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Related products
Alpha, POP
Country of Origin: Korea

Application Notes
#A250001001

Estimation of nitrite content in meat products

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. It is necessary to estimate the nitrite content in processed meat products to ensure safety from diseases.

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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-naphthyl) ethylenediamine 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 dihydrate is added with 30 mL acetic acid in water and the mixture is then diluted up to 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 (ρ20 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 volumes of nitrite standard solutions are prepared by serial dilution procedure. The absorbance of all the solutions is used to prepare a calibration curve. Water serves as blank solution in this part of the procedure.

2. 10 g of sample is mixed with 5 mL sodium tetraborate solution in about 100 mL of hot water (70 - 80°C) and left for 15 min on the boiling water-bath.

3. 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 mixed thoroughly.

4. The mixture is poured into a volumetric flask and added with double distilled water up to the 200 mL mark.

5. After about 30 minutes the mixture is filtered and the filtrate is collected for further testing.

6. 10 mL of the extract is added with 20 mL distilled water.

7. 5 mL Griess reagent I is added followed by 3 mL HCl. After that 1 mL Griess reagent II is also mixed thoroughly.

8. 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 nitrite

$NaNO_2$ = m1 x 1000 x DF / (V1 x m0)

Where,

m0 = weight of sample (g)

m1 = mass (mg) of sodium nitrite from calibration curve

DF = 1 (if no dilution factor)

V1 = volume (mL) of filtratre taken for test

The arithmetic mean of two determinations should be taken as result provided that the condition of repeatability is 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)