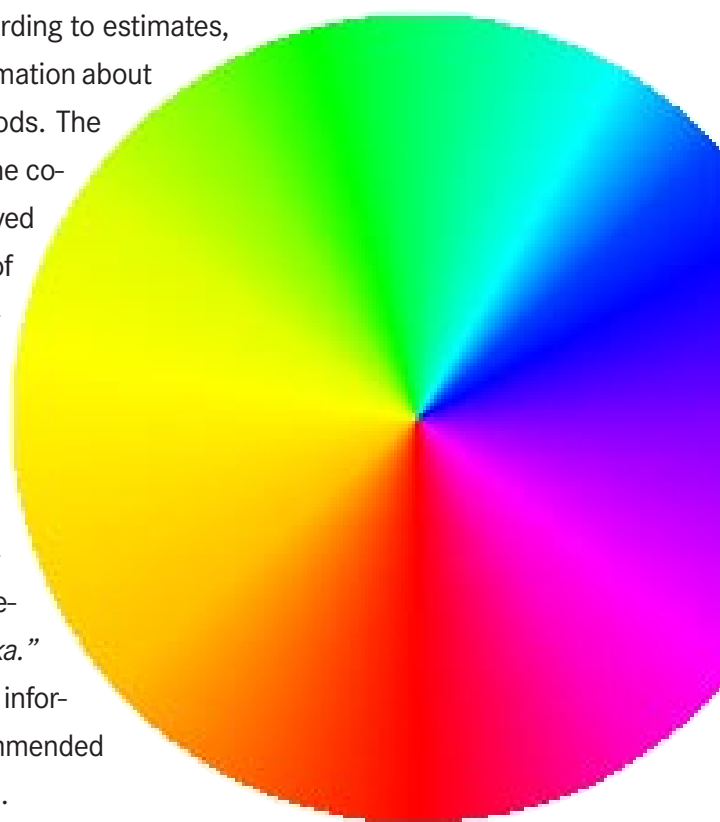


**DRAGOCOLOR<sup>®</sup>**  
**DICTIONARY OF COLORS**  
**2008**

## PREFACE

Human beings have always been fascinated by colors. Besides making life more vivid and pleasant, colors influence our lives far more than we realize. According to estimates, some 40% of all information that humans process is information about color. Colors act on our senses and influence our moods. The color red, for instance, stimulates our bodies, whereas the color green has more of a calming influence. Color is perceived when light of a specific wavelength or combination of wavelengths strikes the retina. Dyes are chemical compounds that have the ability to add color to other materials. This dictionary provides users with a reference work that defines the basic terminology used in the wide range of issues surrounding color. Symrise dyes are primarily used for coloring foods, medications and cosmetics. Please refer to “Coloring of Food, Drugs and Cosmetics” (*“Färbung von Lebensmitteln, Arzneimitteln, Kosmetika.”* Behr’s Verlag, Hamburg) by Gisbert Otterstätter for more information on basic regulatory principles, safety issues, recommended concentrations, international approval requirements, etc.



Bernd Schröder/Gisbert Otterstätter  
Holzminden, Mai 2008

## ABBREVIATIONS

The key word of each text is abbreviated with its initial letter.

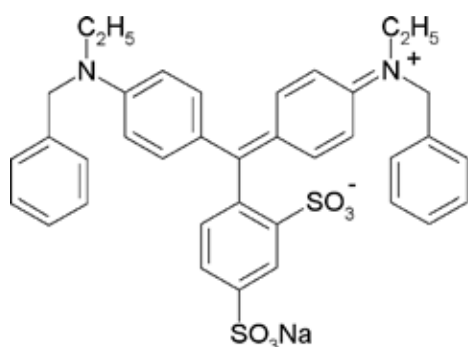
→	See also
<b>Abb.</b>	Abbreviation
<b>App.</b>	Application
<b>C.I.</b>	Colour Index
<b>CAF</b>	Cosmetic application field
<b>Dir.</b>	Directive
<b>E</b>	E-Number
<b>EC</b>	European Community
<b>EU</b>	European Union
<b>ECJ</b>	European Court of Justice
<b>F.-s.</b>	Fat-soluble
<b>O.-s.</b>	Oil-soluble
<b>Ord.</b>	Ordinance
<b>Pigm.</b>	Pigment(s)
<b>Prod.</b>	Product(s)
<b>W.-s.</b>	Water-soluble
<b>VO</b>	<i>Verordnung</i>
<b>Wdisp.</b>	Water-dispersible
<b>CAS</b>	Chemical Abstracts System
<b>CFR</b>	Code of Federal Regulation (USA)
<b>ZZuIV</b>	<i>Zusatzstoff-Zulassungs-Verordnung</i>
<b>CAS</b>	Chemical Abstracts System
<b>CFR</b>	Code of Federal Regulations (USA)
<b>EINECS</b>	European Inventory of Existing Commercial Chemical Substances
<b>FCC</b>	Food Chemical Codex
<b>FDA</b>	Food and Drug Administration

## ABSORPTION

in **optics**, the acceptance or weakening (→ extinction) of light striking an object. If the → light of only certain wavelengths is absorbed (selective absorption), such as the green part, then an observer will perceive the → complementary color red. If all of the light is absorbed, the object appears black, and if all of the light is reflected, it appears white. In **physical chemistry**, A. is considered to be the acceptance of a substance into the interior of another material, such as the intake of a gas into a gas mask filter.

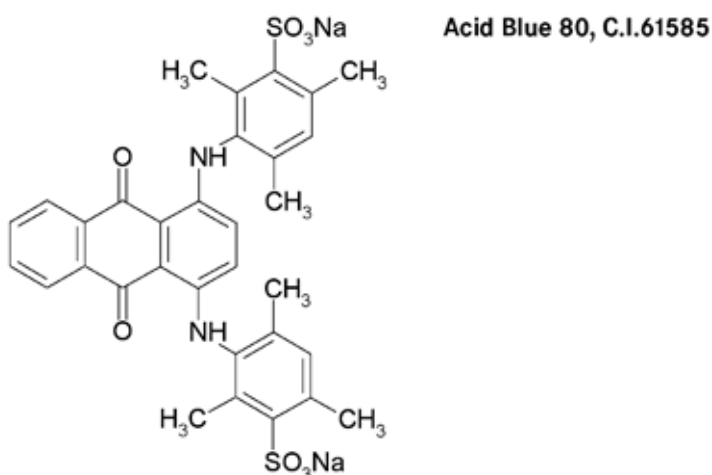
## ACID BLUE 7

(C.I.42080, 656840), blue w.-s. → triarylmethane dye. **App.:** CAF 4, e.g. shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.



## ACID BLUE 80

(C.I.61585, 656839), ) blue w.-s. → anthraquinone dye. **App.:** CAF 4, e.g. body soap, syndet soaps, shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, liquid detergent, and fabric softener.

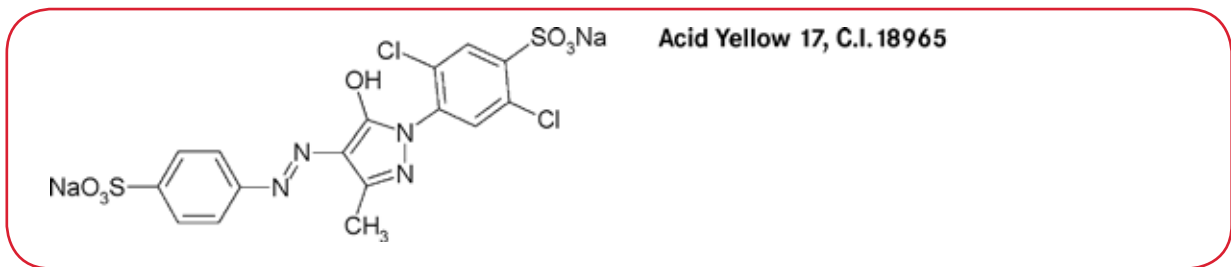


## ACID DYES

a term used to describe soluble dyes which contain anionic molecule groups, regardless of their category. Usually the sulfonic acid or carboxyl group in → food dyes and → cosmetic dyes.

## ACID YELLOW 17

(C.I. 18965, 656588: yellow w.-s. → azo dye. **App.:** CAF 1, e.g. shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, alcohol-based perfumes.



## ADI-LEVEL

(acceptable daily intake), the tolerable amount of a → food additive, including → food coloring, that can be consumed daily in the course of a lifetime without causing a health threat. Indicated in mg/ kg body weight. The value is determined in animal tests to establish the highest safe dose which does not yield any negative effects on health, even when consumed throughout the animal's lifetime (no-adverse-effect level). 1% of this safe dose is declared the A. Since these animal-based calculations are reduced to one-hundredth of the original value, the figures can safely be applied to humans, and therefore there is tolerance enough to account for differing eating habits or poor nutrition as well.

## ADSORPTION

the collection of a substance on the surface of another substance, such as in → chromatography.

## ALCOHOLIC PRODUCTS

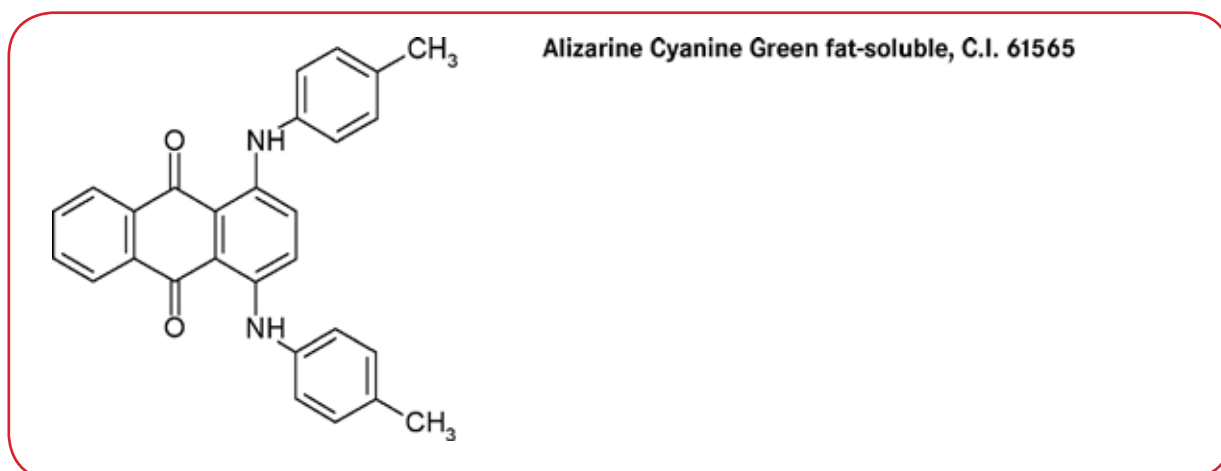
**1) Food.** Beer is colored with → caramel 103603, spirits with → carmine 656825, caramel 103603, or artificial dyes (→ Quinoline Yellow 100290 or → Tartrazine 100296 for yellow, → Ponceau 4R 100300 or → Allura Red 100304 for red, → Patent Blue V 100294 or → Brilliant Blue FCF 656601 for blue).

