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## **DRAFT TANZANIA STANDARD**

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Methods of test for the assessment of odours and taint from packaging materials used for food stuffs.

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**TANZANIA BUREAU OF STANDARDS**

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## **0 Foreword**

Odour is the sensation produced by the interaction of certain volatile materials with the sensory organs of the nose; whereas taste is a sensation produced by the interaction of materials with the sensory organs of the tongue. The combined sensations of smell and taste are generally described by the term “flavor” and whenever a food possesses an “off flavor” due to acquiring adventitious substances it may be described as tainted.

Taint can be also caused by other means such as the extraction of non-volatile constituents from packaging materials by direct contact with the food, but this Tanzania standard is not concerned with any form of taint other than that produced by odorous volatile constituents in packaging materials.

The level of odorous substances in packaging materials that can be tolerated by any particular food depends on a number of factors, including the sensitivity of food to the odour involved, the shelf life of the package concerned and the climatic conditions during marketing which may vary from frozen temperature to ambient conditions in the stores and retail outlets.

Development of this standard has been necessitated by the need to ensure that materials that are used in food packaging do not impart foreign odours to the packaged food.

In preparation of this Tanzania standard considerable assistance was derived from the BS 3755:1964- Methods of test for the assessment of odour from packaging materials used for food stuffs, published by the British Standards Institution.

## **1.0 Scope**

This Tanzania standard specifies method to be employed in assessing the level of odour and taint from packaging materials in packaged foods.

Since the intensity of odour and taint produced by some packaging materials varies according to moisture content of the material and atmospheric conditions surrounding it, the standard therefore includes test in condition received and test in which the moisture content is changed by the addition of water.

## **2.0 General**

**2.1** The quantities of packing material, and the test food employed, the capacity of jars used , the time and temperature at which the jars are allowed to stand may be altered from those given in the standard in specific instances to suit the particular circumstances. Where such alterations are made, they should be stated when quoting the methods in this Tanzania Standard in relation to an order.

## **2.2 Sensory testing**

When conducting sensory testing for assessment of odorous material, there are two possible results of the presence of the odour with which to contend:

- a) Odour of a nature and intensity sufficient to cause rejection without tasting the product.
- b) Odour of a nature and intensity sufficient to cause rejection on olfactory sensation alone, but which will transfer to the food product and cause taint subsequently.

## **2.3 Taint testing**

The actual food for which the package is intended should be used to estimate whether or not any taint will be produced during the shelf life of the package. In some instances, it is difficult to carry out contamination tests on the actual food concerned, and under these circumstances it is possible to cause sensitive materials such as milk, chocolate, butter or icing sugar.

Where this is done, it may be necessary to adjust the time for which the food is exposed to contamination, the quality of the material employed under the temperature at which the contamination experiment is carried out in order to reach an appropriate conclusion. A correlation along these lines should be made during the initial assessment of the packaging material for general compatibility with the food stuff, otherwise there is a risk that more sensitive test product will pick up odour under conditions where the food stuffs will not. This can lead to the rejection of the materials which in fact would be satisfactory.

## **3.0 Test panels**

**3.1 Number-** The number of individuals employed in a test panel may be 2, 3, 4, 6 or 12.

**3.2 Selection of test panel personnel-** For the selection of the test panel personnel, the recommendations given in the annex shall be followed. The test panel should consist of individuals who normally give consistent level of odour and taint assessment, and before they are appointed to the panel, some form of test should be carried out to ascertain whether the individual concerned is suitable. The nature of this procedure will vary according to the type of the food involved. In general, the personnel employed should be individuals who are normally not exposed to source of odour in the carrying out of their normal duties; both male and female are suitable. In general, the individuals of the test panel should agree with the average of the entire panel and consistent disagreement is a basis for replacement. Any member with respiratory infection should be omitted, since sensitivity is thereby impaired.

**3.3 Briefing-** Members of the test panel should be fully briefed on the test and examination procedures.

## **4.0 Apparatus and materials**

**4.1 Smelling test-**the following are required;

**4.1.1** For each member of the test panel, two clean dour free glass jars with accurately ground stoppers, capacity 1000ml each.

**4.1.2** Odour-free water

NOTE- Glass jars with flat stopper. Of the following descriptions, have been found to be quite satisfactory, extra wide mouth, best clear glass with capacity of 1000ml.

**4.2 Taint test-** The test requires the following:

**4.2.1** four glass jars, of the same type as described in 4.1.1 or four glass beakers capacity 50ml each:

**4.2.2** odour-free water:

**4.2.3** four microscope slides, and

**4.2.4** for each glass jar, either the food products concerned, in sufficient quantity to provide 12 portions for tasting, or fresh unsalted sweet cream butter, free from off flavor, 30g or a minimum of 12 milk chocolate drops 45g or icing sugar, 30g.

