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Residue Monograph prepared by the meeting of the Joint FAO/WHO Expert Committee
on Food Additives (JECFA), 82nd meeting 2016

Tartrazine

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TARTRAZINE

Prepared at the 82nd JECFA and published in JECFA Monograph 19 (2016) superseding specifications 28th JECFA (1984), published in FNP 31/1 (1984) and in FNP 52 (1992). Metals and arsenic specifications revised at the 59th JECFA (2002). An ADI of 0-10 mg/kg was established at the 82nd JECFA (2016).

SYNONYMS

INS No. 102, CI Food Yellow 4, CI (1975) No. 19140, FD&C Yellow No. 5

DEFINITION

Consists of trisodium 4,5-dihydro-5-oxo-1-(4-sulfophenyl)-4-[(4-sulfophenyl)azo]-1H-pyrazole-3-carboxylate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components. It is manufactured by coupling diazotized 4-aminobenzenesulfonic acid with 5-oxo-1-(4-sulfophenyl)-2-pyrazoline-3-carboxylic acid or with the methyl ester, the ethyl ester, or a salt of this carboxylic acid. It also may be manufactured by condensing phenylhydrazine-4-sulfonic acid with dioxosuccinic acid or oxalacetic acid derivatives. The resulting dye is purified and isolated as the sodium salt.

May be converted to the corresponding aluminium lake in which case only the *General Specifications for Aluminium Lakes of Colouring Matters* applies.

Chemical name

Trisodium 4,5-dihydro-5-oxo-1-(4-sulfophenyl)-4-[(4-sulfophenyl)azo]-1H-pyrazole-3-carboxylate

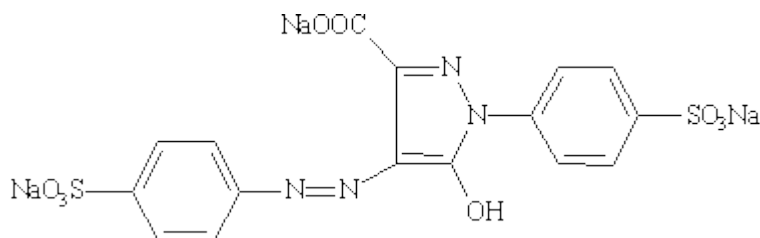
C.A.S. number

1934-21-0

Chemical formula

C₁₆H₉N₄Na₃O₉S₂

Structural formula



Formula Weight

534.37

Assay

Not less than 85% total colouring matters

DESCRIPTION

Light orange powder or granules

FUNCTIONAL USES

Colour

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)

Freely soluble in water; sparingly soluble in ethanol

<u>Spectrophotometry</u> (Vol. 4)	Maximum wavelength approximately 427 nm. Determine the UV-visible absorption spectrum of the sample solution dissolved in water..
PURITY	
<u>Loss on drying, chloride and sulfate as sodium salts</u> (Vol. 4)	Not more than 15% as total amount Determine according to chloride as sodium chloride, sulfate as sodium sulfate, and water content (loss on drying at 135 °C) in Volume 4 (under “Specific Methods, Food Colours”).
<u>Water insoluble matter</u> (Vol. 4)	Not more than 0.2%
<u>Subsidiary colouring matters</u>	Not more than 1% See description under TESTS
<u>Organic compounds other than colouring matters</u> (Vol. 4)	Not more than 0.5% sum of 4-hydrazinobenzenesulfonic acid, 4-aminobenzenesulfonic acid, 5-oxo-1-(4-sulfophenyl)-2-pyrazoline-3-carboxylic acid, 4,4'-(diazamino)dibenzenesulfonic acid, tetrahydroxysuccinic acid See description under TESTS
<u>Unulfonated primary aromatic amines</u> (Vol. 4)	Not more than 0.01% calculated as aniline
<u>Ether extractable matter</u> (Vol. 4)	Not more than 0.2%
<u>Lead</u> (Vol. 4)	Not more than 2 mg/kg Determine using a method appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4 (under “General Methods, Metallic Impurities”)

