*भारतीय मानक*

***Indian Standard***

**IS 1694 : 2024**

# टार्ट्राज़िन, खाद्य ग्रेड — विशिष्टि

*( तीसरा पुनरीक्षण )*

# Tartrazine, Food Grade — Specification

*( Third Revision )*

ICS 67.220.20



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**May 2024** **Price Group 6**

Food Additives Sectional Committee, FAD 08

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Food Additives Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard is one of the series of Indian Standards for edible synthetic food colours permitted under the *Food Safety and Standards* (*Food Products Standards and Food Additives*) *Regulation*, 2011. This standard was first published in 1960. The first revision of the standard was carried out in 1974 to bring it in line with the FAO/WHO specifications and also taking into account the indigenous data generated. In the second revision published in 1994, the minimum requirement for total dye content were raised; the maximum requirement of loss on drying at 135 °C and chloride and sulphate expressed as sodium salt were decreased; and the limits for water insoluble matter, combined ether extracts and subsidiary dyes were made more stringent to align them with the International requirements. Also, the requirements for heavy metals were included.

In this revision, the following changes have been made:

a) The requirement for heavy metals has been removed as the limit of lead (contaminant in food colours) is already covered through the standard; and

b) The limits for mercury, copper, chromium, cadmium, and unsulphonated primary aromatic amines have been incorporated.

In the formulation of this standard, due consideration has been given to the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011 and *Food Safety and Standards Act*, 2006 and rules framed thereunder. This standard is however subject to restrictions imposed under these rules, wherever applicable.

**Description**

*Common Name* — Tartrazine.

*Synonyms* — FD & C Yellow No. 5, EEC Serial No. E 102, L-Gebb 2, C.I. Food Yellow 4, INS 102

*Colour of the 0.1 Percent* (*m/v*) *Solution in Distilled Water* — Yellow.

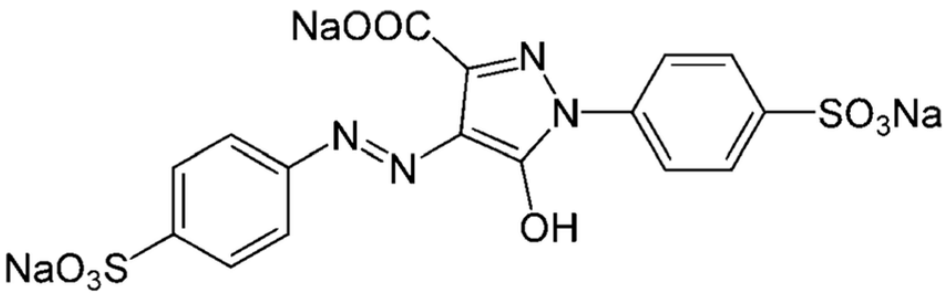
*Colour Index Number* (*1975*) — No. 19140.

*Class* — Monoazo.

*Chemical Name* — Trisodium salt of 5-hydroxy-1-p-sulphophenyl-4-(p-sulphophenylazo) pyrazol-3-carboxylic acid

*Empirical Formula* — $C_{16}H_9N_4Na_3O_9S_2$

*Structural Formula* —




(Continued on third cover)

*Indian Standard*

# TARTRAZINE, FOOD GRADE — SPECIFICATION

*( Third Revision )*

## 1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for tartrazine, food grade.

## 2 REFERENCES

The standards given below 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 edition of these standards:

| *IS No.* | *Title* |
|---|---|
| IS 1070 : 2023 | Reagent grade water — Specification (*fourth revision*) |
| IS 1699 : 1995 | Methods of sampling and test for food colours (*second revision*) |
| IS 2491 : 2013 | Food hygiene — General principles — Code of practice (*third revision*) |

## 3 REQUIREMENTS

**3.1** The material shall also comply with the requirements given in Table 1.

**3.2** The product shall be processed, packed, stored and distributed under hygienic conditions (*see* IS 2491).

## 4 PACKING

The material shall be packed in glass containers, metal containers, polyethylene containers, or cardboard containers suitably lined with polyethylene. Any other suitable containers may also be used, subject to agreement between the purchaser and the vendor.

