
Papir, karton in lepenka v stiku z živili - Umerjanje za preskus neustreznega vonja ali okusa - 3. del: Suha živila

Paper and board intended to come into contact with foodstuffs - Calibration of the off-flavour test - Part 3: Dry food

Papier und Pappe vorgesehen für den Kontakt mit Lebensmitteln - Kalibrierung für die Geschmacksprüfung - Teil 3: Trockene Lebensmittel

Papiers et cartons destinés à entrer en contact avec les denrées alimentaires - Etalonnage des essais de flaveur atypique - Partie 3 : Aliments secs

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ICS:

67.250	Materiali in predmeti v stiku z živili	Materials and articles in contact with foodstuffs
85.060	Papir, karton in lepenka	Paper and board

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ICS 67.250; 85.060

English Version

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Calibration of the off-flavour test - Part 3: Dry food**

Papiers et cartons destinés à entrer en contact avec les
denrées alimentaires - Etalonnage des essais de flaveur
atypique - Partie 3 : Aliments secs

Papier und Pappe vorgesehen für den Kontakt mit
Lebensmitteln - Kalibrierung für die Geschmacksprüfung -
Teil 3: Trockene Lebensmittel

This Technical Report was approved by CEN on 13 August 2007. It has been drawn up by the Technical Committee CEN/TC 172.

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Foreword

This document (CEN/TR 15645-3:2008) has been prepared by Technical Committee CEN/TC 172 “Pulp, paper and board”, the secretariat of which is held by DIN.

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Introduction

Paper and board, intended to be in contact with food, may have characteristic off-flavours that can migrate via the airspace to the food packed in it. The purpose of testing the off-flavour of food in contact with paper and board is to establish whether the material to be tested possesses an inherent off-flavour when kept at room temperature.

In order to gain reliable results from the sensory evaluation, the performance of a sensory panel assessing the off-flavour within test material needs to be validated. This can be implemented through a training procedure by using spiked calibration samples prepared according to the given instructions.

This document consists of:

- protocol to prepare the calibration samples (spiked icing sugar) for sensory evaluation of off-flavour;
- description of the training procedure for a sensory panel in the use of the calibration samples;
- instructions for sensory evaluation of calibration samples before and after training.

This guide is meant to be used in connection with the European Standard EN 1230-2. The guidance given in this document is only a recommendation. Please note that the calibration samples, the preparation of which is described, can be applied also in other ways than described in this document.

This guide has been devised and collaboratively tested in the context of the EU research project CALIBSENSORY (Growth programme, Measurement and Testing activity, GRD2-2000-30015) and it is the sole responsibility of its authors. It does in no way represent the views of the Commission or its services. Published results of the project are available at <http://www1.kcl.fi/euproj/calib.html> .

1 Scope

This Technical Report specifies a written protocol to prepare calibration samples for assessment of off-flavour (given by benzaldehyde) in a test substance representative of dry food products (icing sugar). Essentially, this is meant to simulate the transfer of off-flavours from paper and board to a dry food product.

This Technical Report also specifies how to train the panel in the use of the calibration samples.

The general outline of the test procedure consists of sensory assessment of off-flavour in samples without formal training by a selected panel, followed by training of the panel, and finally sensory assessment of the samples after training by the same sensory panel.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6658, *Sensory analysis — Methodology — General guidance*

ISO 8586-1, *Sensory analysis — General guidance for the selection, training and monitoring of assessors — Part 1: Selected assessors*

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3 Terms and definitions

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For the purposes of this document, the following terms and definitions apply.

3.1 assessor

any person taking part in a sensory test

[see ISO 5492:1992]

3.2 calibration procedure

protocol of calibration samples and written instructions to train selected assessors with calibration samples i.e. calibrate the panel

3.3 calibration sample

test substance that is spiked with spiking compound at a certain concentration

3.4 control sample

a hidden reference sample served blind coded to the assessors among the calibration samples, and prepared according to the procedure of the calibration samples but without the spiking compound

3.5 flavour

complex combination of the olfactory, gustatory and trigeminal sensations perceived during tasting

NOTE The flavour may be influenced by tactile, thermal, painful and/or kinaesthetic effects

[see ISO 5492:1992]

3.6**multicomparison test**

test where the assessor is asked to give a rating of the intensity of the difference in taste between test portions for analysis and a known reference sample

3.7**off-flavour**

a typical flavour often associated with deterioration or transformation of the product

[see ISO 5492:1992]

3.8**reference sample**

calibration sample without any spiking compound.

NOTE This is presented to the assessors labelled as "Reference" and served to the assessors before the calibration samples.