TESTS

PURITY TESTS

Subsidiary colouring matters

Determine subsidiary colouring matters by reversed-phase HPLC (Vol. 4) using the following conditions:

Column: C18 (250 mm x 4.6 mm i.d., 5 µm particle size)

Eluent A: 0.2 M ammonium acetate

Eluent B: methanol

Injection volume: 20 µl

Detector: UV-visible/PDA at 254 nm

Flow rate: 1 ml/min

Gradient:

Min	%A	%B
0	100	0
5	90	10
15	75	25
35	60	40

Standards (all synthesized materials):

4,4'-[4,5-Dihydro-5-oxo-4-[(4-sulfophenyl)hydrazono]-1H-pyrazol-1,3-diyl]bis[benzenesulfonic acid], trisodium salt

4-[(4',5'-Disulfo[1,1'-biphenyl]-2-yl)hydrazono]-4,5-dihydro-5-oxo-1-(4-sulfophenyl)-1H-pyrazole-3-carboxylic acid, tetrasodium salt

Ethyl 4,5-dihydro-5-oxo-1-(4-sulfophenyl)-4-[(4-sulfophenyl)hydrazono]-1H-pyrazole-3-carboxylate, disodium salt

Methyl 4,5-dihydro-5-oxo-1-(4-sulfophenyl)-4-[(4-sulfophenyl)hydrazono]-1H-pyrazole-3-carboxylate, disodium salt

4,5-Dihydro-5-oxo-1-phenyl-4-[(4-sulfophenyl)azo]-1H-pyrazole-3-carboxylic acid, disodium salt

4,5-dihydro-5-oxo-4-(phenylazo)-1-(4-sulfophenyl)-1H-pyrazole-3-carboxylic acid, disodium salt

Sample solution:

Dissolve 500 mg of sample in 100 ml of 0.2 M ammonium acetate.

Organic compounds
other than colouring
matters (Vol. 4)

Determine sum of 4-hydrazinobenzenesulfonic acid, 4-aminobenzenesulfonic acid, 5-oxo-1-(4-sulfophenyl)-2-pyrazoline-3-carboxylic acid, 4,4'-diazoaminodi(benzenesulfonic acid), and tetrahydroxysuccinic acid by reversed-phase HPLC (Vol. 4) using the following conditions:

Column: C18 (250 mm x 4.6 mm i.d., 5 µm particle size)

Eluent A: 0.2 M ammonium acetate

Eluent B: methanol

Injection volume: 20 µl

Detector: UV-visible/PDA at 254 nm and 358 nm

Flow rate: 1 ml/min

Gradient:

Min	%A	%B
0	100	0
5	90	10
15	75	25
35	60	40

Note: A general gradient for the separation of organic compounds other than colouring matters in food colours is given in Vol. 4.

Analyst may use above gradient for the analytes in Tartrazine.

Standards:

4-Hydrazinobenzenesulfonic acid – Wako, Cat. No. 081-09891 or equivalent

4-Aminobenzenesulfonic acid – Sigma-Aldrich, Cat. No. 251917 or equivalent

5-Oxo-1-(4-sulfophenyl)-2-pyrazoline-3-carboxylic acid – Chemos, Cat. No. 119264 or equivalent

4,4'-(Diazoamino)dibenzenesulfonic acid, disodium salt – Wako, Cat. No. 040-33231 or equivalent

Tetrahydroxysuccinic acid – Chemos, Cat. No. 287405 or equivalent

Sample solution:

Dissolve 500 mg of sample in 100 ml of 0.2 M ammonium acetate.

METHOD OF ASSAY

Determine total colouring matters content by spectrophotometry using Procedure 1 in Volume 4 (under “Specific Methods, Food Colours”) and an appropriate solvent.

Using water as the solvent: absorptivity (a) is 53.0 l/(g·cm) and wavelength of maximum absorption is approximately 427 nm.