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

GB/T 33046-2016

**Rubber products - Determination of cobalt content - Atomic
absorption spectrometry**

橡胶制品 钴含量的测定 原子吸收光谱法

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Quarantine;
Standardization Administration of the PRC**

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009. This standard is proposed by the China Petroleum and Chemical Industry Association. This standard by the National Rubber and Rubber Products Standardization Technical Committee (SAC/TC35) centralized. The drafting unit of this standard. Guangzhou South China Rubber Tire Co., Ltd., Beijing Rubber Industry Research and Design Institute, Guangzhou Synthetic Materials Research Institute Co., Ltd., round Jinyu Group Co., Ltd., Shenyang Chemical School, Shandong Linglong Tire Co., Ltd. The main drafters of this standard. Liang Yaping, Yue Min, Tan Hongyang, Li Xiaoyuan, Wang Yi, Luan Dewen, Zhou Xiuliang, Li Haiyan, Zhang Liping. Rubber products - Determination of cobalt content Atomic Absorption Spectrometry WARNING. Personnel using this standard should have practical experience in formal laboratory work. This standard does not address all possible security issues, It is the responsibility of the user to take appropriate safety and health measures and to ensure compliance with the conditions set forth in the relevant national regulations.

1 Scope

China's national standard method for determining cobalt in rubber and vulcanised rubber products by atomic absorption spectrometry. It specifies the principle, the reagents, the apparatus, the sample preparation, the procedure, the calculation and the precision, and it applies to rubber and vulcanised rubber products. Cobalt is in rubber for one reason: it makes rubber stick to brass-plated steel. A steel-belted tyre is a composite whose performance depends entirely on the bond between the rubber and the steel cords inside it, and that bond is not mechanical but chemical - a sulfide layer forms at the brass surface during vulcanisation and ties the two together. Cobalt salts, usually a naphthenate or a stearate, are added to the rubber compound at fractions of a per cent to control how that sulfide layer grows, and the amount is critical in both directions: too little and the bond is

weak from the start, too much and the layer keeps growing in service until it becomes the failure plane. So a tyre plant needs to know how much cobalt is in a compound, and needs to be able to check it in finished product as well as in the mix. The method is a straightforward one: the sample is ashed, the ash is dissolved in nitric acid, the solution is aspirated into an air-acetylene flame or atomised electrothermally, and the absorption of the cobalt line from a hollow cathode lamp is measured against calibration standards. Issued on 13 October 2016 and in force since 1 May 2017.

This standard specifies the method of atomic absorption spectrometry for the determination of cobalt content in rubber products. This standard applies to the determination of cobalt content in rubber or vulcanized rubber products.

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. For undated references, the latest edition (including all modifications) applies to this document.

GB/T 6682 Analytical laboratory water specifications and test methods Testing methods for rubber and rubber products - Determination of standard precision

3 Principle

The rubber or rubber products ashing samples, ash dissolved in nitric acid, the preparation of the appropriate concentration of the solution, and then into the atomic absorption of light. The air of the spectrometer - the acetylene flame or the sample is produced by an atomization system such as electric heating to produce sample vapor. The ground state atoms of cobalt elements in steam. Absorption of cobalt hollow cathode lamp emitted by the characteristics of electromagnetic radiation, by measuring the absorbance of cobalt atoms to quantify the determination of cobalt content.

4 Reagent

4.1 The reagents used in this method, when not specified other requirements, the use of excellent pure reagent. This method uses GB/T 6682 Secondary water.

4.2 Nitric acid. $\rho =$

4.3 Nitric acid solution. 1 1.

4.4 Nitric acid solution. 1 100.

4.5 Sulfuric acid. $\rho =$

4.6 cobalt powder. pure spectrum.

4.7 cobalt standard solution (1000mg/L) 1000mg/L cobalt standard solution is available in two ways. Method 1. Weigh

1.000 g of cobalt powder (accurate to 0.1mg), placed in a beaker, add 20.00mL nitric acid (4.2), heating dissolved completely, After cooling into the 1000mL volumetric flask, diluted with nitric acid solution (4.4) to the scale, shake. Method two. direct purchase of commercially available 1000mg/L cobalt nitrate standard solution.

4.8 Cobalt standard solution (100mg/L) Remove

10.00 mL of cobalt standard solution (4.7) in a 100 mL volumetric flask, dilute to the mark with nitric acid solution (4.4) and shake well.