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COMMISSION DIRECTIVE 95/45/EC

of 26 July 1995

laying down specific purity criteria concerning colours for use in foodstuffs

(Text with EEA relevance)

(OJ L 226, 22.9.1995, p. 1)

Amended by:

		Official Journal		
		No	page	date
►**M1**	Commission Directive 1999/75/EC of 22 July 1999	L 206	19	5.8.1999
►**M2**	Commission Directive 2001/50/EC of 3 July 2001	L 190	14	12.7.2001
►**M3**	Commission Directive 2004/47/EC of 16 April 2004	L 113	24	20.4.2004

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COMMISSION DIRECTIVE 95/45/EC

of 26 July 1995

laying down specific purity criteria concerning colours for use in foodstuffs

(Text with EEA relevance)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Community,

Having regard to Council Directive 89/107/EEC of 21 December 1988 on the approximation of the laws of the Member States concerning food additives authorized for use in foodstuffs intended for human consumption ([1]), as last amended by Directive 94/34/EC ([2]), and in particular Article 3 (3) (a) thereof,

After consulting the Scientific Committee for Food,

Whereas it is necessary to establish purity criteria for all colours mentioned in European Parliament and Council Directive 94/36/EC of 30 June 1994 on colours for use in foodstuffs ([3]);

Whereas it is necessary to revise the purity criteria for colours mentioned in the Council Directive of 23 October 1962 on the approximation of the rules of the Member States concerning the colouring matters authorized for use in foodstuffs intended for human consumption ([4]), as last amended by Directive 85/7/EEC ([5]);

Whereas it is necessary to take into account the specifications and analytical techniques for colours as set out in the Codex Alimentarius and the Joint FAO/WHO Expert Committee on Food Additives (JECFA);

Whereas food additives, prepared by production methods or starting materials significantly different from those included in the evaluation of the Scientific Committee for Food, or different from those mentioned in this Directive, shall be submitted for evaluation by the Scientific Committee for Food for the purposes of a full evaluation with emphasis on the purity criteria;

Whereas the measures provided for in this Directive are in accordance with the opinion of the Standing Committee on Foodstuffs,

HAS ADOPTED THIS DIRECTIVE:

Article 1

The purity criteria referred to in Article 3 (3) (a) of Directive 89/107/EEC for colours mentioned in Directive 94/36/EC are set out in the Annex hereto.

Article 8 and Annex III to the Directive of 23 October 1962 are hereby deleted.

Article 2

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive not later than 1 July 1996. They shall immediately inform the Commission thereof.

When Member States adopt these provisions, they shall contain a reference to this Directive or shall be accompanied by such reference at

([1]) OJ No L 40, 11. 2. 1989, p. 27.
([2]) OJ No L 237, 10. 9. 1994, p. 1.
([3]) OJ No L 237, 10. 9. 1994, p. 13.
([4]) OJ No 115, 11. 11. 1962, p. 2645/62.
([5]) OJ No L 2, 3. 1. 1985, p. 22.

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the time of their official publication. The procedure for such reference shall be adopted by Member States.

2. Products put on the market or labelled before 1 July 1996 which do not comply with this Directive may, however, be marketed until stocks are exhausted.

Article 3

This Directive shall enter into force on the third day following that of its publication in the *Official Journal of the European Communities*.

Article 4

This Directive is addressed to the Member States.

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ANNEX

A. **General specifications for aluminium lakes of colours**

Definition:	Aluminium lakes are prepared by reacting colours complying with the purity criteria set out in the appropriate specification monograph with alumina under aqueous conditions. The alumina is usually freshly prepared undried material made by reacting aluminium sulfate or chloride with sodium or calcium carbonate or bicarbonate or ammonia. Following lake formation, the product is filtered, washed with water and dried. Unreacted alumina may also be present in the finished product.
HCI insoluble matter	Not more than 0,5 %
Ether extractable matter	Not more than 0,2 % (under neutral conditions)
	Specific purity criteria for the corresponding colours are applicable.

B. **SPECIFIC CRITERIA OF PURITY**

E 100 CURCUMIN

Synonyms	CI Natural Yellow 3, Turmeric Yellow, Diferoyl Methane
Definition	Curcumin is obtained by solvent extraction of turmeric i.e. the ground rhizomes of natural strains of *Curcuma longa* L. In order to obtain a concentrated curcumin powder, the extract is purified by crystallization. The product consists essentially of curcumins; i.e. the colouring principle (1,7-bis(4-hydroxy-3-methoxyphenyl)hepta-1,6-dien-3,5-dione) and its two desmethoxy derivatives in varying proportions. Minor amounts of oils and resins naturally occuring in turmeric may be present.
	Only the following solvents may be used in the extraction: ethylacetate, acetone, carbon dioxide, dichloromethane, n-butanol, methanol, ethanol, hexane.
Class	Dicinnamoylmethane
Colour Index No	75300
Einecs	207-280-5
Chemical names	I 1,7-Bis(4-hydroxy-3-methoxyphenyl)hepta-1,6-diene-3,5-dione
	II 1-(4-Hydroxyphenyl)-7-(4-hydroxy-3-methoxy-phenyl-)hepta-1,6-diene-3,5-dione
	III 1,7-Bis(4-hydroxyphenyl)hepta-1,6-diene-3,5-dione
Chemical formula	I $C_{21}H_{20}O_6$
	II $C_{20}H_{18}O_5$
	III $C_{19}H_{16}O_4$
Molecular weight	I. 368,39
	II. 338,39
	III. 308,39
Assay	Content not less than 90 % total colouring matters
	$E^{1\ \%}_{1\ cm}$ 1 607 at ca 426 nm in ethanol
Description	Orange-yellow crystalline powder
Identification	
A. Spectrometry	Maximum in ethanol at ca 426 nm
B. Melting Range	179 ºC—182 ºC

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Purity	
Solvent residues	Ethylacetate, Acetone, n-butanol, Methanol, Ethanol, Hexane: Not more than 50 mg/kg, singly or in combination
	Dichloromethane: not more than 10 mg/kg
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 101 (i) RIBOFLAVIN

Synonyms	Lactoflavin
Class	Isoalloxazine
Einecs	201-507-1
Chemical names	7,8-Dimethyl-10-(D-ribo-2,3,4,5-tetrahydroxypentyl)-benzo(g)pteridine-2,4(3H,10H)-dione
	7,8-dimethyl-10-(1′-D-ribityl)isoalloxazine
Chemical formula	$C_{17}H_{20}N_4O_6$
Molecular weight	376,37
Assay	Content not less than 98 % on the anhydrous basis
	$E^{1\ \%}_{1\ cm}$ 328 at ca 444 nm in aqueous solution
Description	Yellow to orange-yellow crystalline powder, with slight odour
Identification	
A. Spectrometry	The ratio A_{375}/A_{267} is between 0,31 and 0,33; The ratio A_{444}/A_{267} is between 0,36 and 0,39: in aqueous solution
	Maximum in water at ca 375 nm
B. Specific rotation	$[\alpha]^{20}_D$ between -115º and -140º in a 0,05 N sodium hydroxide solution
Purity	
Loss on drying	Not more than 1,5 % after drying at 105 ºC for 4 hrs
Sulfated ash	Not more than 0,1 %
Primary aromatic amines	Not more than 100 mg/kg (calculated as aniline)
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

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E 101 (ii) RIBOFLAVIN-5′-PHOSPHATE

Synonyms	Riboflavin-5′-phosphate sodium
Definition	These specifications apply to riboflavin 5′-phosphate together with minor amounts of free riboflavin and riboflavin diphosphate
Class	Isoalloxazine
Einecs	204-988-6
Chemical names	Monosodium (2R,3R,4S)-5-(3′)10′-dihydro-7′,8′-dimethyl-2′,4′-dioxo-10′-benzo[γ]pteridinyl)-2,3,4-trihydroxypentyl phosphate; monosodium salt of 5′-monophosphate ester of riboflavin
Chemical formula	For the dihydrate form: $C_{17}H_{20}N_4NaO_9P.2H_2O$ For the anhydrous form: $C_{17}H_{20}N_4NaO_9P$
Molecular weight	541,36
Assay	Content not less than 95 % total colouring matters calculated as $C_{17}H_{20}N_4NaO_9P.2H_2O$ $E^{1\ \%}_{1\ cm}$ 250 at ca 375 nm in aqueous solution
Description	Yellow to orange crystalline hygroscopic powder, with slight odour and a bitter taste
Identification	
A. Spectrometry	The ratio A_{375}/A_{267} is between 0,30 and 0,34 The ratio A_{444}/A_{267} is between 0,35 and 0,40 } in aqueous solution Maximum in water at ca 375 nm
B. Specific rotation	$[\alpha]^{20}_D$ between +38º and +42º in a 5 molar HCI solution
Purity	
Loss on drying	Not more than 8 % (100 ºC, 5 hrs in vacuum over P_2O_5) for the dihydrate form
Sulfated ash	Not more than 25 %
Inorganic phosphate	Not more than 1,0 % (calculated as PO_4 on the anhydrous basis)
Subsidiary colouring matters	Riboflavin (free): Not more than 6 % Riboflavine diphosphate: Not more than 6 %
Primary aromatic amines	Not more than 70 mg/kg (calculated as aniline)
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 102 TARTRAZINE

Synonyms	CI Food Yellow 4
Definition	Tartrazine consists essentially of trisodium 5-hydroxy-1-(4-sulfonatophenyl)-4-(4-sulfonatophenylazo)-H-pyrazole-3-carboxylate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components.

