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National Standard of the People’s Republic of China

GB/T 15072.2-2008

Replaces GB/T 15072.2-1994

Test method of precious metal alloys

Determination of silver contents for silver alloys

Potentionmeter titration with sodium chloride

贵金属合金化学分析方法

银合金中银量的测定

氯化钠电位滴定法

(English Translation)

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Foreword

SAC/TC 243 is in charge of this English translation. In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritative.

This standard is an integrated revision of GB/T 15072-1994( *Chemical analysis methods for precious metals and their alloys*)(all parts), which is divided into 19 parts:

—GB/T 15072.1-2008 *Test methods of precious metal alloys Determination of gold content for gold, platinum and palladium alloys Potentiometric titration with ferrous sulfate*.

—GB/T 15072.2-2008 *Test methods of precious metal alloys Determination of silver content for silver alloys Potentiometric titration with sodium chloride*.

—GB/T 15072.3-2008 *Test methods of precious metal alloys Determination of platinum content for gold, platinum and palladium alloys Current titration with potassium permanganate*.

—GB/T 15072.4-2008 *Test methods of precious metal alloys Determination of palladium content for palladium and silver alloys Butanedione dioxime gravimetry*.

—GB/T 15072.5-2008 *Test methods of precious metal alloys Determination of silver content for gold and palladium alloys Potentiometric titration with potassium iodide*.

—GB/T 15072.6-2008 *Test methods of precious metal alloys Determination of iridium content for platinum and palladium alloys Potentiometric titration with ferrous sulfate*.

—GB/T 15072.7-2008 *Test methods of precious metal alloys Determination of chromium and iron contents for gold alloys Inductively coupled plasma atomic emission spectrometry*.

—GB/T 15072.8-2008 *Test methods of precious metal alloys Determination of copper content for gold, palladium and silver alloys EDTA complexometric back titration with thiourea precipitation*.

—GB/T 15072.9-2008 *Test methods of precious metal alloys Determination of indium content for gold alloys EDTA complexometric back titration*.

—GB/T 15072.10-2008 *Test methods of precious metal alloys Determination of nickel content for gold alloys EDTA complexometric back titration*.

—GB/T 15072.11-2008 *Test methods of precious metal alloys Determination of gadolinium and beryllium contents for gold alloys Inductively coupled plasma atomic emission spectrometry*.

—GB/T 15072.12-2008 *Test methods of precious metal alloys Determination of vanadium content for silver alloys Hydrogen peroxide spectrophotometry*.

—GB/T 15072.13-2008 *Test methods of precious metal alloys Determination of tin, cerium and lanthanum contents in silver alloys Inductively coupled plasma atomic emission spectrometry*.

—GB/T 15072.14-2008 *Test methods of precious metal alloys Determination of aluminium and nickel contents for silver alloys Inductively coupled plasma atomic emission spectrometry*.

—GB/T 15072.15-2008 *Test methods of precious metal alloys Determination of nickel, zinc and manganese contents for gold, silver and palladium alloys Inductively coupled plasma atomic emission spectrometry*.

—GB/T 15072.16-2008 *Test methods of precious metal alloys Determination of copper and manganese contents for gold alloys Inductively coupled plasma atomic emission spectrometry*.

—GB/T 15072.17-2008 *Test methods of precious metal alloys Determination of tungsten content for platinum alloys Tungsten trioxide gravimetry*.

—GB/T 15072.18-2008 *Test methods of precious metal alloys Determination of zirconium and gallium contents for gold alloys Inductively coupled plasma atomic emission spectrometry*.

—GB/T 15072.19-2008 Test methods of precious metal alloys Determination of vanadium and magnesium contents for silver alloys Inductively coupled plasma atomic emission spectrometry.

This part is the second of GB/T 15072-2008.

This part replaced GB/T 15072.2-1994 (*Methods for Chemical Analysis of Precious Metals and Their Alloys Silver alloys Determination of sliver content*) in whole.

The following deviations have been made with respect to the GB / T 15072.2-1994(the previous edition):

—The title of standard is changed from *Methods for Chemical Analysis of Precious Metals and Their Alloys Silver alloys Determination of sliver content* to *Test method of precious metal alloys Determination of silver contents for silver alloys Potentionmeter titration with sodium chloride*.

—This part is drafted in accordance with the rules given in the new document including compound and consistency.

—The scope of the standard is extended from AgCu10,AgCu12.5,AgCuNiAl20-2.0-1.0,AgCuV10-0.2,AgGe0.5 of the previous edition to this standard is applicable to the determination of silver content for alloys of AgCu, AgCuZnMnNi, AgCuNiAl, AgCuV, AgCuZnSn, AgSnCeLa,AgCe,AgMgNi.  The determination range of this standard (mass fraction) is 50% to 99.5%.

—This part is drafted in accordance with the rules given in the GB/T20001.4-2001.

Appendix A (Annex A) is informative in this part.

This part was proposed by Nonferrous Metals Industry Association of China;

This part was prepared by SAC/TC 243 Chinese Nonferrous Metal Standardization Technical Committee.

This part is explained by the national non ferrous metal Standardization Technical Committee.

The previous edition of this standard is as follow:

—GB/T 15072.2-1994.

Test method of precious metal alloys

Determination of silver contents for silver alloys

Potentionmeter titration with sodium chloride

1. Scope

This part specifies a method for the determination of silver content in silver alloys.

This part is applicable to determination of silver content between 50% to 99.5% in AgCu, AgCuZnMnNi, AgCuNiAl, AgCuV, AgCuZnSn, AgSnCeLa,AgCe,AgMgNi alloys.

