Doc: CHD 05 (27506) WC
February 2025

BUREAU OF INDIAN STANDARDS

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भारतीय मानक मसौदा

गोल्ड क्लोराइड (क्लोरोऑरिक एसिड) — विशिष्टि

(IS 6588 का पहला पुनरीक्षण)

Draft Indian Standard

Gold Chloride (Chloroauric Acid) — Specification

(First Revision of IS 6588)

ICS 25.220.40, 71.060.01

Electroplating Chemicals and Photographic Materials Sectional Committee, CHD 5	Last Date for Comments: 9 April 2025

Electroplating Chemicals and Photographic Materials Sectional Committee, CHD 5

FOREWORD

(*Formal clause will be added later*)

Gold chloride (chloroauric acid), an important starting material for a variety of gold preparations, is finding use in industries like electroplating, decoration of glass and pottery, electronics, etc. This material is affected by exposure to sunlight and is very soluble in water. It should, therefore, be kept in a cool place in well-closed, glass-stoppered bottles or in sealed tubes.

This standard was first published 1972. This revision has been taken up in order to bring out the standard in latest style and format of the Indian Standards. The relevant clauses have been added and the reference clause has been incorporated.

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*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard

Draft Indian Standard

GOLD CHLORIDE (CHLOROAURIC ACID) — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes requirements and methods of sampling and test for gold chloride.

2 REFERENCES

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

IS No	*Title*
IS 266 : 2024	Sulphuric acid — Specification (*fourth revision*)
IS 296 : 2023	Sodium carbonate anhydrous — Specification (*fourth revision*)
IS 336 : 2021	Ether — Specification (*third revision*)
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 4905 : 2015/ISO 24153 : 2009	Random sampling and randomization procedures (*First Revision*)

3 REQUIREMENTS

3.1 Description

Gold chloride shall be in bright golden-yellow crystal line form free from dirt, foreign matter and visible impurities and shall correspond essentially to the formula $AuCl_3.HCl.4H_2O$.

3.2 The material shall also comply with the requirements prescribed in Table 1 when tested according to the methods prescribed in Annex A.

Table 1 Requirements for Gold Chloride

(*Clause* 3.2)

Sl. No	**Characteristic**	**Requirements**	**Method of test (Ref to Cl No. of Annex A)**
(1)	(2)	(3)	(4)
i)	Matter insoluble in ether, percent by mass, *Max*	0.1	**A-2**
ii)	Gold (as Au), percent by mass, *Min*	47.8	**A-3**
iii)	Chlorides (as Cl), percent by mass, *Max*	34.4	**A-4**
iv)	Alkalis and other metals (as sulphates), percent by mass, *Max*	0.2	**A-5**
v)	Nitrates (as NO_3), percent by mass *Max*	0.05	**A-6**

4 PRECAUTIONS IN HANDLING GOLD CHLORIDE

4.1 Gold chloride shall not be handled with bare hands as it has a caustic action causing blisters on the skin.

4.2 The material shall he kept protected from light and heat.

4.3 While opening the container adequate care shall be taken to prevent foreign particles from falling into the material.

5 PACKING AND MARKING

5.1 Packing

Gold chloride shall be packed in air-tight containers, preferably with a replaceable closure.

5.2 Marking

The containers shall be marked with the following:

a) Name of material;
b) Net mass, with mass of equivalent gold in bracket;
c) Name of manufacturer and recognized trade-mark, if any; and
d) Date and batch number of manufacture to enable the material to be traced from records.

5.2.1 *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

The method of preparing representative samples of the material and the criteria for its conformity to this specification shall be as prescribed in Annex B.

ANNEX A

(*Clause* 3.2)

METHODS OF TEST FOR GOLD CHLORIDE

A-1 QUALITY OF REAGENTS

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

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

A-2 DETERMINATION OF MATERIAL INSOLUBLE IN ETHER

A-2.1 Reagent

A-2.1.1 *Ether — see* IS 336

A-2.2 Procedure

Weigh accurately about 2.5 g of the material in a weighing bottle. Add 26 ml of ether to the weighing bottle and dissolve the material carefully. Filter the solution through a tared sintered glass crucible (G No. 4). Rinse the weighing bottle and wash the residue in the crucible with ether and dry at 105 °C ± 2 °C to a constant mass. Retain the filtrate for further test.

A-2.3 Calculation

$$\text{Matter insoluble in ether, percent by mass } = \frac{W_1}{W} \times 100$$

where,

W_1 = mass in g, of the residue in the sintered glass crucible; and

W = mass in g, of the material taken for the test.

A-3 DETERMINATION OF GOLD

A-3.1 Reagents

A-3.1.1 *Concentrated Sulphuric Acid* **— s***ee* IS 266

A-3.1.2 *Saturated Oxalic Acid Solution*

A-3.2 Procedure

Evaporate the filtrate obtained in **A-2.2** to dryness on a steam bath. Dissolve the dry mass in water and dilute to 100 ml. Add 1 ml of concentrated sulphuric solution acid followed by 25 ml of a saturated solution of oxalic acid and boil for 1 h. Add 5 ml of oxalic acid solution and boil again for 5 min. Allow to stand on a steam-bath till the supernatant liquid is clear. Filter through a filter paper (whatman No. 42) containing some ashless filter pulp and wash with hot water. Reserve the filtrate for further test and transfer the filter paper with gold to a tared silica crucible and carefully ignite at 900 °C to a constant mass.

