

ICS 13.030.10

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

GB/T 33071-2026

Replacing GB/T 33071-2016

**Technical specification for the treatment and disposal of
cobalt-bearing waste**

含钴废料处理处置技术规范

Issued on: May 25, 2026

Implemented on: December 1, 2026

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

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Foreword

This document conforms to GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents". Drafting is scheduled. This document replaces GB/T 33071-2016 "Technical Specification for Treatment and Disposal of Cobalt-Containing Waste". Compared with GB/T 33071-2016, it has the following differences. Aside from structural adjustments and editorial changes, the main technical changes are as follows:

- a) The category for cobalt-containing waste has been removed (see Chapter 3 of the.2016 edition);
- b) A new category for the treatment and disposal of cobalt-containing waste has been added (see Chapter 4);
- c) Added requirements for zinc melting process (see 5.1.4);
- d) Compressed air was added as an oxidant (see 5.2.1.3 and 5.3.1.3);
- e) A pressurized oxygen leaching process has been added (see 5.2.2);
- f) The control conditions have been changed (see 5.3.4.5,.2016 version 4.3.4.5).
- g) The recovery rate of cobalt has been changed (see 6.2, 4.5.2 in the.2016 edition).
- h) The method for determining cobalt content has been changed (see 6.3, Appendix B of the.2016 edition).
- i) The requirements for the treatment of wastewater and air pollutants generated during the recycling process have been changed (see Chapter 7,.2016 edition). Chapter 5);
- j) A method for calculating current efficiency has been added (see Appendix A). 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 Petroleum and Chemical Industry Federation. This document is under the jurisdiction of the National Technical Committee on Standardization of Waste Chemicals Disposal (SAC/TC 294). This document was drafted by: Zhejiang Huayou Cobalt Co., Ltd., GEM (Jiangsu) Cobalt Co., Ltd., and Nanchang Aviation University. CNOOC Tianjin Chemical Research and Design Institute Co., Ltd., Jiangsu Chenhui New Material Technology Co., Ltd., Hunan Jinkai Recycling Technology Co., Ltd. Yichang Bangpu Times New Energy Co., Ltd. The main drafters of this document are. Yang Jie, Xu Kaihua, Xie Yu, Rui Xue, Xue Jiayun, Lei Yangui, Yan Qunxuan, Shi Qiyong, Wang Hao, Hu Lei, and Sun Jiahan. Tan Qunying, Tang Shenghe, Ding Ling, An Xiaoying, and Gong Chuangzhou. This document was first published in.2016 and this is its first revision. Technical Specifications for the Treatment and Disposal of Cobalt-Containing Waste

1 Scope

GB/T 33071-2026 is the Chinese national standard covering cobalt-bearing waste - battery scrap, catalyst residues and alloy swarf - and the leaching, separation and recovery that get the cobalt back out of it, or the disposal that applies when they cannot. Cobalt is scarce, expensive and mined in conditions the buyers of it are increasingly asked about, all of

which makes recovery worth standardising. It replaces GB/T 33071-2016 and takes effect on 1 December 2026. It was issued on 25 May 2026 and takes effect on 1 December 2026, replacing GB/T 33071-2016. The document is under the responsibility of the China Petroleum and Chemical Industry Federation. 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.

5.3.4.5 The control conditions are as follows:

- a) Suitable pH adjusters include sulfuric acid, hydrochloric acid, sodium hydroxide, and ammonia.
- b) Suitable extractants include bis(2,4,4-trimethylpentyl)phosphonic acid, 2-ethylhexylphosphonic acid mono-2-ethylhexyl ester (P204), and bis(2-ethylhexyl)phosphonic acid mono-2-ethylhexyl ester. Phosphate esters (P507), etc.;
- c) Sulfonated kerosene, solvent oil, etc. are suitable diluents;
- d) Extractant dilution ratio. 1.(2~5);
- e) Extraction system. $V_{\text{organic phase}} : V_{\text{aqueous phase}} = (1\sim3) : 1$;
- f) Sodium hydroxide, ammonia, etc. are suitable saponifying agents;
- g) Temperature control. 35 °C~45 °C.

1.2 MPa~

5.1.4.3 Distillation separation. Vacuum distillation of zinc, heating to 950 °C~970 °C, holding for 10 h~20 h, pressure -

0.05 MPa~-

0.15 MPa. Zinc vapor is condensed and recovered, leaving behind spongy cobalt and carbide clumps.

5.1.4.4 The agglomerates are ball-milled until the particle size is less than

0.15 mm, and then recycled after adjusting the composition.

1.8 MPa~

- c) Kettle temperature. 180 °C~200 °C.

2 Purification process flow diagram

5.4.5 The control conditions are as follows:

- a) Purification and extraction conditions are the same as in 5.3.4.5;

b) Back-extraction acid solution. The hydrogen ion molar concentration in the sulfuric acid solution or hydrochloric acid solution is

c) Back-extraction system. V back-extraction acid solution. V organic phase = 1. (8~20);

d) Back-extraction stages. 3~6.

5.4.6 The cobalt products obtained after treatment and disposal shall meet the requirements of the corresponding product standards.

5.1.1 Calcination

5.1.1.1 When cobalt-containing waste contains organic matter or insoluble cobalt compounds, roasting treatment should be adopted.

5.1.1.2 High temperature is used to thermally remove organic matter and oxidize metals in cobalt-containing waste.

5.1.1.3 The main equipment should include a roasting furnace or a rotary kiln.

5.1.1.4 The cobalt-containing waste is fed into a roasting device and roasted in stages, including heating to 600 °C~700 °C, holding at that temperature for 1 h~3 h, and then cooling. After the waste has been processed and deemed acceptable, it is collected and ready for use.

5.1.1.5 Control conditions.

a) Firing temperature. 600 °C~700 °C;

b) Calcination time. 1 h to 3 h.

5.1.2 Crushing

5.1.2.1 Cobalt-containing waste containing large particles or lumps shall be crushed and ground, and the particle size after crushing and grinding shall be less than 1 mm.

5.1.2.2 The main equipment should include air jet crushers, ball mills, etc.

5.1.3 Magnetic Separation

5.1.3.1 Separate materials by utilizing their magnetic differences under magnetic force.

5.1.3.2 The main equipment should be a magnetic separator.

5.1.3.3 Cobalt-containing waste containing magnetic materials is fed into a magnetic separation device, and the separated cobalt-containing waste is collected for later use.

5.1.3.4 The magnetic field strength should be

0.1 T to