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Sensory analysis — Methodology — General guidance

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National foreword

This British Standard is the UK implementation of ISO 6658:2017. It supersedes BS ISO 6658:2005, which is withdrawn.

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 34, *Food Products*, Subcommittee SC 12, *Sensory analysis*.

This third edition cancels and replaces the second edition (ISO 6658:2005), which has been technically revised. The following changes have been made:

— the definition of "sensory analysis" was updated;

— a tetrad test was added to the discrimination tests as 5.2.7;

— the descriptive test in 5.4 was expanded by new methods;

— Clause 6 was updated;

— Table A.1 was deleted from Annex A;

— the Bibliography was updated and expanded.

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Introduction

This document constitutes a general introduction to the methodology of sensory analysis and should be read before undertaking the more detailed test procedures described in other International Standards. It covers the general area of methodology and is intended to fulfil the following functions:

— to provide a brief background of the essential features of methods of sensory analysis for the user of specific tests;

— to provide details of general requirements, procedures and interpretation of results common to all or most tests;

— to provide sufficient guidance on requirements, procedures and interpretation of results for the different specific tests to allow choice of the most appropriate procedure(s) for solution of a particular problem.

It comprises three main aspects, covered in Clauses 4, 5 and 6.

It is essential that Clause 4 “General requirements” be read first. Clause 5 “Methods of test” describes, in a general manner, all the main tests. Clause 6 is concerned with some general principles of data collection and analysis of sensory data and also briefly covers general principles of statistical treatment of the results.

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Sensory analysis — Methodology — General guidance

WARNING — This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

1 Scope

This document gives general guidance on the use of sensory analysis. It describes tests for the examination of foods and other products by sensory analysis, and includes some general information on the techniques to be used if statistical analysis of the results is required.

Generally these tests are intended only for objective sensory analysis. However, if a test can be used for determining preference in hedonic test, this is indicated.

A hedonic test aims to determine the acceptability of the products and/or to determine preferences among two or more products by the specified consumer population. The methods are effective for determining whether a perceptible preference exists (difference in degree of liking), or whether no perceptible preference exists (paired similarity test). General guidance for hedonic tests is given in ISO 11136.

2 Normative references

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

ISO 5492, *Sensory analysis — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5492 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
sensory analysis
science involved with the assessment of the organoleptic attributes of a product by the senses

4 General requirements

4.1 Basic information

This clause covers the general requirements common to all situations encountered in sensory analysis. The information basic to these requirements is as follows.

a) The human response to one stimulus cannot be isolated from previous experiences or from other sensory stimuli received from the environment. Nevertheless, influences arising from these two sources can be controlled and the effect standardized.

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b) Variability in sensory response is inherent in any group of people used for testing and is unavoidable; this can arise from inconsistencies within an individual, and through physiological and psychological differences between individuals. However, with training, such a group can show highly consistent individual responses. Recognition of these factors is important in the analysis of results.

c) Systematic biases in sensory experiments involving human response can result in misleading data and incorrect interpretation that can be difficult to identify. The factors that can result in bias should be identified and controlled as far as possible by appropriate experimental design and conduct of the tests.

d) The validity of the conclusions drawn from the results is dependent upon the test used and the way it is conducted, including the questions that have been asked.

4.2 Statement of objectives

There are three main types of objective, as follows:

a) those in which the aim of the test is to categorize, rank or describe the product(s);

b) those in which the aim is to distinguish between two or more products; here it is important to distinguish between the need to know

   i) if there is a difference at all,

   ii) how great is the magnitude of the difference,

   iii) the direction (or quality) of that difference,

   iv) the influence of that difference, e.g. with regard to preference, or

   v) if all or only part of a population is detecting a difference;

c) those in which reassurance is sought that products are sufficiently similar to be used interchangeably.

In sensory analysis, a given problem frequently requires appreciable discussion or thought before an appropriate test is selected. This is because the initial concept of the problem may require clarification.

4.3 Choice of test

The choice of appropriate test depends largely on the nature of the test objective, but also needs to take account of factors associated with the product, the assessors, the test environment, and the desired level of analytical precision and statistical confidence in the conclusions. The action that would occur based on the outcome of the test should be determined in advance.

For each test, an attempt is made in Clause 5 to give guidance as to its relevance. Preliminary tests may be necessary to confirm the applicability of a given test.

Because of sensory fatigue and the effects of adaptation, only a limited number of samples can be assessed during a session, depending on the nature of the test and the type of product. Some of these effects can be moderated by appropriate rinse procedures and recovery between samples.

While the use of control samples is essential in most cases, their use naturally limits the number of samples that can be assessed during any given session.

The statistical plan should always be determined before starting the tests. This is especially recommended if the number of samples to be evaluated requires more than one session. Details of statistical plans should be selected from specialized texts. Whatever test method is used, the sequential testing approach described in ISO 16820 should be considered whenever it is desirable to keep the number of samples or the number of assessors to a minimum.

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4.4 Choosing and training assessors

A sensory analysis panel constitutes a true "measuring instrument", and consequently the results of the analyses conducted depend on its members. The recruitment of persons willing to participate in a panel, therefore, needs to be carried out with care and should be considered as a real investment, both in time and financially. Management support in the organization is necessary if it is to be effective.

