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भारतीय मानक मसौदा

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(*आइ एस 1669 का पहला पुनरीक्षण*)

Draft Indian Standard

CUPROUS OXIDE DUSTING POWDER (DP) — SPECIFICATION

(*First Revision of IS 1669*)

ICS No. 65.100.30

Pesticides Sectional Committee, FAD 01 Last Date of Comments: **11 September 2024**

FOREWORD

(*Formal clauses would be added later*)

Cuprous oxide dusting powder containing varying percentages of cuprous oxide, technical is largely used as fungicides for the control of plant diseases in agriculture and horticulture.

This standard was first published in 1960. 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. It also incorporates five amendments issued to the previous version of the standard.

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 test for cuprous oxide dusting powder.

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 296 : 2023	Sodium carbonate anhydrous — Specification (*fourth revision*)
IS 323 : 2009	Rectified spirit for industrial use — Specification (*second revision*)
IS 460 (Part 1) : 2020	Test sieves — Specification: Part 1 Wire cloth test sieves (*fourth revision*)
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 1682 : 202X	Cuprous oxide, technical (fungicidal grade) — Specification (*second revision*) [*Under preparation Doc: FAD 01(25532)WC*]
IS 6940 : 202X	Pesticides and their formulations – Test methods (*second revision*) [*Under preparation Doc: FAD 01(25870)WC*]
IS 8190 (Part 1) : 1988	Requirements for packing of pesticides: Part 1 Solid pesticides (*second revision*)
IS 10627 : 1983	Methods for sampling of pesticidal formulations

3 REQUIREMENTS

3.1 Description

The material shall be in the form of powder. It shall be free flowing and devoid of hard lumps; the cuprous oxide, technical, used in its manufacture shall have been properly extended in the filler. The material when dusted from a hand rotary duster shall issue freely without clogging or bridging.

Cuprous oxide, technical, used in the manufacture of the material shall conform to IS 1682.

3.2 Colour

The colour of the material shall be subject to an agreement between the purchaser and the vendor.

3.3 Physical

The material shall comply with the following physical requirements.

3.3.1 *Sieving Requirement*

Not less than 90.0 percent by mass of the material shall pass through IS Sieve 8 (aperture 75 microns) [*see* IS 460 (Part 1)] when tested by the method prescribed in IS 6940.

3.3.2 *Density After Compacting*

When tested by the method prescribed in IS 6940, the compact density of the material shall be not greater than 2.0 g/ml.

3.4 Chemical

The material shall comply with the following chemical requirements.

3.4.1 *Copper Content*

When determined by the method prescribed in Annex A, the observed copper content, percent (*m*/*m*) of any of the samples shall not differ from the declared nominal value by more than tolerance limits indicated below:

Nominal Value, percent	*Tolerance limit, percent*	
Up to 9	+10 − 5	of the nominal value
Above 9 and below 50	±5	
50 and above	+5 − 3	

The actual value of copper content shall be calculated to two decimal places and then rounded off to one decimal place before applying the tolerance.

3.4.2 *Total Soluble Alkali*

When determined by the method prescribed in Annex B, the alkalinity calculated as sodium carbonate shall be not more than 0.1 percent by mass.

4 PACKING

The material shall comply with the requirements given in 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 10627.

7 TESTS

Tests shall be carried out as prescribed in appropriate as mentioned in **3.3.1, 3.3.2, 3.4.1** and **3.4.2**.

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
(*Clause* 3.4.1)
DETERMINATION OF COPPER CONTENT

A-1 PRINCIPLE

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 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

A-2.6 Standard Sodium Thiosulphate Solution – 0.1 N, standardized with potassium iodate or potassium dichromate.

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

A-2.8 Potassium or Ammonium Thiocyanate

A-3 PROCEDURE

Weigh accurately about 0.2 g of the material into a 500 ml Erlenmeyer flask. Firstly, add 25 ml of water and then 5 ml of concentrated nitric acid carefully to avoid any spurting. If necessary, shake and warm the mixture to effect complete dissolution. Heat this mixture to reduce the volume to a low bulk (about 5 ml). Add 30 ml of water to this dried material and boil for 5 min. Remove the flask from the flame, add one gram of urea and boil the mixture again for about 10 min. Cool to room temperature and add sodium carbonate in small quantities until a faint permanent precipitate or blue colour is produced. Add dilute acetic acid dropwise until the blue colour or precipitate disappears. If necessary, filter the solution. Add 1.5 to 2.0 g of potassium iodide and titrate immediately the brown solution with the standard sodium thiosulphate solution to a pale straw colour. Add about 2 ml of starch indicator solution and one gram of potassium or ammonium thiocyanate and continue the titration until the blue colour is just discharged.

