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PEOPLE'S REPUBLIC OF CHINA**

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**Animal and vegetable fats and oils -- Determination of oxidation
stability (accelerated oxidation test)**
(English Translation)

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Table of Contents

Foreword...	3
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	5
4 Principle...	6
5 Reagents and materials...	6
6 Equipment...	6
7 Sampling...	9
8 Preparation of specimens and instruments...	9
9 Analysis steps...	10
10 Result calculation...	12
11 Precision...	12
12 Test report...	13

1 Scope

This document describes a method for determining the oxidative stability of animal and plant oils that are rapidly oxidized under extreme conditions of high temperature and high airflow.

This document applies to the determination of oxidative stability of unrefined and refined animal and vegetable oils. It does not apply to the determination of oxidative stability of milk and dairy products (or oils derived from milk and dairy products).

This document is not applicable to the determination of the oxidative stability of animal and vegetable oils at room temperature, but is used to compare the effects of adding antioxidants to animal and vegetable oils.

NOTE: The presence of volatile fatty acids and volatile acidic oxidation products affects the accuracy of measurement results.

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 661, Animal and vegetable fats and oils -- Preparation of test sample

NOTE: GB/T 15687-2008, Animal and vegetable fats and oils -- Preparation of test sample (ISO 661:2003, IDT)

3 Terms and definitions

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

3.1

induction period

The time from the start of the measurement until the formation of oxidation products begins to increase rapidly.

3.2

oxidative stability

The induction period, as determined according to the procedures specified in this document, expressed in hours (h).

NOTE: The temperature typically used for determining oxidative stability is 100°C~120°C.

Depending on the oxidative stability of the sample being tested, or when extrapolation via regression is required, measurements can be performed under other temperature conditions. The optimal induction period is between 6 h~24 h. Each 10°C increase or decrease in temperature will cause the induction period to decrease or increase by approximately two times.

3.3

conductivity

The electrical conductivity of a substance.

4 Principle

Purified air is introduced into the sample, which has been heated to the specified temperature. The gases released during oxidation are mixed with the air and then introduced into a long-necked flask. The flask is pre-filled with deionized or distilled water and an electrode for measuring conductivity. The electrode is connected to a measuring and recording instrument. During oxidation, the conductivity increases rapidly due to the aggregation of volatile fatty acids. When the conductivity begins to increase rapidly, it indicates the end of the induction period.

5 Reagents and materials

This document uses only reagents that have been confirmed to be analytically pure, and the water used in the test should be distilled water or deionized water.

5.1

Molecular sieve. spherical, with a particle size of about 1 mm and a pore size of 0.3 nm, with a moisture indicator.

Molecular sieves should be dried in an oven at 150°C and cooled to room temperature in a desiccator.

5.2

Acetone.

5.3

Alkaline cleaning solution. used for cleaning glassware.

5.4

Glycerin.

5.5

Heat-resistant oil.

6 Equipment

6.1

Oxidation stability test apparatus (see Figure 1 and Figure 2).

6.1.1

Air filter. it consists of a cylinder with filter paper at both ends and filled with molecular sieve (5.1), and is connected to the suction port of the air pump.

6.1.2

Diaphragm air pump. adjustable flow rate is 10 L/h. It is equipped with manual or automatic speed control. The maximum deviation from the set value is ± 1.0 L/h.

NOTE: For the oxidation stabilizer (OSI type), at a pressure of 37.92 kPa (5.5 psi), the flow rate is approximately 10 L/h.

6.1.3

Borosilicate glass vent tubes (usually 8). equipped with sealing plugs.

The sealing plug should have inlet and outlet air tubes. The cylindrical part of the air tube should be a few centimeters thinner than its top to facilitate the elimination of foam.

A manual defoamer (such as a glass ring) should also be used to eliminate foam.

6.1.4

Enclosed measuring tanks (usually 8 units). capacity is approximately 150 m³.

One air inlet pipe leads directly to the bottom of the container. A vent should be located at the top of the container.

6.1.5 Electrodes (usually 8). used to measure conductivity, with a measurement range

of 0 μ S/cm~300 μ S/cm, and are matched with the size of the measuring cell (6.1.4).

6.1.6 Measurement and recording instruments. including amplifiers and recorders for

recording the measurement signals of each electrode (6.1.5).

6.1.7 Certified and calibrated contact thermometers. with an accuracy of 0.1°C or

platinum 100 resistance (platinum wire resistance thermometer), used to measure the temperature of heating blocks, connected to relays and adjustable heating elements, with a temperature range of 0°C~150°C.

6.1.8 Heating block. made of cast aluminum, with an adjustable temperature of

150°C $\pm$ 0.1°C. The heating block should have round holes (usually 8) for placing the vent pipe (6.1.3) and a hole for inserting a thermometer (6.1.7).

A heating bath can be used, filled with heat-resistant oil. The temperature can be adjusted to 150°C $\pm$ 0.1°C through the oil bath.

6.2 Calibrated and verified thermometer or platinum-100 resistance thermometer. range

is 150°C, and accuracy is 0.1°C.

6.3 Pipettes. 50 mL, 5 mL.

6.4 Oven. Capable of maintaining a constant temperature of 150°C $\pm$ 3°C.

6.5 Connecting tubing. flexible, made of inert material (PTFE or silicone rubber).

7 Sampling

The samples should be truly representative and should not be damaged or deteriorated during transportation and storage.