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Quinoline Yellow

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QUINOLINE YELLOW

Prepared at the 82nd JECFA (2016) and published in FAO JECFA Monograph 19 (2016), superseding tentative specifications prepared at the 74th JECFA (2011) and published in FAO JECFA Monographs 11 (2011). An ADI of ADI of 0–3 mg/kg bw was established at the 82nd JECFA (2016).

SYNONYMS INS No. 104; CI Food Yellow 13; CI (1982) No. 47005

DEFINITION Quinoline Yellow is manufactured by sulfonating 2-(2-quinolyl)-1,3-indandione. It consists predominantly of sodium salts of disulfonates of 2-(2-quinolyl)-1,3-indandione with smaller amounts of monosulfonates and trisulfonates; and subsidiary colouring matters, sodium chloride and/or sodium sulfate.

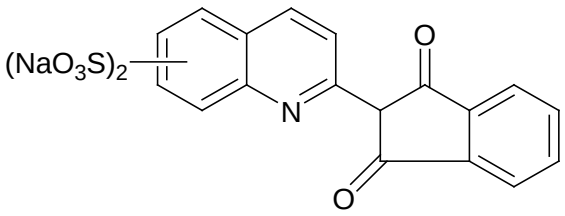
Quinoline Yellow may be converted to the corresponding aluminium lake, in which case only the *General Specifications for Aluminium Lakes of Colouring Matters* apply.

Chemical name Disodium 2-(2-quinolyl)indan-1,3-dionedisulphonate (principal component)

C.A.S. number 80583-08-0 (principal component)

Chemical formula $C_{18}H_9NO_8S_2Na_2$ (principal component)

Structural formula (Principal component)



Formula weight 477.38 (Principal component)

Assay Not less than 70% total colouring matters.
Of the total colouring matters present:
- not less than 80% of disodium 2-(2-quinolyl)-indan-1,3-dione-disulfonates;
- not more than 15% of sodium 2-(2-quinolyl)-indan-1,3-dione-monosulfonates;
- not more than 7% of trisodium 2-(2-quinolyl)-indan-1,3-dione-trisulfonate

DESCRIPTION Yellow powder or granules

FUNCTIONAL USES Colour

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)	Freely soluble in water; sparingly soluble in ethanol
Spectrophotometry (Vol.4)	The UV-visible absorption spectrum of an aqueous solution of the sample shows a maximum wavelength approximately at 414 nm.

PURITY

Loss on drying at 135°, chloride and sulfate as sodium salts (Vol. 4)	Not more than 30% Determine according to Loss on drying in Volume 4 (under "Specific Methods, Food Colours").
Water-insoluble matter (Vol. 4)	Not more than 0.2%
Subsidiary colouring matters	Not more than 4 mg/kg of 2-(2-quinolyl)-1,3-indandione and 2-[2-(6-methylquinolyl)]-1,3-indandione See description under TESTS
Organic compounds other than colouring matters (Vol. 4)	Not more than 0.5%, sum of 2-methylquinoline, 2-methylquinolinesulfonic acid and phthalic acid See description under TESTS
Unsulfonated primary aromatic amines (Vol. 4)	Not more than 0.01% calculated as aniline
Ether-extractable matter (Vol. 4)	Not more than 0.2%
Lead (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").
Zinc (Vol. 4)	Not more than 50 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 2-(2-quinolyl)-1,3-indandione and 2-[2-(6-methyl-quinolyl)]-1,3-indandione by reversed-phase HPLC (Vol.4) using the following conditions:
Solvent A: 0.05 M ammonium acetate
Solvent B; acetonitrile
Injection volume: 100 µl
Column: C18 (250 mm x 4.6 mm i.d., 5 µm particle size)
Detector: UV-Vis/PDA at 436 nm
Flow rate: 1 ml/min

Gradient:

Min	%A	%B
0	40	60
19.9	40	60
20.0	0	100
35.0	0	100

Standards: 2-(2-quinolyl)-1,3-indandione, Sigma 01354 or equivalent; 2-[2-(6-methyl-quinolyl)]-1,3-indandione, Chemos GmbH or equivalent.

Sample preparation: Dissolve 1 g of sample in 10 ml of hot water. Allow solution to cool to room temperature. Extract analytes using chloroform, evaporate the solvent and dissolve the residue in acetonitrile.