**2) Alcoholic (alcohol-based) perfumery prod.** The color of alcohol-based perfumery prod. is usually determined by the intrinsic colors of the components of the perfume oil. The current tendency is to use w.-s. cosmetic dyes either to reinforce the natural color of the ingredients, to cover it, or to recolor it as desired. The amount of the dye has no real effect on the cost and quantity (for example, 20 g of dye per ton of finished product results in dyeing costs of 2 DM/t if the dye costs 100 DM/kg). There can be significant problems with colorfastness. The combined effects of light and of the components of the formula (and, in some cases, of heat) often lead to discoloration or decolorization of the product. In 1993/94, SYMRISE Holzmindens' colorant development division performed and documented extensive tests. Among other things, it was established that the quality of the water and alcohol used strongly affected the colorfastness; not only can → UV absorbers improve the → lightfastness, but they also have the potential to make it worse. Therefore, the use of a UV absorber must be considered on an individual basis.

The following are generally well suited for coloring alcohol-based perfumery products (dyes marked with \* are FDA-certified and can be used in the US as well): → Fast Yellow 656800, → Quinoline Yellow 100290 or → D&C Yellow No. 10 656804\*; → Patent Blue V 100294, → Brilliant Blue FCF 656601, or → FD&C Blue No. 1 100301\*. The following are suitable with some restrictions: → Tartrazine 100296 and → FD&C Yellow No. 5 656802\*, → Orange Yellow S 100291 and → FD&C Yellow No. 6 656803\*, → Allura Red AC 100304 and → FD&C Red No. 40 100295\* and → D&C Red No. 33 656855\*. This selection of dyes permits yellow, blue, and green (green = blue + yellow) colors to be created, usually with good lightfastness. Red, violet (= blue + red), and brown (= yellow + blue + red or orange) colors are not as lightfast. Dosage: approximately 5 - 20 g/t of finished product. In spite of the guidelines given here, manufacturers will have to perform tests on the products. A modification of the perfume oil after the tests are completed means that all of the tests must be repeated.

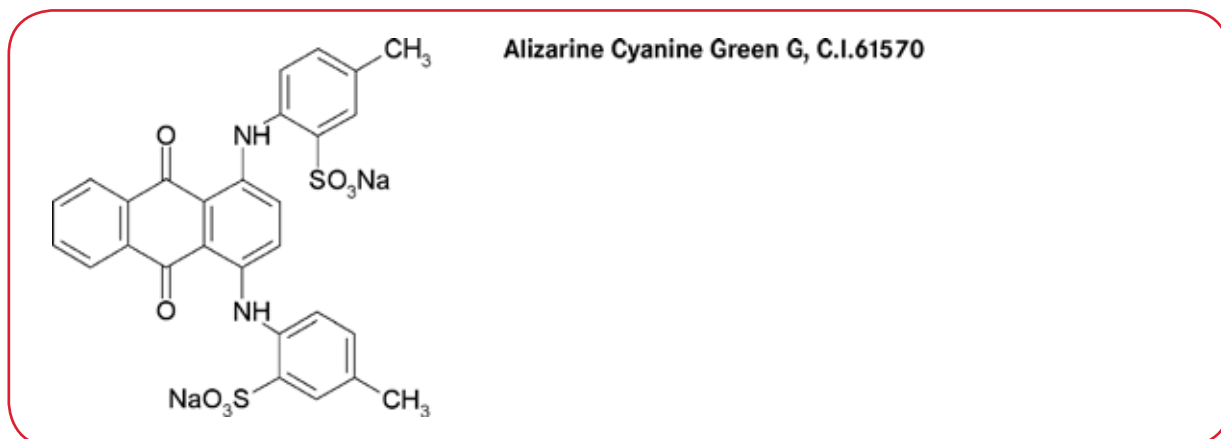
### ALIZARINE CYANINE GREEN F-S.

(C.I.61565, 656871) blue-green o.-s. → anthraquinone dye. **App.:** CAF 1, oil prod.



### ALIZARINE CYANINE GREEN W-S., D&C GREEN NO. 5

(C.I.61570, 656555 u. 656848 D&C) blue-green w.-s. → anthraquinone dye. **App.:** CAF 1, e.g. mouthwash, body soap, syndet soap, shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, fabric softener.

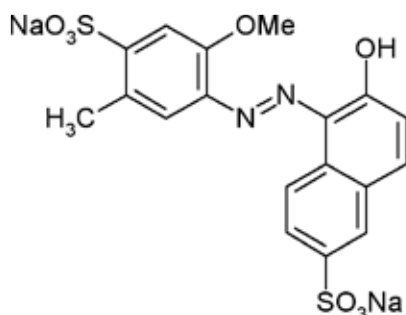


## ALLERGY

the most important food allergens are found in eggs, cow's milk, fish, nuts, soy, celery, and some fruits. However, food allergies occur much less frequently than is commonly assumed. → Food additives, including → food colorings, do not usually have as strong an effect. Occasionally, there are reports of intolerance reactions (known as "pseudo-allergies" because the medical mechanism that triggers the reaction is different than the one which occurs in real allergies) to individual additives or groups of additives. These include benzoate and PHB ester (E 210 - E 219), **certain → azo dyes (E 102, 110, 122, 123, 124, 129, 151)**, and antioxidants (E 320, E 321). Only about 10% of suspected cases of additive intolerance have been confirmed in methodical challenge tests. Since all additives are declared on the lists printed on food packaging, those who are sensitive to them can avoid contact with foods which contain these substances. **There are only a very few documented reports of allergies or pseudo-allergic reactions that result from external contact with cosmetic dyes.**

## ALLURA RED AC, FD&C RED NO. 40

(E 129, C.I.16035, 100304 bzw. 100295 FD&C), red w.-s. → azo dye. **App.:** such products as sweets, desserts, and beverages. → Maximum limits must be observed in the EU. Corresponds to the color → Ponceau 4R. CAF 1, e.g. mouthwash, alcohol-based perfumes, shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.



Allura Rot AC, FD&C Red No. 40, C.I.16035 (E 129)

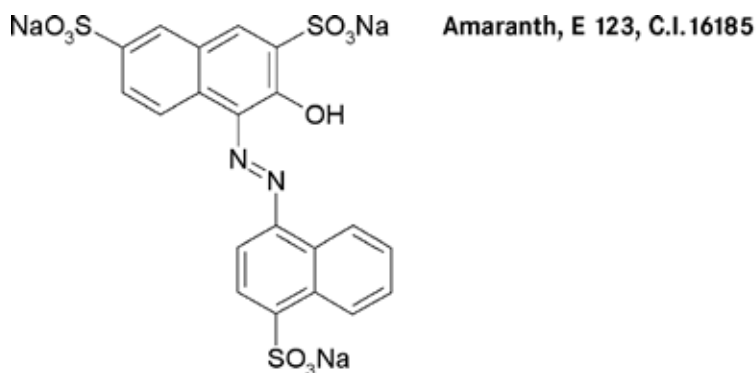
## ALUMINUM

(E 173, C.I. 77000, not in the DRAGOCOLOR® product range) silver-gray inorganic → pigm. **App.:** surface coloration of coated tablets, decoration, creating shiny effects. Seldom used. CAF 1; use not known.

## ALUMINUM LAKES → lakes

## AMARANTH, NAPHTHOL RED S

(E 123, C.I. 16185, 100292) red w.-s. → azo dye. **App.:** → maximum limits only permitted in the EU for use in spirits and fish roe. CAF 1, e.g. mouthwash, alcohol-based perfumery, shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.



**AMIDO BLUE AE** → Brilliant Blue FCF

**AMIDO BLUE VF** → Patent Blue VF

### AMINES, AROMATIC

aromatic compounds which contain nitrogen and yield the azo bridge (-N=N-) found in → azo dyes when reductive cleavage occurs. The DRAGOCOLOR® product range of colorants for food, drugs, cosmetics, and technical prod. contains **no** → azo dyes that could be cleaved into one or more azo groups to form any of the toxic amines listed in the amendments to the German law on food and objects of everyday use (LMBG) (1994 and 1997) (4-aminobiphenyl, benzidine, 4-chloro-o-toluidine, 2-naphthylamine, o-aminoazotoluene, 2-amino-4-nitrotoluol, p-chloraniline, 2,4-diaminoanisole, 4,4'-diaminodiphenylmethane, 3,3'-dichlorobenzidine, 3,3'-dimethoxybenzidine, 3,3'-dimethylbenzidine, 4,4'-diamino-3,3'-dimethyldiphenyl methane, p-kresidine, 4,4'-methylene-bis-(2-chloroaniline), 4,4'-oxydianiline, 4,4'-thiodianiline, o-toluidine, 2,4-toluylendiamine, 2,4,5-trimethylaniline). **Analytical analyses have not been performed because these amines cannot be formed due to the chemical structure of DRAGOCOLOR® colorants.**

### ANALYTICAL CHEMISTRY

in the analytical chemistry of → colorants, a distinction is made between a) analyzing the colorant itself and isolating the colorant from the dyed finished product (food, drugs, cosmetics, etc.) and b) the analysis that follows this process. The isolation of a dye usually occurs via → adsorption of the dye via a suitable adsorbent (→ polyamide method), after which desorption and → identification are performed. Isolation can also be carried out via extraction or distillation. A comparatively low number of dyes can be identified in a food or drug. In general, the pure dyes are available as control materials; therefore, simple chromatographical methods are adequate for identifying dyes, even if they are present in mixtures (paper or thin-layer chromatography → chromatography). In individual dyes, there is also a means of comparison using color reactions with acids and lyes, or with the solubility of the dye in concentrated sulfuric acid and the change in color after dilution in water. → Lakes and → pigm. cannot be isolated from the colored product by means of adsorption. Fats or other components of the product must be separated and the existing pigm. isolated as residues. Quantitative determination of dyes can be performed effectively with → spectroscopy.

## ANATASE

a crystal modification of → titanium dioxide. DRAGOCOLOR® titanium dioxide 656838 exists in the A. modification.