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	Tartrazine is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Monoazo
Colour Index No	19140
Einecs	217-699-5
Chemical names	Trisodium-5-hydroxy-1-(4-sulfonatophenyl)-4-(4-sulfonatophenylazo)-H-pyrazole-3-carboxylate
Chemical formula	$C_{16}H_9N_4Na_3O_9S_2$
Molecular weight	534,37
Assay	Content not less than 85 % total colouring matters calculated as the sodium salt
	$E^{1\ \%}_{1\ cm}$ 530 at ca 426 nm in aqueous solution
Description	Light orange powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 426 nm
B. Yellow solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 1,0 %
Organic compounds other than colouring matters:	
4-hydrazinobenzene sulfonic acid	Total not more than 0,5 %
4-aminobenzene-1-sulfonic acid	
5-oxo-1-(4-sulfophenyl)-2-pyrazoline-3-carboxylic acid	
4,4′-diazoaminodi(benzene sulfonic acid)	
Tetrahydroxysuccinic acid	
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 104 QUINOLINE YELLOW

Synonyms	CI Food Yellow 13
Definition	Quinoline Yellow is prepared by sulfonating 2-(2-quinolyl) indan-1,3-dione. Quinoline Yellow consists essentially of sodium salts of a mixture of disulfonates (principally), monosulfonates and trisulfonates of the above compound and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components.
	Quinoline Yellow is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Chinophthalone
Colour Index No	47005
Einecs	305-897-5

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Chemical name	The disodium salts of the disulfonates of 2-(2-quinolyl) indan-1,3-dione (principal component)
Chemical formula	$C_{18}H_9N\ Na_2O_8S_2$ (principal component)
Molecular weight	477,38 (principal component)
Assay	Content not less than 70 % total colouring matters calculated as the sodium salt Quinoline Yellow shall have the following composition: Of the total colouring matters present: — not less than 80 % shall be disodium 2-(2-quinolyl) indan-1,3-dione-disulfonates — not more than 15 % shall be sodium 2-(2-quinolyl) indan-1,3-dione-monosulfonates — not more than 7,0 % shall be trisodium 2-(2-quinolyl) indan-1,3-dione-trisulfonate $E^{1\ \%}_{1\ cm}$ 865 (principal component) at ca 411 nm in aqueous acetic acid solution
Description	Yellow powder or granules
Identification	
A. Spectrometry	Maximum in aqueous acetic acid solution of pH 5 at ca 411 nm
B. Yellow solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 4,0 %
Organic compounds other than colouring matters:	
2-methylquinoline	Total not more than 0,5 %
2-methylquinoline-sulfonic acid	
Phthalic acid	
2,6-dimethyl quinoline	
2,6-dimethyl quinoline sulfonic acid	
2-(2-quinolyl)indan-1,3-dione	Not more than 4 mg/kg
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 110 SUNSET YELLOW FCF

Synonyms	CI Food Yellow 3, Orange Yellow S
Definition	Sunset Yellow FCF consists essentially of disodium 2-hydroxy-1-(4-sulfonatophenylazo) naphthalene-6-sulfonate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components. Sunset Yellow FCF is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Monoazo

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Colour Index No	15985
Einecs	220-491-7
Chemical names	Disodium 2-hydroxy-1-(4-sulfonatophenylazo) naphthalene-6-sulfonate
Chemical formula	$C_{16}H_{10}N_2Na_2O_7S_2$
Molecular weight	452,37
Assay	Content not less than 85 % total colouring matters calculated as the sodium salt
	$E^{1\ \%}_{1\ cm}$ 555 at ca 485 nm in aqueous solution at pH 7
Description	Orange-red powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 485 nm at pH 7
B. Orange solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 5 %
Organic compounds other than colouring matters:	
4-aminobenzene-1-sulfonic acid	Total not more than 0,5 %
3-hydroxynaphthalene-2,7-disulfonic acid	
6-hydroxynaphthalene-2-sulfonic acid	
7-hydroxynaphthalene-1,3-disulfonic acid	
4,4′-diazoaminodi(benzene sulfonic acid)	
6,6′-oxydi(naphthalene-2-sulfonic acid)	
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 120 COCHINEAL, CARMINIC ACID, CARMINES

Definition	Carmines and carminic acid are obtained from aqueous, aqueous alcoholic or alcoholic extracts from Cochineal, with consists of the dried bodies of the female insect *Dactylopius coccus* Costa.
	The colouring principle is carminic acid.
	Aluminium lakes of carminic acid (carmines) can be formed in which aluminium and carminic acid are thought to be present in the molar ratio 1:2.
	In commercial products the colouring principle is present in association with ammonium, calcium, potassium or sodium cations, singly or in combination, and these cations may also be present in excess.
	Commercial products may also contain proteinaceous material derived from the source insect, and may also

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	contain free carminate or a small residue of unbound aluminium cations.
Class	Anthraquinone
Colour Index No	75470
Einecs	Cochineal: 215-680-6; carminic acid: 215-023-3; carmines: 215-724-4
Chemical names	7-β-D-glucopyranosyl-3,5,6,8-tetrahydroxy-1-methyl-9,10-dioxoanthracene-2-carboxylic acid (carminic acid); carmine is the hydrated aluminium chelate of this acid
Chemical formula	$C_{22}H_{20}O_{13}$ (carminic acid)
Molecular weight	492,39 (carminic acid)
Assay	Content not less than 2,0 % carminic acid in the extracts containing carminic acid; not less than 50 % carminic acid in the chelates.
Description	Red to dark red, friable, solid or powder. Cochineal extract is generally a dark red liquid but can also be dried as a powder.
Identification	
Spectrometry	Maximum in aqueous ammonia solution at ca 518 nm
	Maximum in dilute hydrochloric solution at ca 494 nm for carminic acid
Purity	
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 122 AZORUBINE, CARMOISINE

Synonyms	CI Food Red 3
Definition	Azorubine consists essentially of disodium 4-hydroxy-3-(4-sulfonato-1-naphthylazo) naphthalene-1-sulfonate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components.
	Azorubine is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Monoazo
Colour Index No	14720
Einecs	222-657-4
Chemical name	Disodium 4-hydroxy-3-(4-sulfonato-1-naphthylazo) naphthalene-1-sulfonate
Chemical formula	$C_{20}H_{12}N_2Na_2O_7S_2$
Molecular weight	502,44
Assay	Content not less than 85 % total colouring matters, calculated as the sodium salt
	$E^{1\,\%}_{1\ cm}$ 510 at ca 516 nm in aqueous solution
Description	Red to maroon powder or granules

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Identification	
A. Spectrometry	Maximum in water at ca 516 nm
B. Red solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 2,0 %
Organic compounds other than colouring matters:	
4-aminonaphthalene-1-sulfonic acid	Total not more than 0,5 %
4-hydroxynaphthalene-1-sulfonic acid	
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 123 AMARANTH

Synonyms	CI Food Red 9
Definition	Amaranth consists essentially of trisodium 2-hydroxy-1-(4-sulfonato-1-naphthylazo) naphthalene-3,6-disulfonate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components. Amaranth is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Monoazo
Colour Index No	16185
Einecs	213-022-2
Chemical name	Trisodium 2-hydroxy-1-(4-sulfonato-1-naphthylazo) naphthalene-3,6-disulfonate
Chemical formula	$C_{20}H_{11}N_2Na_3O_{10}S_3$
Molecular weight	604,48
Assay	Content not less than 85 % total colouring matters, calculated as the sodium salt $E^{1\ \%}_{1\ cm}$ 440 at ca 520 nm in aqueous solution
Description	Reddish-brown powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 520 nm
B. Red solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 3,0 %

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Organic compounds other than colouring matters:	
4-aminonaphthalene-1-sulfonic acid	Total not more than 0,5 %
3-hydroxynaphthalene-2,7-disulfonic acid	
6-hydroxynaphthalene-2-sulfonic acid	
7-hydroxynaphthalene-1,3-disulfonic acid	
7-hydroxynaphthalene-1,3-6-trisulfonic acid	
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 124 PONCEAU 4R, COCHINEAL RED A

Synonyms	CI Food Red 7, New Coccine
Definition	Ponceau 4R consists essentially of trisodium 2-hydroxy-1-(4-sulfonato-1-naphthylazo) naphthalene-6,8-disulfonate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components. Ponceau 4R is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Monoazo
Colour Index No	16255
Einecs	220-036-2
Chemical name	Trisodium 2-hydroxy-1-(4-sulfonato-1-naphthylazo) naphthalene-6,8-disulfonate
Chemical formula	$C_{20}H_{11}N_2Na_3O_{10}S_3$
Molecular weight	604,48
Assay	Content not less than 80 % total colouring matters, calculated as the sodium salt. $E^{1\ \%}_{1\ cm}$ 430 at ca 505 nm in aqueous solution
Description	Reddish powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 505 nm
B. Red solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 1,0 %

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Organic compounds other than colouring matters:	
4-aminonaphthalene-1-sulfonic acid	Total not more than 0,5 %
7-hydroxynaphthalene-1,3-disulfonic acid	
3-hydroxynaphthalene-2,7-disulfonic acid	
6-hydroxynaphthalene-2-sulfonic acid	
7-hydroxynaphthalene-1,3-6-trisulfonic acid	
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 127 ERYTHROSINE

Synonyms	CI Food Red 14
Definition	Erythrosine consists essentially of disodium 2-(2,4,5,7-tetraiodo-3-oxido-6-oxoxanthen-9-yl) benzoate monohydrate and subsidiary colouring matters together with water, sodium chloride and/or sodium sulfate as the principal uncoloured components. Erythrosine is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Xanthen
Colour Index No	45430
Einecs	240-474-8
Chemical name	Disodium 2-(2,4,5,7-tetraiodo-3-oxido-6-oxoxanthen-9-yl)benzoate monohydrate
Chemical formula	$C_{20}H_6I_4Na_2O_5.H_2O$
Molecular weight	897,88
Assay	Content not less than 87 % total colouring matters, calculated as the anhydrous sodium salt $E^{1\ \%}_{1\ cm}$ 1 100 at ca 526 nm in aqueous solution at pH 7
Description	Red powder or granules.
Identification	
A. Spectrometry	Maximum in water at ca 526 nm at pH 7
B. Red solution in water	
Purity	
Inorganic iodides calculated as sodium iodide	Not more than 0,1 %
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters (except fluorescein)	Not more than 4,0 %
Fluorescein	Not more than 20 mg/kg

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Organic compounds other than colouring matters:	
Tri-iodoresorcinol	Not more than 0,2 %
2-(2,4-dihydroxy-3,5-diodobenzoyl) benzoic acid	Not more than 0,2 %
Ether extractable matter	From a solution of pH from 7 through 8, not more than 0,2 %
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg
Aluminium Lakes	The hydrochloric acid insoluble matter method is not applicable. It is replaced by a sodium hydroxide insoluble matter, at not more than 0,5 %, for this colour only