## 5 MARKING

**5.1** Each container shall be legibly and indelibly marked with the following information:

a) The words ‘Food Colour’;

b) Common name of the colour;

c) Chemical name of the colour;

d) Colour index number;

e) Date of manufacture;

f) Net quantity, in g or kg;

g) Batch or code number; and

h) Any other requirements as given under the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011 and *Food Safety and Standards* (*Labelling and Display*) *Regulations*, 2020 framed thereunder.

### 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 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.

**Table 1 Requirements for Tartrazine, Food Grade**

(*Clause* 3.1)

| Sl No. | Characteristic | Requirements | Method of Test, Ref to |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| i) | Total dye content, corrected for sample dried at 105 °C ± 1°C for 2 h, percent by mass, *Min* | 87.0 | Annex A |
| ii) | Loss on drying at 135 ºC, percent by mass, *Max* | 13.0 | IS 1699 |
| | and | | |
| | Chlorides and sulphates expressed as sodium salt, percent by mass, *Max* | | |
| iii) | Water-insoluble matter, percent by mass, *Max* | 0.2 | IS 1699 |
| iv) | Combined ether extracts, percent by mass, *Max* | 0.2 | IS 1699 |
| v) | Subsidiary dyes, percent by mass, *Max* | 1.0 | Annex B |
| vi) | Dye intermediates, percent by mass, *Max* | 0.5 | Annex C |
| vii) | Lead, mg/kg, *Max* | 2.0 | IS 1699 |
| viii) | Arsenic, mg/kg, *Max* | 3.0 | IS 1699 |
| ix) | Mercury, mg/kg, *Max* | 1.0 | IS 1699 |
| x) | Copper, mg/kg, *Max* | 30.0 | IS 1699 |
| xi) | Chromium, mg/kg, *Max* | 50.0 | IS 1699 |
| xii) | Cadmium, mg/kg, *Max* | 1.0 | IS 1699 |
| xiii) | Unsulphonated primary aromatic amines (as aniline), percent, *Max* | 0.01 | IS 1699 |

## ANNEX A

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

## DETERMINATION OF TOTAL DYE CONTENT

### A-1 GENERAL

Two methods, spectrophotometric method and the titanium trichloride method, are specified. In case of dispute, spectrophotometric method shall be regarded as the reference method.

### A-2 SPECTROPHOTOMETRIC METHOD

#### A-2.1 Apparatus

Suitable spectrophotometer with properly calibrated scales for both wave length and optical density. However, a suitable spectrocolorimetric may also be used after calibration against a spectrophotometer.

#### A-2.2 Procedure

Weigh accurately about 250 mg of the dye sample and dissolve with 0.1 N hydrochloric acid in a 250 ml volumetric flask, dilute this with the same solvent to make a final concentration of 1 mg/100 ml (approximately). Find out the optical density of this dilute solution, against 0.1 N hydrochloric acid as blank, at 428 nm, in a glass cell with 10.0 mm light path.

Simultaneously weigh accurately about 2 g of the dye-sample and dry this in an air-oven at 105 °C ± 1 °C for 2 hours. Calculate the loss of mass on drying; from this data, calculate the dry mass of the sample (*M*) in the final solution taken for measurement of optical density.

#### A-2.3 Calculation

Total dye content of the sample, percent by mass =

$$\frac{OD \times 100}{M \times 485}$$

where

| | | |
|---|---|---|
| *OD* | = | optical density observed; |
| *M* | = | dry mass, in g, of the sample in 100 ml solution; and |
| 485 | = | $E^{1\%}_{1cm}$, 428 nm, for tartrazine in 0.1 N hydrochloric acid. |

### A-3 TITANIUM CHLORIDE METHOD

The method given in IS 1699 shall be followed. The percentage of total dye content shall be determined using the following calculation:

1 ml of 0.1 N $TiCl_3$ = 0.013 36 g of tartrazine.

## ANNEX B

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

## SUBSIDIARY DYES

### B-1 PROCEDURE

The method given in IS 1699 using the conditions given below shall be followed:

a) *Developing solvent*: No. 4
b) *Height of ascent of solvent front*: approximately 12 cm

## ANNEX C

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

## DETERMINATION OF DYE INTERMEDIATES

### C-1 GENERAL

Tartrazine is prepared by diazotization of aniline-4-sulphonic acid and the diazo so formed is coupled with l-*p*-sulphophenyl-5-pyrazolone-3-carboxylic acid. The intermediates are determined by ascending paper chromatography.

