THE PREPARATION OF BUTTER FOR ANALYSIS OF ITS COMPOSITION PRINCIPLES AND CRITICAL POINTS

The butter is subject to composition criteria including, in particular, moisture, dry non-fat content and fat contents.

In order to ensure compliance with these criteria and also to monitor production operations, the butter is regularly analysed using chemical or instrumental analytical methods.

For chemical methods, a preparation of the sample is required. This step is described in the standardised analytical methods (AFNOR and / or ISO in particular):

- **ISO 3727-1 to -3: Butter: Determination of moisture, non-fat solids and fat contents**
- **ISO 8851-1 to -3: Butter: Determination of moisture, non-fat solids and fat contents (routine methods)**
- **ISO 17189: Butter, edible oil emulsions and spreadable fats — Determination of fat content (Reference method)**

As with all the other dairy products, the steps of sampling, sub-sampling and sample preparation for butter are essential to achieving results, accurate and representative of the initial sample.

You will find below a description of these different steps, their objectives, the operating conditions to set up and the critical points to control.

Sampling

As with the most analytical standards, the sampling part is not included in the documents relating to the determination of the composition of the butter. In this case, the reference is made to ISO 707 | IDF 50 standard, which specifies the sampling methods to be applied in a production area.

Once the sample has been taken, it should be packed in an airtight container and then stored at 2 ± 2 ° C.
This step is obviously major to ensure the representativeness and the stability of the sample during production (or part of the production) whose composition we want to know.

However, it should be noted that the test laboratories mainly receive either samples during the process, or samples in their final packaging. These must then be subjected to a subsampling step, and then to a preparation step of the final test sample.

The major critical points of this step are:

- **The representativeness of the sample taken with regard to the product to be characterized**
- **The compliance with the packaging and storage methods so as to avoid any change in the sample initially taken.**

Sub-sampling

Despite its importance, this intermediate step is not often described in detail in analytical standards. The first objective of this step is to ensure the representativeness of the sample which will be prepared and then subjected to testing considering that a "mass reduction" is very often necessary (for example reception of a pack or tub of 250 g and preparation only of a fraction of 50 g).

This "mass reduction" must be precisely carried out and defined to ensure representativeness to the sample received. Various methods exist and fulfill the objective, but the general principle to apply is to divide the sample received into smaller portions followed by a sampling of these small portions within the total sample to constitute a sample of about 50 g which will then be subjected to preparation.

The images below are an illustration of what can be done on the basis of the reception of a pack which will be, firstly, cut into "cubes" which will then be sampled within the global sample to constitute a subsample. It should be noted that this operation needs to be carried out "cold", on the one hand to avoid a product development but also, and on the other hand for ease of cutting and gripping the cubes.

The advantage of such a method will also be to be able to constitute several sub-samples which will be immediately stored at 2 ± 2 ° C in the case of multiple analysis or for duplicate analysis if necessary.
It should be noted that the containers chosen to carry out these sub-samples must ensure good sealing.

Within the framework of the definition of its operating mode, the laboratory will have to validate on the one hand that its sub-sampling methods make it possible to ensure representativeness to the sample received and on the other hand that the storage methods (containers, time) also meet the stability objective of the subsampled sample.



The major critical points of this step are:

- **To have a method to ensure the representativeness of the sub-sample to the sample received**
- **Define packaging and storage methods to ensure the non-evolution of the product received.**
- **Validate the sub-sampling process**

Preparation

The general principle to prepare a sample of butter (in the closed container) is heating the sample in a water bath to a temperature not exceeding 35 °C until it melts and obtaining a butter with an "ointment-like" texture. This temperature can be lowered over a range of 25 to 30 °C for samples susceptible to phase difference.

During the stay in the water bath, the sample will be mixed manually without opening the bottle, taking care not to create a break in the emulsion (phase difference of the butter). As soon as the desired texture is reached, the bottle will be opened and the butter will be mixed using a spoon or a spatula to ensure consistency and representativeness of subsequent test samples. This mixing time should not exceed 10 seconds

It will be important to quickly carry out the test samples for all of the planned determinations. This sample thus prepared must in no case be re-stored in the cold for subsequent determinations (with integration of a new heating step), otherwise its water content will be impacted.

The major critical points of this step are:

- **The respect for the heating temperature which, if it is too high, could lead to an attack on the physical integrity of the sample (phase difference) and an increased risk of loss of humidity**
- **A too intense shaking of the sample during heating which may cause damage to the physical integrity of the sample and lead to a non-representative and non-homogeneous test sample.**
- **A too long opening time of the bottle causing loss of water and thus an underestimation of the water content of the product tested.**

Conclusion

As you have understood, compliance with good practices during these steps is the only solution to ensure the quality of the determinations that are carried out in the laboratories. Indeed, they will allow you to ensure the representativeness of the initial sample throughout the analytical process and also the quality of the associated analytical determinations.

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