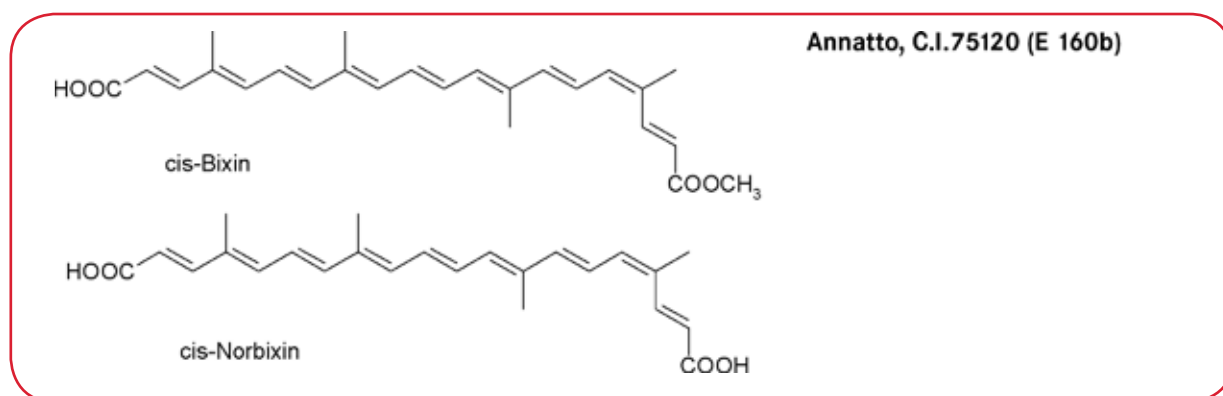
**ANILINE COLORS** → coal-tar colors

## ANIMAL TESTING

All of the DRAGOCOLOR® colorants for food, drugs, cosmetics, and technical prod. were **not** tested on animals, either by SYMRISE or by the research institutes it works with. However, all colorants for food, drugs, and cosmetics were tested on animals at one time, either by the Colorant Commission of the Deutsche Forschungsgemeinschaft (German Research Society), the Scientific Commission of the EC, other international organizations, or the companies that perform synthesis. It is only with positive results of these tests that legal permission is granted for a dye to be used in food or cosmetics. A summary of the biological-toxicological studies of food dyes and cosmetic colorants of the EU was published in “*Kosmetische Färbemittel/ Farbstoffkommission der DFG*”. (3rd fully revised edition, Weinheim: VCH, 1991 [ISBN 3-527-27020-5]). In the case of technical colorants, animal testing was performed for reasons of occupational and medical safety. Results can be read in the → material safety data sheets of the products in question.

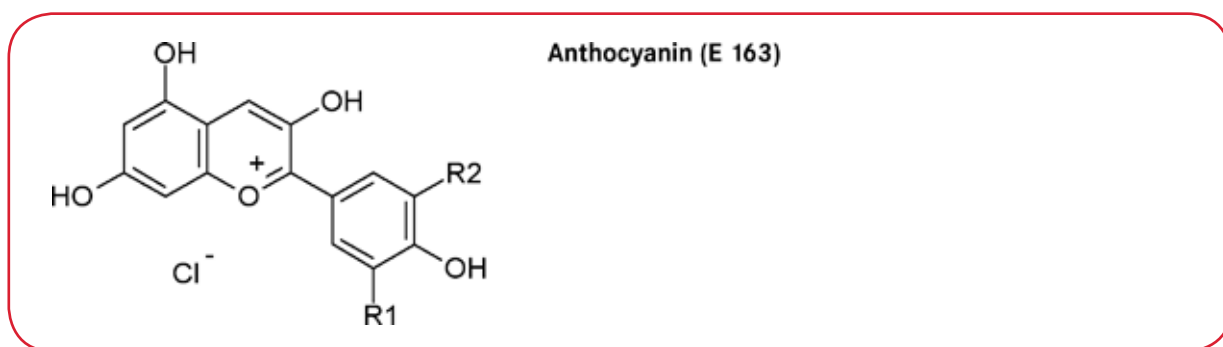
## ANNATTO

a → carotenoid. (E 160b, C.I. 75120, 656816), extract from the seed of the annatto tree (*Bixa orellana*). **Bixin**, with up to 30% of the main dye component, is the extract that is commercially available. O.-s.; yellow to orange in color depending on the dosage. Ester cleavage of bixin yields the w.-s. **norbixin**. **App.:** → maximum limits must be observed in the EU. Uses of annatto include oils, margarine, mayonnaise, cheese; CAF 1, oil prod. Use of norbixin includes sweets, O/ W emulsions.



## ANTHOCYANIN, ENOCYANIN

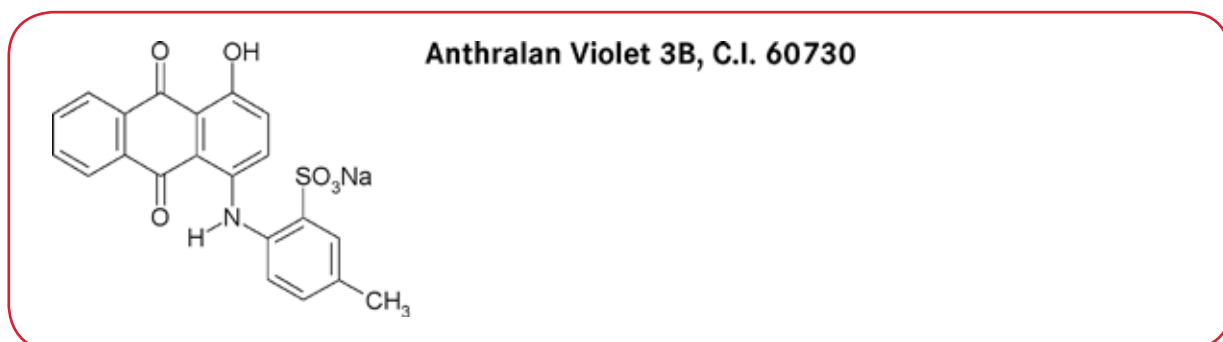
(E 163, no C.I., 656824) collective term for the blue, violet, and red w.-s. colorants that occur in fruit (berries), vegetables (e.g. red cabbage), and flowers. They belong to the group of → flavone dyes. The isolated A. **pelargonidin, cyanidin, peonidin, delphinidin, petunidin, and malvidin** have no technical relevance. Extracts of grape peels and berries are commercially available, some of which also come in the form of a spray-dried powder. Since A. are sensitive to changes in pH-values, light, and temperature, their uses are limited. At pH-values > 3.8 the color tone shifts from red to blue-gray. **App.:** Uses in the EU include sweets, jams, beverages. Use not known in CAF 1.



ANTHOCYAN	R1	R2
Pelargonidin	H	H
Cyanidin	OH	H
Delphinidin	OH	OH
Peonidin	OMe	H
Petunidin	OMe	OH
Malvidin	OMe	OMe

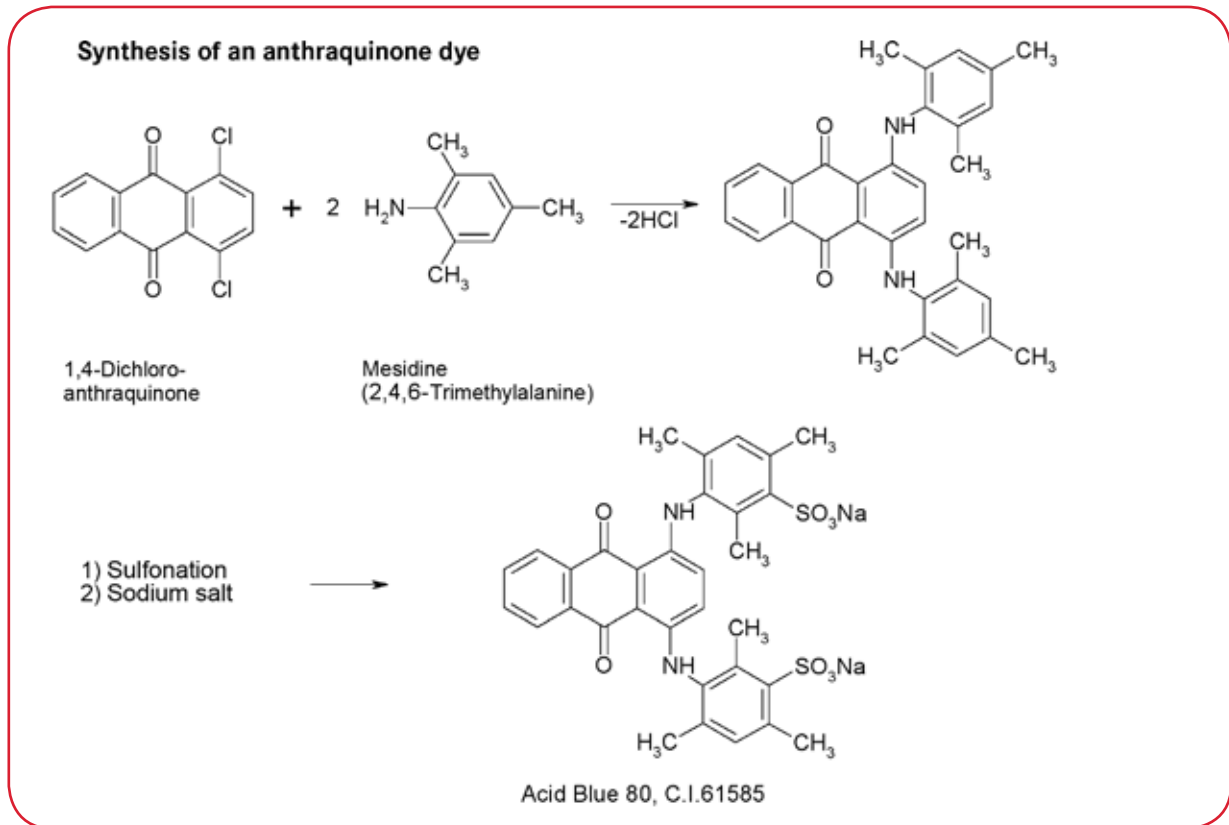
## ANTHRALAN VIOLET 3B

(C.I. 60730, 656861) violet w.-s. → anthraquinone dye. **App.:** CAF 3, semi-permanent hair dyes, alcohol-based perfumery.