A-4 CALCULATION

Total copper content, percent by mass = $\frac{6.357 \times V \times N}{M}$

where

V = volume, in ml, of the standard sodium thiosulphate solution required for the test with the material (*see* **A-3**);

N = normality of the standard sodium thiosulphate solution (*see* **A-5.2** and **A-5.3**); and

M = mass, in g, of the material taken for the test (*see* **A-3**).

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. Either of these two methods may be used for standardization of sodium thiosulphate solution, but the method employed should be stated while expressing the results of a test.

A-5.2 Standardization with Potassium Iodate

D-5.2.1 *Reagents*

D-5.1.1.1 *Potassium iodate* – to be ground and dried at 105 °C for 2 h immediately before using.

D-5.1.1.2 *Potassium iodide* – iodate free.

D-5.1.1.3 *Starch indicator solution* – one percent (*m*/*v*), freshly prepared.

D-5.1.1.4 *Standard hydrochloric acid solution* – approximately 2 N, chlorine free**.**

A-5.2.2 *Procedure*

Weigh, accurately about 0.15 g of potassium iodate and dissolve it in 40 ml water in a conical flask. Stopper securely, shake to dissolve and add 2 g potassium iodide and about 6 ml of standard hydrochloric acid solution. Titrate the liberated iodine with the thiosulphate solution with constant shaking. When reaction is nearly complete, as indicated by pale yellow colour of the solution, dilute with distilled water to about 200 ml. Add 2 ml starch indicator solution and continue titration until the solution becomes colourless.

A-5.2.3 *Calculation*

Normality (N) sodium thiosulphate solution = $\frac{28.04 \times m}{v}$

where

v = volume, in ml, of the standard sodium thiosulphate solution required; and

m = mass, in g, of the potassium iodate.

A-5.3 Standardization with Potassium Dichromate

A-5.3.1 *Reagents*

A-5.3.1.1 *Potassium dichromate solution* – dried at 105°C for two hours immediately before using.

A-5.3.1.2 *Standard hydrochloric acid solution* – approximately 2 N, chlorine free.

A-5.3.1.3 *Potassium iodide* – free from iodate.

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

A-5.3.2 *Procedure*

Weigh, accurately, between 0.20 and 0.23 g of potassium dichromate and transfer to a 500 ml conical flask fitted with a ground glass stopper. Add 100 ml water and 2 g potassium iodide and shake until the salts dissolve. Add with swirling 10 ml standard hydrochloric acid solution, stopper the flask and immediately place in a dark place for 10 min. Titrate the solution with sodium thiosulphate solution. Near the end of the reaction, that is when the solution is yellowish-green in colour, add 1 ml of starch indicator solution. Continue the addition of sodium thiosulphate solution dropwise until the blue black colour formed on the addition of starch indicator solution changes to pale green.

D.5.3.2.1 Carry out a blank determination, using distilled water instead of the potassium dichromate solution, by the same method (*see* **D-5.3.2).** If the potassium iodide is iodate free, the volume of sodium thiosulphate solution used shall be 0.05 ml or less.

A-5.3.3 *Calculation*

$$\text{Normality } (N) \text{ sodium thiosulphate solution} = \frac{20.4 \times m}{v_1 - v_2}$$

where

v_1 = volume, in ml, of the sodium thiosulphate solution consumed.
v_2 = volume, in ml, of sodium thiosulphate solution consumed for the blank.
m = mass, in g, of the potassium dichromate.

ANNEX B
(*Clause* 3.4.2)
DETERMINATION OF TOTAL SOLUBLE ALKALI

B-1 REAGENTS

B-1.1 Standard Sulphuric Acid – 0.02 N.

B-l.2 Methyl Orange Indicator Solution – 0.1 percent. Dissolve 0.5 g of the indicator in 100 ml of ethyl alcohol (95 percent by volume) or rectified spirit (*see* IS 323) and make up the volume to 500 ml with water.

B-2 PROCEDURE

B-2.1 Weigh accurately about 25 g of the material into a 400 ml beaker. Add 100 ml of water (freshly boiled and cooled, carbon dioxide-free). Stir the mixture occasionally and keep for about 30 min. Filter and then wash the residue with water several times collecting the washings in the same conical flask as the filtrate. Titrate these total washings (filtrate) with the standard sulphuric acid using methyl orange as the indicator.

B-2.2 Carry out a blank determination on 100 ml of water (freshly boiled and cooled, carbon dioxide-free) plus the quantity of water approximately used for washings.

B-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 solution required for the test with the material (*see* **B-2.1**);

N = normality of the standard sulphuric acid;

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

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