ICS 71.100.40
CCS G 72

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 11985-2026

Replacing GB/T 11985-1989

Surface active agents - Determination of interfacial tension - Drop volume method

表面活性剂 界面张力的测定 滴体积法

Issued on: May 25, 2026 **Implemented on: December 1, 2026**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

Table of Contents

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document supersedes GB/T 11985-1989 "Determination of Interfacial Tension of Surfactants - Drop Volume Method", and is consistent with GB/T 11985- Compared to 1989, aside from structural adjustments and editorial changes, the main technical changes are as follows:

---The terminology for interfacial tension has been changed (see 3.1, Chapter 3 of the 1989 edition);

---The preparation of test water has been removed (see Chapter 5 of the 1989 edition);

---The requirements for water used in preparation have been changed (see 6.1.1,

7.1.1 in the 1989 edition). Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the China National Light Industry Council. This document is under the jurisdiction of the National Technical Committee on Standardization of Surfactants and Detergents (SAC/TC272). This document was drafted by: China Daily Chemical Research Institute Co., Ltd., China Light Industry Inspection and Certification (Taiyuan) Co., Ltd., and Beijing Hake Testing Instruments Co., Ltd. Equipment manufacturers, Sanda Aoke Chemical Co., Ltd., Hubei Anaiji Environmental Protection Technology Co., Ltd., Zhejiang Hailian New Material Technology Co., Ltd., Jiangxi Ruisibo New Materials Co., Ltd., Shaanxi Rixin Petrochemical Co., Ltd., Shenzhen Ruqinba Chemical Materials Co., Ltd., Shandong Deshunyuan Stone Oil Technology Co., Ltd., Xi'an

Kelvin Petrochemical Additives Manufacturing Co., Ltd., Xi'an Sanwei Technology Development Co., Ltd., Hebei Hejia Pharmaceutical Co., Ltd. Technology Group Co., Ltd., Zhuhai Jintuan Chemicals Co., Ltd., Shandong Binzhou Yucheng Chemical Technology Co., Ltd., and St. Paul Petrochemicals Gong (Tianjin) Co., Ltd., Shenyang Haobo Group Co., Ltd., Shandong Juxing Petroleum Technology Co., Ltd., Dongying Baomo Environmental Engineering Co., Ltd. The company, Shanghai Linqingxuan Cosmetics Group Co., Ltd., and Guangdong Shifei Cosmetics Co., Ltd. The main drafters of this document are. Zheng Yangzhen, Wang Yue, Li Kunze, Yang Tongyong, Zhang Yaohua, Lu Liang, Zhou Linbo, Li Yutao, Xiong Donglu, and Liu Xiangxing. Wang Haifeng, Zhang Chuangwei, Chen Cen, Li Yang, Li Wuping, Lü Feifei, Li Yanguo, Xing Yiming, Liu Yang, Wang Haidao, Chen Xiaogang, Gao Hongqi, Cao Yimiao Zhang Taijun. The release history of this document and the document it replaces is as follows:

---First published in 1989 as GB/T 11985-1989;

---This is the first revision. Measurement of interfacial tension of surfactants Drop volume method

1.Scope This document describes a test method for determining the interfacial tension between two liquid phases by measuring the volume of a droplet. This document is applicable to the determination of interfacial tension between two solutions of a surfactant in water or an organic solvent.

Note. The titration volume method described in this document has the following advantages compared to the liquid film pulling method.

a) Capable of measuring the interfacial tension between two liquid phases of various surfactant solutions, including cationic surfactants;

b) Capable of measuring the interfacial tension of viscous liquids;

c) Capable of accurately measuring low interfacial tensions in the range of 1 mN/m;

d) Repeatability standard deviation less than ±

5.1 Measuring Instruments

5.1.1 The apparatus for measuring interfacial tension using the drop volume method is shown in Figure 1.

5.1.2 A glass syringe, precisely calibrated, with a volume of

0.5 cm^3 or

1.0 cm^3, driven by a micrometer screw, its scale allowing for accurate measurement of droplet volume. Measure to ±0.0001 cm3.

