

ICS 73.040
CCS D 21



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

GB/T 16658-2026

Replacing GB/T 16658-2007

**Determination of copper, cobalt, nickel, zinc, chromium,
cadmium and lead in coal**

煤中铜、钴、镍、锌、铬、镉、铅的测定方法

Issued on: March 31, 2026

Implemented on: October 1, 2026

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

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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 16658-2007 "Determination of Chromium, Cadmium and Lead in Coal" and GB/T 19225-2003 "Determination of Copper, Cobalt, Nickel and Zinc in Coal". The determination method is based on GB/T 16658-2007, and integrates the content of GB/T 19225-2003. Compared to.2007, aside from structural adjustments and editorial changes, the main technical changes are as follows:

- a) Preparation methods for standard stock solutions of copper, cobalt, nickel, and zinc have been added (see 5.5~5.8);
- b) Preparation methods for standard working solutions of copper, cobalt, nickel, and zinc have been added (see

- c) Added technical requirements for acetylene (see 5.16);
- d) The technical requirements for ash trays have been increased (see 6.7);
- e) The digestion method for the sample solution has been changed (see 7.1.2, 6.1.2 in the.2007 edition);
- f) Preparation methods for copper, cobalt, nickel, and zinc series standard solutions have been added (see 7.4.1 and 7.4.3);
- g) The wording of the result calculation formula has been changed (see Chapter 8, Chapter 7 of the.2007 edition);
- h) The mass fraction ranges for chromium, cadmium, and lead in the method precision have been changed (see Table 2,.2007 edition);
- i) Added test reports (see Chapter 10). 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 Coal Association. This document is under the jurisdiction of the National Coal Standardization Technical Committee (SAC/TC42). This document was drafted by the Coal Science and Technology Research Institute Co., Ltd. The main drafters of this document are. Sui Yan and Chai Wen. This document was first published in.1996, revised for the first time in.2007, and this is the second revision, incorporating it into GB/T 19225-2003. content. Methods for determining copper, cobalt, nickel, zinc, chromium, cadmium, and lead in coal

1 Scope

GB/T 16658-2026 is the Chinese national standard covering the trace metals in coal - which end up either in the flue gas or in the ash, and which therefore decide both the emission limits a plant must meet and what can be done with the ash afterwards. It replaces GB/T 16658-2007 and has been in force since 1 October 2026. It was issued on 31 March 2026 and takes effect on 1 October 2026, replacing GB/T 16658-2007. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document outlines the methods, reagents and materials, instruments and equipment, test procedures, and results for determining copper, cobalt, nickel, zinc, chromium, cadmium, and lead in coal. Calculations, method precision, and test reports. This document applies to lignite, bituminous coal, and anthracite, and also to coke.

4.Methodology Summary After the coal samples were ashed, they were decomposed with hydrofluoric acid-perchloric acid, and the contents of copper, cobalt, nickel, zinc, chromium,

cadmium and lead were determined by atomic absorption spectrometry. When determining the chromium content, sodium sulfate solution needs to be added to the nitric acid medium to eliminate interference from coexisting elements such as magnesium.

5.Reagents and Materials Warning. The strong acid used in the experiment is highly corrosive and can cause burns to the human body. Take precautions during use. Unless otherwise stated, reagents confirmed to be of analytical purity or higher and distilled or deionized water or water of equivalent purity were used in the analysis.

5.1 Hydrofluoric acid. above 40.0%.

5.2 Perchloric acid. 70.0%~72.0%.

5.3 Nitric acid solution. volume ratio is (1.1).

5.4 Sodium sulfate solution..200 g/L. Weigh.200 g (accurate to 1

g) of anhydrous sodium sulfate into a 1000 mL beaker, add a small amount of water to dissolve, and then... Transfer to a 1000mL volumetric flask, dilute to the mark with water, and mix well. Transfer to a plastic bottle.