## **5.0 Testing room.**

Detection of low levels of odour requires working space in which individual members of the panel can concentrate. The room must be free from plant or industrial odours. The temperature of the room should normally be  $20^{\circ} \pm 5^{\circ}\text{C}$ , except in special instances, and all distracting influences should be minimized.

## **6.0 Selection of sample**

Sample of the packing materials to be tested may be selected from any part of reel or package as desired.

## **7.0 Smelling test procedures**

**7.1** Preparation of Samples-Two test jars are required for each member of the test panel. For each test jars about  $1000\text{ cm}^3$  of the sample is used. Where printed materials are concerned, the sample is chosen that the proportion of printed to unprinted surface is representative of the materials as a whole. Paper, film, foil, or other thin materials are thoroughly crumpled. Coated materials are torn into shreds. Thicker materials such as paper board is cut or torn into pieces about 5 cm square. Immediately after its preparation (e.g. by crumpling or tearing) the materials is placed into glass jars. 2ml of odour free water is then added to one of each pair of jars (wet jar), the jars are closed, well shaken and then allowed to stand for 24 hours at room temperature.

### **7.2 Procedure**

**7.2.1** All samples are identified only by code numbers, and the panel director gives to the panelists only the minimum necessary amount of information prior to carrying out test.

**7.2.2** Each member of the panel is given a pair of jars and working independently, each member opens the jars and proceed with smelling test. Sufficient time to obviate any question of odour fatigue is allowed to elapse before examination of the second jars.

**7.2.3** Each member of the panel places each of the jars in one of the following categories:

A: Odourless

B: Slight odour

C: Odour present at any level strong enough to render the sample unacceptable.

**7.2.4** Sample falling into category C may be rejected without further examination. Sample rated A or B are subjected to the taint test. In instances where there is a doubt or disagreement as to whether a sample is category C the material is also subjected to the taint test.

## **8 Taint test procedure**

**8.1** Preparation of the samples- This test is divided into two parts as follows;

a) Dry jar and control jar

b) Wet jar and control jar

**8.1.1** Dry jar-About 1000cm<sup>3</sup> of the packaging material prepared as for smelling test is placed in one of the two jars and the jars shaken. The food product concerned is suspended by a suitable means above the packaging material in the jars so that there is a free access of air from the packaging material to the food product without contact between the food and packaging material.

**8.1.1.1** The food product concerned is suspended similarly in the dry control jar.

**8.1.1.2** The jars are maintained at room temperature for a period of 24 hours before examination.

**8.1.2** Wet jar-two jars are prepared as for dry jar test, 2ml of odour-free water being added to each other and both shaken before the insertion of the food product in its holder or container.

### **8.2 Procedure**

**8.2.1** Dry jar-The food product from the dry jar and that from dry control jar are each divided by the panel director into twelve equal portions. The 24 portions are then arranged into 12 pairs as follows;

(a) 3 pairs each consisting of 2 untreated portions;

(b) 3 pairs each consisting of 2 treated portions;

(c) 3 pairs each consisting of 1 untreated and 1 treated portions, and

(d) 3 pairs each consisting of 1 treated and 1 untreated portions.

The 12 pairs are then coded by the panel director and arranged in random order.

## NOTES

- 1) If it is not possible to use the actual food concerned, or where it has been agreed between supplier and user, one or more of the standard product (butter, milk chocolate, icing sugar) may be used in the quantities specified in 4.2.4.
- 2) The butter can be conveniently supported on a microscope slide and the chocolate and icing sugar placed in 50ml glass beaker.
- 3) When dividing the butter, a slice 2.5 mm thick is removed from each end of the pat and the remainder can then be divided into 12 portions 5mm thick each of which has the same surface area exposed.

Each member of the panel tests, by testing the food, an equal number of pairs, the number being determined by dividing 12 by the number of individuals in the panel. Thus, when the panel consists of 4 members, each will test 3 pairs. The members of the panel are asked to test each pair in the order presented.

The testers are asked if the 2 specimens are the same or different in the taste. No information is required on whether are they like them or not.