E 128 RED 2G

Synonyms	CI Food Red 10, Azogeranine
Definition	Red 2G consists essentially of disodium 8-acetamido-1-hydroxy-2-phenylazonaphthalene-3,6-disulfonate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components. Red 2G is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Monoazo
Colour Index No	18050
Einecs	223-098-9
Chemical name	Disodium 8-acetamido-1-hydroxy-2-phenylazo-naphthalene-3,6-disulfonate
Chemical formula	$C_{18}H_{13}N_3Na_2O_8S_2$
Molecular weight	509,43
Assay	Content not less than 80 % total colouring matters, calculated as the sodium salt $E^{1\ \%}_{1\ cm}$ 620 at ca 532 nm in aqueous solution
Description	Red powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 532 nm
B. Red solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 2,0 %
Organic compounds other than colouring matters:	
5-acetamido-4-hydroxynaphthalene-2,7-disulfonic acid 5-amino-4-hydroxynaphthalene-2,7-disulfonic acid	Total not more than 0,5 %
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg

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Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 129 ALLURA RED AC

Synonyms	CI Food Red 17
Definition	Allura Red AC consists essentially of disodium 2-hydroxy-1-(2-methoxy-5-methyl-4-sulfonato-phenylazo) naphthalene-6-sulfonate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components. Allura Red AC is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Monoazo
Colour Index No	16035
Einecs	247-368-0
Chemical name	Disodium 2-hydroxy-1-(2-methoxy-5-methyl-4-sulfonatophenylazo) naphthalene-6-sulfonate
Chemical formula	$C_{18}H_{14}N_2Na_2O_8S_2$
Molecular weight	496,42
Assay	Content not less than 85 % total colouring matters, calculated as the sodium salt $E^{1\ \%}_{1\ cm}$ 540 at ca 504 nm in aqueous solution at pH 7
Description	Dark red powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 504 nm
B. Red solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 3,0 %
Organic compounds other than colouring matters:	
6-hydroxy-2-naphthalene sulfonic acid, sodium salt	Not more than 0,3 %
4-amino-5-methoxy-2-methylbenezene sulfonic acid	Not more than 0,2 %
6,6-oxybis (2-naphthalene sulfonic acid) disodium salt	Not more than 1,0 %
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	From a solution of pH 7, not more than 0,2 %
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

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E 131 PATENT BLUE V

Synonyms	CI Food Blue 5
Definition	Patent Blue V consists essentially of the calcium or sodium compound of [4-(α-(4-diethylaminophenyl)-5-hydroxy-2,4-disulfophenyl-methylidene)2,5-cyclohexadien-1-ylidene] diethylammonium hydroxide inner salt and subsidiary colouring matters together with sodium chloride and/or sodium sulfate and/or calcium sulfate as the principal uncoloured components.
	The potassium salt is also permitted.
Class	Triarylmethane
Colour Index No	42051
Einecs	222-573-8
Chemical names	The calcium or sodium compound of [4-(α-(4-diethylaminophenyl)-5-hydroxy-2,4-disulfophenyl-methylidene) 2,5-cyclohexadien-1-ylidene] diethyl-ammonium hydroxide inner salt
Chemical formula	Calcium compound: $C_{27}H_{31}N_2O_7S_2Ca_{1/2}$ Sodium compound: $C_{27}H_{31}N_2O_7S_2Na$
Molecular weight	Calcium compound: 579,72 Sodium compound: 582,67
Assay	Content not less than 85 % total colouring matters, calculated as the sodium salt
	$E^{1\ \%}_{1\ cm}$ 2 000 at ca 638 nm in aqueous solution at pH 5
Description	Dark-blue powder or granules
Identification	
A. Spectrometry	Maximum in water at 638 nm at pH 5
B. Blue solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 2,0 %
Organic compounds other than colouring matters:	
3-hydroxy benzaldehyde 3-hydroxy benzoic acid 3-hydroxy-4-sulfobenzoic acid N,N-diethylamino benzene sulfonic acid	Total not more than 0,5 %
Leuco base	Not more than 4,0 %
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	From a solution of pH 5 not more than 0,2 %
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

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E 132 INDIGOTINE, INDIGO CARMINE

Synonyms	CI Food Blue 1
Definition	Indigotine consists essentially of a mixture of disodium 3,3′dioxo-2,2′-bi-indolylidene-5,5′-disulfonate, and disodium 3,3′-dioxo-2,2′-bi-indolylidene-5,7′-disulfonate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components. Indigotine is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Indigoid
Colour Index No	73015
Einecs	212-728-8
Chemical names	Disodium 3,3′-dioxo-2,2′-bi-indolylidene-5,5′-disulfonate
Chemical formula	$C_{16}H_8N_2Na_2O_8S_2$
Molecular weight	466,36
Assay	Content not less than 85 % total colouring matters, calculated as the sodium salt; disodium 3,3′-dioxo-2,2′-bi-indolylidene-5,7′-disulfonate: not more than 18 % $E^{1\ \%}_{1\ cm}$ 480 at ca 610 nm in aqueous solution
Description	Dark-blue powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 610 nm
B. Blue solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Excluding disodium 3,3′-dioxo-2,2′-bi-indolylidene-5,7′-disulfonate: not more than 1,0 %
Organic compounds other than colouring matters:	
Isatin-5-sulfonic acid 5-sulfoanthranilic acid Anthranilic acid	Total not more than 0,5 %
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 133 BRILLIANT BLUE FCF

Synonyms	CI Food Blue 2
Definition	Brilliant Blue FCF consists essentially of disodium α-(4-(N-ethyl-3-sulfonatobenzylamino) phenyl)-α-(4-N-ethyl-3-sulfonatobenzylamino) cyclohexa-2,5-dienylidene) toluene-2-sulfonate and its isomers and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal

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	uncoloured components. Brilliant Blue FCF is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Triarylmethane
Colour Index No	42090
Einecs	223-339-8
Chemical names	Disodium α-(4-(N-ethyl-3-sulfonatobenzylamino) phenyl)-α-(4-N-ethyl-3-sulfonatobenzylamino) cyclo-hexa-2,5-dienylidene) toluene-2-sulfonate
Chemical formula	$C_{37}H_{34}N_2Na_2O_9S_3$
Molecular weight	792,84
Assay	Content not less than 85 % total colouring matters, calculated as the sodium salt $E^{1\ \%}_{1\ cm}$ 1 630 at ca 630 nm in aqueous solution
Description	Reddish-blue powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 630 nm
B. Blue solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 6,0 %
Organic compounds other than colouring matters:	
Sum of 2-, 3- and 4-formyl benzene sulfonic acids	Not more than 1,5 %
3-((ethyl)(4-sulfophenyl) amino) methyl benzene sulfonic acid	Not more than 0,3 %
Leuco base	Not more than 5,0 %
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % at pH 7
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 140 (i) CHLOROPHYLLS

Synonyms	CI Natural Green 3, Magnesium Chlorophyll, Magnesium Phaeophytin
Definition	Chlorophylls are obtained by solvent extraction of natural strains of edible plant material, grass, lucerne and nettle. During the subsequent removal of solvent, the naturally present co-ordinated magnesium may be wholly or partly removed from the chlorophylls to give the corresponding phaeophytins. The principal colouring matters are the phaeophytins and magnesium chlorophylls. The extracted product, from which the solvent has been removed, contains other pigments such as carotenoids as well as oils, fats and waxes derived from the source material. Only the following solvents may be used for the extraction: acetone, methyl ethyl ketone, dichloromethane, carbon dioxide,

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	methanol, ethanol, propan-2-ol and hexane.
Class	Porphyrin
Colour Index No	75810
Einecs	Chlorophylls: 215-800-7, chlorophyll a: 207-536-6, Chlorophyll b: 208-272-4
Chemical names	The major colouring principles are:
	Phytyl (13²*R*,17*S*,18*S*)-3-(8-ethyl-13²-methoxycarbonyl-2,7,12,18-tetramethyl-13′-oxo-3-vinyl-13¹-13²-17,18-tetrahydrocyclopenta [at]-porphyrin-17-yl)propionate, (Pheophytin a), or as the magnesium complex (Chlorophyll a)
	Phytyl (13²*R*,17*S*,18*S*)-3-(8-ethyl-7-formyl-13²-methoxycarbonyl-2,12,18-trimethyl-13′-oxo-3-vinyl-13¹-13²-17,18-tetrahydrocyclopenta[at]-porphyrin-17-yl)propionate, (Pheophytin b), or as the magnesium complex (Chlorophyll b)
Chemical formula	Chlorophyll a (magnesium complex): $C_{55}H_{72}MgN_4O_5$
	Chlorophyll a: $C_{55}H_{74}N_4O_5$
	Chlorophyll b (magnesium complex): $C_{55}H_{70}MgN_4O_6$
	Chlorophyll b: $C_{55}H_{72}N_4O_6$
Molecular weight	Chlorophyll a (magnesium complex): 893,51
	Chlorophyll a: 871,22
	Chlorophyll b (magnesium complex): 907,49
	Chlorophyll b: 885,20
Assay	Content of total combined Chlorophylls and their magnesium complexes is not less than 10 %
	$E^{1\ \%}_{1\ cm}$ 700 at ca 409 nm in chloroform
Description	Waxy solid ranging in colour from olive green to dark green depending on the content of co-ordinated magnesium
Identification	
Spectrometry	Maximum in chloroform at ca 409 nm
Purity	
Solvent residues	Acetone, Methyl Ethyl ketone, Methanol, Ethanol, Propan-2-ol, Hexane: Not more than 50 mg/kg, singly or in combination
	Dichloromethane: Not more than 10 mg/kg
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 140 (ii) CHLOROPHYLLINS

Synonyms	CI Natural Green 5, Sodium Chlorophyllin, Potassium Chlorophyllin
Definition	The alkali salts of chlorophyllins are obtained by the saponification of a solvent extract of natural strains of