### C-2 APPARATUS

**C-2.1 Chromatography Tank and Ancillary Equipment** — as given under IS 1699

**C-2.2 Microsyringe** — capable of 0.2 ml with a tolerance of ± 0.000 2 ml

**C-2.3 Ultraviolet Lamp** — with a wavelength of 365.5 nm

**C-2.4 Filter Paper** — Whatman No. 1 or equivalent

### C-3 REAGENTS

**C-3.1 Ammonium Hydroxide Solution** — specific gravity 0.923

**C-3.2 Aniline-4-Sulphonic Acid**

**C-3.3 1-p-Sulphophenyl-5-Pyrozolone-3-Carboxylic Acid**

**C-3.4 Developing Solvent** — sodium bicarbonate solution, 10 percent

**C-3.5 Sodium Nitrite** — crystals

**C-3.6 Hydrochloric Acid** — 1 N

**C-3.7 Chromotropic Acid** — 0.05 percent

**C-3.8 Sodium Acetate Solution** — 40 percent

**C-3.9 Sulphanilic Acid Solution** — 0.01 N

Take about 50 ml ice cold water. Add 10 ml of N/10 sodium sulphanilate solution, 10.2 ml of N/10 sodium nitrite solution and 10 ml of N/l hydrochloric acid. Shake well and adjust the volume to 100 ml in a measuring cylinder with ice cold water.

### C-4 PROCEDURE

#### C-4.1 Preparation of Solutions

**C-4.1.1** Prepare 2 percent *m/v* solution of the dye in a mixture of nine parts of water and one part of the ammonium hydroxide.

**C-4.1.2 Reference Substances**

a) Prepare 0.01 percent on 100 percent basis, (*m/v*) solution of aniline-4-sulphonic acid solution in nine parts of water and one part of ammonium hydroxide; and

b) Prepare 0.01 percent, on 100 percent basis, (*m/v*) solution of 1 p, sulphophenyl-5-pyrozolone-3-carboxylic acid in a mixture of nine parts of water and one part of ammonium hydroxide.

#### C-4.2 Test Substances

**C-4.2.1** *Dye Solution*

Ten microlitres of the solution (*see* C-4.1.1) shall be equivalent to 200 micrograms of the sample.

**C-4.2.2** *Reference Substances*

a) *Aniline-4-sulphonic acid* [*see* C-4.1.2 (a)] —Five microlitres shall be equivalent to 0.5 micrograms corresponding to 0.25 percent in the dye sample. Ten microlitres shall be equivalent to one microgram corresponding to 0.5 percent in the dye sample.

b) *1-p-sulphophenyl-S-pyrorolone-3 carboxylic acid* [*see* C-4.1.2 (b)] — Five microlitres shall be equivalent to 0.5 micrograms corresponding to 0.25 percent in the dye sample. Ten microlitres shall be equivalent to one microgram corresponding to 0.5 percent in the dye sample.

**C-4.3** Mark out a sheet of chromatographic paper as shown in Fig. 3 of IS 1699 and apply 10 microlitres of the dye solution as uniformly as possible with the help of microsyringe. Also apply reference substances (*see* C-4.1.2). Mount the sheet together with plane sheet to act a blank in the frame (C). Pour sufficient developing solvent into the tray (D) to bring the surface of the solvent about 1 cm below the base line of the chromatogram sheet. Put the frame (C) in the same position and replace the cover. Take out the filter paper after 30 cm run. Dry in an oven at 70 °C to 75 °C.

**C-4.4 Detection and Semi-Quantitative Estimation**

**C-4.4.1** *Aniline-4-Sulphonic Acid*

Diazotize the chromatogram for 10 minutes under the nitrous acid vapours. Introduce the paper into a rectangular glass jar in which a beaker containing crystal of sodium nitrite have been kept. Cover and pour into the beaker, with the help of a pipette through the hole of the cover, hydrochloric acid into the beaker. Take out the paper and keep in air for ten minutes. Spray the chromatogram with the chromatropic acid solution in the sodium acetate solution. Compare visually the intensity of the colour of the sample with the reference substances and report the content of aniline-4-sulphonic acid nearest to the intensity of the reference substance.

