Tartrazine (E 102)

Catalogue No. ASD-640

1. Identification

Chemical name	Trisodium 5-oxo-1-(4-sulfonatophenyl)-4-[(4-sulfonatophenyl)hydrazono]-3-pyrazolecarboxylate
Synonyms	Tartrazine; Acid Yellow 23; CI Food Yellow 4; Hydrazine Yellow
C.I. number	19140
E number	E 102
CAS number	1934-21-0
EC number	217-699-5
Molecular formula	$C_{16}H_9N_4Na_3O_9S_2$
Molecular weight	534.36 g/mol
Dye class	Pyrazolone monoazo, anionic (acid) dye

2. Intended Use

Histological counterstain, spectrophotometric reference dye, teaching reagent and E 102 reference colour.

For laboratory, research, education and quality-control use. Not intended for human or veterinary therapeutic use, diagnosis, or direct consumption. Food-grade (E 102) material. For food-industry supply, contact Ausamics for suitability and regulatory documentation.

3. Mode of Action

The sulfonate and carboxylate groups make tartrazine strongly anionic, so it binds positively charged tissue proteins in acidic stains. Its azo–pyrazolone chromophore absorbs blue light at about 426 nm, which gives the yellow colour.

4. Physical & Chemical Properties

Appearance	Orange to orange-red powder
Colour of 1 % aqueous solution	Lemon yellow
Absorption maximum (λmax)	approx. 426 nm in water

Solubility	Freely soluble in water; slightly soluble in ethanol
Moisture at 110 °C	Max. 2.0 %
Light and heat	Good stability in normal laboratory conditions; protect from sunlight, heat and moisture

5. Specifications

Parameter	Specification
Pure dye content (E 1 %, 1 cm at 426 nm)	Min. 85.0 %
Appearance	Orange to orange-red powder
Hue of 1 % solution	Lemon yellow
Loss on drying at 135 °C (as sodium salts)	Max. 15.0 %
Moisture at 110 °C	Max. 2.0 %
Water-insoluble matter	Max. 0.20 %
Subsidiary colouring matters	Max. 1.0 %
Organic compounds other than colouring matters	Max. 0.5 %
Unsulfonated primary aromatic amines (as aniline)	Max. 0.01 %
Ether-extractable matter	Max. 0.2 %
Arsenic (As)	Max. 1 ppm
Lead (Pb)	Max. 1 ppm
Mercury (Hg)	Max. 0.05 ppm
Cadmium (Cd)	Max. 0.1 ppm
Chromium (Cr)	Max. 2 ppm
Copper (Cu)	Max. 30 ppm
Zinc (Zn)	Max. 50 ppm
Heavy metals (as Pb)	Max. 5 ppm

6. Solution Preparation

1. Stock solution (1 % w/v): weigh 1.0 g of tartrazine.

2. Add to about 80 mL of purified water and stir until fully dissolved.
3. Make up to 100 mL with purified water.
4. Store closed at room temperature, away from light. Dilute for use according to your method.

7. Applications

- Histology: Yellow counterstain, including Lendrum's phloxine–tartrazine method for viral inclusion bodies and Paneth cell granules.
- Optical Clearing Research: Water-soluble absorbing dye studied for making biological tissue optically transparent in imaging research.
- Spectrophotometry: Stable yellow dye (λmax ≈ 426 nm) for Beer–Lambert calibration and absorbance teaching.
- Food Colour QC: Reference material for E 102 identification, HPLC and colour-matching work.
- Education: Intense, water-soluble colour for chromatography, colour-mixing and diffusion practicals.
- Formulation Development: Yellow colourant for prototype buffers, gels and visual tracer solutions in research.

8. Storage & Shelf Life

Store at 15–25 °C, dry, tightly closed and protected from sunlight, heat and moisture. Shelf life 36 months from the date of manufacture.

9. Literature / References

5. Commission Regulation (EU) No 231/2012, Annex: E 102 Tartrazine. Specifications for food additives.
6. FAO/WHO JECFA. Tartrazine: Combined Compendium of Food Additive Specifications.
7. EFSA ANS Panel (2009). Scientific Opinion on the re-evaluation of tartrazine (E 102). EFSA Journal 7(11):1331.
8. Lendrum A.C. (1947). The phloxin-tartrazine method as a general histological stain and for the demonstration of inclusion bodies. J. Pathol. Bacteriol. 59:399–404.
9. Ou Z. et al. (2024). Achieving optical transparency in live animals with absorbing molecules. Science 385:eadm6869.
10. Horobin R.W., Kiernan J.A. (eds) (2002). Conn's Biological Stains, 10th ed. BIOS Scientific Publishers, Oxford.

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