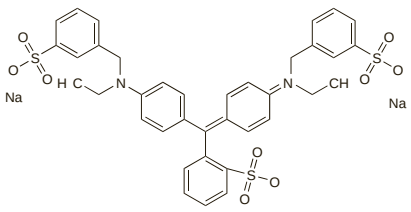
Profile
Bordeaux B was formerly used as a colouring agent for medicines and foods but has been replaced by other colours.

Brilliant Blue FCF

Azul brillante FCF; Blue EGS; CI Acid Blue 9; CI Food Blue 2; Colour Index No. 42090; E133; FD & C Blue No. 1; Patent Blue AC. Disodium 4′,4″-bis(*N*-ethyl-3-sulphonatobenzylamino)triphenylmethylium-2-sulphonate.

Бриллиантовый Голубой FCF; Синий Блестящий FCF

$C_{37}H_{34}N_2Na_2O_9S_3$ = 792.8.
CAS — 3844-45-9.



Profile
Brilliant blue FCF is used as a colouring agent in medicines, cosmetics, and foodstuffs. The parent compound, brilliant blue, is under investigation as a stain in ophthalmology.

Enteral feeds. Blue colourings such as brilliant blue FCF have been added to enteral feeds to aid the detection of pulmonary aspiration but such use has been associated with toxic effects. Blue discoloration of the skin, initially attributed to cyanosis, has been reported[1] in a child who received a large quantity of brilliant blue FCF as a colouring in an enteral feed. Abnormal systemic absorption of the dye has also been reported[2] in 2 critically ill patients, both of whom subsequently died. As of September 2003 the FDA was aware of 20 cases of blue discoloration of body fluids and skin associated with the use of blue dyes, including 12 fatalities.[3] Most cases occurred in patients with a history of sepsis, suggesting that altered intestinal permeability could be a factor.

1. Zillich AJ, *et al.* Skin discoloration with blue food colouring. *Ann Pharmacother* 2000; **34:** 868–70.
2. Lucarelli MR, *et al.* Toxicity of Food Drug and Cosmetic Blue No. 1 dye in critically ill patients. *Chest* 2004; **125:** 793–5.
3. Anonymous. Blue discoloration and death from FD&C Blue No. 1. *WHO Drug Inf* 2003; **17:** 239–40.

Brown FK

Chocolate Brown FK; CI Food Brown 1; E154; Marrón FK. A mixture of 6 azo dyes: sodium 2′,4′-diaminoazobenzene-4-sulphonate; sodium 2′,4′-diamino-5′-methylazobenzene-4-sulphonate; disodium 4,4′-(4,6-diamino-1,3-phenylenebisazo) dibenzenesulphonate; disodium 4,4′-(2,4-diamino-1,3-phenylenebisazo) dibenzenesulphonate; disodium 4,4′-(2,4-diamino-5-methyl-1,3-phenylenebisazo) dibenzenesulphonate; trisodium 4,4′,4″-(2,4-diaminobenzene-1,3,5-triazo)tribenzenesulphonate.

Коричневый FK
CAS — 8062-14-4.

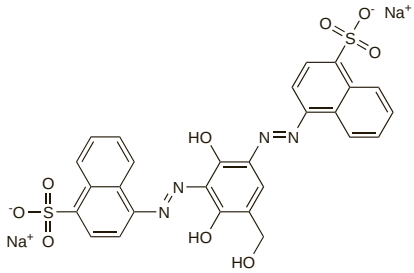
Profile
Brown FK is used as a colouring agent for foodstuffs.

Brown HT

Chocolate Brown HT; CI Food Brown 3; Colour Index No. 20285; E155; Marrón HT. Disodium 4,4′-(2,4-dihydroxy-5-hydroxymethyl-1,3-phenylenebisazo)di(naphthalene-1-sulphonate).

Коричневый HT

$C_{27}H_{18}N_4Na_2O_9S_2$ = 652.6.
CAS — 4553-89-3.