5.1.3 Capillary tube, made of glass or stainless steel, with its end connected to the syringe,

which can be disassembled for cleaning. The method for preparing capillaries is as follows:

a) Preparation of glass capillary tubes. Cut a 4cm length from a high-quality, small-diameter glass capillary tube of suitable and uniform diameter. One end of the segment is machined into a frosted nozzle that can connect to a glass syringe, while the other end is precisely ground on a glass plate coated with fine diamond powder. Grinding. To prevent the capillary tube from wobbling during polishing, it is embedded in a glass tube with an inner diameter of approximately

1.5 cm, containing paraffin (softening point approximately...). At 70°C. The capillary should be horizontal and perpendicular to its axis. Its circumference should be free of gaps.

b) Preparation of stainless steel capillary tube. Cut a section of approximately 4cm from a high-quality, small-diameter stainless steel capillary tube of suitable and uniform diameter. The long tube is cut at one end with a precision lathe to make it precisely right-angled with the tube shaft, and a polytetrafluoroethylene connector is fitted at the other end. Based on the interfacial tension value and density difference, the outer radius of the capillary should be selected between 0.1cm and 0.4cm.

5.1.4 Jacketed glass container, inner diameter 2.5cm~4cm, height greater than 5cm, temperature adjustable and capable of accommodating syringes and capillaries.

5.2 Super Thermostat The water bath temperature can be controlled accurately to ±0.5°C.

5.3 Instrument Installation The glass syringe (5.1.2) and capillary (5.1.3) shall be mounted on a support that allows them to move vertically, and the tip of the capillary shall be perpendicular to the ground. Its axis and diameter are uniform, and its edges are free of defects. The bracket is fixed to the metal plate of the vibration isolation platform. Since rotating the micrometer screw by hand will cause vibration, a micro motor can be used to drive the micrometer screw to reduce the vibration of the test device. The circulation of water causes small vibrations, so the thermostat should be turned off when the droplet is close to its maximum volume during measurement.

6.1 Preparation of Surfactant Solutions

6.1.1 Extra care must be taken when preparing the surfactant solution for testing. The water used in its preparation should meet the requirements specified in QB/T 1223. The requirement can be verified by measuring its surface tension. Cork should not be used in the structure of instruments for preparing water or in sealed containers for storing water, and even less so... Use a rubber stopper.

6.1.2 The temperature deviation of the solution should be kept within 0.5°C.

Note. Measurements taken near the critical dissolution temperature (Krafft temperature) or at the cloud point temperature of nonionic surfactants involved in the addition of ethylene oxide are highly susceptible to errors. Poor. It is recommended that the test be conducted

above the critical dissolution temperature or below the cloud point temperature of the nonionic surfactant.

6.1.3 Since the mutual saturation of the two liquid phases and the adsorption of surfactants at the interface both require time, the interfacial tension will change with time. Furthermore, the time required varies across different systems, making it difficult to recommend a consistent standard time. Therefore, multiple measurements should be performed over a period of time to obtain a boundary value. The surface tension as a function of time is used to determine the time it takes for the interface to reach a static state, based on the flattening point of the curve.

6.1.4 Dust in the atmosphere or vapors emitted from solvents used nearby can easily contaminate the liquid surface; therefore, the indoor environment for the measurement should not be contaminated. Store or handle items containing volatile solvents. The entire instrument should be protected with a balance cover to minimize temperature fluctuations.

6.1.5 Because the surface of the solution is easily contaminated by insoluble particles and dust, it is advisable to use a pipette to draw a small amount of the test phase from the center of a large quantity of the liquid phase to be tested. Verify identity.

6.2 Cleaning of measuring instruments (5.1) For impurities that cannot be removed with a mixture of sulfuric acid and chromic acid, phosphoric acid, or potassium persulfate and sulfuric acid solutions, such as silicone, a specialized solvent (such as formaldehyde) can be used. Clean syringes, capillary tubes, and glass-jacketed containers with a solution of benzene, perchloroethylene, or potassium hydroxide in methanol or ethanol. If no such impurities are present, or if using... After solvent rinsing, the measuring instrument must be carefully washed with hot potassium persulfate or ferric ammonium persulfate sulfuric acid solution, and finally rinsed with freshly prepared pure water. (6.1.1) Rinse until neutral. Finally, rinse the syringe and capillary with water to reduce contamination. Before measurement, the measuring instrument should be completely dry.

6.3 Inspection of measuring instruments

6.3.1 Measurement of capillary radius Measure the capillary radius using a reading microscope (minimum division

0.01 mm) or other instruments with higher precision, and take 5-10 flat measurements. Mean.

Note. The capillary radius can also be measured using a liquid with known density and interfacial tension, according to Appendix A, but this is only applicable to microscopes without readings and micrometers.

6.3.2 Measurement of droplet volume To accurately obtain the droplet volume, the reading obtained from the movement of the micrometer screw is checked by weighing a few drops.