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Microbiology of food and animal feeding stuffs — Determination of water activity

Microbiologie des aliments — Détermination de l'activité de l'eau

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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Introduction

Microorganisms require water for their metabolic activities, but only a certain fraction, the so-called “free water”, of the total water present in any foodstuff is available for this purpose. The amount of “free water”, termed the water activity, depends upon the nature and quantity of the components dissolved in the aqueous phase of the product (see reference [1]). Various species of microorganisms tolerate only water activities that are within certain levels. Water activity can therefore be used to predict microbial growth and determine the microbiological stability of a food product.

Microbiology of food and animal feeding stuffs — Determination of water activity

1 Scope

This International Standard gives basic principles and requirements for physical methods of determining the water activity of products intended for human consumption and the feeding of animals.

Water activity can be used to predict microbial growth and determine the microbiological stability of a food product, and it also provides an important, quantitatively determinable criterion for estimating the times for which a foodstuff can be kept.

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 7218, *Microbiology of food and animal feeding stuffs — General rules for microbiological examinations*

3 Terms and definitions

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

3.1
water activity
a_w
ratio of the water-vapour pressure in the foodstuff to the vapour pressure of pure water at the same temperature

$$a_w = \frac{c_{EM}}{100} = \frac{p_F(T)}{p_S(T)}$$

where

c_{EM} is the relative equilibrium moisture content of the atmosphere in contact with the foodstuff;

$p_F(T)$ is the partial water-vapour pressure in equilibrium with the foodstuff at the temperature T (kept constant during measurement);

$p_S(T)$ is the saturated partial pressure of pure water at the same temperature (T); this can be obtained from reference tables of water vapour pressure.

NOTE The water activity is therefore a dimensionless quantity, with a completely anhydrous test specimen having a water activity of 0,0 and pure salt-free water having one of 1,0. The water activities of most foodstuffs are at the upper end of this scale, and range from approximately 0,992 for untreated, raw meat down to about 0,800 for salted and dried products.