Sensory assessment may be made by three types of assessor: "sensory assessors", "selected assessors" or "expert sensory assessors". Assessors can be "naive assessors" who do not have to meet any precise criterion of selection or training, or people who have already taken part in some sensory tests ("initiated assessors"). "Selected assessors" are assessors who have been selected and trained for the particular sensory test. "Expert sensory assessors" are selected assessors who have been selected and trained for a variety of sensory analysis methods and who are able to make consistent and repeatable sensory assessments of products in one or several categories.

The selection and training methods to be employed depend on the tasks and methods that it is intended to give to the "selected assessors". Procedures for training assessors for descriptive tests are different from those for training assessors in discrimination tests.

Detailed procedures and methods for selection and training of assessors are given in ISO 8586. It should be noted that these methods sometimes only constitute a way of choosing the better candidates amongst those who are available, rather than to satisfy predetermined criteria. Also, the selection of assessors for their ability to discriminate and describe foods and other products is quite different from that used for preference tests. The former tasks require selection and training, whereas the latter requires only that the panel be representative of a specified sector of the population, for example, a group of consumers.

If a selection procedure is to be carried out, some important criteria for choosing assessors are as follows:

a) general ability to perform the specific sensory task;

b) availability with respect to normal employment;

c) motivation (willingness and interest);

d) good health (including the absence of specific allergies or treatment with medications) and good dental and general hygienic condition.

The performance of "selected assessors" and "expert sensory assessors" should be monitored regularly to ensure that the criteria by which they were initially selected continue to be met (see ISO 11132).

4.5 Material to be tested

The nature of the product to be tested determines the experimental protocol of the test, and may also have an influence on the type of test that is required to satisfy the test objectives. For example, a protocol in which foods are to be consumed hot will need to take into account the cooling rate of the product and the likely effect on sensory attributes, and the changes in sensory attributes that may occur in keeping the product hot prior to testing.

Methods of preparation and presentation of samples should be appropriate for the product and to the problem concerned.

EXAMPLE 1 A product that is normally consumed hot is prepared in the usual manner and tested hot; however, elevated temperatures can be used in some circumstances to increase the ease with which some flavours can be evaluated.

EXAMPLE 2 A product that is normally consumed in discrete pieces is not homogenized in order to retain textural characteristics. Care is needed, however, to ensure maximum uniformity between sub-samples for each assessor; this includes similar portion size and uniformity of composition.

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General principles for product sampling (in accordance with International Standards relating to the product under test) should be applied for test samples. In all cases, documentation of sample identification codes or lot numbers is necessary. Valid conclusions can be drawn for a product as a whole only if the samples tested are representative.

Carriers may sometimes be used for tests relating to the evaluation of products for which direct tasting is not feasible (see ISO 5497), for example food ingredients.

Lighting conditions should be specified when appearance is being assessed. When the test concerns only differences in flavour, the effect of colour differences may be partially masked by the use of lighting conditions that minimize the colour difference.

Containers should be chosen so as not to affect the test or the product. These may include washable ceramic or glass containers, or disposable plastic or paper containers, but shall not transfer chemical materials that could result in taint. In particular, washable containers should be washed only in odour- and taint-free detergents and rinsed in water, and polymeric and paper containers, including insulated containers used for hot or cold samples, should be odour- and taint-free.

Palate cleansers may be used by the assessors between samples and between sessions, but care should be taken to ensure that they do not influence the flavour of products to be assessed. Still and carbonated water and bland foods (for example, unsalted crackers) may be used between samples and between sessions. Checks on the water supply are desirable to ensure that it is bland and safe to consume. For particular purposes, deionized water, glass-distilled water, low mineral content spring water, carbon-filtered water or boiled tap water may be used, but it shall be noted that they are likely to have different flavours.

4.6 Test room

Sensory analysis shall be conducted in a dedicated test room (see ISO 8589 for guidance). The aim shall be to create for each assessor a separate environment with minimum distraction, so that each assessor can quickly adjust to the nature of the new task(s). Extraneous activities, including preparation of the samples, should not be allowed during the tests, as these can lead to biased results. The room should be at a comfortable temperature and should be ventilated with odour-free air; limited airflow is desirable to avoid excessive temperature fluctuations. Persistent odours, such as tobacco or cosmetics, shall not be allowed to contaminate the environment of the test room.

Sound should be restricted. A low background noise is usually more tolerable than a fluctuating level of noise. Conversation is more distracting than background noise. Interruptions cause the greatest distraction.

It is usually helpful to have control over both the colour and the intensity of the lighting, although coloured lights rarely succeed in completely masking differences in appearance.

Surfaces shall be non-absorbent and designed to facilitate a high standard of hygiene. The dimensions of the tasting booths are important; very low ceilings and very narrow booths can be oppressive or can give rise to a feeling of claustrophobia. Comfortable seating is necessary.

If provision is made for computerized data acquisition, then this should be implemented safely, hygienically, and in a way that does not compromise sensory judgement.

4.7 Planning and conduct of the test

The planning and operation of the test are determined by the objectives of the programme, the test chosen, and practical constraints associated with the use of human subjects. In particular, it is important to recognize the biases that might be inherent in the chosen test, and to operate the test in such a way as to minimize the effects of any bias. The potential biases can originate from both psychological and physiological sources.

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