**8.2.2** Wet jar- the same procedure is followed as for dry jar.

## **8.3 Interpretation of results**

**8.3.1** For the purpose of the interpretation of the results, it is assumed that the treatment of exposing the food stuff in jar containing packaging materials has made a difference, and this hypothesis is tested assuming that a correct answer will take this difference into account. In particular; recognition of the difference a pair from (c) and (d) pairs is termed as correct answer, and also be recognition of no difference in pairs from (a) and (b) pairs. The number of correct answers is compared with the possibility of obtaining such a result by chance alone. The conclusions for various numbers of correct answers which can be obtained from 12 samples are given in table 1

**TABLE 1**-Interpretation of results

Number of correct answers	Inference	Conclusion
10-12	Treatment has produced a statistically significant difference between 'control' treated food materials	Taint has occurred
7, 8, or 9	The difference produced is not statistically significant at the 5 per cent level	The test should be repeated and results combined (see table 2)
6 or less	The treatment has produced no significant difference between the control and the treated material	No detectable taint

**8.3.2** Where 7,8, or 9 correct answers are obtained the difference produced is not statistically significant and the test is repeated. It is preferable, but not essential, to use the same panel as previously but which ever procedure is adopted the two sets of results are combined and conclusion to be drawn from the possible number of the correct answer obtained out of 24 are given in table 2.'

**TABLE 2**-Interpretation of test results

Number of correct answers	Inference	conclusion
Greater than 17	Treatment has produced a significant difference between the 'control' and the 'treated' food material	Taint has occurred
17 or less	No significant difference	No detectable taint

## 9. Test report

The report shall give the results of

- (a) The free smelling test in;
  - i) The Dry condition, and
  - ii) The wet condition,
- (b) The taint test in;
  - i) the dry condition, and
  - ii) the wet condition.

## ANNEX A

### RECOMMENDATIONS ON THE SELECTION AND OPERATION OF TEST PANELS FOR ODOUR AND TAINT

A.1 PERSONNEL-It is assumed that it is possible to select group of people whose performance in sensory test will be superior to that of average population.

Sensitivity is only one factor determining performance as a panel member; constituency or the ability to remember sensations, and motivation are also important. Flavour and odour are closely related sensations, the latter being a major component of the former, but it is not necessary safe to assume that individuals show similar abilities in tasting and smelling tests. Generally, however, such a relation does exist.

A.2 PRELIMINARY SELECTION OF PERSONNEL. The following persons should be generally excluded:

- a) persons over 60 years of age- there is probably some loss in tasting ability after the late 50's,
- b) persons exposed to odour (especially of the type which may have to be detected during their normal duties) and
- c) persons with a chronic or recurrent respiratory infection.

A.3 FURTHER SELECTION OF THE PERSONNEL-Further selection can be made on the basis of some form of test.

A small proportion of people (5% or less) have no real sense of smell, being able to detect only irritant odours. Such individuals can be discovered by simple test. A set of bottle containing (say) (1) benzyl alcohol, (2) Cyclohexanol, (3) isopropanol, (4) 6M acetic acid, (5) 6M ammonia, (6) water, is submitted and candidates asked whether they can smell anything. Individuals with a normal sense of smell will report 'yes' to all except (6), while those sensitive to irritants will only report odour in (4) and (5).

Such a simple test is, however, of little use in differentiating the best panel members from remainder of the population. The ability to detect a difference between two or more foodstuff samples appears to be specific, and although general experience on test panel may be useful, it is quite common for proficient members of a panel for one sample of a foodstuff to show little ability to discriminate between sample of a different foodstuff. Therefore, the selection of the panel members should be as far as possible carried out using the specific type of taint which the panel will be required to evaluate. If the samples of packaging material known to be typically unsatisfactory are available, this can be done by following the taint test procedure given in clause 8 of this standard and allowing the candidate to taste a number of pairs of portions of foodstuff (at more than one session) sufficient to obtain statistically significant results. In other instances, it may be necessary to devise means of preparing appropriately contaminated samples of the specific food.

Once the panel members have been selected, it is advisable for them to conduct few evaluations as training, the degree of contamination of the tainted samples of foodstuff, should if possible be gradually reduced during this training period.

A.4 TEST ROOM-There are two most important requirements for the test room; it should be free from smell and distracting influences such as noises should be minimized. Ideally individual screened booths for each panel member should be provided as well as facilities for disposing of unpalatable samples. The preparation of samples should be carried out in the test room itself, and where the room cannot be kept for organoleptic testing only, particular care should be taken to avoid odours derived from cleanser or polishes. Where it is not possible to provide individual booths, this disadvantage can be overcome by arranging for panel members to make a test one at a time.

A.5 PLANNING THE TEST-The number of the panel members available will determine the number of pairs of the food samples each will taste. The possibility of the individuals' sensitivity decreasing through fatigue must be considered, and the number of the sample tasted in session limited. Fatigue effects will depend on the nature of the food; in the absence of further information it is inadvisable for any individual to taste more than six samples. The members should himself record his observation on a form. The panel director can then collect the forms and evaluate the results. A permanent record of the observations of each panel member should be kept to provide a basis for assessing reliability.

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