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# YC/T 159-2019

Replacing YC/T 159-2002

# Tobacco and tobacco products - Determination of water soluble sugars - Continuous flow method

烟草及烟草制品 水溶性糖的测定 连续流动法

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# Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009 and GB/T 20001.4-2015.

This Standard replaces YC/T 159-2002 “Tobacco and tobacco products - Determination of water soluble sugars - Continuous flow method”. Compared with YC/T 159-2002, in addition to editorial modifications, the main technical changes are as follows:

- modified green/green pipe sodium hydroxide solution concentration (see 4.2 of this Edition, 4.2 of Edition 2002);

- modified reagent for measuring red/red pipe diameter when reducing sugar (see 4.6 of this Edition, 4.6 of Edition 2002);

- modified 85°C heating tank volume (see 5.1 of this Edition, 5/1 of Edition 2002);

- added heat-dissipation device (see 5.1 of this Edition, 5.1 of Edition 2002).

Please note that some content of this document may involve patents. The issuer of this document does not assume responsibility for identifying these patents.

This Standard was proposed by State Tobacco Monopoly Administration.

This Standard shall be under the jurisdiction of Subcommittee on Cigarette of National Technical Committee on Tobacco of Standardization Administration of China (SAC/TC 144/SC 1).

The drafting organizations of this Standard: National Tobacco Quality Supervision and Inspection Center, Shanghai Tobacco Group Beijing Cigarette Factory, Yunnan China Tobacco Industry Co., Ltd., Yunnan China Tobacco Recycled Tobacco Co., Ltd., Zhengzhou Tobacco Research Institute, Yunnan Tobacco Quality Supervision and Inspection Station, Guizhou China Tobacco Industry Co., Ltd., Henan China Tobacco Industry Co., Ltd., Henan Tobacco Quality Supervision and Inspection Station, Northwest Tobacco Quality Supervision and Inspection Station, Guangdong Tobacco Quality Supervision and Inspection Station, Shandong China Tobacco Industry Co., Ltd.

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# Tobacco and tobacco products - Determination of water soluble sugars - Continuous flow method

## 1 Scope

This Standard specifies the method to determine water-soluble sugar (including water-soluble total sugar and water-soluble reducing sugar) in tobacco and tobacco products.

This Standard is applicable to the determination of water-soluble sugar in tobacco and tobacco products. The detection limit of this method is 0.0063%. quantitation limit is 0.0210%.

## 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.

GB/T 6682, *Water for analytical laboratory use - Specification and test methods*

YC/T 31, *Tobacco and tobacco products - Preparation of test sample and determination of water content - Oven method*

## 3 Principle

Use 5% aqueous acetic acid to extract the sample. The sugar in the extract reacts with p-hydroxybenzoic acid hydrazide. Produce yellow azo compounds in alkaline media at 85°C. Its maximum absorption wavelength is 410nm. Use colorimeter to determine.

## 4 Reagents

Except for special requirements, analytically pure reagents shall be used. The water shall comply with the regulations for grade one water in GB/T 6682.

**4.1** Polyoxyethylene lauryl ether solution (Brij35 solution)

- 5% p-hydroxybenzoic acid hydrazide solution is yellow;

- It is difficult to dissolve p-hydroxybenzoic acid hydrazide in 0.5mol/L sodium hydroxide solution;

- There are suspended particles in the solution;

- The baseline is wavy.

**4.10** 5% p-hydroxybenzoic acid hydrazide solution

Add 250mL of 0.5mol/L hydrochloric acid solution (4.7) to a beaker. Add 25g of paraben hydrazide (4.9) to make it dissolved. Add 10.5g of citric acid ($C_6H_8O_7 \cdot H_2O$). After dissolution, transfer to a 500mL volumetric flask. Use 0.5mol/L hydrochloric acid solution to dilute to the scale. Store at 0°C~4°C.

5% p-hydroxybenzoic acid hydrazide solution can also be prepared by the following method. Add 250mL of 0.5mol/L hydrochloric acid solution (4.7) to the beaker. Heat to 45°C. Add p-hydroxybenzoic acid hydrazide and citric acid under continuous stirring. Transfer to volumetric flask after cooling. Use 0.5 mol/L hydrochloric acid solution to dilute to the scale. The p-hydroxybenzoic acid hydrazide solution prepared in this way can avoid the formation of precipitates in the pipeline.

**4.11** D-glucose, purity ≥99.5%.

**4.12** Standard stock solution: Weigh 20.0g of dry D-glucose (4.11) in a beaker, to the nearest of 0.0001g. Use water to dissolve then transfer into a 500mL volumetric flask and set volume to the scale. The standard stock solution is stored in the refrigerator at 0°C~4°C. The validity is 1 month.

**4.13** Series standard working solution: Use 5% acetic acid solution (4.4) to prepare at least 5 standard working solution from stock solution. The concentration range shall cover the expected sample content. The standard stock solution is stored in the refrigerator at 0°C~4°C. The validity is 2 weeks.

# 5 Instruments and materials

**5.1** Continuous flow analyzer, consisting of the following parts:

- Sampler;

- Proportional pump;

- Dialyzer;

- Heating tank;

- Spiral tube;
- Colorimeter with 410nm filter;
- Data processing device;
- Heat-dissipation device (radiating fin or equivalent cooling device).

**5.2** Balance, with a sensitivity of 0.0001g.

**5.3** Oscillator.

**5.4** Quantitative filling injector or pipette.

**5.5** 50mL Erlenmeyer flask with stopper.

**5.6** Rapid qualitative filter paper.

### 6 Analysis steps

#### 6.1 Sample preparation

Prepare sample according to YC/T 31 and measure its moisture content.

#### 6.2 Sample processing

Weigh 0.25g of sample in the 50mL Erlenmeyer flask with stopper (5.5), to the nearest of 0.0001g. Add 25mL of 5% acetic acid solution (4.4). Cover with a stopper. Shake on the shaker (5.3) (rotation speed >150r/min) and extract for 30min. Use rapid qualitative filter paper (5.6) to filter the extract. Discard the first 2mL~3mL of filtrate. Collect subsequent filtrate for analysis.

#### 6.3 Instrument analysis

Operate the series of standard working solution (4.13) and subsequent filtrate of sample processing (6.2) on the instrument. See Annex A for the analysis flowchart. If the sample concentration exceeds the standard working solution concentration range, it shall be diluted before measurement.

## 7 Result calculation and expression

#### 7.1 Calculation of water-soluble sugar

The water-soluble sugar content is calculated according to formula (1):

$$\alpha = \frac{n \times c \times V}{m \times (1 - W) \times 1\,000} \times 100 \qquad \cdots\cdots (1)$$

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