Organic compounds other than colouring matters
(Vol. 4)

Determine sum of 2-methylquinoline, 2-methylquinolinesulfonic acid and phthalic acid by reversed-phase HPLC (under “Specific Methods, Food Colours”) using the following conditions:
Solvent A: 0.2 M ammonium acetate in water/methanol (95:5, v/v)
Solvent B: methanol
Injection volume: 20 µl
Detector wavelength: UV/PDA at 254 nm
Flow rate: 1 ml/min

Gradient:

Min	%A	%B
0	100	0
8.8	80	20
9.0	0	100
12.0	0	100

Note: A general gradient for the separation of organic compounds other than colouring matters in several food colours is given in Vol. 4. The above gradient may be use for the analytes in Quinoline Yellow.

Standard solution: 0.1% of quinaldine-6-sulfonic acid, quinaldine-6,8-disulfonic acid, trisodium salt of 4-sulfophthalic acid and 3-sulfophthalic acid in Solvent A

Sample solution: 100 mg (± 5 mg) of sample in 10 ml of water

METHOD OF ASSAY Determine total colouring matters using Procedure 1 in Volume 4 (under "Specific Methods, Food Colours") and mono-, di- and trisulfonates of 2-(2-quinolyl)-indan-1,3-dione by reversed-phase HPLC (Vol.4).

Total colouring matters
Solvent: Water
Absorptivity (a) = 87.9 L/(g·cm)
Wavelength of maximum absorbance = 414 nm

Mono-, di- and trisulfonates
Determine sodium salts of mono-, di- and trisulfonates of 2-(2-quinolyl)-indan-1,3-dione by reversed-phase HPLC using the following conditions:
Solvent A: 0.1 M ammonium acetate in water/methanol (95:5, v/v)
Solvent B: methanol
Injection volume: 20 µl
Column: Hypersil RP C8 (250 mm x 4.6 mm i.d.,5 µm particle size) or equivalent.
Column temperature: 25 º
Detector: UV-Vis/PDA at 414 nm
Flow rate: 1 ml/min

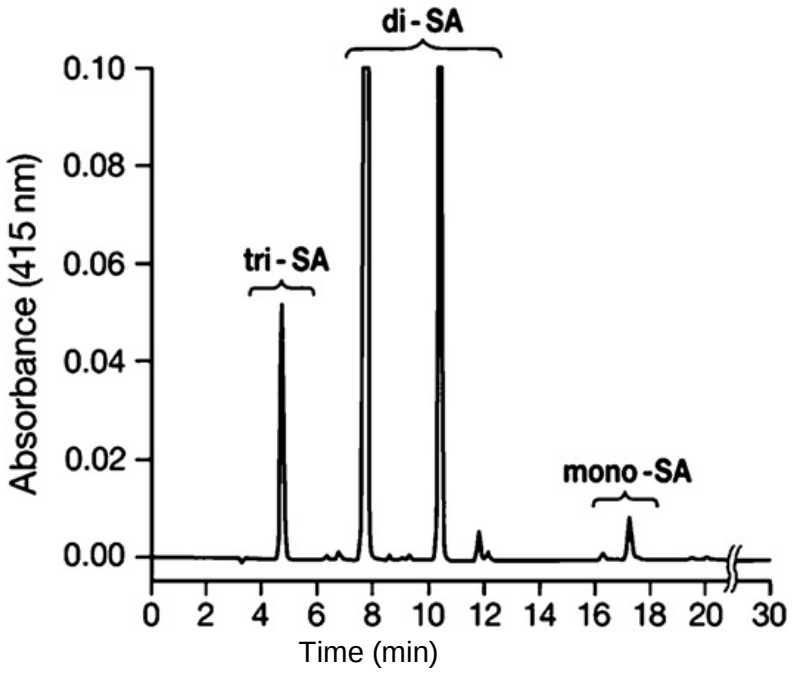
Gradient:

Min	%A	%B
0	90	10
30	0	100

Standard solution (for retention times): 10 mg of Quinoline Yellow containing mono-, di-, and trisulfonates in 100 ml of water/methanol (75:25).
Sample solution: 10 mg of sample in 100 ml of water/methanol (75:25).

Calculation: Express the results as percentage of the peak area of each components/the peak area of total peaks on the chromatogram.

Appendix Typical HPLC chromatogram of Quinoline Yellow



mono-SA: sodium 2-(2-quinolyl)-indan-1,3-dione-monosulfonates
di-SA: disodium 2-(2-quinolyl)-indan-1,3-dione-disulfonates
tri-SA: trisodium 2-(2-quinolyl)-indan-1,3-dione-trisulfonate

[Reference] A. Weisz, E. P. Mazzola, and Y. Ito, “Preparative Separation of Di- and Trisulfonated Components of Quinoline Yellow Using Affinity-Ligand pH-Zone-Refining Counter-Current Chromatography,” J. Chromatography A, 1216, 4161-4168 (2009).