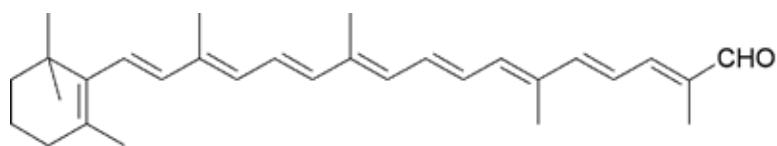
## ANTHRAQUINONE DYES

the most common naturally occurring group of dyes; → Carmine is the only food dye in this group. Other A. are used in cosmetics (e.g. → Alizarine Cyanine Green, → irisol, → Acid Blue 80). A. generally have good fastness and are often very stable in the presence of alkalines and acids.



**BETA-APO-8-CAROTENAL** a → carotenoid

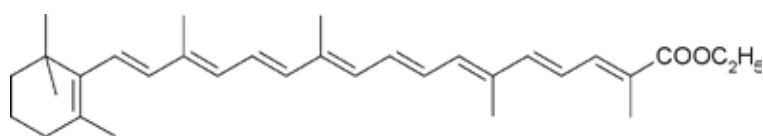
(E 160e, C.I. 40820, not in the DRAGOCOLOR® product range), o.-s.; orange to red color, depending on dosage. Wdisp. form also commercially available. **App.:** sauces, beverages, sweets.



**beta-Apo-8-carotenal, C.I. 40820 (E 160e)**

**BETA-APO-8-ETHYL ESTER OF CAROTENE ACID** a → carotenoid

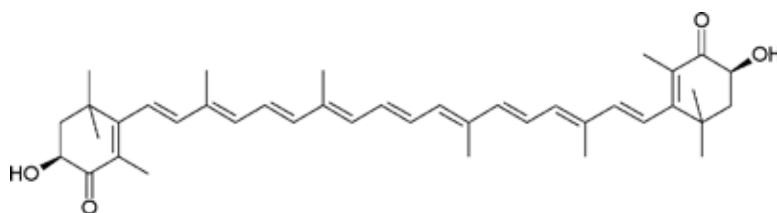
(E 160f, C.I. 40825, not in the DRAGOCOLOR® product range); has provitamin A properties, o.-s.; orange to red color depending on the dosage. Wdisp. form also commercially available. **App.:** primarily as a feed additive that colors egg yolks.



**3-Apo-8'-ethyl ester of carotenic acid, C.I. 40825 (E 160f)**

**Flavoring Information Service:** 5/ 1958 *Farbstoffe - Eigenschaften, Herstellung u. Anwendung*; 3/ 1985 *Lebensmittelfarbstoffe - Gestern, Heute, Morgen* (Food Colors Yesterday, Today and Tomorrow); 2/ 1987 *Lebensmittelzusatzstoffe - Dichtung u. Wahrheit* (Food Additives - Facts and Fiction); 3/ 1988 *Die Färbung von Arzneimitteln in der Europäischen Gemeinschaft (Coloring Pharmaceutical Products in the European Community)*; 2/ 1995 *Lebensmittelfärbung in der Europäischen Union* (Food Coloring in the European Union).

**Aspect** the appearance of a dye powder. Does not necessarily correlate with the actual color of the dye after it has been mixed into a solution and processed (e.g. brown powder yields a red solution). The A. is therefore not a test standard and is not suitable for quality control (e.g. of incoming goods).



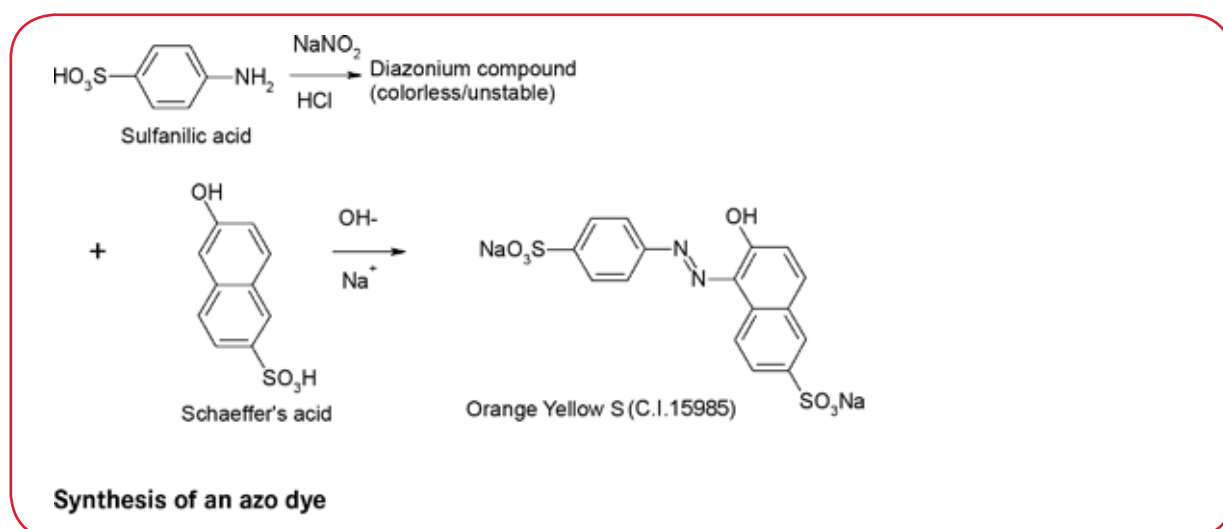
**Astaxanthin**

**ASTAXANTHIN** → xanthophylls

## AZO DYE

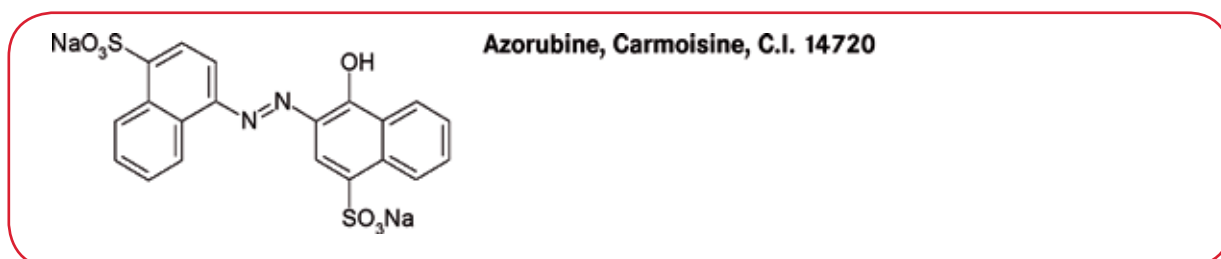
(more accurately, azo colorant) (Fr. azote: nitrogen) the most extensive category of synthetic organic → colorants and → pigments, characterized by the fact that their molecules contain the azo group -N=N- at least once; this group is bound to aromatic or heterocyclic ring systems on both sides. If one azo group occurs, such as with → Orange Yellow S, the compound is described as a monoazo dye; if two occur, such as with → Brilliant Black BN, it is called a diazo dye; if three occur, a trisazo dye; and if there are four, a tetrakisazo dye. Using → Orange Yellow S as an example, A.'s are manufactured in two reaction steps: a primary aromatic amine (e.g. sulfanilic acid = 1-aminobenzene-4-sulfonic acid) is diazotized in an acid medium at cool temperatures by slowly adding a sodium nitrate solution or another compound containing nitrogen. The colorless diazonium solution that results is then coupled with a suitable component (e.g. 2-naphthol-6-sulfonic acid) in an alkaline medium (or an acid medium when coupled with amines). This yields either alkaline salts or alkaline earth salts. The azo group is split when the reductive cleavage of A. occurs; this yields two primary aromatic → amines. Among food dyes, the sulfonic acid groups which ensure water solubility, both in the diazo component and in the coupling components, mean that the cleavage products are eliminated instead of being retained in fatty tissue. Although extensive toxicological studies have been performed to prove the safety of A., their use is still controversial for coloring certain foods. This is especially true of → Tartrazine and → Amaranth. The following food dyes belong to the group of A.: → Azorubine, → Amaranth, → Ponceau 4R, → Allura Red, → Orange Yellow S, → Tartrazine, → Brilliant Black BN, → Brown FK, → Brown HT. Other A. are permitted as colorants for cosmetic products. A. have the → C.I. Numbers 11000 - 36999. → Azofarbstoffe (Azo Dyes).

## AZO PIGMENT → Azo dye



## AZORUBINE, CARMOISINE

(E 122, C.I. 14720, 100293) red w.-s. → azo dye; a suitable substitute for → Amaranth, which has a similar tone and limited uses. **App.:** sweets, desserts, ice cream, also as a lake for coated tablets (656832). The permitted → maximum limits must be observed in the EU. CAF 1, e.g. bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash. Lake for make-up, powder, lipstick.



## BAN ON SALES

exists for consumers because of the low → ADI levels for the → dyes → Amaranth, → Erythrosine, → Brown FK, → Annatto.

## BASIC DYES (CATIONIC DYES)

→ Methyl Violet and other dyes once used to stamp meat are no longer used in food.

## BATH PRODUCTS

collective term for shampoo, bubble bath, shower gel, oil or cream baths, and bath salts. The dyes that are especially suited for coloring bath products include → Brilliant Blue FCF 656601, → Patent Blue V 100294, → Quinoline Yellow 100290, → Tartrazine 100296, → Fast Yellow 656800, → Alizarine Cyanine Green w.-s. 656555, → Allura Red 100304, → Amaranth 100292, and → Brilliant Black BN 100303, in → mixtures as well.

## BATH SALTS

consist primarily of sodium chloride. Coloring can be difficult due to interactions between dye, perfume oil, salt, and the effects of light. Generally acceptable dyes include → Brilliant Blue FCF 656601, → Quinoline Yellow 100290, → Tartrazine 100296, → Fast Yellow 656800, → Alizarine Cyanine Green w.-s. 656555, → Allura Red 100304.

**BEER-LAMBERT LAW** → extinction

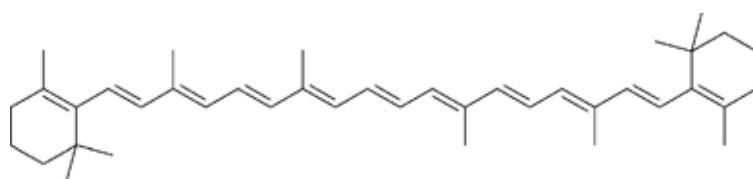
**BEET RED** → beetroot

## BEETROOT BETANIN

E 162, no C.I.) or beet red, the w.-s. dye isolated from the beetroot (*Beta vulgaris*), is instable in the presence of light and heat. Instead of using the isolated dye, concentrates of beet juice are usually chosen as colorants, occasionally as a spray-dried powder (656826). These products are not considered food dyes but → foods as colorants.