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	edible plant material, grass, lucerne and nettle. The saponification removes the methyl and phytol ester groups and may partially cleave the cyclopentenyl ring. The acid groups are neutralized to form the salts of potassium and/or sodium. Only the following solvents may be used for the extraction: acetone, methyl ethyl ketone, dichloromethane, carbon dioxide, methanol, ethanol, propan-2-ol and hexane.
Class	Porphyrin
Colour Index No	75815
Einecs	287-483-3
Chemical names	The major colouring principles in their acid forms are: — 3-(10-carboxylato-4-ethyl-1,3,5,8-tetramethyl-9-oxo-2-vinylphorbin-7-yl)propionate (chlorophyllin a) and — 3-(10-carboxylato-4-ethyl-3-formyl-1,5,8-trimethyl-9-oxo-2-vinylphorbin-7-yl)propionate (chlorophyllin b) Depending on the degree of hydrolysis the cyclopentenyl ring may be cleaved with the resultant production of a third carboxyl function. Magnesium complexes may also be present.
Chemical formula	Chlorophyllin a (acid form): $C_{34}H_{34}N_4O_5$ Chlorophyllin b (acid form): $C_{34}H_{32}N_4O_6$
Molecular weight	Chlorophyllin a: 578,68 Chlorophyllin b: 592,66 Each may be increased by 18 daltons if the cyclopentenyl ring is cleaved.
Assay	Content of total chlorophyllins is not less than 95 % of the sample dried at ca 100 ºC for 1 hour. $E^{1\ \%}_{1\ cm}$ 700 at ca 405 nm in aqueous solution at pH 9 $E^{1\ \%}_{1\ cm}$ 140 at ca 653 nm in aqueous solution at pH 9
Description	Dark green to blue/black powder
Identification	
Spectrometry	Maximum in aqueous phosphate buffer at pH 9 at ca 405 nm and at ca 653 nm
Purity	
Solvent residues	Acetone, Methyl ethyl ketone, Methanol, Ethanol, Propan-2-ol, Hexane: Not more than 50 mg/kg, singly or in combination Dichloromethane: not more than 10 mg/kg
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

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E 141 (i) COPPER COMPLEXES OF CHLOROPHYLLS

Synonyms	CI Natural Green 3, Copper Chlorophyll, Copper Phaeophytin
Definition	Copper chlorophylls are obtained by addition of a salt of copper to the substance obtained by solvent extraction of natural strains of edible plant material, grass, lucerne, and nettle. The product, from which the solvent has been removed, contains other pigments such as carotenoids as well as fats and waxes derived from the source material. The principal colouring matters are the copper phaeophytins. Only the following solvents may be used for the extraction: acetone, methyl ethyl ketone, dichloromethane, carbon dioxide, methanol, ethanol, propan-2-ol and hexane.
Class	Porphyrin
Colour Index No	75815
Einecs	Copper chlorophyll a: 239-830-5; copper chlorophyll b: 246-020-5
Chemical names	[Phytyl (13^2*R*,17*S*,18*S*)-3-(8-ethyl-13^2-methoxycarbonyl-2,7,12,18-tetramethyl-13′-oxo-3-vinyl-13^1-13^2-17,18-tetrahydrocyclopenta[at]-porphyrin-17-yl)propionate] copper (II) (Copper Chlorophyll a) [Phytyl (13^2*R*,17*S*,18*S*)-3-(8-ethyl-7-formyl-13^2-methoxycarbonyl-2,12,18-trimethyl-13′-oxo-3-vinyl-13^1-13^2-17,18-tetrahydrocyclopenta[at]-porphyrin-17-yl)propionate] copper (II) (Copper chlorophyll b)
Chemical formula	Copper chlorophyll a: $C_{55}H_{72}Cu\ N_4O_5$ Copper chlorophyll b: $C_{55}H_{70}Cu\ N_4O_6$
Molecular weight	Copper chlorophyll a: 932,75 Copper chlorophyll b: 946,73
Assay	Content of total copper chlorophylls is not less than 10 %. $E^{1\ \%}_{1\ cm}$ 540 at ca 422 nm in chloroform $E^{1\ \%}_{1\ cm}$ 300 at ca 652 nm in chloroform
Description	Waxy solid ranging in colour from blue green to dark green depending on the source material
Identification	
Spectrometry	Maximum in chloroform at ca 422 nm and at ca 652 nm
Purity	
Solvent residues	Acetone, Methyl ethyl ketone, Methanol, Ethanol, Propan-2-ol, Hexane: Not more than 50 mg/kg, singly or in combination Dichloromethane: not more than 10 mg/kg
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Copper ions	Not more than 200 mg/kg
Total copper	Not more than 8,0 % of the total copper phaeophytins

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E 141 (ii) COPPER COMPLEXES OF CHLOROPHYLLINS

Synonyms	Sodium Copper Chlorophyllin, Potassium Copper Chlorophyllin, CI Natural Green 5
Definition	The alkali salts of copper chlorophyllins are obtained by the addition of copper to the product obtained by the saponification of a solvent extraction of natural strains of edible plant material, grass, lucerne, and nettle; the saponification removes the methyl and phytol ester groups and may partially cleave the cyclopentenyl ring. After addition of copper to the purified chlorophyllins, the acid groups are neutralized to form the salts of potassium and/or sodium. Only the following solvents may be used for the extraction: acetone, methyl ethyl ketone, dichloromethane, carbon dioxide methanol, ethanol, propan-2-ol and hexane.
Class	Porphyrin
Colour Index No	75815
Einecs	
Chemical names	The major colouring principles in their acid forms are 3-(10-Carboxylato-4-ethyl-1,3,5,8-tetramethyl-9-oxo-2-vinylphorbin-7-yl)propionate, copper complex (Copper chlorophyllin a) and 3-(10-Carboxylato-4-ethyl-3-formyl-1,5,8-trimethyl-9-oxo-2-vinylphorbin-7-yl) propionate, copper complex (Copper chlorophyllin b)
Chemical formula	Copper chlorophyllin a (acid form): $C_{34}H_{32}Cu\ N_4O_5$ Copper chlorophyllin b (acid form): $C_{34}H_{30}Cu\ N_4O_6$
Molecular weight	Copper chlorophyllin a: 640,20 Copper chlorophyllin b: 654,18 Each may be increased by 18 daltons if the cyclopentenyl ring is cleaved.
Assay	Content of total copper chlorophyllins is not less than 95 % of the sample dried at 100 ºC for 1 h. $E^{1\ \%}_{1\ cm}$ 565 at ca 405 nm in aqueous phosphate buffer at pH 7,5 $E^{1\ \%}_{1\ cm}$ 145 at ca 630 nm in aqueous phosphate buffer at pH 7,5
Description	Dark green to blue/black powder
Identification	
Spectrometry	Maximum in aqueous phosphate buffer at pH 7,5 at ca 405 nm and at 630 nm
Purity	
Solvent residues	Acetone, Methyl ethyl ketone, Methanol, Ethanol, Propan-2-ol, Hexane: Not more than 50 mg/kg, singly or in combination Dichloromethane: not more than 10 mg/kg
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg

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Cadmium	Not more than 1 mg/kg
Copper ions	Not more than 200 mg/kg
Total copper	Not more than 8,0 % of the total copper chlorophyllins

E 142 GREEN S

Synonyms	CI Food Green 4, Brilliant Green BS
Definition	Green S consists essentially of sodium N-[4-(dimethylamino)phenyl] 2-hydroxy-3,6-disulfo-1-naphthalenyl)methylene]-2,5-cyclohexadien-1-ylidene]-N-methylmethanaminium and subsidiary colouring matters together with sodium chloride and/or sodium sulphate as the principal uncoloured compounds. Green S is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Triarylmethane
Colour Index No	44090
Einecs	221-409-2
Chemical names	Sodium N-[4-[[4-(dimethylamino)phenyl](2-hydroxy-3,6-disulfo-1-naphthalenyl)-methylene]2,5-cyclohexadien-1-ylidene]-N-methylmethanaminium; Sodium 5-[4-dimethylamino-α-(4-dimethyliminocyclohexa-2,5-dienylidene) benzyl]-6-hydroxy-7-sulfonato-naphthalene-2-sulfonate (alternative chemical name).
Chemical formula	$C_{27}H_{25}N_2NaO_7S_2$
Molecular weight	576,63
Assay	Content not less than 80 % total colouring matters calculated as the sodium salt $E^{1\ \%}_{1\ cm}$ 1 720 at ca 632 nm in aqueous solution
Description	Dark blue or dark green powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 632 nm
B. Blue or green solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 1,0 %
Organic compounds other than colouring matters:	
4,4′-bis(dimethylamino)-benzhydryl alcohol	Not more than 0,1 %
4,4′-bis(dimethylamino)-benzophenone	Not more than 0,1 %
3-hydroxynaphthalene-2,7-disulfonic acid	Not more than 0,2 %
Leuco base	Not more than 5,0 %
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg

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Heavy metals (as Pb)	Not more than 40 mg/kg

E 150a PLAIN CARAMEL

Definition	Plain caramel is prepared by the controlled heat treatment of carbohydrates (commercially available food grade nutritive sweeteners which are the monomers glucose and fructose and/or polymers thereof, e.g. glucose syrups, sucrose, and/or invert syrups, and dextrose). To promote caramelization, acids, alkalis and salts may be employed, with the exception of ammonium compounds and sulphites.
Einecs	232-435-9
Description	Dark brown to black liquids or solids
Purity	
Colour bound by DEAE cellulose	Not more than 50 %
Colour bound by phosphoryl cellulose	Not more than 50 %
Colour intensity (1)	0,01—0,12
Total nitrogen	Not more than 0,1 %
Total sulphur	Not more than 0,2 %
Arsenic	Not more than 1 mg/kg
Lead	Not more than 2 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 25 mg/kg

(1) Colour intensity is defined as the absorbance of a 0,1 % (w/v) solution of caramel colour solids in water in a 1 cm cell at 610 nm.

E 150b CAUSTIC SULPHITE CARAMEL

Definition	Caustic sulphite caramel is prepared by the controlled heat treatment of carbohydrates (commercially available food grade nutritive sweeteners which are the monomers glucose and fructose and/or polymers thereof, e.g. glucose syrups, sucrose, and/or invert syrups, and dextrose) with or without acids or alkalis, in the presence of sulphite compounds (sulphurous acid, potassium sulphite, potassium bisulphite, sodium sulphite and sodium bisulphite); no ammonium compounds are used.
Einecs	232-435-9
Description	Dark brown to black liquids or solids
Purity	
Colour bound by DEAE cellulose	More than 50 %
Colour intensity (1)	0,05—0,13
Total nitrogen	Not more than 0,3 % (2)
Sulphur dioxide	Not more than 0,2 % (2)
Total sulphur	0,3—3,5 % (2)
Sulphur bound by DEAE cellulose	More than 40 %
Absorbance ratio of colour bound by DEAE cellulose	19—34
Absorbance ratio (A 280/560)	Greater than 50
Arsenic	Not more than 1 mg/kg

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Lead	Not more than 2 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 25 mg/kg

(1) Colour intensity is defined as the absorbance of a 0,1 % (w/v) solution of caramel colour solids in water in a 1 cm cell at 610 nm.
(2) Expressed on equivalent colour basis i.e. is expressed in terms of a product having a colour intensity of 0,1 absorbance units.