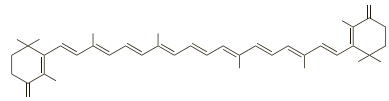
Profile
Brown HT is used as a colouring agent for drugs and foodstuffs.

Canthaxanthin

Cantaxantina; Canthaxantinum; CI Food Orange 8; Colour Index No. 40850; E161(g); Kantaksantiini; Kantaxantin. β,β-Carotene-4,4′-dione.

Кантаксантин

$C_{40}H_{52}O_2$ = 564.8.
CAS — 514-78-3.



Profile
Canthaxanthin is a carotenoid but unlike betacarotene or β-apo-8′-carotenal it has no vitamin A activity. It has selected uses as a food colouring and is given to salmon, trout, and poultry to colour their flesh, and to laying hens to colour the yolks of their eggs. It is also used to colour drugs and cosmetics.

Canthaxanthin has also been given orally to produce an artificial suntan, and as an adjunct to betacarotene in the management of erythropoietic protoporphyria (see Porphyrias under Haem Derivatives, p.1448). Such use has led to retinal deposits and in some cases to impairment of vision.

Adverse effects. Canthaxanthin has been associated with retinal changes involving accumulation of bright yellow particles around the macula ('gold speck' maculopathy), and alterations in eye function and visual deterioration have occurred.[1,2] Although these reports have related to oral use either for the production of an artificial tan by means of pigment deposition in the skin or for the medical treatment of erythropoietic protoporphyria, there has been concern about the use of canthaxanthin as a food colouring, and it was suggested that it should be restricted to use as a feed additive for farmed salmon and trout in order to produce a coloration of the fish flesh.[1] The results of long-term toxicity studies in *animals* have led to concern[2] about the potential for hepatotoxicity. However, subsequent studies failed to confirm hepatotoxicity in humans and it is now allowed as a food colouring,[3] although its uses are restricted in some countries.

There has also been a report of fatal aplastic anaemia in a patient who took canthaxanthin in order to produce an artificial tan.[4]

1. MAFF. Food advisory committee: final report on the review of the colouring matter in food regulations 1973. *FdAC/REP/4.* London: HMSO, 1987.
2. FAO/WHO. Evaluation of certain food additives and contaminants: thirty-fifth report of the joint FAO/WHO expert committee on food additives. *WHO Tech Rep Ser 789* 1990. Also available at: http://libdoc.who.int/trs/WHO_TRS_789.pdf (accessed 25/05/07)
3. FAO/WHO. Evaluation of certain food additives and contaminants: forty-fourth report of the joint FAO/WHO expert committee on food additives. *WHO Tech Rep Ser 859* 1995. Also available at: http://libdoc.who.int/trs/WHO_TRS_859.pdf (accessed 25/05/07)
4. Bluhm R, *et al.* Aplastic anemia associated with canthaxanthin ingested for 'tanning' purposes. *JAMA* 1990; **264:** 1141–2.

Preparations

Proprietary Preparations (details are given in Part 3)
Arg.: Bronzearte.

Multi-ingredient: ***Arg.:*** Bronsul; Sol Bronce Vital.

Caramel

Burnt Sugar; Caramelo; Sacch. Ust.; Saccharum Ustum.

Жжёный Сахар; Сахарный Колер
CAS — 8028-89-5.

Pharmacopoeias. In *USNF.*

USNF 26 (Caramel). A concentrated solution of the product obtained by heating sugar or glucose until the sweet taste is destroyed and a uniform dark brown mass results, a small amount of alkali or of alkaline carbonate or a trace of mineral acid being added while heating. It is a thick, dark brown liquid, having the characteristic odour of burnt sugar, and a pleasant bitter taste. One part dissolved in 1000 parts of water yields a clear solution having a distinct yellowish-orange colour. The colour of this solution is not changed and no precipitate is formed after exposure to sunlight for 6 hours. When spread as a thin layer on a glass plate, it appears homogeneous, reddish-brown, and transparent. Miscible with water; immiscible with ether, with chloroform, with acetone, with petroleum spirit, and with benzene; soluble in dilute alcohol up to 55%. Store in airtight containers.