## BETA-CAROTENE

(E 160a, C.I. 40800, 656818 o.-s., 656819 wdisp.) a → carotenoid, the main component of a naturally occurring yellow to orange carotene compound ( $\alpha$ ,  $\beta$ ,  $\gamma$ ). B. is produced synthetically on a large scale and is the most important food dye. **App.:** oils, fats, margarine, mayonnaise, cheese; wdisp. forms used in beverages, sweets, desserts. → Quantum satis in the EU. CAF 1, oils, emulsions, creams.



Beta-carotene, C.I. 40800 (E 160a)

**BETANIN** → beetroot

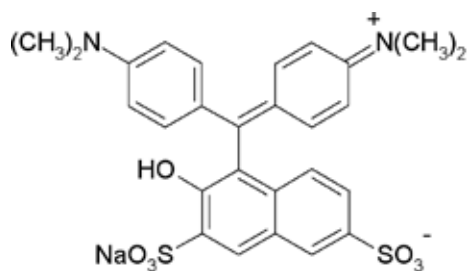
**BIXIN** → Annatto

## BRIGHTENING AGENTS, OPTICAL BRIGHTENERS

(not in the DRAGOCOLOR® product range) chem. compounds which → absorb the illumination of the UV range and fluoresce in the → complementary color of the yellowish tone, i.e. bluish. **App.:** detergents and dishwashing liquid, dosage approx. 0.1%; lakes, waxes, paper, textiles.

## BRILLIANT ACID GREEN BS, WOOL GREEN S, LISSAMIN GREEN BS

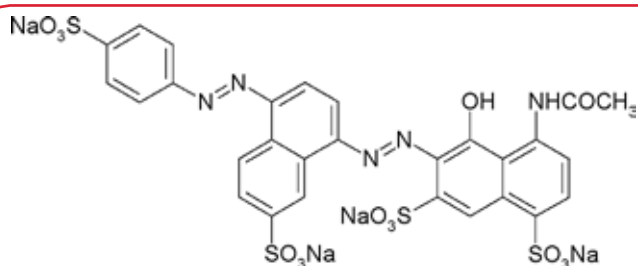
(E142, C.I. 44090, 656805) green w.-s. → triarylmethane dye. **App.:** sweets; → maximum limits must be observed in the EU. CAF 1, e.g. shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes.



Brilliant Acid Green BS, Wool Green S, C.I. 44090 (E 142)

## BRILLIANT BLACK PN

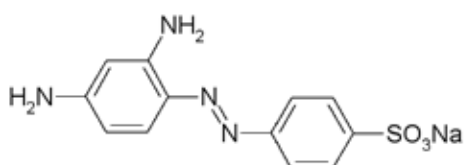
(E 151, C.I. 28440, 100303) bluish-black w.-s. → azo dye. Mixtures with yellow, orange, and/or red dyes can yield violet, brown, and black tones. **App.:** fish roe, sweets; → maximum limits must be observed in the EU. CAF 1, uses: shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.



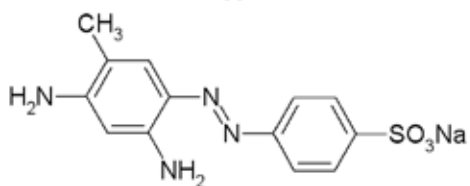
Brilliant Black BN, C.I. 28440 (E 151)

## BROWN FK

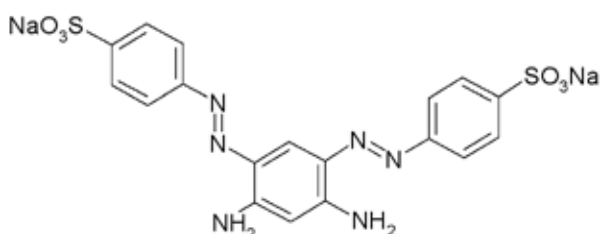
(E 154, no C.I., not available in the DRAGOCOLOR® product range) a brown w.-s. → azo dye created by synthesis. **App.:** Traditionally used in Great Britain to color kippers (smoked herring); → maximum limit in the EU is 20 mg/ kg ready-to-serve food. Not registered for drugs and cosmetics in the EU.



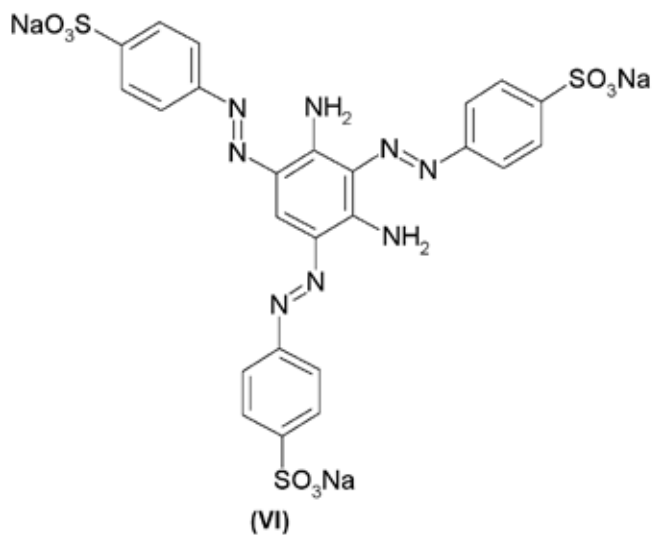
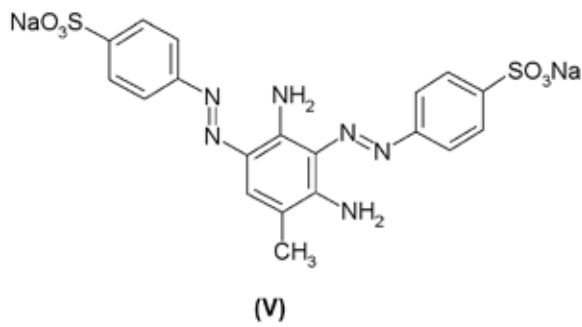
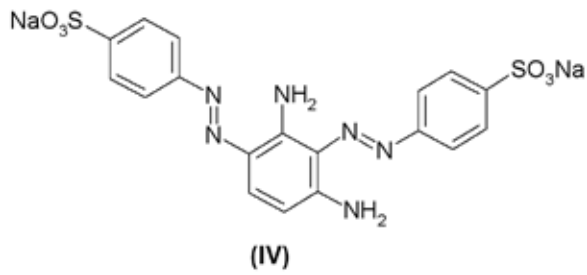
(I)



(II)



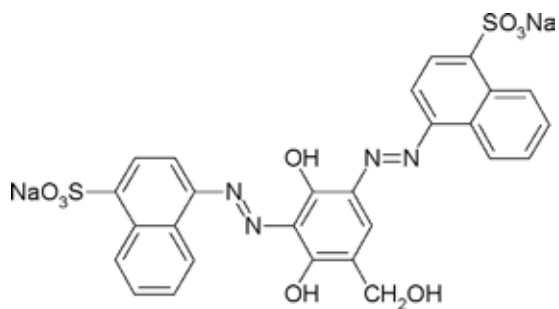
(III)



**Brown FK (E 154): Mixture of 6 azo dyes**

### **BROWN HT, CHOCOLATE BROWN HT**

(E 155, C.I. 20285, 656798) brown w.-s. → azo dye. **App.:** sweets; → maximum limits must be observed in the EU. Not registered for drugs and cosmetics in the EU.



**Brown HT, C.I. 20285 (E 155)**

## BUBBLE BATH

the dyes that are especially suited include → Brilliant Blue FCF 656601, → Patent Blue V 100294, → Quinoline Yellow 100290, → Tartrazine 100296, → Fast Yellow 656800, → Alizarine Cyanine Green w.-s. 656555, → Allura Red 100304, → Amaranth 100292, and → Brilliant Black BN 100303, in → mixtures as well.

## BUTTER

colored with → carotenes, dosage → quantum satis.

**C-COLORS** → dyes used to mark foods

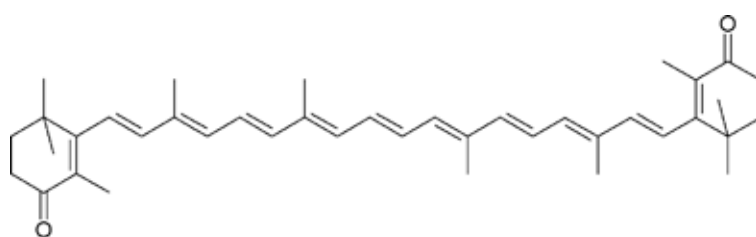
**C.I.:** Abb. for → Colour Index

## CALCIUM CARBONATE

(E 170, C.I. 77220, not in the DRAGOCOLOR® product range) white inorgan. → pigm. **App.:** surface coloring of coated tablets, decoration. Used to achieve suitable pH-values in doughs and baked goods. Used to improve pouring ability of flour-like baking products; serves as a deoxidizing agent for hard cider and wine.

## CANTHAXANTHIN

(E 161g, C.I. 40850, not in the DRAGOCOLOR® product range) o.-s. → carotenoid from the → xanthophylls group; also commercially available in wdisp. form. Orange-yellow to red in color depending on the dosage. **App.:** only permitted in “Strasbourg sausages” in the EU; max. limit of 15 mg/ kg ready-to-serve food.



Canthaxanthin, C.I.40850 (E 161g)

## CAPSANTHIN U. CAPSORUBIN

(→ carotenoids) (both E 160c, no C.I., not in the DRAGOCOLOR® product range) orange-red, o.-s. Have no technical relevance as isolated dyes (and only slight differences in their structural formula). Extracts from red peppers are used; also commercially available in wdisp. form. **App.:** mayonnaise, sauces, soups, ready-to-serve dishes, sweets.

**CAPSORUBIN** → capsanthin

## CARMEL

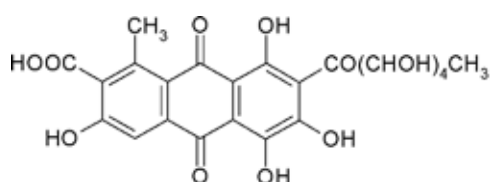
four brown food dyes, manufactured by applying controlled heat to sugar in the presence of certain legally permitted chem. compounds. Not to be confused with → caramel sugar, a → food as colorant. There are four types: **plain (caustic) caramel** (E 150a, no C.I.), alcohol stable, **App.:** spirits, sweets; **caustic sulphite caramel** (E 150b, no C.I., not in the DRAGOCOLOR® product range), alcohol stable, **App.:** spirits; **ammonia caramel** (E 150c, no C.I., 656815), **App.:** beer, soups, sauces; **ammonia sulphite caramel** (E 150d, no C.I., 103603 ) acid stable, **App.:** alcohol-free, carbonated refreshment beverages.