3.9**selected assessor**

assessor chosen for his/her ability to perform a sensory test

[see ISO 5492:1992]

3.10**spiking compound**

volatile chemical compound having a specific flavour

NOTE In this case benzaldehyde is the selected spiking compound

3.11**spiking method**

method for spiking the test substance with spiking compounds

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3.12**taint**

taste or odour foreign to the product

[see ISO 5492:1992]

3.13**taste**

sensations perceived by the taste organ when stimulated by certain soluble substances

[see ISO 5492:1992]

NOTE For simplicity, taste and flavour are used as synonyms in the European Standard EN 1230-2, though this is not exactly in accordance with ISO 5492. The same regards taint and off-flavour.

3.14**test portion**

portion of the test sample, which is directly tested by the assessor

[see ISO 5492:1992]

3.15**test substance**

substance to be assessed by the assessor

NOTE It may be the food product intended to be packed, or a suitable simulant that may absorb compounds from the packaging materials. In this case icing sugar is the selected test substance.

4 Principle

A validation of the training process for a sensory panel has to be conducted with freshly made calibration samples. Spiking solutions shall be prepared by diluting the spiking compound (benzaldehyde) in triacetin, until required concentrations are reached. Calibration samples have to be prepared by exposure of icing sugar to the different spiking solutions by an absorption procedure, using glass desiccators. The panel performance in evaluating the off-flavour intensity within the calibration samples has to be determined before and after a formal training step. The effectiveness of training can then be determined.

The test procedure consists of 3 steps:

- a) first step: assessment of calibration samples before training;
- b) second step: training procedure;
- c) third step: assessment of calibration samples after training.

Detailed instructions for general test procedure, sample preparation and sensory evaluation are provided within this Technical Report, and must be carefully followed to ensure validity of results.

5 Materials and reagents

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5.1 General

Icing sugar is the test substance used to absorb different concentrations of the spiking compound diluted with the solvent. In this Technical Report, benzaldehyde shall be used as the spiking compound and triacetin as the solvent.

Every substance and reagent shall be certified for use in foodstuffs in accordance with European Standards and free from off-flavours.

5.2 Test substance

Icing sugar that is free from off-flavour is used as the test substance. It should be stored in an odourless environment, with storage conditions recommended as follows:

- Temperature: 18 °C to 25 °C;
- Relative Humidity: 20 % to 60 %.

5.3 Spiking compound

Food grade benzaldehyde with purity of ≥ 99 % is used as the spiking compound.

5.4 Solvent

Triacetin (glyceryl triacetate) shall be used as a solvent for diluting the spiking compound. The CAS number of triacetin is 102-76-1. Recommended purity of 97 % to 100 %.

5.5 Silicone (optional)

Silicone may be used to seal the cap of the glass-weighting flasks. If silicone is used, it should be chemically pure and odourless (or very weak odour). Note that the use of silicone is optional.

5.6 Saturated sodium chloride solution

Pure NaCl (sodium chloride) has to be used to create batches of saturated sodium chloride solutions. NaCl shall be free from off-flavours.

6 Equipment

6.1 General

All equipment used shall be free from odour and only in use for sensory analysis (see ISO 6658). Minimum-odour cleaning agents for cleaning shall be used. Equipment and glassware shall be cleaned between sessions. Any glassware used shall be washed with minimum-odour cleaning agents and dried by placement in an oven at a temperature > 100 °C and left to evaporate for at least 2 h. All other equipment (including dessicators) shall be washed with minimum-odour cleaning agents and left to dry at room temperature.

6.2 Dessicators

The absorption process has to be carried out in a glass dessicator fitted with a porcelain plate. One dessicator is used per concentration of the spiking compound, five in total. **Ensure the same dessicator is used to make the same concentration of sample at each session.** Specifications for the recommended dessicator are given in Annex A.

6.3 Glass-weighting flasks

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Glass-weighting flasks with ground glass cap that fits into an internally ground glass body.

Dimensions: diameter 50 mm

 height 35 mm

If these flasks are not available, glass flasks of similar dimensions may be used, as long as they do not introduce off-flavours or absorb odour.

Each test portion should be prepared and served in a separate glass-weighting flask. Six glass flasks are required for each assessor on the panel. E.g. if there are eight assessors on the panel, then 48 flasks have to be required.

NOTE Five extra glass-weighting flasks should be required for the spiking solutions. If possible, these should be of identical dimensions, i.e. 50 mm diameter × 35 mm height.

6.4 Glass rods

Glass rods to stir the samples.