E 150c AMMONIA CARAMEL

Definition	Ammonia caramel is prepared by the controlled heat treatment of carbohydrates (commercially available food grade nutritive sweeteners which are the monomers glucose and fructose and/or polymers thereof, e.g. glucose syrups, sucrose, and/or invert syrups, and dextrose) with or without acids or alkalis, in the presence of ammonium compounds (ammonium hydroxide, ammonium carbonate, ammonium hydrogen carbonate and ammonium phosphate); no sulphite compounds are used.
Einecs	232-435-9
Description	Dark brown to black liquids or solids
Purity	
Colour bound by DEAE cellulose	Not more than 50 %
Colour bound by phosphoryl cellulose	More than 50 %
Colour intensity (1)	0,08—0,36
Ammoniacal nitrogen	Not more than 0,3 % (2)
4-methylimidazole	Not more than 250 mg/kg (2)
2-acetyl-4-tetrahydroxy-butylimidazole	Not more than 10 mg/kg (2)
Total sulphur	Not more than 0,2 % (2)
Total nitrogen	0,7—3,3 % (2)
Absorbance ratio of colour bound by phosphoryl cellulose	13—35
Arsenic	Not more than 1 mg/kg
Lead	Not more than 2 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 25 mg/kg

(1) Colour intensity is defined as the absorbance of a 0,1 % (w/v) solution of caramel colour solids in water in a 1 cm cell at 610 nm.
(2) Expressed on equivalent colour basis i.e. is expressed in terms of a product having a colour intensity of 0,1 absorbance units.

E 150d SULPHITE AMMONIA CARAMEL

Definition	Sulphite ammonia caramel is prepared by the controlled heat treatment of carbohydrates (commercially available food grade nutritive sweeteners which are the monomers glucose and fructose and/or polymers thereof (e.g. glucose syrups, sucrose, and/or invert syrups, and dextrose) with or without acids or alkalis in the presence of both sulphite and ammonium compounds (sulphurous acid, potassium sulphite, potassium bisulphite, sodium sulphite, sodium bisulphite, ammonium hydroxide, ammonium carbonate, ammonium hydrogen carbonate, ammonium phosphate, ammonium sulphate, ammonium sulphite and ammonium hydrogen sulphite).

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Einecs	232-435-9
Description	Dark brown to black liquids or solids
Purity	
Colour bound by DEAE cellulose	More than 50 %
Colour intensity (1)	0,10—0,60
Ammoniacal nitrogen	Not more than 0,6 % (2)
Sulphur dioxide	Not more than 0,2 % (2)
4-methylimidazole	Not more than 250 mg/kg (2)
Total nitrogen	0,3—1,7 % (2)
Total sulphur	0,8—2,5 % (2)
Nitrogen/sulphur ratio of alcohol precipitate	0,7—2,7
Absorbance ratio of alcohol precipitate (3)	8—14
Absorbance ratio ($A_{280}/_{560}$)	Not more than 50
Arsenic	Not more than 1 mg/kg
Lead	Not more than 2 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 25 mg/kg

(1) Colour intensity is defined as the absorbance of a 0,1 % (w/v) solution of caramel colour solids in water in a 1 cm cell at 610 nm.
(2) Expressed on equivalent colour basis i.e. is expressed in terms of a product having a colour intensity of 0,1 absorbance units.
(3) Absorbance ratio of alcohol precipitate is defined as the absorbance of the precipitate at 280 nm divided by the absorbance at 560 nm (1 cm cell).

E 151 BRILLIANT BLACK BN, BLACK PN

Synonyms	CI Food Black 1
Definition	Brilliant Black BN consists essentially of tetrasodium-4-acetamido-5-hydroxy-6-[7-sulfonato-4-(4-sulfonato-phenylazo)-1-naphthylazo] naphthalene-1,7-disulfonate and subsidiary colouring matters together with sodium chloride and/or sodium sulfate as the principal uncoloured components. Brilliant Black BN is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Bisazo
Colour Index No	28440
Einecs	219-746-5
Chemical names	Tetrasodium 4-acetamido-5-hydroxy-6-[7-sulfonato-4-(4-sulfonatophenylazo)-1-naphthylazo] naphthalene-1,7-disulfonate
Chemical formula	$C_{28}H_{17}N_5Na_4O_{14}S_4$
Molecular weight	867,69
Assay	Content not less than 80 % total colouring matters calculated as the sodium salt $E^{1\ \%}_{1\ cm}$ 530 at ca 570 nm in solution
Description	Black powder or granules
Identification	
A. Spectrometry	Maximum in water at ca 570 nm

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B. Black-bluish solution in water	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 10 % (expressed on the dye content)
Organic compounds other than colouring matters:	
4-acetamido-5-hydroxynaphthalene-1,7-disulfonic acid	Total not more than 0,8 %
4-amino-5-hydroxynaphthalene-1,7-disulfonic acid	
8-aminonaphthalene-2-sulfonic acid	
4,4′-diazoaminodi-(benzenesulfonic acid)	
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % under neutral conditions
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 153 VEGETABLE CARBON

Synonyms	Vegetable black
Definition	Vegetable carbon is produced by the carbonization of vegetable material such as wood, cellulose residues, peat and coconut and other shells. The raw material is carbonized at high temperatures. It consists essentially of finely divided carbon. It may contain minor amounts of nitrogen, hydrogen and oxygen. Some moisture may be absorbed on the product after manufacture.
Colour Index No	77266
Einecs	215-609-9
Chemical names	Carbon
Chemical formula	C
Molecular weight	12,01
Assay	Content not less than 95 % of carbon calculated on an anhydrous and ash-free basis
Description	Black powder, odourless and tasteless
Identification	
A. Solubility	Insoluble in water and organic solvents
B. Burning	When heated to redness it burns slowly without a flame
Purity	
Ash (Total)	Not more than 4,0 % (ignition temperature: 625 ºC)
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

▼B

Polyaromatic hydrocarbons	The extract obtained by extraction of 1 g of the product with 10 g pure cyclohexane in a continuous extraction apparatus shall be colourless, and the fluorescence of the extract in ultraviolet light shall not be more intense than that of a solution of 0,100 mg of quinine sulfate in 1 000 ml of 0,01 M sulphuric acid.
Loss on drying	Not more than 12 % (120 ºC, 4 hrs)
Alkali soluble matter	The filtrate obtained by boiling 2 g of the sample with 20 ml N sodium hydroxide and filtering shall be colourless

E 154 BROWN FK

Synonyms	CI Food Brown 1
Definition	Brown FK consists essentially of a mixture of: I sodium 4-(2,4-diaminophenylazo) benzenesulfonate II sodium 4-(4,6-diamino-m-tolylazo) benzenesulfonate III disodium 4,4′-(4,6-diamino-1,3-phenylenebisazo)di (benzenesulfonate) IV disodium 4,4′-(2,4-diamino-1,3-phenylenebisazo)di (benzenesulfonate) V disodium 4,4′-(2,4-diamino-5-methyl-1,3-phenylenebisazo)di (benzenesulfonate) VI trisodium 4,4′,4″-(2,4-diaminobenzene-1,3,5-trisazo)tri-(benzenesulfonate) and subsidiary colouring matters together with water, sodium chloride and/or sodium sulfate as the principal uncoloured components. Brown FK is described as the sodium salt. The calcium and the potassium salt are also permitted.
Class	Azo (a mixture of mono-, bis- and trisazo colours)
Einecs	
Chemical names	A mixture of: I sodium 4-(2,4-diaminophenylazo) benzenesulfonate II sodium 4-(4,6-diamino-m-tolylazo) benzenesulfonate III disodium 4,4′-(4,6-diamino-1,3-phenylenebisazo)di (benzenesulfonate) IV disodium 4,4′-(2,4-diamino-1,3-phenylenebisazo)di (benzenesulfonate) V disodium 4,4′-(2,4-diamino-5-methyl-1,3-phenylenebisazo)di (benzenesulfonate) VI trisodium 4,4′,4″-(2,4-diaminobenzene-1,3,5-trisazo)tri-(benzenesulfonate)
Chemical formula	I $C_{12}H_{11}N_4NaO_3S$ II $C_{13}H_{13}N_4NaO_3S$ III $C_{18}H_{14}N_6Na_2O_6S_2$ IV $C_{18}H_{14}N_6Na_2O_6S_2$ V $C_{19}H_{16}N_6Na_2O_6S_2$ VI $C_{24}H_{17}N_8Na_3O_9S_3$
Molecular weight	I 314,30 II 328,33 III 520,46 IV 520,46 V 534,47 VI 726,59
Assay	Content not less than 70 % total colouring matters Of the total colouring matters present the proportions of the components shall not exceed: I 26 % II 17 %

▼B

	III 17 % IV 16 % V 20 % VI 16 %
Description	Red-brown powder or granules
Identification	
Orange to reddish solution	
Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 3,5 %
Organic compounds other than colouring matters:	
4-aminobenzene-1-sulfonic acid	Not more than 0,7 %
m-phenylenediamine and 4-methyl-m-phenylenediamine	Not more than 0,35 %
Unsulfonated primary aromatic amines other than m-phenylene diamine and 4-methyl-m-phenylene diamine	Not more than 0,007 % (calculated as aniline)
Ether extractable matter	From a solution of pH 7, not more than 0,2 %
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 155 BROWN HT

Synonyms	CI Food Brown 3
Definition	Brown HT consists essentially of disodium 4,4′-(2,4-dihydroxy-5-hydroxymethyl-1,3-phenylene bisazo) di (naphthalene-1-sulfonate) and subsidiary colouring matters together with sodium chloride and/or sulfate as the principal uncoloured components. Brown HT is described as the sodium salt. The calcium and potassium salt are also permitted.
Class	Bisazo
Colour Index No	20285
Einecs	224-924-0
Chemical names	Disodium 4,4′-(2,4-dihydroxy-5-hydroxymethyl-1,3-phenylene bisazo)di (naphthalene-1-sulfonate)
Chemical formula	$C_{27}H_{18}N_4Na_2O_9S_2$
Molecular weight	652,57
Assay	Content not less than 70 % total colouring matters calculated as the sodium salt. $E^{1\ \%}_{1\ cm}$ 403 at ca 460 nm in aqueous solution at pH 7
Description	Reddish-brown powder or granules
Identification	
A. Spectrometry	Maximum in water of pH 7 at ca 460 nm
B. Brown solution in water	

