

KES

Method for Atomic Absorption
Spectro Chemical Analysis of
Copper Products and Copper Alloys.

KES T – M046

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1. Scope of application

In this standard, the method for atomic absorption spectro chemical analysis of cooper products and copper alloys shall be provided.

This analysis element and range of analytic quantity are referred in the table 1.

Table 1 Range of analytic quantity⁽¹⁾

Component	Range of analytic quantity
Lead	0.01 ~ 4.5
Iron	0.01 ~ 6.0
Tin	0.02 ~ 4.0
Zinc	0.01 ~ 1.0
Aluminum	0.1 ~ 3.0
Manganese	0.01 ~ 3.0
Nickel	0.01 ~ 7.0
Silicon	0.1 ~ 4.0
Cobalt	0.01 ~ 1.0
Chrome	0.01 ~ 0.2
Beryllium	0.1 ~ 2.0

Note ⁽¹⁾ The minimum value in the range of analytic quantity is a general standard data considered from the standard of an object sample and experiment result.

Generally, the component that is applied to a few lower content ratio under this minimum value is even 0.005 % of zinc, manganese and beryllium.

2. General particulars

General particulars of the method of analysis are according to KS M 0001 (General rules of chemical analysis) and KS M 0016 (General rules of atomic absorption spectro chemical analysis).

3. Method to gather samples for analyzing and to treat samples for analyzing

3.1 Method to gather samples for analyzing

- (1) Method to gather samples is according to KS D 0002 (General rules of testing nonferrous metal) and KS D 1651 (General rules of analyzing copper products and copper alloy).
- (2) When Method to gather samples is not done with the rules, decide them by an agreement between persons concerned.

3.2 Method to treat samples

- (1) Keep the samples for analyzing in a glass bottle with a cap in order to prevent them from being polluted by a contaminant.
- (2) When you are worry about for fatty matter to adhere to the surface of sample for analyzing, wash the samples and remove the fatty matter with pure alcohol and ether.

3.3 Method for measuring the sample's analytic quantity

- (1) When you measure the analysis sample weight, stir and mix the sample well. And pay attention to keep the sample's composition ratio.
- (2) Use the chemical balance to measure the analysis sample weight.

4. Method for indicating analysis data and notice for operation

4.1 Method for indicating analysis data

- (1) Analysis is executed more 2 times for same reagent. And decide the result.
- (2) Show the analysis data in percentage. And each copper goods and copper alloy standard is according to the KES A-A 003 (Data finishing).

4.2 Notice for operation

- (1) After making the sample solution, measure quickly. Also, draw measuring graph at the same time.
- (2) Use a solution to dissolve pure metal in acid as a rule, for each element solution and standard solution, in order to prevent coexistence salt interference.

(3) Use copper, zinc, nickel used in making reagent, which do not include objective analytic quantity element or are known about analytic quantity element's content exactly.

Besides, use Pb, Fe, Sn, Al, Be which are determined about content of objective analytic quantity element in advance.

(4) High pressure gas treatment, spark lighting and spark extinguishing are executed with sufficient attention.

Specially, in use of nitrous oxide-acetylene spark, pay attention to backfire and explosion. Also pay attention to nitrous oxide's poisonous.

5. Method for analysis

5.1 Outline

After resolving the sample with mixed acid and making an fixed quantity, measure the absorption spectro intensity with atomic absorption spectro.

5.2 Reagent

(1) Hydrochloric acid (1 : 1, 1 : 9)

(2) Mixed acid (Hydrochloric acid 1, nitric acid 1, water 2)

(3) Hydrofluoric acid (1 : 9) : Refer remark

(4) Boric acid solution (5 w/v %)

(5) Copper solution (20 mg Cu / ml) : Take copper (More than 99.98 %) 10.00 g, add nitric acid (1 : 1) 80 ml, heat quietly and resolve.

After cooling, add hydrochloric acid (1 : 1) 50 ml and dilute with distilled water. Then make 500ml solution exactly.

(6) Zinc solution (20 mg Zn / ml) : Take zinc (More than 99.9 %) 2.500 g, add mixed acid 100 ml by several separate times, heat quietly and resolve.

After cooling, dilute with distilled water. Then make 500 ml solution exactly.

(7) Nickel solution (20 mg Ni / ml) : Take nickel (More than 99.9 %), add nitric acid (1 : 1)

80 mL, heat quietly and resolve.

After cooling, add hydrochloric acid (1 : 1) 50 mL and dilute with distilled water. Then make 500 mL solution exactly.

(8) Standard lead solution (1000 μg and 100 μg Pb / mL) : Take lead (More than 99.99 %)

2.500 g, add nitric acid (1 : 4) 70 mL, heat quietly and resolve.

After cooling, dilute with distilled water. Then make 500 mL solution exactly and make it original solution (20 mg Fe / mL).

(9) Standard iron solution (100 μg and 100 μg Fe / mL) : Take electrolytic iron (More than

99.5%) 1,000 g, add hydrochloric acid (1 : 1) 30 mL and nitric acid 5 mL, heat quietly and resolve.

After cooling, dilute with distilled water. Then make 500 mL solution exactly and make it original solution (5 mg Fe / mL).

Every use of this solution, dilute 2 times or 20 times with distilled water and make it standard iron solution.

(10) Standard tin solution (1000 μg and 100 μg Sn / mL) : Take tin (More than 99.5 %)

2.500 g, add hydrochloric acid 50 mL with contact of platinum and heat it from 50 ° ~ 80 ° and resolve.

After cooling, move it into 500 mL mass flask by washing with hydrochloric acid 200 mL, dilute up to marked line with distilled water and make it original solution (5 mg Sn / mL).

Every use of this solution, dilute 5 times with distilled water or 50 times with hydrochloric acid and make it standard tin solution.

(11) Standard zinc solution (1000 μg and 100 μg Zn / mL) : Take zinc (More than 99.99 %),

add hydrochloric acid 30 mL, heat quietly and resolve.

After cooling, move it into 500 mL mass flask by washing with water, dilute up to marked line with distilled water and make it original solution (2 mg Zn / mL).