Profile
Caramels are used in foods, drugs, and cosmetics to produce pale yellow to dark brown colours. They have no calorific value. They are complex mixtures of compounds prepared by heating carbohydrates (food-grade sweeteners consisting of glucose, fructose, or polymers of these) either alone or in the presence of acids or alkalis (food-grade citric or sulfuric acids or calcium, potassium, or sodium hydroxides, or mixtures of these). The caramels can be classified according to the reactants used in the manufacturing process:

Class I (E150a, plain caramel, spirit caramel, or caustic caramel); no ammonium or sulfite compounds are used.

Class II (E150b or caustic sulfite caramel); sulfite compounds used but not ammonium compounds.

Class III (E150c, ammonia caramel, or beer caramel); ammonium compounds used but not sulfite compounds

Class IV (E150d, sulfite ammonia caramel, or soft-drink caramel); both ammonium and sulfite compounds used.

Some caramels also have flavouring properties.

Carbazole Violet

Colour Index No. 51319; Pigment Violet 23. 8,18-Dichloro-5,15-diethyl-5,15-dihydrodiindolo(3,2-*b*:3′,2′-*m*)triphenodioxazine.

Фиолетовый Карбазол

$C_{34}H_{22}Cl_2N_4O_2$ = 589.5.
CAS — 6358-30-1.

Profile
Carbazole violet is a colouring agent used in cosmetics and contact lenses.

Carmine

Carmín; CI Natural Red 4; Cochineal Carmine; Colour Index No. 75470; E120.

Кармин
CAS — 1390-65-4.

Profile
Carmine is an aluminium lake of the colouring matter of cochineal (p.1471). It contains carminic acid, an anthraquinone glycoside. Unless precautions are taken during manufacture and transport to prevent contamination, carmine may be infected with salmonella micro-organisms.

Carmine and some of its salts are used as colouring agents in medicines, foodstuffs, and cosmetics.

Carmine passes through the gastrointestinal tract unchanged and has been used as a faecal 'marker'.

Hypersensitivity. By February 2004 the FDA was aware of 35 cases of hypersensitivity to carmine, carminic acid, or cochineal extract published in the scientific and medical literature and/or reported directly to the FDA. Hypersensitivity reactions to carmine, carminic acid, or cochineal extract included contact dermatitis (4 cases), urticaria/angioedema (9), occupational asthma (10), and systemic anaphylaxis (12). In more than half of these reports, there was evidence of an IgE-mediated diagnostic response. The adverse effects included allergic reactions to foods containing carmine and cochineal extract, occupational asthma from exposure to carmine, and allergic reactions to topically applied cosmetics containing carmine.

The FDA concluded that carmine and cochineal extract may cause potentially severe allergic responses and proposed that food and cosmetic labelling be enhanced; a declaration of inactive ingredients in drugs was already in force.[1]

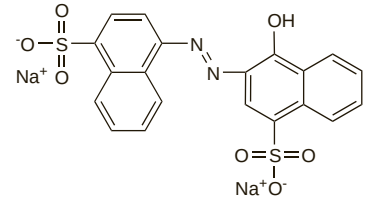
1. *Fed Regist* 2006; **71:** 4839–51. Available at: http://www.cfsan.fda.gov/~lrd/fr060130.html (accessed 16/11/06)

Carmoisine

Azorrubina; Azorubine; Carmoisina; CI Food Red 3; Colour Index No. 14720; E122. It consists mainly of disodium 4-hydroxy-3-(4-sulphonato-1-naphthylazo)naphthalene-1-sulphonate.

