Doc: FAD 01(25532)WC
May 2024

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY

भारतीय मानक मसौदा

क्यूप्रस ऑक्साइड (फन्गीसाईडल ग्रेड), तकनीकी — विशिष्टि

(*आइ एस 1682 का दूसरा पुनरीक्षण*)

Draft Indian Standard

CUPROUS OXIDE (FUNGICIDAL GRADE), TECHNICAL — SPECIFICATION

(*Second Revision of IS 1682*)

ICS No. 65.100.30

Pesticides Sectional Committee, FAD 01 **Last Date of Comments: 4 July 2024**

FOREWORD

(*Formal clauses would be added later*)

Cuprous oxide (fungicidal grade), technical, is extensively used for agricultural and horticultural purposes in fungicidal formulations.

This standard was published in 1960. In 1973, the standard was first revised so as to bring the standard up-to-date, taking into consideration the views of the industry and consumers.

In this revision, the standard has been brought out in the latest style and format of the Indian Standards, and references to Indian Standards wherever applicable have been updated.

In the preparation of this standard, due consideration has been given to the provisions of the *Insecticides Act*, 1968 and the Rules framed thereunder. However, this standard is subject to the restrictions imposed under these, wherever applicable.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022. 'Rules for rounding off numerical values (*second revision*)' This number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for methods of test for cuprous oxide, technical, used in the formulation of fungicides for agricultural and horticultural purposes.

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 264 : 2005	Nitric acid — Specification (*third revision*)
IS 265 : 2021	Hydrochloric acid — Specification (*fifth revision*)
IS 296 : 2023	Sodium carbonate anhydrous — Specification (*fourth revision*)
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 6940 : 1982	Methods of test for pesticides and their formulations (*first revision*)
IS 10946 : 1996	Methods of sampling for technical grade pesticides (*first revision*)

3 REQUIREMENTS

3.1 Description

The material shall be essentially cuprous oxide. It shall be in the form of a dry powder, or in such a form that it is possible to easily powder it by crushing under a palette knife, without a grinding action. It shall have a yellow-orange to orange-red colour and shall be free from adulterants and foreign matter.

3.2 The material shall also comply with the requirement given in Table 1.

Table 1 Requirements of Cuprous Oxide (Fungicidal Grade), Technical

(*Clause* 3.2)

Sl. No.	**Characteristic**	**Requirements**	**Method of Test, Ref to**
(1)	(2)	(3)	(4)
i)	Moisture content, percent by mass, *Min*	1.0	IS 6940
ii)	Total copper, percent by mass, *Max*	80.0	Annex A
iii)	Total soluble alkali (as Na_2CO_3) percent by mass, *Max*	0.50	Annex B
iv)	Total soluble chloride (as NaCl), percent by mass, *Max*	0.50	Annex C

4 PACKING

The material shall be packed according to IS 8190 (Part 1).

5 MARKING

5.1 The containers shall be securely closed and shall bear legibly and indelibly the following information:

a) Name of the material;
b) Name and address of the manufacturer;
c) Batch number;
d) Date of manufacture;
e) Date of expiry;
f) Net quantity;
g) Nominal copper content, percent (*m*/*m*);
h) Cautionary notice as worded in the *Insecticides Act*, 1968, and Rules framed thereunder; and
j) Any other information required under the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011.

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples of the material shall be drawn as prescribed in IS 10946.

7 TESTS

Tests shall be carried out by appropriate methods as referred in col (4) of Table 1.

8 QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE – 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A
[*Table* 1, *Sl No.* (ii)]
DETERMINATION OF TOTAL COPPER

A-1 PRINCIPLE OF THE METHOD

Copper is determined by titration of the iodine liberated on addition of potassium iodide to the weakly acidic solution. Difficulties with absorption of iodine on the cuprous iodide precipitate are avoided by the addition of potassium or ammonium thiocyanate.

A-2 REAGENTS

A-2.1 Concentrated Nitric Acid – sp. gr 1.42 (conforming to IS 264).

A-2.2 Urea

A-2.3 Sodium Carbonate - anhydrous (conforming to IS 296).

A-2.4 Dilute Acetic Acid - 10 percent (*v*/*v*).

A-2.5 Potassium Iodide Solution - 30 percent (*m*/*v*).

A-2.6 Standard Sodium Thiosulphate Solution – 0.1 N, standardized against pure copper or against 0.1 N standard potassium dichromate solution (*see* **A-5**).

A-2.7 Starch Indicator Solution - One percent (*m*/*v*), freshly prepared.

A-2.8 Potassium or Ammonium Thiocyanate

A-3 PROCEDURE

A-3.1 Weigh accurately about 0.4 g of the material into a 250 ml Erlenmeyer flask. Add 1 to 2 ml of concentrated nitric acid and about 20 ml of water, and allow the material to dissolve by shaking. Boil the contents for 3 to 5 min, remove the flask from the flame, add 1 g of urea and boil again for about 5 minutes. Cool and add sodium carbonate in small quantities until a faint permanent precipitate or blue colour appears. Add dilute acetic acid dropwise until the blue colour (or the precipitate) disappears. Add 2 to 3 ml of potassium iodide solution and titrate the brown solution with the standard sodium thiosulphate solution to a pale-straw colour. Add about 2 ml of starch indicator solution and about 1.5 to 2.5 g of potassium or ammonium thiocyanate, and continue titration until the blue colour is just discharged.