▼B

Purity	
Water insoluble matter	Not more than 0,2 %
Subsidiary colouring matters	Not more than 10 % (TLCmethod)
Organic compounds other than colouring matters:	
4-aminonaphthalene-1-sulfonic acid	Not more than 0,7 %
Unsulfonated primary aromatic amines	Not more than 0,01 % (calculated as aniline)
Ether extractable matter	Not more than 0,2 % in a solution of pH 7
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

▼M3

E 160 a (i) MIXED CAROTENES

1. **Plant carotenes**	
Synonyms	CI Food Orange 5
Definition	Mixed carotenes are obtained by solvent extraction of natural strains of edible plants, carrots, vegetable oils, grass, alfalfa (lucerne) and nettle. The main colouring principle consists of carotenoids of which beta-carotene accounts for the major part. Alpha, gamma-carotene and other pigments may be present. Besides the colour pigments, this substance may contain oils, fats and waxes naturally occurring in the source material. Only the following solvents may be used in the extraction: acetone, methyl ethyl ketone, methanol, ethanol, propan-2-ol, hexane ([1]), dichloromethane and carbon dioxide.
Class	Carotenoid
Colour index No	75130
EINECS	230-636-6
Chemical formula	Beta-carotene: $C_{40}H_{56}$
Molecular weight	Beta-carotene: 536,88
Assay	Content of carotenes (calculated as beta-carotene) is not less than 5 %. For products obtained by extraction of vegetable oils: not less than 0,2 % in edible fats $E^{1\,\%}_{1\,cm}$ 2 500 at approximately 440 nm to 457 nm in cyclohexane
Identification	
A. Spectrometry	Maximum in cyclohexane at 440 nm to 457 nm and 470 nm to 486 nm
Purity	
Solvent residues	Acetone Methyl ethyl ketone Methanol Propan-2-ol Hexane Ethanol — Not more than 50 mg/kg, singly or in combination
	Dichloromethane — Not more than 10 mg/kg

▼M3

Lead	Not more than 5 mg/kg
2. **Algal carotenes**	
Synonyms	CI Food Orange 5
Definition	Mixed carotenes may also be produced from natural strains of the algae *Dunaliella salina*, grown in large saline lakes located in Whyalla, South Australia. Beta-carotene is extracted using an essential oil. The preparation is a 20 to 30 % suspension in edible oil. The ratio of trans-cis isomers is in the range of 50/50 to 71/29. The main colouring principle consists of carotenoids of which beta-carotene accounts for the major part. Alpha-carotene, lutein, zeaxanthin and beta-cryptoxanthin may be present. Besides the colour pigments, this substance may contain oils, fats and waxes naturally occurring in the source material.
Class	Carotenoid
Colour index No	75130
Chemical formula	Beta-carotene: $C_{40}H_{56}$
Molecular weight	Beta-carotene: 536,88
Assay	Content of carotenes (calculated as beta-carotene) is not less than 20 %. $E^{1\,\%}_{1\,cm}$ 2 500 at approximately 440 nm to 457 nm in cyclohexane
Identification	
A. Spectrometry	Maximum in cyclohexane at 440 nm to 457 nm and 474 nm to 486 nm
Purity	
Natural tocopherols in edible oil	Not more than 0,3 %
Lead	Not more than 5 mg/kg

([1]) Benzene not more than 0,05 % v/v.

E 160 a (ii) BETA-CAROTENE

1. **Beta-carotene**	
Synonyms	CI Food Orange 5
Definition	These specifications apply predominantly to all trans isomers of beta-carotene together with minor amounts of other carotenoids. Diluted and stabilised preparations may have different trans-cis isomer ratios.
Class	Carotenoid
Colour index No	40800
EINECS	230-636-6
Chemical names	Beta-carotene, beta,beta-carotene
Chemical formula	$C_{40}H_{56}$
Molecular weight	536,88
Assay	Not less than 96 % total colouring matters (expressed as beta-carotene) $E^{1\,\%}_{1\,cm}$ 2 500 at approximately 440 nm to 457 nm in cyclohexane
Description	Red to brownish-red crystals or crystalline powder
Identification	
A. Spectrometry	Maximum in cyclohexane at 453 to 456 nm

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Purity	
Sulfated ash	Not more than 0,2 %
Subsidiary colouring matters	Carotenoids other than beta-carotene: not more than 3,0 % of total colouring matters
Lead	Not more than 2 mg/kg
2. **Beta-carotene from *Blakeslea trispora***	
Synonyms	CI Food Orange 5
Definition	Obtained by a fermentation process using a mixed culture of the two sexual mating types (+) and (-) of natural strains of the fungus *Blakeslea trispora*. The beta-carotene is extracted from the biomass with ethyl acetate, or isobutyl acetate followed by isopropyl alcohol, and crystallised. The crystallised product consists mainly of trans beta-carotene. Because of the natural process, approximately 3 % of the product consists of mixed carotenoids, which is specific for the product.
Class	Carotenoid
Colour index No	40800
EINECS	230-636-6
Chemical names	Beta-carotene, beta,beta-carotene
Chemical formula	$C_{40}H_{56}$
Molecular weight	536,88
Assay	Not less than 96 % total colouring matters (expressed as beta-carotene) $E^{1\,\%}_{1\,cm}$ 2 500 at approximately 440 nm to 457 nm in cyclohexane
Description	Red, brownish-red or purple-violet crystals or crystalline powder (colour varies according to extraction solvent used and conditions of crystallisation)
Identification	
A. Spectrometry	Maximum in cyclohexane at 453 nm to 456 nm
Purity	
Solvent residues	Ethyl acetate, Ethanol: Not more than 0,8 %, singly or in combination Isobutyl acetate: Not more than 1,0 % Isopropyl alcohol: Not more than 0,1 %
Sulfated ash	Not more than 0,2 %
Subsidiary colouring matters	Carotenoids other than beta-carotene: not more than 3,0 % of total colouring matters
Lead	Not more than 2 mg/kg
Mycotoxins:	
Aflatoxin B1	Absent
Trichothecene (T2)	Absent
Ochratoxin	Absent
Zearalenone	Absent
Microbiology:	
Moulds	Not more than 100/g
Yeasts	Not more than 100/g
Salmonella	Absent in 25 g

▼M3

Escherichia coli	Absent in 5 g

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E 160b ANNATTO, BIXIN, NORBIXIN

Synonyms	CI Natural Orange 4	
Definition		
Class	Carotenoid	
Colour Index No	75120	
Einecs	Annatto: 215-735-4, annatto seed extract: 289-561-2; bixin: 230-248-7	
Chemical names	Bixin:	6′-Methylhydrogen-9′-cis-6,6′-diapocarotene-6,6′-dioate
		6′-Methylhydrogen-9′-trans-6,6′-diapocarotene-6,6′-dioate
	Norbixin:	9′Cis-6,6′-diapocarotene-6,6′-dioic acid
		9′-Trans-6,6′-diapocarotene-6,6′-dioic acid
Chemical formula	Bixin:	$C_{25}H_{30}O_4$
	Norbixin:	$C_{24}H_{28}O_4$
Molecular weight	Bixin:	394,51
	Norbixin:	380,48
Description	Reddish-brown powder, suspension or solution	
Identification		
Spectrometry	Bixin:	maximum in chloroform at ca 502 nm
	Norbixin:	maximum in dilute KOH solution at ca 482 nm
(i) *Solvent extracted bixin and norbixin*		
Definition	Bixin is prepared by the extraction of the outer coating of the seeds of the annatto tree (*Bixa orellana* L.) with one or more of the following solvents: acetone, methanol, hexane or dichloromethane, carbon dioxide followed by the removal of the solvent.	
	Norbixin is prepared by hydrolysis by aqueous alkali of the extracted bixin.	
	Bixin and norbixin may contain other materials extracted from the annatto seed.	
	The bixin powder contains several coloured components, the major single one being bixin, which may be present in both cis- and trans- forms. Thermal degradation products of bixin may also be present.	
	The norbixin powder contains the hydrolysis product of bixin, in the form of the sodium or potassium salts as the major colouring principle. Both cis- and trans-forms may be present.	
Assay	Content of bixin powders not less than 75 % total carotenoids calculated as bixin.	
	Content of norbixin powders not less than 25 % total carotenoids calculated as norbixin	
	Bixin:	$E^{1\,\%}_{1\,cm}$ 2 870 at ca 502 nm in chloroform
	Norbixin:	$E^{1\,\%}_{1\,cm}$ 2 870 at ca 482 nm in KOH solution

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Purity	
Solvent residues	Acetone, Methanol, Hexane: not more than 50 mg/kg, singly or in combination
	Dichloromethane: not more than 10 mg/kg
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg
(ii) *Alkali extracted annatto*	
Definition	Water soluble annatto is prepared by extraction with aqueous alkali (sodium or potassium hydroxide) of the outer coating of the seeds of the annatto tree (*Bixa orellana L.*)
	Water soluble annatto contains norbixin, the hydrolysis product of bixin, in the form of the sodium or potassium salts, as the major colouring principle. Both cis- and trans- forms may be present.
Assay	Contains not less than 0,1 % of total carotenoids expressed as norbixin
	Norbixin: $E^{1\,\%}_{1\,cm}$ 2 870 at ca 482 nm in KOH solution
Purity	
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg
(iii) *Oil extracted annatto*	
Definition	Annatto extracts in oil, as solution or suspension, are prepared by extraction of the outer coating of the seeds of the annatto tree (*Bixa orellana L.*) with edible vegetable oil. Annatto extract in oil contains several coloured components, the major single one being bixin, which may be present in both cis- and trans- forms. Thermal degradation products of bixin may also be present.
Assay	Contains not less than 0,1 % of total carotenoids expressed as bixin
	Bixin: $E^{1\,\%}_{1\,cm}$ 2 870 at ca 502 nm in chloroform
Purity	
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 160c PAPRIKA EXTRACT, CAPSANTHIN, CAPSORUBIN

