

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

HJ 781-2016

**Solid waste. Determination of 22 metal elements. Inductively
coupled plasma optical emission spectrometry**

固体废物 22种金属元素的测定 电感耦合等离子体发射光谱法

(English Translation)

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Foreword

In order to implement the Environmental Protection Law of the People's Republic of China and the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes, Protect the environment, protect human health, regulate the solid waste of 22 kinds of metal elements of the determination method, the development of this standard.

This standard specifies the inductively coupled plasma emission of 22 metal elements in the determination of solid waste and solid waste leachate Spectroscopy.

This standard is the first release.

Appendix A to this standard is a normative appendix, Appendix B, Appendix C, Appendix D and Appendix E are informative.

This standard is organized by the Ministry of Environmental Protection Science and Technology Standards Division.

The main drafting unit of this standard. Jiangsu Province Environmental Monitoring Center.

The standard verification unit. Nanjing Environmental Monitoring Center Station, Zhejiang Province Environmental Monitoring Center, Shanghai Environmental Monitoring Center Station, Changzhou City Environmental Monitoring Center Station, Ma On Shan City Environmental Monitoring Center Station, Lianyungang City Environmental Monitoring Center Station.

This standard is approved by the Ministry of Environmental Protection on February 1, 2016.

This standard has been implemented since March 1, 2016.

This standard is explained by the Ministry of Environmental Protection.

Determination of 22 Kinds of Metal Elements in Solid Waste Inductively Coupled Plasma Atomic Emission Spectrometry Warning. The use of perchloric acid, nitric acid, hydrogen peroxide in the experiment is highly oxidizing and corrosive, hydrochloric acid, hydrofluoric acid Strong volatile and corrosive, the operation should be required to wear protective equipment, solution preparation and sample pretreatment process should be in the process Do not operate in a fume hood.

1 Scope of application

This standard specifies the determination of 22 kinds of metal elements in solid waste and solid waste leachate inductive coupling plasma emission Spectroscopy.

This standard applies to the solid waste and solid waste leaching solution of silver (Ag), aluminum (Al), barium (Ba), beryllium (Be), Calcium (Ca), cadmium (Cd), cobalt (Co), chromium (Cr), copper (Cu), iron (Fe), potassium (K), magnesium (Mg) Manganese (Mn), sodium (Na), nickel (Ni), lead (Pb), strontium (Sr), titanium (Ti), vanadium (V), zinc (Zn) Thallium (Tl), antimony (Sb) and other 22 kinds of metal elements. If verified, this standard may also apply to other trace amounts of gold Determination of elements.

The amount of solid waste sample is 0.25 g. When the volume of the fixed volume is 25.0 ml, the detection limit of 22 kinds of metal elements is 0.04 mg/kg ~ 8.9 mg/kg, the determination of the lower limit of 0.16 mg/kg ~ 35.6 mg/kg. 22 kinds of metal elements in solid waste leaching solution the detection limit of the method was 0.004 mg/L ~ 0.35 mg/L, and the lower limit was 0.016 mg/L ~ 1.40 mg/L. See Appendix A. for details.

2 Normative reference documents

The contents of this standard refer to the following documents or their terms. Those who do not specify the date of the reference file, the effective version of the appropriate for this standard.

Solid waste leaching toxicity leaching method Technical specification for SJ sample preparation for industrial solid waste Technical Specification for Hazardous Waste Identification HJ/T 299 Solid waste leaching toxicity leaching method sulfuric acid nitric acid method HJ/T 300 solid waste leaching toxicity leaching method acetic acid buffer solution method HJ 557 Solid waste leaching toxicity leaching method Horizontal oscillation method

3 Principle of the method

Solid waste or solid waste leaching solution after acid digestion, into the plasma emission spectrometer atomizer was atomized, from the argon carrier gas into the plasma torch, the target element in the plasma torch is gasified, ionized, excited and radiated Sign line. The intensity of the characteristic spectrum is proportional to the content of the element to be measured in the sample within a certain range.

4.1 Spectral interference

Spectral disturbances mainly include continuous background and overlapping lines. The usual method of correcting spectral interference is the background subtraction method (root According to single element test to determine the location and manner of subtracting the background) and the interference coefficient method. The base may also be used in a mixed standard solution Body matching method to eliminate its effects.

When there is a single element interference, the interference coefficient can be obtained according to equation (1).

$$Q_{QK} / Q = (1) - t_K$$

Where. t_K - interference coefficient;

Q_{QK} - the content measured at the wavelength of the element;

Q - analysis of the content of elements;

t_K - the content of interfering elements.

By preparing a series of known interfering element content solutions, the Q_{QK} is determined at the position of the elemental wavelengths, (1) to find t_K , and then artificial deduction or computer automatic deduction. Under normal circumstances, solid waste and solid waste leaching the concentration of each element in the liquid sample is low, and the interference between the spectrum and the matrix element can be neglected. When the concentration of each element is high, the target element determines the wavelength spectral interference and the relevant interference coefficient. Note that the interference factor for different instruments will be measured do not.

4.2 Non-spectral interference

Non-spectral interference mainly includes chemical interference, ionization interference, physical interference and solvent interference, etc., in the actual analysis it is difficult to separate the various types of interference. Whether it is compensated and corrected, and the concentration of interfering elements in the sample. In addition, Physical disturbances are generally caused by changes in the degree of stickiness and surface tension of the sample, especially when the sample contains a large amount of soluble salts or Acid is too

high, will interfere with the determination. The most common way to eliminate such interference is dilution and standard addition.

The standard addition method is described in Appendix E.

5 Reagents and materials

Unless otherwise stated, analytical reagents conforming to national standards are used in the analysis, and the test water is a newly prepared deionized water.

5.1

concentrated sulfuric acid. ρ (H_2SO_4) = 1.84 g/ml, excellent grade pure.

5.2

concentrated nitric acid. ρ (HNO_3) = 1.42 g/ml, excellent grade pure.

5.3

concentrated hydrochloric acid. ρ (HCl) = 1.19 g/ml, excellent grade pure.

5.4

hydrofluoric acid. ρ (HF) = 1.49 g/ml, excellent grade pure.

5.5

perchloric acid. ρ (HClO_4) = 1.76 g/ml, excellent grade pure.

5.6

Hydrogen peroxide. ϕ (H_2O_2) = 30%, excellent grade pure.

5.7

nitric acid solution. 1 1 (v/v), prepared with concentrated nitric acid (5.2).

5.8

nitric acid solution. 1 99 (v/v), prepared with concentrated nitric acid (5.2).

5.9

Hydrochloric acid solution. 1 1 (v/v), prepared with concentrated hydrochloric acid (5.3).

5.10

single element standard stock solution. ρ = 1000 mg/L.

Can be made of high purity metal (purity greater than 99.99%) or metal salts (reference or high purity reagent) prepared into 1000 mg/L Standard stock solution containing 1% nitric acid (5.8). You can also purchase commercially available standard solutions.