Кармуазин

$C_{20}H_{12}N_2Na_2O_7S_2$ = 502.4.
CAS — 3567-69-9.



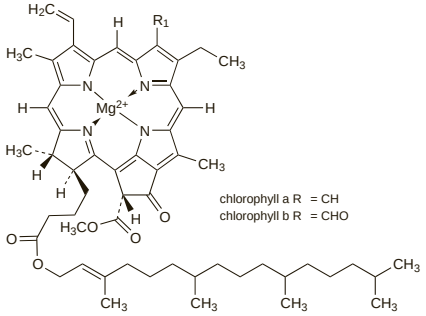
Profile
Carmoisine is used as a colouring agent in foods, medicines, and cosmetics. It has also been investigated clinically as a stain, to aid visualisation of malignant neoplasms of the skin during surgery.

Chlorophyll

CI Natural Green 3; Clorofila; Colour Index No. 75810; E140 (chlorophylls or chlorophyllins).

Хлорофилл

CAS — 479-61-8 (chlorophyll a); 519-62-0 (chlorophyll b).



Chlorophyllin Copper Complex Sodium

Clorofilina cúprica, complejo sódico de.

Медного Комплекса Хлорофиллина Натриевая Соль

Pharmacopoeias. In *US.*

USP 31 (Chlorophyllin Copper Complex Sodium). It contains sodium salts of copper-chelated chlorophyll derivatives, but no artificial colouring. Store in airtight containers. Protect from light.

Profile

Chlorophyll is a green photosynthetic pigment found in plants, algae, and cyanobacteria (blue-green algae). There are four closely related forms of chlorophyll. Chlorophyll a ($C_{55}H_{72}MgN_4O_5$ = 893.5) and chlorophyll b ($C_{55}H_{70}MgN_4O_6$ = 907.5) are found in plants and some types of algae; chlorophyll c, further subdivided into chlorophyll c1 ($C_{35}H_{30}MgN_4O_5$ = 610.9) and chlorophyll c2 ($C_{35}H_{28}MgN_4O_5$ = 608.9), is found in some types of algae; and chlorophyll d ($C_{54}H_{70}MgN_4O_6$ = 895.5) is found in some types of algae and in cyanobacteria.

Oil-soluble chlorophyll derivatives. Replacement of the magnesium atom in the chlorophylls by 2 hydrogen atoms using dilute mineral acids produces olive-green water-insoluble phaeophytins. Copper phaeophytins (sometimes called copper chlorophyll complex; E141) can be formed; these are more stable to acids and to light than the chlorophylls.

Water-soluble chlorophyll derivatives. When the chlorophylls are hydrolysed with alkali, phytyl alcohol and methyl alcohol are split off and green water-soluble chlorophyllins are formed as the potassium or sodium salts. Similar water-soluble compounds can be prepared in which the magnesium is replaced by copper to give copper chlorophyllin complex (E141).

Chlorophylls and chlorophyllins, as well as the copper complexes of these compounds, are used mainly as colouring agents, in foods, medicines, and cosmetics.

Chlorophyll is used clinically, as an external application in the treatment of wounds and ulcers, and as a mouthwash. There is no clear evidence that it accelerates healing but it is considered to have a deodorant action. Chlorophyllin and copper chlorophyllin complex are used similarly. Chlorophyll is also used as a dietary supplement.

Preparations

Proprietary Preparations (details are given in Part 3)

USA: Chloresium; Derifil; Pals.

Multi-ingredient: ***Arg.:*** Fanaletas; Notoxin; Palan†; ***Braz.:*** Broncopinol†; Emoform Clorofila; Eucaliptan†; Mentozil†; Salimetin†; ***Ger.:*** Chlorophyl liquid "Schuh"†; Chlorophyllin Salbe "Schuh"†; Ginseng-Complex "Schuh"†; Stomasal Med†; ***Hong Kong:*** Epilon; ***Indon.:*** Methaphyllin; ***Spain:*** Odontocromil c Sulfamida†; Vitavox Pastillas†; ***Thai.:*** Sanaco†; ***UK:*** Chlorophyll; ***USA:*** AllanEnzyme; AllanfillEnzyme; Fresh-N-Free; Gladase-C; Panafil; Prophyllin; Wound Cleanser; Ziox.