## CARMEL SUGAR

a food used as a colorant. Not to be confused with the dye → caramel. C. is suitable for general use as a food.

## CARMINE, COCHINEAL, CARMINIC ACID

(E 120, C.I. 75470, 656825 w.-s.) these terms are often used as synonyms but refer to three different substances. **Cochineal** comes from the dried bodies of female cactus-eating insects (Coccus cacti) which contain about 10% of a red colorant that is an alkali-protein compound of **carminic acid**. This is extracted to obtain pure, w.-s. carminic acid, an → anthraquinone dye. The → lake carmine (carmine naccarat) occurs upon precipitation with aluminum salts. Currently there is no economical method of creating carmine synthetically. **App.:** sweets, beverages, desserts. → Maximum limits must be observed in the EU. CAF 1, previously used for lipstick; C. is the only red organ. pigm. that can also be used for eye make-up in the US (“exempt from certification”).



**Carmine, cochineal, C.I. 75470 (E 120)**

**CARMINIC ACID** → carmine

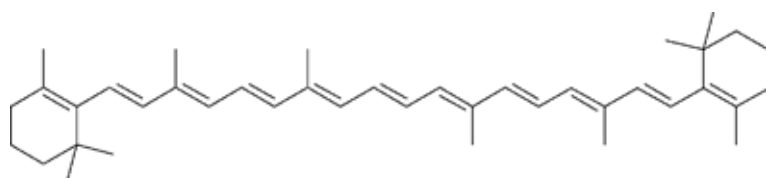
**CARBON BLACK** → vegetable carbon

**CARMOISINE** → azorubine

**CAROTENE, BETA** → beta carotene

## CAROTENOIDS CAROTENES

(alpha, beta, gamma, E 160a, C.I. 75130, not available from natural sources in the DRAGOCOLOR® product range) and their derivatives, carotenoids, occur commonly in nature. They can be found in fruits (rose hips, bell peppers, citrus fruits, etc.), vegetables (carrots, green cabbage, etc.) and in kidneys, liver, milk, butter, and high-fat cheeses. Many carotenoids have a provitamin-A properties, which means that during digestion they are converted to vitamin A within the organism. Carotenoids are o.-s., although wdisp. products are also commercially available. All carotenoids are sensitive to oxidation. → **Beta-carotene** is the most important representative of the provitamin-A group and has the greatest relevance among all of the food dyes. Beta-carotene can be obtained from products such as carrots or Dunaliella algae, but large-scale synthetic manufacturing is more economical and of much greater importance. The carotenoids → **beta-apo-8-carotenal** and → **beta-apo-8-ethyl ester of carotene acid** are synthetically manufactured. Synthetically generated C.'s are identical to the ones found in nature. Another important carotenoid is **bixin**, which occurs in the seed coating of the fruits of a tropical plant, → **Annatto** (*Bixa orellana*); bixin is also an o.-s. orange dye. The pure form of this dye is not usually commercially available; instead, annatto extracts with a dye content of max. 30% can be obtained. Ester cleavage of bixin yields the w.-s. dicarboxylic acid **norbixin** (→ Annatto). Other C. are → **lycopene**, which is found in tomatoes, and → **capsanthin** and **capsorubin**, which occur in red peppers. They are not significant as isolated dyes; extracts from tomatoes or peppers are commercially available.



Carotinoid → beta-carotene, C.I. 40800

## CARRIER SOLVENTS → carriers

### CARRIERS

dyes do not usually consist of one component exclusively. Natural dyes may contain additional plant materials, and, depending on the manufacturing methods applied, synthetic (artificial) dyes usually contain table salt and/or sodium sulfate. Sodium sulfate and other materials are also added to adjust the color of a dye to a standard intensity and to reduce the formation of particulate matter. In addition, colorants dissolve or disperse in solvents such as glycerin or propylene glycol, making it possible to work in a particle-free environment. The use of carriers and carrier solvents in food is regulated by EC Dir. 95/2/EEC.

## CAS

abb. for Chemical Abstracts System. The CAS number allows a chemical substance to be identified. This is of little relevance among dyes, where the → Colour Index number is now the international standard.

## CATIONIC DYES

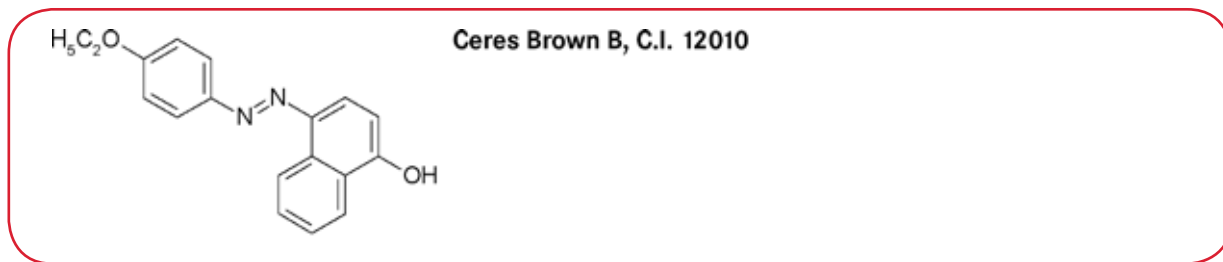
unlike most anionic cosmetic dyes, C. are absorbed directly into the hair. The DRAGOCOLOR® dyes used for coloring hair are cationic dyes. → hair dyes, → DRAGOCOLOR®-Farbstoffe zur Haartönung brochure.

## CERES® DYES

f.-s. dyes, usually → azo dyes; some permitted for cosmetics use and in the DRAGOCOLOR® product range.

## CERES BROWN B, FAT BROWN B

(C.I. 12010, 656869) brown o.-s. → azo dye. App.: CAF 3, oil prod.



**CHALK** → Calcium carbonate

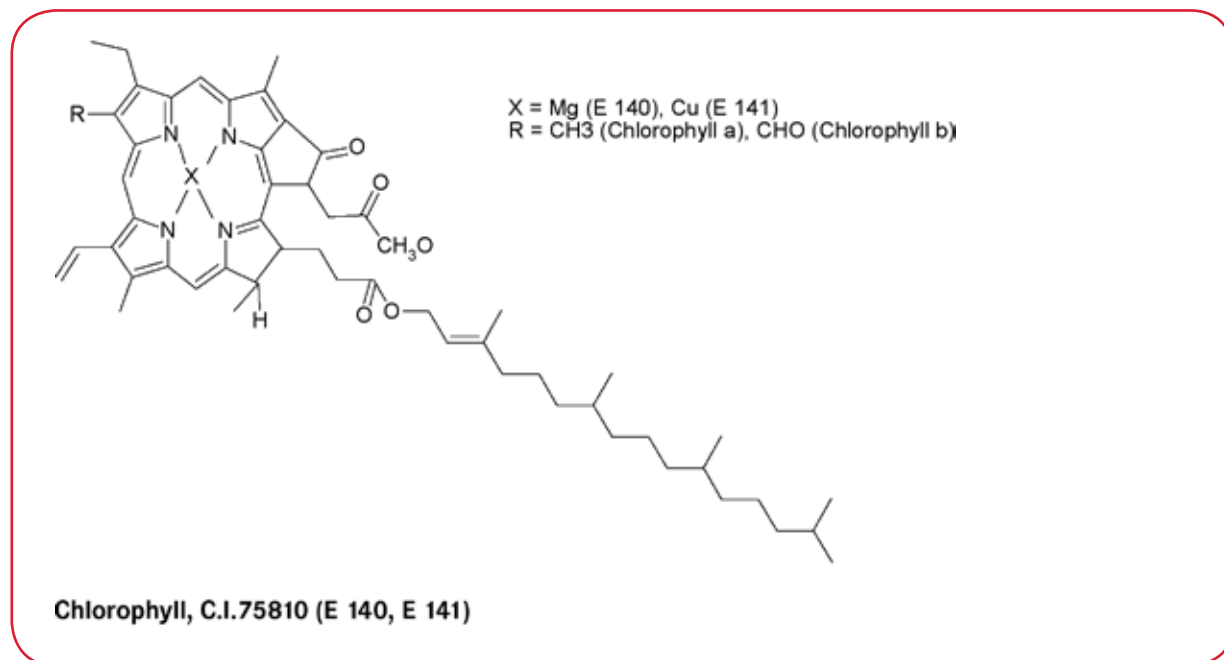
**CHERRY PRESERVES** colored with → erythrosine.

**CHOCOLATE BROWN HT** → Brown HT

## CHLOROPHYLL, LEAF GREEN

(E 140, C.I. 75810, not in the DRAGOCOLOR® product range) occurs in all green plants in the form of a protein complex as a mixture of the isomeres chlorophyll a and b, which differ slightly in their structure. C. are part of the group of → porphyrin dyes. The central atom of C. is magnesium. C. are o.-s.; their color stability (when exposed to heat, for example) is not sufficient. If saponified with alkalines, w.-s. **chlorophyllins** are generated. If the central magnesium atom is partially or completely replaced with copper, **oil-soluble copper chlorophylls** (E 141, C.I. 75810, 656821) result, which become **w.-s. copper chlorophyllins** after saponification (as potassium or sodium salts) (E 141, C.I. 75815, 100308) and have much higher color stability levels than products without copper.

It is for this reason that chlorophyll derivatives with copper are of much greater importance in dyeing foods than ones without copper. App.: o.-s. used for foods which contain fat; CAF 1, e.g. body soap, oil prod., alcohol-based perfumery. W.-s. used for sweets, spirits; CAF 1, oral and dental care products.



**CHLOROPHYLLIN** → chlorophyll

**CHOCOLATE BROWN HT** → Brown HT

### CHROMATOGRAPHY

separation of mixtures based on the interaction between the separating agent (adsorbent) and the mixture, the solution or mixture of solutions used. Paper, thin-layer, or column chromatography may be used to separate colorants. Also used for → identification. → *Die Identifizierung wasserlöslicher Kosmetikfarbstoffe* (Identification of Water-Soluble Cosmetic Colors), DRAGOCO-Report 9/ 1981.