A-4 CALCULATION

$$\text{Total copper content, percent by mass} = \frac{0.6357 \times v \times F}{M}$$

where,

v = volume, in ml, of the standard sodium thiosulphate solution required for the test with the material (*see* **A-3.1**);

F = factor of the standard sodium thiosulphate solution (*see* **A-5.2.2** and **A-5.3.3**); and

M = mass, in g, of the material taken for the test (*see* **A-3.1**).

A-5 STANDARDIZATION OF SODIUM THIOSULPHATE SOLUTION

A-5.1 General

For standardization of sodium thiosulphate solution, two methods, namely titration against pure copper of not less than 99.9 percent purity and against standard potassium dichromate solution, have been specified. Experience has shown that the standardization against pure copper gives accurate results but due to difficulty of availability of pure copper, the alternate method has also been specified. Hence, either of these two methods may be used for the standardization of sodium thiosulphate solution, but the method employed should be stated while expressing the results of a test.

A-5.2 Standardization Against Pure Copper of Not Less than 99.9 Percent Purity

A-5.2.1 Weigh accurately 0.2 g of pure copper in a 500 ml Erlenmeyer flask. Dissolve the copper by adding 5 ml of concentrated nitric acid and, after 1 minute, add 5 ml of water. Follow the procedure as described in **A-3.1**.

A-5.2.2 Calculation

Factor F of 0.1 N sodium thiosulphate solution = $\frac{100 \times M}{0.6357 \times v}$

where,

v = volume, in ml, of the standard sodium thiosulphate solution required for the test with the material;

m = mass, in g, of the pure copper taken for the test.

A-5.3 Standardization Against Standard Potassium Dichromate Solution

A-5.3.1 *Reagents*

A-5.3.1.1 *Standard potassium dichromate solution* - 0.1 N.

A-5.3.1.2 *Concentrated hydrochloric acid* - conforming to IS 265.

A-5.3.1.3 *Potassium iodide*

A-5.3.1.4 *Starch indicator solution* - one percent (*m*/*v*), freshly prepared.

A-5.3.2 *Procedure*

Pipette out accurately 25 ml of the standard potassium dichromate solution into a 600 ml Erlenmeyer flask. Add to this about 125 ml of water, 10 ml of concentrated hydrochloric acid and 4 to 5 g of potassium iodide. Stopper the Erlenmeyer flask and keep it in dark for about 15 min to complete the reaction. After 15 min, titrate this mixture against the standard sodium thiosulphate solution using about 2 ml of starch indicator solution towards the end.

A-5.3.3 *Calculation*

Factor F of 0.1 N sodium thiosulphate solution = $\frac{V \times N}{v}$

where,

V = volume, in ml, of the standard potassium dichromate solution taken for the test (which in this case is equal to 25 ml).

N = normality of the standard potassium dichromate solution; and

v = volume, in ml, of the 0.1 N sodium thiosulphate solution required for titration of the volume of the standard potassium dichromate solution taken for the test.

ANNEX B

[*Table* 1, *Sl No.* (iii)]

DETERMINATION OF TOTAL SOLUBLE ALKALI

B-1 REAGENTS

B-l.1 Standard Sulphuric Acid - 0.02 N.

B-1.2 Methyl Red Indicator - aqueous, 0.1 percent (*m*/*v*).

B-2 PROCEPURE

B-2.1 Weigh accurately about 20 g of the material into a 250 ml conical flask. Add about 100 ml of water, mix and warm slightly. Cool and filter into another conical flask. Wash the material several times with water and collect the washings in the same conical flask as the filtrate. Titrate these total washings (filtrate) with the standard sulphuric acid using methyl red as the indicator.

NOTE – Preserve this solution for the determination of total soluble chloride (*see* **C-2.1**).

B-2.2 Carry out a blank determination on 100 ml of water plus the quantity of water approximately used for washings using methyl red as the indicator.

B-2.3 Calculation

Total soluble alkali (as Na_2CO_3), percent by mass = $\frac{5.3 \times (V - v) \times N}{M}$

where,

V = volume, in ml, of the standard sulphuric acid required for the test (*see* **B-2.1**);

v = volume, in ml, of the standard sulphuric acid required for the blank determination (*see* **B-2.2**);

v = normality of the standard sulphuric acid; and

M = mass, in g, of the material taken for the test (*see* **B-2.1**).

ANNEX C

[*Table* 1, *Sl No.* (iv)]

DETERMINATION OF TOTAL SOLUBLE CHLORIDE

C-1 REAGENTS

C-1.1 Calcium Carbonate

C-1.2 Potassium Chromate Indicator Solution - 5 percent (*m*/*v*), aqueous.

C-l.3 Standard Silver Nitrate Solution - 0.1 N

C-2 PROCEDURE

C-2.1 To the neutralized solution contained in the conical flask (*see* **B-2.1**), add a small quantity of calcium carbonate and mix. Add a few drops of potassium chromate indicator solution and titrate with the standard silver nitrate solution.

C-2.2 Carry out a blank determination using the same volume of water as the solution with potassium chromate as the indicator.

C-2.3 Calculation

$$\text{Total soluble chloride (as NaCl), percent by mass} = \frac{5.85 \times (V - v) \times N}{M}$$

where,

V = volume, in ml, of the standard silver nitrate required for the test (*see* **C-2.1**);

v = volume in ml of the standard silver nitrate required for the blank determination (*see* **C-2.2**);

N = normality of the standard silver nitrate solution; and

M = mass, in g, of the material taken for the test (*see* **C-2.1**).