CI Solvent Yellow 18

CI Food Yellow 12; Colour Index No. 12740. 4-[(2,4-Dimethylphenyl)azo]-2,4-dihydro-5-methyl-2-phenyl-3*H*-pyrazol-3-one.

$C_{18}H_{18}N_4O$ = 306.4.

CAS — 6407-78-9.

Profile

CI Solvent Yellow 18 is a colouring agent used in contact lenses.

CI Vat Orange 1

Colour Index No. 59105. Dibromo-dibenzo (b,def) chrysene-7,14-dione.

CI Кубовый Оранжевый 1

$C_{24}H_{10}Br_2O_2$ = 490.1.

CAS — 1324-11-4.

Profile

CI Vat Orange 1 is a colouring agent used in contact lenses.

Citranaxanthin

Citranaxantina; Elbli.

$C_{33}H_{44}O$ = 456.7.

CAS — 3604-90-8.

Profile

Citranaxanthin is a colouring agent used in animal feeds, to colour the fat of poultry and the egg-yolks of laying hens. It has vitamin A activity.

Citrus Red 2

CI Solvent Red 80; Colour Index No. 12156. 1-(2,5-Dimethoxyphenylazo)-2-naphthol.

Цитрусовый Красный 2

$C_{18}H_{16}N_2O_3$ = 308.3.

CAS — 6358-53-8.

Profile

Citrus Red 2 is a colouring agent used in foods.

Cochineal

CI Natural Red 4; Coccionella; Coccus; Coccus Cacti; Cochinilla; Colour Index No. 75470; E120.

Кошениль

CAS — 1343-78-8.

Pharmacopoeias. In *Br.*

BP 2008 (Cochineal). The dried female insect, *Dactylopius coccus* containing eggs and larvae. It has a characteristic odour. It complies with a test for contamination with *Escherichia coli* and salmonellae.

Profile

Cochineal, which is a source of carmine, is used as a red colouring agent in food, medicines, and cosmetics.

There have been reports of sensitivity reactions including anaphylaxis, after use of products containing cochineal (see Hypersensitivity in Carmine, p.1470).

Homoeopathy. Cochineal has been used in homoeopathic medicines under the following names: Coccus cacti; Dactylopius coccus; Coc. c.

Curcumin

Colour Index No. 75300; Curcumina; E100; Kurkum; Kurkumina; Turmeric Yellow. 1,7-Bis(4-hydroxy-3-methoxyphenyl)hepta-1,6-diene-3,5-dione.

Куркумин

$C_{21}H_{20}O_6$ = 368.4.

CAS — 458-37-7.

Profile

Curcumin is the main colouring component of turmeric (p.1473). It is used as a colouring agent for drugs, foodstuffs, and cosmetics. It is also thought to be responsible for many of the pharmacological properties for which turmeric is under investigation (see p.1473).

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: ***India:*** Well-Beeing†; ***Ital.:*** Depatox.

Eosin

CI Acid Red 87; Colour Index No. 45380; D & C Red No. 22; Eosin Y; Eosina; Éosine Disodique. The disodium salt of 2′,4′,5′,7′-tetrabromofluorescein .

Эозин

$C_{20}H_6Br_4Na_2O_5$ = 691.9.

CAS — 548-26-5; 17372-87-1.

ATC — D08AX02.

ATC Vet — QD08AX02.

Pharmacopoeias. In *Fr.*

Profile

Eosin has been incorporated in solution-tablets to give a distinctive colour to solutions prepared from them. It is also used in cosmetics.

