

KES

**Determination of Tin
in Copper Products
and Copper Alloys**

KES T – M041

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1. Scope of application

This standard shall specify analysis method of tin in copper products and copper alloys.

2. General particulars

General particulars of analysis method refer to KES T-M039 (General rules of analysis method of copper products and copper alloys) and KES T-M046 (Analysis method of light absorption of atom of copper products and copper alloys).

3. Analysis method

Analysis methods of tin are as follows.

- (1) Analysis method of volume I (Carbon dioxide reduction method)
- (2) Analysis method of volume II (Hypophosphite reduction method)

This method is applied to samples that contain 0.5 ~ 20% of tin.

- (3) Analysis method of light absorption of atom

This method is applied to samples that contain 0.02 ~ 4.0% of tin.

4. Analysis method of volume I

4.1 Summary

After separating a hydroxide as a precipitate using hydrolysis of tin by melting samples into acid and adding ammonia, analyze quantity of tin by reduction of tin in carbon dioxide current by dissolving it again and titration as a standard solution of iodine or iodine acid.

4.2 Reagent

- (1) Hydrochloric acid
- (2) Hydrochloric acid (1 : 1)
- (3) Nitric acid (1 : 1)

- (4) An ammonia solution (1 : 1)
- (5) Iron chloride II solution : Dilute iron chloride II ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$) of 10 g by dissolving into distilled water.
- (6) Ammonium chloride solution : Make ammonium chloride (NH_4Cl) 10 g alkali state by dissolving it into 1 ℓ distilled water and adding 2 or 3 drops of ammonia solution.
- (7) Iron powder, lead powder and aluminum foil
- (8) Antimonic chloride solution: Dissolve antimonic chloride (SbCl_3) 2 g into hydrochloric acid 50 ml and dilute with distilled water.
- (9) Potassium iodide solution (10%)
- (10) Dextrin solution (Reagent) refers to KS M 0015
(Preparation method of reagent for chemical analysis)
- (11) Standard solution of 0.05 N iodine acid: refers to KS M 0002
(Preparation method of some kinds of standard solution for chemical analysis)
- (12) Nitric acid or carbon dioxide

4.3 Equipment

Tin reduction equipment refers to (5) in KS M 0014 (Equipment for chemical analysis).

4.4 Operation

- (1) Transfer sample of 1 ~ 2 g exactly into a beaker (250 ml) according to content ratio of tin, dissolve by adding hydrochloric acid 5 ml and nitric acid (1 : 1) 20 ml and covering with watch-plate. If necessary, add more hydrochloric acid.
- (2) When the sample is dissolved completely, remove brown nitric oxide by heating⁽¹⁾ and wash the watch-plate and wall of the beaker. Then, add 5 ~ 10 ml of ironic chloride II solution after dilution with distilled water in order to make about 120 ml of solution.
- (3) Precipitate alkali salt by adding ammonia solution and keep doing until solution become transparent because a precipitate is dissolved again. Then, boil it for a moment and strain out using filtering paper.

After washing a beaker and a precipitate by hot ammonium chloride solution several