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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 1232.4-2017

**Rubber, unvulcanized -- Determinations using a shearing-disc
viscometer -- Part 4: Determination of the Mooney
stress-relaxation rate**

未硫化橡胶 用圆盘剪切黏度计进行测定 第4部分：门尼应力松弛率的测定
(English Translation)

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Foreword

GB/T 1232 "Unvulcanized rubber disc shear viscometer for determination" is divided into the following four parts.

- Part 1. Determination of Mooney viscosity;
- Part 2. Determination of initial vulcanization properties;
- Part 3. Non - filler - based emulsion - filled polymer - based styrene - butadiene rubber.
- Part 4. Determination of stress relaxation rate of Mooney.

This part is part 4 of GB/T 1232.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part uses the translation method equivalent to ISO 289-4.:2003 "Unvulcanized rubber disc shear viscometer for the determination of the first four Min. determination of the stress relaxation rate of Mooney".

This section is proposed by the China Petroleum and Chemical Industry Association.

This part of the National Rubber and Rubber Products Standardization Technical Committee (SAC/TC35) centralized.

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Suxin Zhenwei Test Machinery Co., Ltd., Taizhou Gangyang Rubber & Plastic Co., Ltd., Shanghai Farsen Detection Technology Co., Ltd., Beijing University of Chemical Technology, East City Science and Technology Advisory Service Center.

Introduction

The Mooney viscosity, as defined in GB/T 1232.1-2016, is one of the widely accepted rubber characteristics. But only Mooney viscosity the results can not effectively characterize the other rheological properties of rubber. For example, Mooney viscosity can not reflect the elasticity of raw rubber and unvulcanized rubber Sign [2]. Viscous and elastic changes are relatively independent, so it is necessary to study a test that can contain two characteristic parameters process.

The Mooney viscosity test is carried out at a specific shear rate, and the compound exhibits a viscosity associated with the shear rate. Test with shear speed the varying thickness of the rubber Mooney viscosity required for complex test equipment is already available. In general, the operation of such equipment is complex and the test results are interpreted Difficult, not suitable as the current standard quality control tool.

As described in [3], the stress relaxation of the Mooney is related to the elastic effect in the unvulcanized rubber rheology. Mooney stress relaxation relative capacity Easy to measure, and only in the standard Mooney viscosity test after the end of an additional few seconds to be measured. Mooney Stress Relaxation Parameter and Mooney viscosity independent of each other.

Mooney stress relaxation combined with conventional Mooney viscosity, can better describe the non-kneading and kneading of unvulcanized rubber visco-elastic properties [14].

The Menny stress relaxation test has been recommended as a quality control tool [4] [5].

The Mooney Relaxation Short Time Interval Measurement method described in this section is an improved evaluation procedure. Use short time intervals to evaluate Compared to long-term intervals, there is a better reproducibility.

A short time interval method can be used in the Mooney stress relaxation test to obtain a rheological properties of the rubber is a major parameter - Mooney stress Relaxation rate (MSR), that is, the decay rate of torque over time [16] [17] [18] [19].

Mooney stress relaxation rates have also been called "slope", while "slope" is sometimes positive and sometimes negative. The methods described in this section use one for a specific evaluation interval, the parameter result is always positive and uses a specific name [6] [7] [8] [15].

The data show that, despite the use of short-term evaluation intervals, the method can still distinguish between polymers with different high molecular weight components (EPDM).

Unvulcanized rubber was measured with a disc shear viscometer Part 4. Determination of stress relaxation rate of Mooney

1 Scope

This part of GB/T 1232 specifies the use of disc shear viscometer to measure the stress relaxation rate (MSR) of raw or unvulcanized rubber, the method uses the Mooney viscosity measurement to obtain the elastic response characteristics of the material in addition to the viscous response.

2 Normative reference documents

The following documents are indispensable for the application of this document. For dated references, only the dated edition applies to this article Pieces. For undated references, the latest edition (including all modifications) applies to this document.

GB/T 1232.1-2016 Unseparated rubber disc shear viscometer for determination - Part 1. Determination of Mooney viscosity (ISO 289-1.:2014, IDT)

3 Terms and definitions

The following terms and definitions apply to this document.

Mooney pressure relaxation rate Mooney stress-relaxation rate MSR at the end of the Mooney viscosity test, after the rotor is stopped, the logarithm of the logarithmic linear regression curve of the torque and time on the value.

Note: The Mooney Stress Relaxation Test is a stress relaxation test with a very wide time span. This test shows the structure of the polymer at a specified relaxation time interval sensitive.

4 Principle

This test is a test of the Mooney torque attenuation immediately after the Mooney viscosity test. Mooney viscosity test after the end of the rotor suddenly stopped Only the rotation, recording torque with the time of the attenuation relationship. In accordance with the theoretical hypothesis of the power law law of validity, in a short time interval to assess the torque change Rate.

5 Equipment

Use the equipment specified and calibrated in GB/T 1232.1-2016. In addition, the device disc should be able to stop in the 0.1s time rotation, Reset the torque zero point to the static zero for the stationary rotor and record the torque value at least every 0.2 s after the rotor has stopped.

Note 1: The torque zero at the time of rotation and rotation of the rotor is different. It is recommended that the torque zero of the rotating rotor be reset before each measurement. This will also lead to a warm-up Negative torque signal, as shown in Figure 1.

Note 2: Isolation film is recommended. The type and thickness of the membrane polymer are affected by the results. This part is based on the use of 20 μ m, DSC peak temperature is a polypropylene film of 161 ° C (second heating curve).