6.5 Plastic spoons

Each sample should be assessed using a separate spoon. At each session, every assessor will need one plastic spoon for each sample.

7 Preparation of calibration samples

7.1 General

In general, six samples will be needed to be prepared. These are summarised, along with their concentrations of benzaldehyde, see Table 1.

During the assessment sessions (first and third step), all six calibration samples will be needed to be prepared. During the training session (second step), only four of the samples will be needed to be prepared (reference, S1, S2 and S4). This will impact on the amount of icing sugar test portions that is needed to be prepared, as well as which spiking solutions are needed to be made.

Table 1 — Samples and their concentrations of benzaldehyde (ppm = mg benzaldehyde/g sugar)

sample	benzaldehyde concentration determined by the chemical analyses ppm	first step	second step	third step
reference	0	x	x	x
S0 (control sample)	0	x		x
S1	3,22 ± 0,19	x	x	x
S2	6,44 ± 0,26	x	x	x
S3	14,63 ± 0,60	x		x
S4	30,32 ± 1,39	x	x	x

7.2 Stability of calibration samples

The concentration of benzaldehyde significantly decreases in the calibration samples within 3 d of preparation.

Sample preparation shall begin **24 h** prior to assessment (see details above).

If the dimensions of the used dessicator and the porcelain plate are not exactly the same as described in Annex A, it is strongly recommended that the concentrations of benzaldehyde in calibration samples are checked by chemical analyses (see Annex L) to be within the limits presented in Table 1.

7.3 Preparation of saturated sodium chloride solution

NaCl has to be used to create batches of saturated sodium chloride solutions. One batch is required for each dessicator (five batches in total). For each batch, heat 1 l of distilled water up to 90 °C, add 500 g of pure NaCl and stir using a magnetic stirrer until dissolved. Once it has cooled to room temperature, the solution has to be placed in the dessicators, providing a saturated solution of NaCl standing over excess salt. A relative humidity of 75 % will prevail in the dessicators with the aid of this solution.

7.4 Preparation of icing sugar test portions

First individual test portions of icing sugar shall be prepared. For each session, as many icing sugar samples as you need (one 4,8 g sample of icing sugar for **each sample** for **each assessor**) have to be prepared.

- prior to measure test portions of icing sugar, the container with the 470 g of icing sugar for that session has to be shaken for approximately 30 s for homogenisation;
- weigh (4,8 ± 0,02) g of icing sugar in each glass-weighting flask;

c) the glass-weighting flasks have to be closed immediately;

NOTE The containers may be sealed by smearing silicone around the cap (optional);

d) surface of the sample is levelled out by gently knocking each container on the work surface (table).

Keep the icing sugar samples ready, but do not place them in the dessicators until after the following step.

7.5 Preparation of spiking solutions

Once the icing sugar is ready, the spiking solutions for each concentration should be prepared.

NOTE 1 The mixtures should be prepared immediately prior to introducing the glass-weighting flasks with the icing sugar in the dessicators.

The spiking solutions have to be prepared in glass-weighting flasks (the same size and specifications as the glass-weighting flasks used for the icing sugar).

The spiking compound (benzaldehyde) has to be dissolved and diluted in the solvent (triacetin), $(3 \pm 0,003)$ g total weight. The amount of benzaldehyde and triacetin for each calibration sample, along with the final concentrations, can be found in Table 2.

Table 2 — Concentration of spiking compound in solvent ($(3 \pm 0,003)$ g total weight)

sample	benzaldehyde g	triacetin g	benzaldehyde in solvent %
reference and S0	0,000	3,000	0
S1	0,045	2,955	1,5
S2	0,090	2,910	3
S3	0,210	2,790	7
S4	0,480	2,520	16

NOTE 2 The reference and control sample (S0) should be made simultaneously in the same dessicator, so only one 3 g batch of solution (triacetin only) is required to make both of these samples.

As soon as the spiking solution is ready, the container for each spiking solution by placing the lid on the glass-weighting flask should be closed.

7.6 Preparation of calibration samples

For each session, fresh calibration samples have to be prepared. Prepare each set of calibration samples using a separate dessicator for each concentration, following the steps below:

- prepare the saturated NaCl solution as described in 7.3, pour the solution in the dessicators;
- prepare the icing sugar samples as described in 7.4;
- prepare the spiking solutions as described in 7.5;
- closed container with the spiking compound has to be placed immediately in the centre of the porcelain plate inside the dessicator. **Dessicators should be labelled to identify the concentration inside. Ensure the same dessicator is used to make the same concentration of sample at each session;**
 - each concentration of spiking solution has to be placed in a separate dessicator;