1. Normative references

The following normative documents contain provisions which, through reference in this, constitute provisions of this part. For dated references, subsequent amendments (excluding corrections), or revisions, of any of these publications do not apply to this part. However parties to agreements based on this part are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

YS/T 371 *Methods for chemical analysis of precious metals alloys General rules and regulations*.

1. Method abstract

The test portion shall be dissolved in nitric acid in nitric acid medium, using sliver electrode as the indicating electrode, silver-silver iodide electrode as the reference electrode, silver contents can be determined by sodium chloride titrand. The terminal point can be detected by potentionmeter.

1. Reagent and material

Unless otherwise noted, reagents and utensils are in accordance with YS/T 371.

4.1 Nitric acid( ρ1,42g/ml),guarantee reagent.

4.2 Silver standard solution

Weighing 2.0000g of silver metal (purity≥99.99%), accurate to 0.00001g, It should be placed in a 250 ml beaker, then cover the surface dish and add 40 ml of nitric acid(1+1, guarantee reagent) , Heating the solution until test portion completely dissolved, then excluding oxynitride completely. Remove and cool to room temperature. Wash surface dish and cup wall with water. The solution shall be transferred into a 1000 ml brown one-mark volumetric flask with water, diluting to the mark and mix. 1 ml of this solution contains 2mg of silver. It should be kept in dark place.

4.3 Sodium chloride titrand [c (NaCl) about 0.020 mol/L].

4.3.1 Preparation

Weighing 1.169g of sodium chloride (mass fraction), dissolved with water. The solution shall be transferred into 1000 ml one-mark volumetric flask with water, diluting to the mark and mix.

4.3.2 Standardization

Transfer 25.00 mL silver standard solution into a 100 mL beaker. Putting sliver electrode and silver-silver iodide electrode into the beaker, start electromagnetic stirrer, using the sodium chloride titrand as volumetric solution, The end point of titration is the potential abrupt to the maximum. The range volume of sodium chloride titrand shall not exceed 0.05mL in twice standardizations. The results should be averaged.

The actual concentration of sodium chloride titrand is calculated according to formula (1):

-- -- -- -- -- -- -- -- -- -- -- (1)

In the formula:

C is the actual concentration of sodium chloride titrand, the unit is moles per liter(mol/L).

C0is the mass concentration of silver standard solution, the unit is milligram per milliliter (mg/mL).

V1 is the volume of transfer silver standard solution, the unit is milliliter (mL).

V2 is the volume of sodium chloride titrand which is consumed in standardization by silver standard solution, the unit is milliliter (mL).

107.87 is the molar mass of silver, the unit is gram per mole(g/mol).

5 Apparatus

5.1 Balance, sensitive quality to 0.01mg.

5.2 Potentiometric titrator.

5.2.1 Potentiometer: accuracy to 1mV.

5.2.2 Indicating electrode: sliver electrode.

5.2.3 Reference electrode: silver-silver iodide electrode.

6 Sample

Sample should be rolled into thin sheets of thickness, remove oil stains with acetone, and cut into debris, washed with water, dried, mixed.

7 Analysis procedure

7.1 Test portion

Take the portion according to Table 1, accurate to 0.00001g.

Table 1

|  |  |
| --- | --- |
| Mass fraction of silver /% | Test portion /g |
| 50.00~70.00 | 0.14 |
| >70.00 to 80.00 | 0.12 |
| >80.00 to 90.00 | 0.11 |
| >90.00 to 99.50 | 0.10 |

7.2 Determination of the number

Two independent determinations should be required, and average the results.

7.3 Blank test

Blank test shall be done along with the test portion.

7.4 Determination

7.4.1 The portion should be placed in a 100 ml beaker. then cover the surface dish and add 2mL nitric acid, Heating the solution at low temperature until test portion completely dissolved, then wash surface dish and cup wall with water, Add water to about 20mL.

7.4.2 Putting sliver electrode and silver-silver iodide electrode into the beaker, start electromagnetic stirrer, using the sodium chloride titrand as volumetric solution, The end point of titration is the potential abrupt to the maximum.

8 Calculation of analysis results

The mass fraction of silver is calculated according to formula (2), and the value is expressed as % :

 -- -- -- -- -- -- -- -- -- -- -- (2)

In the formula:

C is the actual concentration of sodium chloride titrand, the unit is moles per liter(mol/L).

V1 is the volume of sodium chloride titrand which is consumed in titration by test solution , the unit is milliliter(mL).

m0 is the mass of the test portion, the unit is gram(g).

107.87 is the molar mass of silver, the unit is gram per mole(g/mol).

The results should be expressed to two decimal places.

9 Tolerance

Differences between laboratory analysis results allowable should be not more than listed in table 2.

Table 2. %

|  |  |
| --- | --- |
| Mass fraction of palladium | Tolerance1 |
| 50.00 to 80.00 | 0.15 |
| >80.00 to 90.00 | 0.22 |
| >90.00 to 99.50 | 0.30 |

Appendix A

(informative)

Manufacture method of silver-silver iodide electrode

Taking a pure silver wire of 1 millimeter in diameter and 180 millimeter in length, It should be polished by abrasive paper. One end coil 5 spiral circles about 5 millimeter in diameter, washing by water, then it should be putted into potassium iodide solution(0.015mol/L), using silver wire as anode and platinum wire as cathode, polarization by 1 milliampere direct-current main in 2000 second, silver-silver iodide electrode has been made. Putting the silver-silver iodide electrode into a glass tube which about 7 millimeter in inner diameter and about 150 millimeter in length. Bottom of the glass tube was filled with nitrate of potash agar as salt bridge. Head of the glass tube shall be filled with mixed saturated solution of nitrate of potash and silver iodide. Enfolded by black paper and kept in dark place, dip in saturated solution of nitrate of potash when not use.