GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 5009.230-2016

National Food Safety Standard -

Determination of Carbonyl Value in Foods

Issued on: August 31, 2016 **Implemented on: March 1, 2017**

Issued by: National Health and Family Planning Commission of the People's Republic of China

Table of Contents

National Food Safety Standard -

Determination of Carbonyl Value in Foods

1 Scope

This Standard specifies the method of determining carbonyl value in foods.

This Standard is applicable to the determination of carbonyl value in foods, such as fried food, nut, instant noodle, puffed food and edible vegetable oil, etc.

2 Principle

In alkaline solution, the reaction product of carbonyl compound and 2,4-dinitrophenylhydrazine generates maroon or wine red. Determine absorbance at the wavelength of 440 nm and calculate carbonyl value.

3 Reagents and Materials

3.1 Reagents

3.1.1 Ethanol (C_2H_6O): analytical purity.

3.1.2 Benzene (C_6H_6): spectral purity or chromatographic purity.

3.1.3 2,4-dinitrophenylhydrazine ($C_6H_6N_4O_4$): analytical purity.

3.1.4 Trichloroacetic acid ($C_2H_6Cl_3O_2$): analytical purity.

3.1.5 Potassium hydroxide (KOH): analytical purity.

3.1.6 Petroleum ether ($C_5H_{12}O_2$): analytical purity, boiling range: 30 °C~60 °C.

3.1.7 Aluminum powder (Al): analytical purity.

3.2 Preparation of Reagents

3.2.1 Refined ethanol: take 1,000 mL of ethanol and place it in 2,000 mL round-bottom flask; add 5 g of aluminum powder, zeolite and 10 g of potassium hydroxide; connect with the reflux condenser of standard grinding mouth; start heating and reflux for 1 h in water bath, then, adopt all-glass distillation unit to distill and gather the distillate.

3.2.2 Trichloroacetic acid solution: weigh-take 4.3 g of solid trichloroacetic acid, add 100 mL of benzene to dissolve it.

evaporator under the room temperature; decompress and recover the reagent; use air-blowing drying oven to volatilize petroleum ether for 1 h under 50 °C, then, obtain grease for later determination. Store it in the refrigerator under 4 °C before usage.

5.2.3 Samples with low content of grease, such as bread and biscuit: weigh-take 250 g~300 g of mixed sample and place it in 500 mL wide-mouth bottle with a lid; add an appropriate amount of petroleum ether to soak the sample and place it for 14 h~18 h. Take quick filter paper to filter it; start rotary evaporation for 15 min with a rotary evaporator under the room temperature; decompress and recover the reagent; use air-blowing drying oven to volatilize petroleum ether for 1 h under 50 °C, then, obtain grease for later determination. Store it in the refrigerator under 4 °C before usage.

5.2.4 Samples with high content of water: add an appropriate amount of anhydrous sodium sulfate to make the sample granular; easily agglomerated sample: add 4 times~6 times of sea sand, mix it up, then, extract grease.

5.3 Determination

Weigh-take 0.025 g~0.5 g (accurate to 0.1 mg) of grease sample: weigh-take 0.1 g of grease sample with carbonyl value <30 meq/kg; weigh-take 0.05 g of grease sample with carbonyl value 30 meq/kg~60 meq/kg; weigh-take 0.025 g of grease sample with carbonyl value >60 meq/kg; place it in 25 mL tube with a plug, then, add 5 mL of benzene to dissolve the grease sample; add 3 mL of trichloroacetic acid solution and 5 mL of 2,4-dinitrophenylhydrazine solution; meticulously shake it and mix it up.

Heat it up for 30 min in water bath at 60 °C; after reaction, take it out and use running water to cool it down to the room temperature. Slowly add 10 mL of potassium hydroxide-ethanol solution along the tube wall to turn it into two-liquid layer. Start vortex oscillation and mix it up, then, place it evenly for 10 min.

Take 1 cm colorimetric cup and adjust the zero point with reagent blank; measure absorbance at the wavelength of 440 nm.

6 Expression of Analysis Results

Carbonyl value in the sample shall be calculated in accordance with Formula (1):

$$X = \frac{A}{854 \times m} \times 1\,000 \qquad \cdots\cdots(1)$$

Where:

X - Carbonyl value (calculated by grease) of the sample, expressed in (meq/kg);

A - The absorbance of the sample during determination;

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------