### CHROMOPHORE

the group of molecules that imparts color (i.e. is chromophoric) to a compound, e.g. the azo group in → azo dyes, the nitro group (-NO<sub>2</sub>) in → nitro dyes, or the nitroso group (-NO) in → nitroso dyes. If the chromophore is damaged in a chemical reaction, discoloration occurs.

### CHROMOXIDE GREEN

(C.I. 77288, not in the DRAGOCOLOR® product range) green inorgan. → pigm. **App.:** CAF body soap, syndet soap, make-up, powder, lipstick.

### CIE

Abb. for Commission Internationale de l'Éclairage (International Lighting Commission)

**CITRANAXANTHIN** → xanthophylls

## **CLEANSERS**

colored with w.-s. dye. → DRAGOCOLOR®-*Farbmittel f. Sondergebiete* brochure

## **COATED TABLETS**

can be colored with → dyes, → lakes, and → pigments as long as they are permitted for use in food. The use of dyes is only recommended at low dosages because the dye can dissolve and, under unfavorable conditions, stain the mouth and tongue.

## **COAL-TAR COLORS**

a designation dating back to Friedlieb Ferdinand Runge (1795 - 1867). He was the first to succeed at taking coal tar (which was considered a waste product at the time) that resulted from generating coal gas and mixing it with aniline and phenol to create synthetic dyes. The use of coal tar as a raw material in dyes has long since been discontinued; instead, petroleum has replaced it. The process of synthesis of various dyes and pigments involves so many steps that neither dyes of the past nor today's dyes actually ever contained tar or petroleum. The terms "tar colors" or "aniline colors" are antiquated phrases.

**COCHINEAL** → carmine

**COCHINEAL RED A** → Ponceau 4R

## **CODE OF FEDERAL REGULATIONS**

(abb. CFR) a series of laws in the US. CFR 21, for example, regulates such things as the use of dyes in foods, drugs, and cosmetics. Can be found in the archives of the colorants division.

## **COLOR**

the sensory impression transmitted by the → eye (taken from German industry standard DIN 5033 Part 1, Edition March 1979). Color is also the reflection of a specific part of the spectrum of visible light. In everyday language the word "color" is sometimes used in the sense of "colorant."

## **COLOR INTENSITY**

a means of measuring the strength of a → dye. Indicated either in **absolute percentages**, as is the case with food dyes (example: pure dye content 85%, the remaining 15% are inorganic salts and moisture resulting from processing), or in **relative percentages** (400% means that the dye has a color four times as intense as the "100%" product). **Amounts indicated in% in the DRAGOCOLOR® colorant specifications are always absolute percentages.**

## COLOR THEORY

**1) Additive:** Used in color TV, for example. Three colored points of light (red, green, blue) are combined to create any number of colors which are then reflected onto the cone receptors of the retina in the → eye of the observer. The principle of additive color theory is also applied in → colorimetry as performed by the CIE lab.

**2) Subtractive:** Part of the white light that strikes the surface of an object is absorbed (subtracted), which is the derivation of the theory's name, and the observer sees the → complementary color. The color theory taught in school is based on the subtractive color theory: yellow + blue = green, red + blue = violet, yellow + red = orange, red + blue + yellow = brown. → mixtures

## COLORANT

general term for all substances that give color (German industry standard DIN 55944, April 1990). Divided into inorganic and organic C. Inorganic C. are → pigments exclusively, whereas organic C. can be both pigments and → dyes. An additional distinction can be made between natural and synthetic C., although natural C. can also be derived from synthetic means (nature-identical C.).

## COLORIMETRY

measurement of colors by comparing the sample solution with a standard solution in a colorimeter (according to the Dubosq method). Used only rarely; has been replaced by → spectroscopy.

## COLORING

**1) Food coloring** is a necessary procedure **a)** when loss of color occurs due to processing (e.g. in conserving fruits), **b)** to correct the color of a product which, because of its content, has a weaker color than consumers expect (e.g. beverages or sauces), **c)** to generate a consistent color for products made from raw materials of variable quality or color intensity, **d)** for products which are inherently colorless or unattractive (e.g. margarine, sweets, and desserts), and **e)** to enhance the recognition factor of the taste that is typical for a given food. If a food needs to be colored for one of these reasons and cannot be colored with → foods as colorants, it must be determined which → food dyes are legally permitted for this food and what → maximum limits apply. The texture of the food to be dyed is usually what determines whether an o.-s. dye, a w.-s. dye, or a wdisp. pigm. is used, as opposed to an insoluble lake or pigm. The dye's → properties and any potential interaction between the dye and the components of the food must be taken into account when selecting the dye. Consideration must also be given to thermal impact during manufacturing or further processing by the consumer and to the storage and packaging conditions, including any exposure to light. Stability tests should definitely be performed. Additionally, the → declaration requirements must be observed and coordinated with marketing. W.-s. or wdisp. dyes such as → beta-carotene, → caramel, or synthetic (artificial) → food dyes are suitable for beverages, powdered drink mixes, desserts, and instant prod. Jellies, jams, and sweets can be colored with w.-s. or wdisp. → natural dyes as well as synthetic dyes. → Coated tablets can be colored with both w.-s. dyes or with pigm. and lakes.

F.-s. dyes such as → chlorophylls or → carotenoids are used in foods with a high fat content. If food laws permit, synthetic dyes can be used with carriers. W.-s. or. o.-s. dyes are added to liquid foods in solution; the most expedient way to do so is to work with the solvent in the food itself. The maximum solubility of the dyes must be considered when creating the dye solutions. However, usually a dye concentration of more than 1% is not necessary. The dye can be added to dry foods as a powder. If this is the case, their colorant properties are not fully evident until the food is mixed with a liquid. If the dry food already has a color, it must be sprayed with a dye solution and then dried. It is also possible to mix lakes with the food in a dry state to create a color directly. As a rule, an optimal, even distribution of dye in the finished product can be guaranteed by use of the appropriate equipment when lakes and pigm. are processed. In all of the options indicated above, it is possible to use the colors on an individual basis or in mixtures to create various color nuances. **2)** Relatively similar methods are used in coloring **drugs and cosmetic products.** **3) Stability tests:** before a dye is used on an industrial scale, its suitability should be tested in a simple trial. The appearance of a freshly colored sample should be compared with samples that were created using the same formulation and then stored in the original packaging (or something comparable) for a given interval under different conditions: at room temperature next to a window; in a laboratory oven at 35-40°C without the influence of light; under artificial light without the influence of temperature changes; or at a relatively close interval to a lamp (40-50 cm) with heat (→ lightfastness). If the colors of all of the samples tested match the freshly colored sample, then the ideal colorant has been found for this product in this formulation. If any changes to the formulation take place, the suitability of the colorant must be re-evaluated so that unwelcome surprises can be ruled out.

**COLORING FOOD** → coloring

**COLORMETRICS** → colorimetry

### **COLOUR INDEX**

a multi-volume reference work about → colorants issued by the British Society of Dyers and Colourists and the American Association of Textile Chemists and Colorists; continually updated. Used internationally. Contains information about the chemical structure, classical names, names, discoverer, patent literature, synthesis, solubility, and reaction of colorants; sorted by the **five-digit Colour Index number.**

### **COLOUR INDEX GENERIC NAME**

used internationally, combined with the → Colour Index Number to identify a colorant, e.g. Acid Yellow 23 for → Tartrazine C.I. 19140.

### **COLOUR INDEX NUMBER**

a five-digit number with which a colorant whose constitution (structural formula) has been published is identified in the → Colour Index. Used internationally. It is therefore also used in the → specifications for DRAGOCOLOR® colorants.

## COMPLEMENTARY COLOR

in the additive color theory, C. can be combined with the color observed to create white. C. are blue / yellow and green / red.

## COSMETIC APPLICATION FIELD

regulated by EC Directives. CAF **1**: permitted for all cosmetic products; **2**: not for use on the eyes; **3**: not for use on mucous membranes; **4**: only for brief use on the skin. → Food dyes (with the exception of E 128, 154, 155) are the most prevalent among C. 1. The C. is stated in the product description for cosmetic colorants in the DRAGOCOLOR® product range.

### COSMETIC DYES

more accurately called cosmetic colorants. In the EU their use is regulated by Dir. 76/168/EC and 86/179/EC. The Directives cover approx. 160 → colorants, of which some 100 have technical relevance. The most important ones are listed in DRAGOCOLOR®-*Farbmittel f. Kosmetika* by their → Colour Index number

### DRAGOCOLOR® COLORANTS FOR COSMETICS

(listed in the sequence of their Colour Index (C.I.) number)

E...: also permitted for use as a food dye in the EU

\$: can be provided in FDA-certified quality for use in the US

\$\$: can be used in the USA without certificate

C.I.NO.	COLOR	PRODUCT NO.	ABBREVIATION	SOLUBILITY	CAF
11680	yellow	656569	Yellow (→ Hansa Yellow G)	pigm.	3
<b>Uses:</b> body soap, syndet soap.					
11680	yellow	656845	Yellow	wdisp.	3
<b>Uses:</b> body soap, syndet soap, shampoo, shower gel, liquid soap.					
12010	brown	656869	Dark brown (→ Ceres Brown B)	o.-s.	3
<b>Uses:</b> oil prod.					
12085	red	656575	Light Red (→ Permanent Red R)	pigm.	1
<b>Uses:</b> make-up, powder, lipstick.					

C.I.NO.	COLOR	PRODUCT NO.	ABBREVIATION	SOLUBILITY	CAF
12490	red	100380	Fast Red (dark) (→ Permanent Carmine FB)	pigm.	1
<b>Uses:</b> make-up, powder, lipstick.					
12490	red	656595	Red	wdisp.	1
<b>Uses:</b> 4, e.g. body soap, syndet soaps, shampoo, shower gel, liquid soap, detergent powder, and fabric softener.					
12700	yellow	656870	Light Yellow (→ Sudan Yellow G)	o.-s.	4
<b>Uses:</b> oil prod.					
13015	yellow	656800	Yellow extra (→ Fast Yellow)	w.-s.	1
<b>Uses:</b> body soap, syndet soap, shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumery.					
14700	red	620093	\$ → Ponceau SX	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap.					
14720	red	100293	→ Azorubine E 122	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash.					
14720	red	656832	Azorubine lake E 122	Lake color	1
<b>Uses:</b> make-up, powder, lipstick.					
15510	orange	656852	\$ → Orange II	w.-s.	2
<b>Uses:</b> body soap, syndet soap, shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, alcohol-based perfumery.					
15850	red	656572	purple-red (Ca salt) (→ Lithol Rubine BK)	pigm.	1
<b>Uses:</b> make-up, powder, lipstick.					