Synonyms	Paprika Oleoresin

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Definition	Paprika extract is obtained by solvent extraction of the natural strains of paprika, which consists of the ground fruits pods, with or without seeds, of *Capsicum annuum L.*, and contains the major colouring principles of this spice. The major colouring principles are capsanthin and capsorubin. A wide variety of other coloured compounds is known to be present. Only the following solvents may be used in the extraction: methanol, ethanol, acetone, hexane, dichloromethane, ethyl acetate and carbon dioxide.
Class	Carotenoid
Einecs	Capsanthin: 207-364-1, capsorubin: 207-425-2
Chemical names	Capsanthin: (3R, 3′S, 5′R)-3,3′-dihydroxy-β,k-carotene-6-one Capsorubin: (3S, 3′S, 5R, 5R′)-3,3′-dihydroxy-k,k-carotene-6,6′-dione
Chemical formula	Capsanthin: $C_{40}H_{56}O_3$ Capsorubin: $C_{40}H_{56}O_4$
Molecular weight	Capsanthin: 584,85 Capsorubin: 600,85
Assay	Paprika extrakt: content not less than 7,0 % carotinoids Capsanthin/capsorubin: not less than 30 % of total carotenoids $E^{1\ \%}_{1\ cm}$ 2 100 at ca 462 nm in acetone
Description	Dark-red viscous liquid
Identification	
A. Spectrometry	Maximum in acetone at ca 462 nm
B. Colour reaction	A deep blue colour is produced by adding one drop of sulfuric acid to one drop of sample in 2—3 drops of chloroform
Purity	
Solvent residues	Ethyl acetate, Methanol, Ethanol, Acetone, Hexane: Not more than 50 mg/kg, singly or in combination Dichloromethan: not more than 10 mg/kg
Capsaicin	Not more than 250 mg/kg
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

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E 160d LYCOPENE

Synonyms	Natural Yellow 27
Definition	Lycopene is obtained by solvent extraction of the natural strains of red tomatoes (*Lycopersicon esculentum* L.) with subsequent removal of the solvent. Only the following solvents may be used: dichloromethane, carbon dioxide, ethyl acetate, acetone, propan-2-ol, methanol, ethanol, hexane. The major colouring principle of tomatoes is lycopene, minor amounts of other carotenoid pigments may be present. Beside the other colour pigments the product may contain oils, fats, waxes, and flavour components naturally occurring in tomatoes.
Class	Carotenoid
Colour Index No	75125
Chemical names	Lycopene, Lycopene, ψ,ψ-carotene
Chemical formula	$C_{40}H_{56}$
Molecular weight	536,85
Assay	$E^{1\ \%}_{1\ cm}$ 3 450 at ca 472 nm in hexane
	$E^{1\ \%}_{1\ cm}$ 3 450 at ca 472 nm in hexane
Description	Dark red viscous liquid
Identification	
Spectrometry	Maximum in hexane at ca 472 nm
Purity	
Solvent residues	Ethyl acetate, Methanol, Ethanol, Acetone, Hexane, Propan-2-ol: Not more than 50 mg/kg, singly or in combination Dichloromethane: not more than 10 mg/kg
Sulfated ash	Not more than 0,1 %
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 160e BETA-APO-8′-CAROTENAL (C30)

Synonyms	CI Food Orange 6
Definition	These specifications apply to predominantly all trans isomer of β-apo-8′-carotenal together with minor amounts of other carotenoids. Diluted and stabilized forms are prepared from β-apo-8′-carotenal meeting these specifications and include solutions or suspensions of ß-apo-8′carotenal in edible fats or oils, emulsions and water dispersible powders. These preparations may have different cis/trans isomer ratios.
Class	Carotinoid
Colour Index No	40820
Einecs	214-171-6

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Chemical names	β-Apo-8′-carotenal, Trans-β-apo-8′carotene-aldehyde
Chemical formula	$C_{30}H_{40}O$
Molecular weight	416,65
Assay	Not less than 96 % of total colouring matters
	$E^{1\ \%}_{1\ cm}$ 2 640 at 460—462 nm in cyclohexane
Description	Dark violet crystals with metallic lustre or crystalline powder
Identification	
Spectrometry	Maximum in cyclohexane at 460—462 nm
Purity	
Sulfated ash	Not more than 0,1 %
Subsidiary colouring matters	Carotenoids other than β-apo-8′-carotenal:
	not more than 3,0 % of total colouring matters
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 10 mg/kg

E 160f ETHYL ESTER OF BETA-APO-8′-CAROTENOIC ACID (C30)

Synonyms	CI Food Orange 7, β-apo-8′-carotenoic ester
Definition	These specifications apply to predominantly all trans isomer of β-apo-8′-carotenoic acid ethyl ester together with minor amounts of other carotenoids. Diluted and stabilized forms are prepared from β-apo-8′-carotenoic acid ethyl ester meeting these specifications and include solutions or suspensions of β-apo-8′-carotenoic acid ethyl ester in edible fats or oils, emulsions and water dispersible powders. These preparations may have different cis/trans isomer ratios.
Class	Carotinoid
Colour Index No	40825
Einecs	214-173-7
Chemical names	β-Apo-8′-carotenoic acid ethyl ester, ethyl 8′-apo-β-caroten-8′-oate
Chemical formula	$C_{32}H_{44}O_2$
Molecular weight	460,70
Assay	Not less than 96 % of total colouring matters
	$E^{1\ \%}_{1\ cm}$ 2 550 at ca 449 nm in cyclohexane
Description	Red to violet-red crystals or crystalline powder
Identification	
Spectrometry	Maximum in cyclohexane at ca 449 nm
Purity	
Sulfated ash	Not more than 0,1 %
Subsidiary colouring matters	Carotenoids other than β-apo-8′-carotenoic acid ethyl ester: not more than 3,0 % of total colouring matters
	Not more than 3,0 % der Farbstoffe insgesamt
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg

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Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 10 mg/kg

E 161b LUTEIN

Synonyms	Mixed Carotenoids, Xanthophylls
Definition	Lutein is obtained by solvent extraction of the natural strains of edible fruits and plants, grass, lucerne (alfalfa) *and tagetes erecta*. The main colouring principle consists of carotenoids of which lutein and its fatty acid esters account for the major part. Variable amounts of carotenes will also be present. Lutein may contain fats, oils and waxes naturally occurring in the plant material. Only the following solvents may be used for the extraction: methanol, ethanol, propan-2-ol, hexane, acetone, methyl ethyl ketone, dichloromethane and carbon dioxide
Class	Carotenoid
Einecs	204-840-0
Chemical names	3,3′-dihydroxy-d-carotene
Chemical formula	$C_{40}H_{56}O_2$
Molecular weight	568,88
Assay	Content of total colouring matter not less than 4 % calculated as lutein $E^{1\ \%}_{1\ cm}$ 2 550 at ca 445 nm in chloroform/ethanol (10 + 90) or in hexane/ethanol/acetone (80 + 10 + 10)
Description	Dark, yellowish brown liquid
Identification	
Spectrometry	Maximum in chloroform/ethanol (10 + 90) at ca 445 nm
Purity	
Solvent residues	Acetone, Methyl ethyl ketone, Methanol, Ethanol, Propan-2-ol, Hexane: Not more than 50 mg/kg, singly or in combination Dichloromethane: not more than 10 mg/kg
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 161g CANTHAXANTHIN

Synonyms	CI Food Orange 8
Definition	These specifications apply to predominantly all trans isomers of canthaxanthin together with minor amounts of other carotenoids. Diluted and stabilized forms are prepared from canthaxanthin meeting these specifications and include solutions or suspensions of

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	canthaxanthin in edible fats or oils, emulsions and water dispersible powders. These preparations may have different cis/trans isomer ratios.
Class	Carotinoid
Colour Index No	40850
Einecs	208-187-2
Chemical names	β-Carotene-4,4′-dione, canthaxanthin, 4,4′-dioxo-β-carotene
Chemical formula	$C_{40}H_{52}O_2$
Molecular weight	564,86
Assay	Not less than 96 % of total colouring matters (expressed as canthaxanthin)
	$E^{1\ \%}_{1\ cm}$ 2 200 at ca 485 nm in chloroform
	at 468—472 nm in cyclohexane
	at 464—467 nm in petroleum ether
Description	Deep violet crystals or crystalline powder
Identification	
Spectrometry	Maximum in chloroform at ca 485 nm
	Maximum in cyclohexane at 468—472 nm
	Maximum in petroleum ether at 464—467 nm
Purity	
Sulfated ash	Not more than 0,1 %
Subsidiary colouring matters	Carotenoids other than canthaxanthin: not more than 5,0 % of total colouring matters
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 162 BEETROOT RED, BETANIN

Synonyms	Beet Red
Definition	Beet red is obtained from the roots of natural strains of red beets (*Beta vulgaris* L. var. *rubra*) by pressing crushed beet as press juice or by aqueous extraction of shredded beet roots and subsequent enrichment in the active principle. The colour is composed of different pigments all belonging to the class betalaine. The main colouring principle consists of betacyanins (red) of which betanin accounts for 75—95 %. Minor amounts of betaxanthin (yellow) and degradation products of betalaines (light brown) may be present.
	Besides the colour pigments the juice or extract consists of sugars, salts, and/or proteins naturally occurring in red beets. The solution may be concentrated and some products may be refined in order to remove most of the sugars, salts and proteins.
Class	Betalaine
Einecs	231-628-5
Chemical names	(S-(R′,R′)-4-(2-(2-Carboxy-5(β-D-glucopyranosyloxy)-2,3-dihydro-6-hydroxy-1H-indol-1-yl)ethenyl)-2,3-dihydro-2,6-pyridine-dicarboxylic acid; 1-(2-(2,6-dicarboxy-1,2,3,4-tetrahydro-4-pyridylidene)ethylidene)-5-β-D-glucopyranosyloxy)-6-hydroxyindolium-2-carbox-

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	ylate
Chemical formula	Betanin: $C_{24}H_{26}N_2O_{13}$
Molecular weight	550,48
Assay	Content of red colour (expressed as betanine) is not less than 0,4 %
	$E^{1\ \%}_{1\ cm}$ 1 120 at ca 535 nm in aqueous solution at pH 5
Description	Red or dark red liquid, paste, powder or solid
Identification	
Spectrometry	Maximum in water of pH 5 at ca 535 nm
Purity	
Nitrate	Not more than 2 g nitrate anion/g of red colour (as calculated from assay).
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 163 ANTHOCYANINS