Eosin has been used as a topical antiseptic in nappy rash, burns and other skin conditions, although other drugs are usually preferred.

Adverse effects. Contact dermatitis to eosin was seen relatively frequently between the 1920s and 1940s when it was a common colour in lipsticks. Fewer reports of hypersensitivity have occurred since then: changing fashions in cosmetic colours have reduced use of eosin and, if used, a purer grade and lower concentrations are now usually employed. However, cases of dermatitis after topical application of antiseptic preparations containing eosin were noted in the 1980s and 1990s. One report[1] suggested that an impurity might be responsible but another[2] implicated eosin itself after patch tests were performed with various products and pure tetrabromofluorescein.

1. Tomb RR. Allergic contact dermatitis from eosin. *Contact Dermatitis* 1991; **24:** 27–9.
2. Koch P, *et al.* Allergic contact dermatitis from purified eosin. *Contact Dermatitis* 1995; **32:** 92–5.

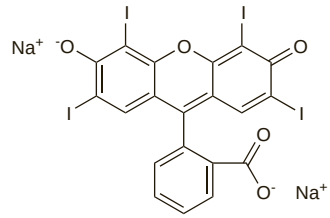
Erythrosine

CI Food Red 14; Colour Index No. 45430; E127; Eritrosin BS; Eritrosina; Erythrosine BS; Erythrosine Sodium; FD & C Red No. 3. The monohydrate of the disodium salt of 2′,4′,5′,7′-tetraiodofluorescein .

Эритрозин

$C_{20}H_6I_4Na_2O_5,H_2O$ = 897.9.

CAS — 568-63-8 (anhydrous erythrosine sodium); 16423-68-0 (anhydrous erythrosine sodium); 49746-10-3 (erythrosine sodium monohydrate).



(anhydrous erythrosine sodium)

Profile

Erythrosine is used as a colouring agent for medicines, foods, and cosmetics. It is also used as a disclosing agent for plaque on teeth.

◊ Although early *animal* studies had indicated that erythrosine might have an adverse effect on the thyroid gland, a review[1] of the evidence and later studies, suggested that erythrosine was not genotoxic or mutagenic and was suitable for use as a food colour. Similarly, no evidence was found to support restricting its use in pharmaceutical products.[2]

1. MAFF. Food advisory committee: final report on the review of the colouring matter in food regulations 1973. *FdAC/REP/4.* London: HMSO, 1987.
2. European Commission. Opinion on toxicological data on colouring agents for medicinal products: erythrosin, adopted by the Scientific Committee on Medicinal Products and Medical Devices on 21 October 1998. Available at: http://ec.europa.eu/health/ph_risk/committees/scmp/docshtml/scmp_out08_en.htm (accessed 04/07/08)

Preparations

Proprietary Preparations (details are given in Part 3)

Arg.: Revelplac; ***Austral.:*** Disclo-Gel; Disclo-Tabs; ***UK:*** Ceplac.

Multi-ingredient: ***Arg.:*** Revelplac 2001.

Ferric Oxide

Demir Oksitler; E172 (iron oxides or hydroxides); Hierro, óxido de.

Оксид Железа

CAS — 51274-00-1; 1309-37-1.

Pharmacopoeias. *Chin.* includes red, black, brown, purple, and yellow ferric oxide. *It.* includes both red and yellow ferric oxide. *USNF* allows the basic colours of red or yellow ferric oxide or mixtures of these.

USNF 26 (Ferric Oxide). A powder exhibiting two basic colours (red and yellow), or other shades produced on blending the basic colours. Insoluble in water and in organic solvents; dissolves in hydrochloric acid upon warming, a small amount of insoluble residue usually remaining.

Profile

Ferric oxide is used for colouring medicines, contact lenses, cosmetics, and foodstuffs.

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: ***Port.:*** Filter Oil Free†.