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Plastics/rubber — Polymer dispersions and rubber latices (natural and synthetic) — Determination of surface tension

Plastiques/caoutchouc — Dispersions de polymères et latex de caoutchouc (naturel et synthétique) — Détermination de la tension superficielle

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 3, *Raw materials (including latex) for use in the rubber industry*.

This sixth edition cancels and replaces the fifth edition (ISO 1409:2006), which has been technically revised.

The main changes compared to the previous edition are as follows:

— extension of Clause 1 and Clause 4;

— inclusion in Clause 1 that method A is the preferred method in case of dispute;

— inclusion of the tensiometer (Wilhelmy type) and glass dish or vessel in 6.2 and 6.3;

— inclusion of the procedure of the new method B in 8.2;

— expression of the test results according to the new method B in 9.2;

— inclusion of the precision data for method B in Annex A.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Plastics/rubber — Polymer dispersions and rubber latices (natural and synthetic) — Determination of surface tension

1 Scope

This document specifies two methods for the determination of the surface tension of polymer dispersions and rubber latices (natural and synthetic).

— Method A is the ring method (Du Noüy ring method).

— Method B is the plate method (Wilhelmy plate method).

Method A is suitable valid for polymer dispersions and rubber latices with a viscosity less than 200 mPa·s.

Method B is not suitable for polymer dispersions and rubber latices containing cationic surfactants.

Methods A and B are also suitable for prevulcanized latices and compounded material.

In case of dispute, the preferred method is method A (the ring method).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 123, *Rubber latex — Sampling*

ISO 124, *Latex, rubber — Determination of total solids content*

ISO 705, *Rubber latex — Determination of density between 5 degrees C and 40 degrees C*

ISO 1652, *Rubber latex — Determination of apparent viscosity by the Brookfield test method*

ISO 2555, *Plastics — Resins in the liquid state or as emulsions or dispersions — Determination of apparent viscosity using a single cylinder type rotational viscometer method*

ISO 3219, *Plastics — Polymers/resins in the liquid state or as emulsions or dispersions — Determination of viscosity using a rotational viscometer with defined shear rate*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

4.1 Method A

Method A is suitable valid for polymer dispersions and rubber latices with a viscosity less than 200 mPa·s. To achieve this, the dispersion or latex is diluted with water to a mass fraction of total solids of 40 %. If necessary, the total solid content is further reduced to ensure that the viscosity is under the specified limit.

A horizontally suspended ring of thin wire is attached to a "Du Noüy type" tensiometer and immersed in the liquid under test, then slowly pulled out. Just before the ring detaches itself from the surface of the liquid, the force required reaches a maximum. This force is measured by a torsion balance, inductive pick-up or some other suitable measuring device.

4.2 Method B

When a liquid is brought into contact with the edge of the plate which is suspended from the “Wilhelmy type” tensiometer, the plate is pulled down into the liquid due to the surface tension. The instrument applies an upward vertical force to the plate so that the plate reaches the force balance. This vertical force is measured and used to calculate the surface tension of the liquid.

5 Reagents

5.1 Distilled water, carbon-dioxide-free, or water of equivalent purity (grade 3 as defined in ISO 3696).

5.2 Toluene, of recognized analytical purity.

6 Apparatus

6.1 Tensiometer (Du Noüy type), with a platinum or platinum-iridium alloy ring of either 60 mm or 40 mm nominal circumference (corresponding to 9,55 mm or 6,37 mm internal radius, respectively) and made of wire having a nominal radius of 0,185 mm.

6.2 Tensiometer (Wilhelmy type), with a flat, thin plate made of platinum or platinum-iridium alloy, and the size suitable for the tensiometer.

6.3 Glass dish or vessel, of 50 cm^3 capacity, with an internal diameter of at least 45 mm or suitable for the thermostat of the tensiometer.

6.4 Thermostatic bath, or some other means of adjusting the temperature of the test sample to 23 °C ± 1 °C (27 °C ± 1 °C for tropical countries).

NOTE The temperature coefficient of rubber latices over the temperature range 20 °C to 30 °C is –0,1 mN/m per degree Celsius.

6.5 Bunsen or ethanol lamp, or some other means of heating and cleaning the ring or plate.

7 Sampling

Carry out the sampling in accordance with one of the methods specified in ISO 123.