have been made on two grades of cream with

the following physico-chemical parameters (table 2):

**Table 2. The physico-chemical parameters during 30 days**

Characteristics	Grade	
	Sweet cream	Fermented cream
-fat, % maximum	32	40
- acidity, °T maximum	20	90

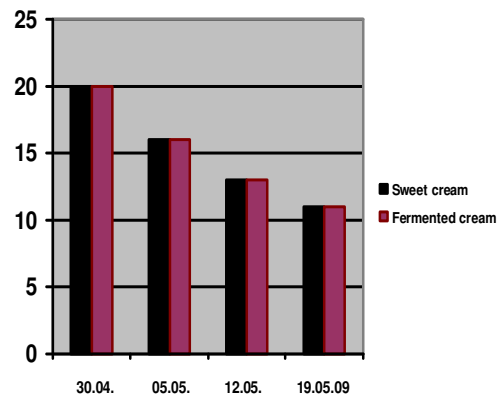
The determinations have been made at 7 day-intervals during a month of storage.

The quantitative evaluation of sensorial quality the marking method has been used due to simplicity of interpretation of the results (table 3).

The quality was established taking into account the following values for the proportion factors (Karshure):

- taste and flavour;
- structure and consistency;
- colour and external appearance;
- smell;
- package.

For the quality characteristics: taste and flavour, structure and consistency, colour and external appearance and package, a certain number of points according to their state on the analysis date has been established.



**Fig 1. The sensorial appreciation of the cream grades (sweet and fermented) at different storage stages**

**Table 3. The sensorial analysis list for cream**

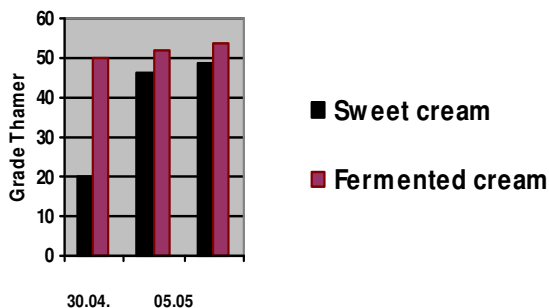
Date	Analyzed sample	Evaluation by points	Examined characteristics					Total points
			Taste and flavour	Structure and consistency	Colour and external appearance	Smell	Package	
		Maximum given points	5	3	3	4	5	20
1	Sample 1	Given points	5	3	3	4	5	20
	Sample 2	Given points	5	3	3	4	5	20
7	Sample 1	Given points	4	2	2	3	5	16
	Sample 2	Given points	4	2	2	3	5	16
14	Sample 1	Given points	3	2	1	2	5	13
	Sample 2	Given points	3	2	1	2	5	13
21	Sample 1	Given points	2	2	1	1	5	11
	Sample 2	Given points	2	2	1	1	5	11

The sum of points for all the criteria gave the final appreciation to the examined samples, getting a score that shows the qualities as being correspondent to the norms and ideal for human consumption.

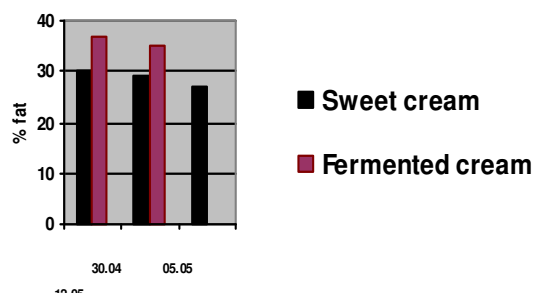
Acidity's determination

**Table 4. Results for the cream acidity's analysis**

Date	Grade	
	Sweet (sample1)	Fermented (sample 2)
30.04	20°T	50°T
5.05	46°T	52°T
12.05	49°T	54°T



**Fig 2. The acidity of cream grades (sweet and fermented) analyzed at different stages of storage**



**Fig 3. The fat content of cream grades analyzed at different stages of storage**

**Table 5. The results of cream fat content analysis**

Date	Sortiment	
	Sweet (sample1)	Fermented (sample 2)
30.04	30%	37%
5.05	29%	35%
12.05	27%	34.5%

Hygienic-sanitary methods for packaging's analysis .

The compounds global migration analysis. The cream packagings have been tested specifically: white polypropylene packagings and coloured sealing ends as well.

### 3. CONCLUSIONS

After the analyses have been made and after testing the package, the plastic material respectively, the bucket where the daily cream is packed, we can say that the package does not cause any issues of compounds release into the product which could modify the organoleptic properties of the product.

**Table.6 Results of the compounds global migration**

Characteristics	U.M.	Method of analysis	Results	
The compound global migration			White bucket	PP Coloured PP sealing ends
Conditions of extraction 10 days at 40°C - in distilled water - in acetic acid 3% - in ethylic alcohol 50%	mg/kg mg/kg mg/kg	SR EN 1186-9 :2003	5,0 8,5 8,0	4,0 11,25 7,5
Conditions of extraction 24 hours at 40°C : - in iso-octane	mg/kg	SR EN 1186-15 :2003	34,5	45,5
<b>Organoleptic examination</b>				
Conditions of extraction 10 days at 40°C - in distilled water - sample - extract - in acetic acid 3% - sample - extract - in ethylic alcohol 50% - sample - extract		Method of analysis	unmodified unmodified unmodified unmodified	unmodified unmodified unmodified unmodified
Conditions of extraction 24 hours at 40°C : - in iso-octane - sample - extract		Internal method	unmodified unmodified	unmodified unmodified
<b>Dye dropping</b>				
Conditions of extraction 10 days at 40°C : - in acetic acid 3% -blue		Spectrophotometry UV/VIS	-	Absent

The variations of 5-10°C registered in sweet cream as well as in the fermented one are mostly due to the conditions imposed by the analyzing method (the samples preparation by heating at 40-45°C for 10-15 min) fact which is not due to storage, without influencing the acidity's increase (we know it takes place at -18°C). The fat content is totally brought by diary raw materials (unprocessed milk), during storage to the approved norms, only small variations being noticed.

The results obtained after analysis were: the global migration into the simulated items A, B, C and D is placed under the 60 ppm limit; no organoleptic modifications have been noticed, neither for samples nor for extracts; no dye release in the simulated item B has been noticed either.

All the results obtained from package analysis (bucket as well as endings) are in conformity with HG no 1197/ 2007 and its further modifications.

#### 4. REFERENCES

- [1] Department of Health (1994). *Guidelines for the Safe Production of Heat Preserved Foods*, HMSO, London.
- [2] NFPA (1975). *Safety of Damaged Canned Food Containers – Guidelines for Consumers, Regulatory Officials, Canners, Distributors and Retailers*. Bulletin 38-L, National Food Processors Association 1133 20th Street, N.W. Washington DC20036
- [4] David H. Watson – Food Chemical Safety-Vol I-Contaminants,pag 193