

Estimation of nitrite content in meat products



Application Note

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Introduction

Inorganic nitrites are naturally occurring compounds in foods, especially plant foods and vegetables but they are also used as additives in industrially processed foods such as various meat products as well. Increased use of nitrogen-containing compounds as additives has presented a significant public health hazard because of potential conversion of nitrogen-compounds into nitrosamines, which causes thyroid disorders, carcinogenesis etc. It is necessary to estimate the nitrite content in processed meat products to ensure safety from diseases.

Principle

Extraction of a test portion with hot water, precipitation of the proteins and filtration. In the presence of nitrite, development of a red colour by the addition of sulphanilamide and N-1-naphthylethylenediamine dihydrochloride to the filtrate and photometric measurement at a wavelength of 538 nm.

Reagents

All the reagents should be of analytical quality along with double distilled water.

- 1. Carrez reagent I:** Potassium ferrocyanide trihydrate is dissolved in distilled water (approx. 106 g / 1000 mL).
- 2. Carrez reagent II:** 220 g zinc acetate dehydrate is added with 30 mL acetic acid in water and the mixture is then diluted upto the mark of 1000 mL.
- 3. Borax solution:** About 50 g of sodium tetraborate decahydrate is dissolved in 1000 mL tepid water followed by cooling to room temperature.
- 4. Griess reagent I:** 2 g of sulphanilamide is dissolved in 800 mL of water by heating on a water bath. It is cooled, filtered, if necessary followed by addition of 100 mL of concentrated hydrochloric acid solution (ρ_{20} 1.19 g/mL), while stirring. It is then diluted to 1000 mL with water.
- 5. Griess reagent II:** 0.25 g of N-1-naphthylethylenediamine dihydrochloride is dissolved in water and diluted to 250 mL with water.
- 6.** Concentrated hydrochloric acid.

Procedure

- 1. Nitrite standard solutions:** A number of different volume of nitrite standard solutions are prepared by serial dilution procedure. The absorbance of all the solutions are used to prepare a calibration curve. Water serves as blank solution in this part of the procedure.
- 10 g of samples is mixed with 5 mL sodium tetraborate solution in 100 mL hot water (70 - 80°C) is left for 15 min on the boiling water-bath.
- The solution is allowed to cool down to room temperature. 2 mL Carrez I solution is added followed by the addition of 2 mL Carrez II and mix thoroughly.
- The mixture is poured into a volumetric flask and added with double distilled water up to 200 mL mark.
- After about 30 minutes the mixture is filtered and filtrate is collected for further testing.
- 10 mL of extract is added with 20 mL distilled water.
- 5 mL Griess reagent I is added followed by 3 mL HCl. After that 1 mL Griess reagent II is also mixed thoroughly.
- Double distilled water is poured into the mixture up to 50 mL mark. The solution is incubated at 25°C for 15 min away from light. Absorbance is checked at 538 nm.

The experiment should be run twice using the same set of test solutions.

Calculation of nitrate

$$\text{NaNO}_3 = m_1 \times (1000 \times \text{DF}/V_1 \times m_0)$$

Where,

m_0 = weight of sample

m_1 = mass of sodium nitrite from the calibration curve

DF = 1 (if no dilution is carried out)

V_1 = portion of filtrate (mL)

The arithmetic mean of two determination should be taken as result provided condition of repeatability satisfied.

Reference

ISO 2918:1975, Meat and meat products - Determination of nitrite content(Reference method)

ISO 3091:1975, Meat and meat products - Determination of nitrate content(Reference method)

Further information

<http://www.klabkis.com/0201#>

Related models: **OPTIZEN Alpha, OPTIZEN POP, OPTIZEN View (Ver. 5.0 and above)**

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