**C-4.4.2** *1-p-Sulphophenyl-5-Pyrozolone-3-Carboxylic Acid*

Spray chromatogram with the diazo solution of the sulphanilic acid after mixing it with the sodium acetate solution in 1 : 1 proportion. Compare visually the intensities of the colour of the sample with the reference substances and report the value nearest to the intensity of the reference substance.

## ANNEX D

(*Foreword*)

## COMMITTEE COMPOSITION

Food Additives Sectional Committee, FAD 08

| *Organization* | *Representative(s)* |
|---|---|
| CSIR - Indian Institute of Toxicology Research, Lucknow | DR YOGESHWAR SHUKLA **(*Chairperson*)** |
| All India Food Processors Association, New Delhi | MS SHREYA PANDEY<br>SHRI KRISHNA KUMAR JOSHI (*Alternate*) |
| Association of Food Scientists and Technologists India, Mumbai | DR VIKAS SINGH CHAUHAN<br>DR NANDINI P. SHETTY (*Alternate*) |
| Bose Institute, Kolkata | PROF GAOURISHANKAR |
| Confederation of Indian Food Trade and Industry, New Delhi | DR JASVIR SINGH<br>MS PRIYANKA SHARMA (*Alternate*) |
| Confederation of Indian Industry, New Delhi | MS NEHA AGGARAWAL<br>MS MAMTA ARORA BUDHIRAJA (*Alternate*) |
| Consumer Education and Research Centre, Ahmedabad | MS ANINDITA MEHTA<br>MS DOLLY A. JANI (*Alternate*) |
| Consumer Guidance Society of India, Mumbai | DR SITARAM DIXIT<br>DR M. S. KAMATH (*Alternate*) |
| CSIR - Central Food Technological Research Institute, Mysuru | DR NGASEPPAM IBOYIAMA<br>SHRI ARUNA KUMAR (*Alternate*) |
| Defence Food Research Laboratory, Mysuru | DR G. K. SHARMA<br>DR D. D. WADIKAR (*Alternate*) |
| Department of Chemical Technology, University of Calcutta, Kolkata | PROF ARUP MUKHERJEEE<br>DR FAROOQUE ABDULLAH (*Alternate*) |
| Envirocare Labs Private Limited, Thane | DR PRITI AMRITKAR<br>DR NILESH AMRITKAR (*Alternate*) |
| Food Ingredients Manufacturers & Suppliers of India Association, Mumbai | SHRI FIROZ H. NAQVI |
| Grasim Industry, Mumbai | SHRI PANKAJ KUMAR GUPTA |
| ICMR - National Institute of Nutrition, Hyderabad | DR J. PADMAJA |
| Indian Institute of Chemical Technology, Hyderabad | DR ASHOK KUMAR TIWARI<br>DR T. KUMARAGURU (*Alternate*) |
| Indian Pharmacopoeia Commission, Ghaziabad | MS SHRUTI RASTOGI<br>SHRI JAI SHIV CHAUHAN (*Alternate*) |
| Indian Salt Manufacturers Association, Ahmedabad | SHRI B. C. RAWAL<br>SHRI P. R. DHRUVE (*Alternate*) |

| *Organization* | *Representative(s)* |
|---|---|
| Office of the Salt Commissioner, Jaipur | SHRI M. A. ANSARI<br>SHRI B. S. NAGAR (*Alternate*) |
| Protein Foods and Nutrition Development Association of India, Mumbai | SHRI BHUPINDER SINGH<br>DR JAGADISH PAI (*Alternate*) |
| Roha Dyechem, Mumbai | SHRI ZAINULABIDIN DHANSE |
| VR Food Tech Pvt Ltd, Mumbai | DR ASHLESH PARCHURE<br>DR N. RAM (*Alternate*) |
| BIS Directorate General | SHRIMATI SUNEETI TOTEJA, SCIENTIST 'E'/DIRECTOR AND HEAD (FOOD AND AGRICULTURE) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)] |

*Member Secretary*
SHRI KULDEEP MITTAL
SCIENTIST 'B'/ASSISTANT DIRECTOR
(FOOD AND AGRICULTURE), BIS

(*Continued from second cover*)

*Solubility* — Soluble in water (sparingly soluble in ethanol).

The composition of the Committee responsible for the formulation of this standard is given in Annex D.

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.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: FAD 08 (22579).

## Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

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