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**Methods for determination of
arsenic in copper and copper alloys**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Copper and Brass Association (JCBA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS H 1059** : 1987 is replaced with this Standard.

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Methods for determination of arsenic in copper and copper alloys

Introduction This Japanese Industrial Standard has been prepared by adopting the first edition of **ISO 3220** *Copper and copper alloys—Determination of arsenic—Photometric method* published in 1975 for the corresponding part (clause 6, Bromide extraction separation molybdoarsenate blue absorptiometry) and by adding the clauses (those other than clause 6) not given in the original International Standards, as provisions that are unique to the Japanese Industrial Standard.

The portions given sidelines or dotted underlines are the matters which have been added to or modified from the original International Standard. A list of modifications with the explanations is given in annex (informative).

1 Scope This Standard specifies the methods for determination of arsenic in copper and copper alloys (wrought copper).

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

ISO 3220:1975 *Copper and copper alloys—Determination of arsenic—Photometric method* (MOD)

2 Normative reference The following standard contains provisions which, through reference in this text, constitute provisions of this Standard. The most recent edition of the standard (including amendments) indicated below shall be applied.

JIS H 1012 *General rules for chemical analysis of copper and copper alloys*

3 General matters General matters common to this method shall be in accordance with **JIS H 1012**.

4 Classification of determination methods The method for determination of arsenic shall be in accordance with either of the following methods.

The determination methods and alloy numbers of copper or copper alloys to which they are applicable shall be as given in table 1.

- a) **Molybdoarsenate extraction absorptiometry** This method applies to the sample of 0.005 % (m/m) or over up to and including 0.08 % (m/m) in arsenic content.
- b) **Bromide extraction separation molybdoarsenate blue absorptiometry** This method applies to the sample of 0.002 % (m/m) or over up to and including 0.8 % (m/m) in arsenic content.

Table 1 Determination method and subject alloy number

Alloy number	Molybdoarsenate extraction absorptiometry	Bromide extraction separation molybdoarsenate blue absorptiometry
C4430	○	○
C6870	○	○
C6871	○	○
C6872	○	○

5 Molybdoarsenate extraction absorptiometry

5.1 Summary After decomposing a sample with the mixture of hydrochloric and nitric acid, it is joined by sodium hypobromite and hexaammonium heptamolybdate, and molybdoarsenic acid is generated. Thereafter, it is extracted with ethyl acetate, butanol and the absorbance is measured by using a photometer.

5.2 Reagents The reagents shall be as follows:

- Mixed acid (hydrochloric acid 1, nitric acid 3, and water 4)**
- Copper** It is the copper of 99.96 % (m/m) min. in purity, 0.000 5 % (m/m) max. in arsenic content, and 0.000 3 % (m/m) max. in phosphorus content.
- Zinc** It is the zinc of 99.9 % (m/m) min. in purity, 0.000 5 % (m/m) max. in arsenic content, and 0.000 3 % (m/m) max. in phosphorus content.
- Sodium hypobromite solution** 3 ml of bromine water (saturated), 11 ml of water, and 2 ml of sodium hydroxide solution (20 g/L) are mixed. This solution is prepared at each service.
- Ammonium molybdate solution** 10 g of hexaammonium heptamolybdate tetrahydrate is dissolved with water to 100 ml. This solution is prepared at each service.
- Ethyl acetate · butanol mixed solvent (ethyl acetate 1 and butanol 1)**
- Arsenic standard solution (200 µgAs/ml)** 0.265 g diarsenic trioxide is weighed out, transferred into a beaker (200 ml) and dissolved by adding 10 ml of sodium hydroxide solution (20 g/L). It is diluted to approximately 50 ml with water, slightly acidified by adding 3 ml of sulfuric acid (1+10) and cooled to ordinary temperature. Thereafter, it is transferred into a transfer flask of 1 000 ml by using water and diluted to the marked line with water.

5.3 Weighing out amount of sample The weighing out amount of a sample shall be 2.00 g.

5.4 Operation