A-3.3 Calculation

$$\text{Gold (as Au), percent by mass} = \frac{W_2}{W} \times 100$$

where,

W_2 = mass in g, of the residue; and

W = mass in g, of the material taken for the test (*see* **A-2.2**).

A-4 DETERMINATION OF CHLORIDES

A-4.1 Reagents

A-4.1.1 *Dilute Nitric Acid* — approximately 2 N

A-4.1.2 *Silver Nitrate Solution* — approximately 1 N

A-4.2 Procedure

To the filtrate obtained in **A-3.2**, add 40 ml of dilute nitric acid and warm at 50 °C. Add slowly with constant stirring 30 ml of silver nitrate solution. Boil until the precipitate has coagulated. Add a drop of silver nitrate solution to make sure that it does not produce turbidity. Set aside in the dark to cool. Filter through a tared sintered glass crucible (G No. 4) and wash the precipitate with warm water. Reserve the filtrate and dry the precipitate at 90 °C ± 2 °C to a constant mass.

A-4.3 Calculation

$$\text{Chlorides (as Cl), percent by mass} = \frac{24.74 \times W_3}{W}$$

where,

W_3 = mass in g, of the precipitate; and

W = mass in g, of the material taken for the test (*see* **A-2.2**).

A-5 DETERMINATION OF ALKALIS AND OTHER METALS

A-5.1 Reagents

A-5.1.1 *Dilute Hydrochloric Acid* — approximately 4 N

A~5.1.2 *Concentrated Sulphuric Acid — see* IS 266

A-5.2 Procedure

Heat the filtrate obtained in **A-4.2** to boiling and add 5 ml of dilute hydrochloric acid with constant stirring to precipitate excess silver nitrate as silver chloride. Make sure that the precipitation is complete by adding a few drops of dilute hydrochloric acid and seeing that no turbidity is produced on addition. Allow the precipitate to coagulate and filter through a sintered glass crucible (G No. 4). Wash the precipitate with water. Reject the precipitate and evaporate the filtrate to dryness. Moisten the residue with a few drops of dilute hydrochloric acid, dilute to 20 ml with water, boil and filter. Add 0.5 ml of concentrated sulphuric acid to the filtrate and evaporate to dryness in a tared platinum dish. Ignite gently and weigh and find out the percentage by mass of the residue in respect of the material (*W*) taken for the test (*see* **A-2.2**).

A-6 DETERMINATION OF NITRATES

A-6.1 Reagents

A-6.1.1 *Sodium Carbonate* — *see* IS 296

A-6.1.2 *Concentrated Sulphuric Acid — see* IS 266

A-6.1.3 *Indigo Carmine Solution*

Dissolve 0.10 g of indigo carmine, previously dried for 2 h at 105 °C in a mixture of 10 ml of sulphuric acid and 80 ml of water, and dilute to 100 ml.

A-6.2 Procedure

Weigh accurately 0.1 g of the material and dissolve in 5 ml of water, add 0.5 g of sodium carbonate, evaporate to dryness and ignite gently. Cool, take up the residue with 10 ml of water and filter. To 5 ml of filtrate add concentrated sulphuric acid dropwise till effervescence ceases, then add 0.1 ml of indigo carmine solution and 5 ml of concentrated sulphuric acid.

A-6.2.1 The material shall be taken as having satisfied the requirement of the test if the blue colour does not stay longer than 30 s.

ANNEX B

(*Clause* 6)

SAMPLING OF GOLD CHLORIDE AND CRITERIA FOR CONFORMITY

B-1 GENERAL REQUIREMENTS OF SAMPLNG

B-1.1 In drawing, preparing, storing and handling the test sample, the precautions given in **4** shall be strictly observed.

B-1.2 The sampling instrument and the sample container shall be clean and dry.

B-2 SCALE OF SAMPLING

B-2.1 In single consignment, all the containers from the same batch of manufacture shall be grouped together to form a lot.

B-2.2 Each lot shall be separately tested for ascertaining its conformity to the specification. The number of containers (*n*) to be sampled form each lot (*N*) is given Table 2. These *n* containers shall be selected at random with the help of random number tables. Guidance for random selection procedures may be had form IS 4905.

Table 2 Scale of Sampling

(*Clause* B-2.2)

Sl No.	Lot Size	Sample Size
	N	*n*
(1)	(2)	(3)
i)	Up to 10	1
ii)	11 to 50	2
iii)	51 and above	3

B-3 NUMBER OF TESTS

From each of the selected containers 3 g of gold chloride shall be withdrawn. These portions shall be thoroughly mixed to form a composite sample. Test for all characteristics shall be conducted on this composite sample.

B-4 CRITERIA FOR CONFORMITY

All the test results shall satisfy the corresponding requirements if the lot is to be accepted as conforming to this specification.