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NATIONAL STANDARD OF
THE PEOPLE'S REPUBLIC OF CHINA

GB 5009.238-2016

**National standard for food safety -
Determination of water activity in foods**

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National standard for food safety -

Determination of water activity in foods

1 Scope

This Standard specifies the Conway's dish diffusion method and the water activity meter diffusion method for determination of water activity in foods.

This Standard is applicable to the determination of water activity in pre-packaged cereal products, meat products, aquatic products, bee products, potato products, fruit products, vegetable products, milk powder and solid drinks.

This Standard is not applicable to the frozen foods and foods containing volatile ingredients.

Method I (Conway's dish diffusion method) of this Standard applies to the water activity in foods with a range of 0.00 to 0.98; while Method II (water activity meter diffusion method) applies to the water activity in foods with a range of 0.60 to 0.90.

Method I Conway's Dish Diffusion Method

2 Principle

In a sealed Conway's dish at constant temperature, there is inter-diffusion between free water in the sample and standard saturated solution with a higher and lower water activity (A_w). After the equilibrium is reached, the water activity in the sample is determined according to the variation of the sample mass.

3 Reagents and materials

3.1 Reagents

Unless otherwise stated, the reagents used in this method are of analytical grade, and water is the tertiary water specified in GB/T 6682.

3.1.1 Lithium bromide ($\text{LiBr} \cdot 2\text{H}_2\text{O}$).

3.1.2 Lithium chloride ($\text{LiCl} \cdot \text{H}_2\text{O}$).

liquid two-phase. STORE saturated solution in a brown reagent bottle. PLACE at room temperature for one week before use.

3.2.4 Saturated potassium carbonate solution (water activity of 0.432, 25°C): Accurately WEIGH 300g of potassium carbonate at a readily soluble temperature. ADD 200mL of hot water. COOL to form saturated solution of solid-liquid two-phase. STORE saturated solution in a brown reagent bottle. PLACE at room temperature for one week before use.

3.2.5 Saturated magnesium nitrate solution (water activity of 0.529, 25°C): Accurately WEIGH 200g of magnesium nitrate at a readily soluble temperature. ADD 200mL of hot water. COOL to form saturated solution of solid-liquid two-phase. STORE saturated solution in a brown reagent bottle. PLACE at room temperature for one week before use.

3.2.6 Saturated sodium bromide solution (water activity of 0.576, 25°C): Accurately WEIGH 260g of sodium bromide at a readily soluble temperature. ADD 200mL of hot water. COOL to form saturated solution of solid-liquid two-phase. STORE saturated solution in a brown reagent bottle. PLACE at room temperature for one week before use.

3.2.7 Saturated cobalt oxide solution (water activity of 0.649, 25°C): Accurately WEIGH 160g of cobalt oxide at a readily soluble temperature. ADD 200mL of hot water. COOL to form saturated solution of solid-liquid two-phase. STORE saturated solution in a brown reagent bottle. PLACE at room temperature for one week before use.

3.2.8 Saturated strontium oxide solution (water activity of 0.709, 25°C): Accurately WEIGH 200g of strontium oxide at a readily soluble temperature. ADD 200mL of hot water. COOL to form saturated solution of solid-liquid two-phase. STORE saturated solution in a brown reagent bottle. PLACE at room temperature for one week before use.

3.2.9 Saturated sodium nitrate solution (water activity of 0.743, 25°C): Accurately WEIGH 260g of sodium nitrate at a readily soluble temperature. ADD 200mL of hot water. COOL to form saturated solution of solid-liquid two-phase. STORE saturated solution in a brown reagent bottle. PLACE at room temperature for one week before use.

3.2.10 Saturated sodium chloride solution (water activity of 0.753, 25°C): Accurately WEIGH 100g of sodium chloride at a readily soluble temperature. ADD 200mL of hot water. COOL to form saturated solution of solid-liquid two-phase. STORE saturated solution in a brown reagent bottle. PLACE at room temperature for one week before use.

TAKE at least 200g of representative sample. MIX evenly. PLACE in an airtight glass container.

5.1.2 Bulk samples

TAKE at least 200g of the representative sample of the edible part. Rapidly CUT into small pieces of less than about 3mm × 3mm × 3mm at a room temperature of 18°C to 25°C and a humidity of 50% to 80%. Do not use tissue mashers. MIX evenly. PLACE in an airtight glass container.

5.1.3 Bottled solid-liquid mixed samples

TAKE the liquid part.

5.1.4 Mixed samples of various masses

TAKE a representative sample that has been mixed evenly.

5.1.5 Liquid or flowing sauce samples

Directly TAKE a homogeneous sample for weighing.

5.2 Pre-determination of samples

5.2.1 Pre-processing

PLACE a sealed container, a Conway's dish and a weighing dish containing the samples in a constant temperature incubator. MAINTAIN constant temperature at 25°C ± 1°C. USE and DETERMINE immediately after removal.

5.2.2 Pre-determination

Respectively ADD 12.0mL of saturated lithium bromide solution, saturated magnesium chloride solution, saturated cobalt chloride solution and saturated potassium sulfate solution to the outer chambers of 4 Conway's dishes. USE a weighing dish at constant temperature to rapidly weigh about 1.5g (accurate to 0.000 1g) of the same sample of the same amount of the standard saturated salt solution from a pre-dried and weighed weighing dish (accurate to 0.000 1g). PLACE the sample into the inner chamber of the Conway's dish containing standard saturated salt solution. MOVE the covered frosted glass sheet coated with Vaseline in a parallel direction along the mouth of the Conway's dish. PLACE the glass sheet into a constant temperature incubator at 25°C ± 1°C. MAINTAIN constant temperature for 24h. WEIGH (accurate to 0.000 1g) immediately after taking out the weighing dish containing the sample.

5.2.3 Calculation of pre-determination results

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