5.5 Copper Standard Stock Solution. 1 mg/mL. Weigh 1.0000 g (accurate to 0.0002

g) of metallic copper (mass fraction not less than 99.99%). Dissolve in a small amount of nitric acid solution with a volume ratio of (1.1). Dilute to 1000 mL with 1% nitric acid solution and mix well. Put it into a plastic bottle.

5.6 Cobalt Standard Stock Solution. 1 mg/mL. Weigh 1.0000 g (accurate to 0.0002

g) of metallic cobalt (mass fraction not less than 99.99%). Dissolve in a small amount of hydrochloric acid solution with a volume ratio of (1.1). Dilute to 1000 mL with a 1% hydrochloric acid solution and mix well. Put it into a plastic bottle.

5.7 Nickel Standard Stock Solution. 1 mg/mL. Weigh 1.0000 g (accurate to 0.0002

g) of metallic nickel (mass fraction not less than 99.99%). Dissolve in a small amount of nitric acid solution with a volume ratio of (1.1). Dilute to 1000 mL with 1% nitric acid solution and mix well. Put it into a plastic bottle.

5.8 Zinc Standard Stock Solution. 1 mg/mL. Weigh 1.0000 g (accurate to 0.0002

g) of metallic zinc (mass fraction not less than 99.99%). Dissolve in a small amount of hydrochloric acid solution with a volume ratio of (1.1). Dilute to 1000 mL with a 1% hydrochloric acid solution and mix well. Put it into a plastic bottle.

5.9 Chromium Standard Stock Solution. 1 mg/mL. Weigh 2.8288 g (accurate to

0.0002

g) of spectroscopically pure potassium dichromate into a 300 mL beaker. Add 50 mL each of water and nitric acid solution in a

1.1 volume ratio to the solution. After complete dissolution, transfer the solution to a 1000 mL volumetric flask and dilute with water to the mark. Shake well. Transfer to a plastic bottle.

5.10 Cadmium Standard Stock Solution. 1 mg/mL. Weigh 1.0000 g (accurate to 0.0002

g) of metallic cadmium (mass fraction not less than 99.99%) into... Add 50 mL of nitric acid solution (

1.1 volume ratio) to a 300 mL beaker. After complete dissolution, transfer the solution to a 1000 mL volumetric flask and dilute with water. Pour to the mark and shake well. Transfer to a plastic bottle.

5.11 Lead Standard Stock Solution. 1 mg/mL. Weigh 1.0000 g (accurate to 0.0002

g) of metallic lead (mass fraction not less than 99.99%) into... Add 50 mL of nitric acid solution (

1.1 volume ratio) to a 300 mL beaker. After complete dissolution, transfer to a 1000 mL volumetric flask and dilute with water. Fill to the mark and shake well. Transfer to a plastic bottle.

5.12 Copper, cobalt, and nickel mixed standard working solution. 20 µg/mL each. Accurately pipette the copper standard stock solution (5.5) and the cobalt standard stock solution. (5.6) and 10 mL of nickel standard stock solution (5.7) were placed in a 500 mL volumetric flask and diluted to the mark with 2% nitric acid solution. Shake well. Transfer to a plastic bottle.

5.13 Cadmium and lead mixed standard working solution. 20 µg/mL each. Accurately pipette the cadmium standard stock solution (5.10) and the lead standard stock solution. (5.11) Dilute 10 mL of each solution in a 500 mL volumetric flask with 1% nitric acid solution to the mark and shake well. Transfer to a plastic bottle.

5.14 Zinc standard working solution. 50 µg/mL. Accurately pipette 25 mL of zinc standard stock solution (5.8) into a 500 mL volumetric flask, and use a syringe... Dilute a 2% nitric acid solution to the mark, shake well, and transfer to a plastic bottle.

5.15 Chromium Standard Working Solution. 20 µg/mL. Accurately pipette 10 mL of the chromium standard stock solution (5.9) into a 500 mL volumetric flask, and use a syringe... Dilute a 1% nitric acid solution to the mark and shake well. Transfer to a plastic bottle.

Note. Standard stock solutions for copper, cobalt, nickel, zinc, chromium, cadmium, and