Definition	Anthocyanins are obtained by extraction with sulphited water, acidified water, carbon dioxide, methanol or ethanol from the natural strains of vegetables and edible fruits. Anthocyanins contain common components of the source material, namely anthocyanine, organic acids, tannins, sugars, minerals etc., but not necessarily in the same proportions as found in the source material.
Class	Anthocyanin
Einecs	208-438-6 (cyanidin); 205-125-6 (peonidin); 208-437-0 (delphinidin); 211-403-8 (malvidin); 205-127-7 (pelargonidin)
Chemical names	3,3′,4′,5,7-Pentahydroxy-flavylium chloride (cyanidin)
	3,4′,5,7-Tetrahydroxy-3′-methoxyflavylium chloride (peonidin)
	3,4′,5,7-Tetrahydroxy-3′,5′-dimethoxyflavylium chloride (malvidin)
	3,5,7-Trihydroxy-2-(3,4,5,trihydroxyphenyl)-1-benzopyrylium chloride (delphinidin)
	3,3′4′,5,7-Pentahydroxy-5′-methoxyflavylium chloride (petunidin)
	3,5,7-Trihydroxy-2-(4-hydroxyphenyl)-1-benzopyrilium chloride (pelargonidin)
Chemical formula	Cyanidin: $C_{15}H_{11}O_6Cl$
	Peonidin: $C_{16}H_{13}O_6Cl$
	Malvidin: $C_{17}H_{15}O_7Cl$
	Delphinidin: $C_{15}H_{11}O_7Cl$
	Petunidin: $C_{16}H_{13}O_7Cl$
	Pelargonidin: $C_{15}H_{11}O_5Cl$
Molecular weight	Cyanidin: 322,6
	Peonidin: 336,7
	Malvidin: 366,7
	Delphinidin: 340,6
	Petunidin: 352,7
	Pelargonidin: 306,7

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Assay	$E^{1\ \%}_{1\ cm}$ 300 for the pure pigment at 515-535 nm at pH 3,0
Description	Purplish-red liquid, powder or paste, having a slight characteristic odour
Identification	
Spectrometry	Maximum in methanol with 0,01 % conc. HCl Cyanidin: 535 nm Peonidin: 532 nm Malvidin: 542 nm Delphinidin: 546 nm Petunidin: 543 nm Pelargonidin: 530 nm
Purity	
Solvent residues	Methanol, Ethanol } Not more than 50 mg/kg, singly or in combination
Sulfur dioxide	Not more than 1 000 mg/kg per percent pigment
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 170 CALCIUM CARBONATE

Synonyms	CI Pigment White 18, Chalk
Definition	Calcium carbonate is the product obtained from ground limestone or by the precipitation of calcium ions with carbonate ions.
Class	Inorganic
Colour Index No	77220
Einecs	Calcium carbonate: 207-439-9 Limestone: 215-279-6
Chemical names	Calcium carbonate
Chemical formula	$CaCO_3$
Molecular weight	100,1
Assay	Content not less than 98 % on the anhydrous basis
Description	White crystalline or amorphous, odourless and tasteless powder
Identification	
Solubility	Practically insoluble in water and in alcohol. Dissolves with effervescence in diluted acetic acid, in diluted hydrochloric acid and in diluted nitric acid, and the resulting solutions, after boiling, give positive tests for calcium.
Purity	
Loss on drying	Not more than 2,0 % (200 ºC, 4 hours)
Acid-insoluble substances	Not more than 0,2 %
Magnesium and alkali salts	Not more than 1,5 %
Fluoride	Not more than 50 mg/kg

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Antimony (as Sb) Copper (as Cu) Chromium (as Cr) Zinc (as Zn) Barium (as Ba)	Not more than 100 mg/kg, singly or in combination
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Cadmium	Not more than 1 mg/kg

E 171 TITANIUM DIOXIDE

Synonyms	CI Pigment White 6
Definition	Titanium Dioxide consists essentially of pure anatase titanium dioxide which may be coated with small amounts of alumina and/or silica to improve the technological properties of the product.
Class	Inorganic
Colour Index No	77891
Einecs	236-675-5
Chemical names	Titanium dioxide
Chemical formula	TiO_2
Molecular weight	79,88
Assay	Content not less than 99 % on an alumina and silica-free basis
Description	Amorphous white powder
Identification	
Solubility	Insoluble in water and organic solvents. Dissolves slowly in hydrofluoric acid and in hot concentrated sulfuric acid.
Purity	
Loss on drying	Not more than 0,5 % (105 ºC, 3 hours)
Loss on ignition	Not more than 1,0 % on a volatile matter free basis (800 ºC)
Aluminium oxide and/or silicon dioxide	Total not more than 2,0 %
Matter soluble in 0,5N HCl	Not more than 0,5 % on an alumina and silica-free basis and, in addition, for products containing alumina and/or silica, not more than 1,5 % on the basis of the product as sold.
Water soluble matter	Not more than 0,5 %
Cadmium	Not more than 1 mg/kg
Antimony	Not more than 50 mg/kg by total dissolution
Arsenic	Not more than 3 mg/kg by total dissolution
Lead	Not more than 10 mg/kg by total dissolution
Mercury	Not more than 1 mg/kg by total dissolution
Zink	Not more than 50 mg/kg by total dissolution

E 172 IRON OXIDES AND IRON HYDROXIDES

Synonyms	Iron Oxide Yellow: CI Pigment Yellow 42 and 43 Iron Oxide Red: CI Pigment Red 101 and 102 Iron Oxide Black: CI Pigment Black 11

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Definition	Iron oxides and iron hydroxides are produced synthetically and consist essentially of anhydrous and/or hydrated iron oxides. The range of hues includes yellows, reds, browns and blacks. Food quality iron oxides are primarily distinguished from technical grades by the comparatively low levels of contamination by other metals. This si achieved by the selection and control of the source of the iron and/or by the extent of chemical purification during the manufacturing process.
Class	Inorganic
Colour Index No	Iron Oxide Yellow: 77492 Iron Oxide Red: 77491 Iron Oxide Black: 77499
Einecs	Iron Oxide Yellow: 257-098-5 Iron Oxide Red: 215-168-2 Iron Oxide Black: 235-442-5
Chemical names	Iron Oxide Yellow: hydrated ferric oxide, hydrated iron (III) oxide Iron Oxide Red: anhydrous ferric oxide, anhydrous iron (III) oxide Iron Oxide Black: ferroso ferric oxide, iron (II, III) oxide
Chemical formula	Iron Oxide Yellow: $FeO(OH).xH_2O$ Iron Oxide Red: Fe_2O_3 Iron Oxide Black: $FeO.Fe_2O_3$
Molecular weight	88,85: FeO(OH) 159,70: Fe_2O_3 231,55: $FeO.Fe_2O_3$
Assay	Yellow not less than 60 %, red and black not less than 68 % total iron, expressed as iron
Description	Powder; yellow, red, brown or black in hue
Identification	
Solubility	Insoluble in water and in organic solvents Soluble in concentrated mineral acids
Purity	
Water soluble matter	Not more than 1,0 %
Arsenic	Not more than 5 mg/kg
Barium	Not more than 50 mg/kg
Cadmium	Not more than 5 mg/kg
Chromium	Not more than 100 mg/kg
Copper	Not more than 50 mg/kg
Lead	Not more than 20 mg/kg
Mercury	Not more than 1 mg/kg
Nickel	Not more than 200 mg/kg
Zinc	Not more than 100 mg/kg

(By total dissolution)

E 173 ALUMINIUM

Synonyms	CI Pigment Metal, Al
Definition	Aluminium powder is composed of finely divided particles of aluminium. The grinding may or may not be carried out in the presence of edible vegetable oils

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	and/or food additive quality fatty acids. It is free from admixture with substances other than edible vegetable oils and/or food additive quality fatty acids.
Colour Index No	77000
Einecs	231-072-3
Chemical names	Aluminium
Chemical formula	Al
Atomic weight	26,98
Assay	Not less than 99 % calculated as Al on an oil-free basis
Description	A silvery-grey powder or tiny sheets
Identification	
Solubility	Insoluble in water and in organic solvents. Soluble in dilute hydrochloric acid. The resulting solution gives positive tests for aluminium.
Purity	
Loss on drying	Not more than 0,5 % (105 ºC, to constant weight)
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg

E 174 SILVER

Synonyms	Argentum, Ag
Class	Inorganic
Colour Index No	77820
Einecs	231-131-3
Chemical names	Silver
Chemical formula	Ag
Atomic weight	107,87
Assay	Content not less than 99,5 % Ag
Description	Silver-coloured powder or tiny sheets

E 175 GOLD

Synonyms	Pigment Metal 3, Aurum, Au
Class	Inorganic
Colour Index No	77480
Einecs	231-165-9
Chemical names	Gold
Chemical formula	Au
Atomic weight	197,0
Assay	Content not less than 90 % Au
Description	Gold-coloured powder or tiny sheets

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Purity		
Silver	Not more than 7 %	After complete dissolution
Copper	Not more than 4 %	

E 180 LITHOLRUBINE BK

Synonyms	CI Pigment Red 57, Rubinpigment, Carmine 6B
Definition	Lithol Rubine BK consists essentially of calcium 3-hydroxy-4-(4-methyl-2-sulfonatophenylazo)-2-naphthalenecarboxylate and subsidiary colouring matters together with water, calcium chloride and/or calcium sulfate as the principal uncoloured components.
Class	Monoazo
Colour Index No	15850:1
Einecs	226-109-5
Chemical names	Calcium 3-hydroxy-4-(4-methyl-2-sulfonatophenylazo)-2-naphthalene-carboxylate
Chemical formula	$C_{18}H_{12}CaN_2O_6S$
Molecular weight	424,45
Assay	Content not less than 90 % total colouring matters
	$E^{1\ \%}_{1\ cm}$ 200 at ca 442 nm in dimethylformamide
Description	Red powder
Identification	
Spectrometry	Maximum in dimethylformamide at ca 442 nm
Purity	
Subsidiary colouring matters	Not more than 0,5 %
Organic compounds other than colouring matters:	
2-Amino-5-methylbenzenesulfonic acid, calcium salt	Not more than 0,2 %
3-hydroxy-2-naphthalenecarboxylic acid, calcium salt	Not more than 0,4 %
Unsulfonated primary aromatic amines	Not more than 0,01 % (expressed as aniline)
Ether extractable matter	From a solution of pH 7, not more than 0,2 %
Arsenic	Not more than 3 mg/kg
Lead	Not more than 10 mg/kg
Mercury	Not more than 1 mg/kg
Cadmium	Not more than 1 mg/kg
Heavy metals (as Pb)	Not more than 40 mg/kg