C.I.NO.	COLOR	PRODUCT NO.	ABBREVIATION	SOLUBILITY	CAF
15985	orange	100291	\$ → Orange Yellow E 110	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes.					
15985	orange	656831	Orange Yellow E 110	Lake color	1
<b>Uses:</b> make-up, powder, lipstick.					
16035	red	100304	\$ → Allura Red E 129	w.-s.	1
16185	red	100292	→ Amaranth E 123	w.-s.	1
16255	red	100300	→ Ponceau 4R	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes.					
16255	red	107043	Ponceau 4R E124	Lake color	1
17200	red	656855	\$ → Rot 10B	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes.					
18050	red	656589	Brillant Red	w.-s.	3
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.					
18965	yellow	656588	Yellow (→ Acid Yellow 17)	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, alcohol-based perfumes.					
19140	yellow	100296	\$ → Tartrazine E 102	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes.					
19140	yellow	656828	Tartrazine E 102	color lake	1
<b>Uses:</b> make-up, powder, lipstick.					

C.I.NO.	COLOR	PRODUCT NO.	ABBREVIATION	SOLUBILITY	CAF
28440	black	100303	→ Brilliant Black E 151	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.					
40800	orange	656818	beta carotene E 160a (→ Carotinoids)	o.-s.	1
<b>Uses:</b> oil prod.					
40800	orange	656819	beta carotene E 160a (→ Carotinoids)	w.-s.	1
<b>Uses:</b> O/W emulsions.					
42045	blue	656477	Blue (→ Patent Blue VF)	w.-s.	3
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.					
42051	blue	100294	→ Patent Blue V, E 131	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, toothpaste gel, mouthwash, alcohol-based perfumery.					
42053	green	656806	\$ → FD&C Green No.3	w.-s.	1
<b>Uses:</b> mouthwash.					
42080	blue	656840	→ Acid Blue 7	w.-s.	4
<b>Uses:</b> shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.					
42090	blue	656601	→ Brilliant Blue FCF	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, toothpaste gel, mouthwash, alcohol-based perfumery.					
44090	green	656805	→ Brilliant Acid Green E 142	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes.					

C.I.NO.	COLOR	PRODUCT NO.	ABBREVIATION	SOLUBILITY	CAF
45100	red fluorescent	656859	Rhodamine EB4 (→ Sulforhodamine B)	w.-s.	4
<b>Uses:</b> shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, detergent powder, fabric softener.					
45350	yellow fluorescent	656846	→ Uranin	w.-s.	1
<b>Uses:</b> shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.					
45410	red fluorescent	656858	→ Phloxine	w.-s.	1
<b>Uses:</b> lipstick.					
45430	red	656808	→ Erythrosine E 127	w.-s.	1
<b>Uses:</b> mouthwash.					
47005	yellow	100290	\$ → Chinoline Yellow E 104	w.-s.	1
<b>Uses:</b> body soap, syndet soap, shampoo, bubble bath, shower gel, mouthwash, alcohol-based perfumery, liquid soap, multi-purpose cleanser, dishwashing liquid.					
47005	yellow	656829	Chinoline Yellow E 104	Lake color	1
<b>Uses:</b> make-up, powder, lipstick.					
59040	green fluorescent	656533	\$ → Pyranine	w.-s.	3
<b>Uses:</b> body soap, syndet soap, shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.					
60725	violet	656873	Violet (→ Irisol)	o.-s.	1
<b>Uses:</b> oil prod.					
60730	violet	656861	Alizarine Brillant Violet R (→ Anthralanviolett 3B)	w.-s.	3
<b>Uses:</b> hair dyes, alcohol-based perfumery.					

C.I.NO.	COLOR	PRODUCT NO.	ABBREVIATION	SOLUBILITY	CAF
61565	green	656871	\$ Turquoise (→ Alizarine Cyanine Green f.-s.)	o.-s.	1
<b>Uses:</b> oil prod.					
61570	green	656555	\$ Acid Green (→ Alizarine Cyanine Green w.)	w.-s.	1
<b>Uses:</b> body soap, syndet soap, shampoo, shower gel, bubble bath, liquid soap, mouthwash, multi-purpose cleanser, dishwashing liquid, fabric softener.					
61585	blue	656839	Blue (→ Acid Blue 80)	blue	4
<b>Uses:</b> body soap, syndet soaps, shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, liquid detergent, fabric softener.					
73015	blue	100298	→ Indigotine E 132	w.-s.	1
<b>Uses:</b> mouthwash.					
73015	blue	656827	Indigotine E 132	Lake color	1
<b>Uses:</b> make-up, powder, lipstick.					
73360	red	100383	\$ Brilliant Red Z (→ Indanthrene Brilliant Red R)	pigm.	1
<b>Uses:</b> toothpaste (as paste 656263 15%, 656264 18%), make-up, powder, lipstick.					
74160	blue	656568	Phthaloblu (→ Helio- gen Blue B)	pigm.	1
<b>Uses:</b> toothpaste (as paste 656488), body soap, eye make-up.					
74160	blue	656842	Blue	wdisp.	1
<b>Uses:</b> body soap, syndet soap, shampoo, shower gel, liquid soap, dishwashing liquid, detergent (powder and liquid), and fabric softener.					
74260	green	100379	Fast Green (→ Helio- gen Green G)	pigm.	2
<b>Uses:</b> body soap, syndet soap, toothpaste (as paste 656558), detergent powder.					

C.I.NO.	COLOR	PRODUCT NO.	ABBREVIATION	SOLUBILITY	CAF
74260	green	656851	Green	wdisp.	2
<b>Uses:</b> body soap, syndet soap, shampoo, shower gel, liquid soap, dishwashing liquid, detergent (powder and liquid), and fabric softener.					
75120	orange	656816	→ Annatto E 160b	o.-s.	1
<b>Uses:</b> oil prod.					
75470	red	656825	Carmine red E 120 (→ Carmine)	w.-s.	1
<b>Uses:</b> mouthwash.					
75810	green	656821	→ Chlorophyll E 141	o.-s.	1
<b>Uses:</b> body soap, oil prod, alcohol-based perfumery.					
75815	green	100308	Chloropyllin E 141 (→ Chlorophyll)	w.-s.	1
<b>Uses:</b> mouthwash.					
77007	blue	656879	\$\$ Ultramarine Blue (→ Ultramarine)	pigm.	1
77007	violet	656573	\$\$ Ultramarine Violet (→ Ultramarine)	pigm.	1
<b>Uses:</b> body soap, syndet soap, make-up, powder, lipstick, detergent powder.					
77491	red	656836	\$\$ Iron Oxide Red E 172 (→ Iron oxides)	pigm.	1
77492	yellow	656835	\$\$ Iron Oxide Yellow E 172 (→ Iron oxides)	pigm.	1
77499	black	656837	\$\$ Iron Oxide Black E 172E(→ Iron oxides)	pigm.	1
77891	white	656838	\$\$ → Titanium Dioxide E 171	pigm.	1
<b>Uses:</b> body soap, syndet soap, make-up, powder, lipstick (titanium dioxide also used in toothpaste).					

**GLYCERINE PIGMENT PASTE FOR SOAP: CAF 3**

PRODUCT NO.	%	COLOR	C.I NO.
656864	45%	Yellow	C.I. 11710
656867	30%	Violet	C.I. 51319 (App. 4)
656560	22.5%	Green	C.I. 11680. 74260. 77492
608264	18%	Green	C.I. 11680. 74260
606552	15%	Orange	C.I. 11680. 12490

**GLYCERINE PIGMENT PASTE FOR SOAP AND TOOTHPASTE: CAF 1 AND 2**

PRODUCT NO.	%	COLOR	C.I NO.
656488	15%	Blue	C.I. 74160
656866	40%	Red	C.I. 12490
656865	45%	Green	C.I. 74260
656862	40%	Blue	C.I. 74160
135659	30%	Blue	C.I. 77007
656486	27.5%	Turquoise	C.I. 74260. 77007
656264	18%	Red	C.I. 73360
656512	35%	Brown Khaki	C.I. 74260. 77492. 77499
656529	25%	Cream Yellow	C.I. 77492
656561	20%	Light Green	C.I. 74260, 77492
656558	20%	Green	C.I. 74260
656559	20%	Green	C.I. 11680, 74260
656260	16%	Red	C.I. 12490. 77492
656262	17%	Red	C.I. 12490
656275	50%	Titanium Dioxide	C.I. 77891
677583	17%	Red	C.I. 12085
656268	35.5%	Black	C.I. 77492. 77499

## CONSUMER PROTECTION

Coloring foods with synthetic dyes has been a topic of some debate for quite a while; both specialists and the general public have recurrent discussions on the matter. Unfortunately, in the past falsified lists of → food additives with dubious health assessments have contributed to the problem. The discussion is accompanied by an overall analysis of the purpose and use of food additives in general. A primary factor is the potential such substances have to trigger → allergies and pseudoallergic reactions. There are ongoing reports about → azo dyes in general, and → Tartrazine (E 102) in particular, although these reports usually do not include the information that adverse reactions only take place in people who are also allergic to aspirin and naturally occurring components of foods. When seen in comparison to the rest of the population, this constitutes a small group of people, and because of the → declaration of dyes, Tartrazine (E 102) or other foods with dyes can be easily identified and avoided if necessary. The total consumption of food dyes in West Germany was determined in 1985 as the result of a poll conducted by the German association of mineral pigments among its member companies. At the time, the total amounted approx. 1.5 g per capita annually, and in the meantime the figures should be lower. If these statistics are taken into consideration along with the extensive toxicological tests that have proven the safety of food dyes, it can be stated that dyes pose no threat to consumers.

## CONSUMPTION

of artificial (synthetic) food dyes in Germany was determined in 1985 by a poll of the member companies of the German association of mineral pigments: approx. 1.5 g per person per year. The numbers continue to decline. → consumer protection.

## COSMETICS DIRECTIVE

(abb.: cos. Dir.) regulates the use of cosmetic colorants and other ingredients used in cosmetics in Germany. Based on EC Dir. 86/179/EC and the pursuant amendments.

## COSMETIC PRODUCTS

according to the definition given in the EC cos. Dir., C. are the materials or prepared mixtures that are designed for external contact with various parts of the human body or with the teeth and the mucous membranes of the mouth with the purpose of cleaning, perfuming, changing appearance, modifying body odors, or protecting and maintaining in good condition.

**CRYPTOXANTHIN** → xanthophylls

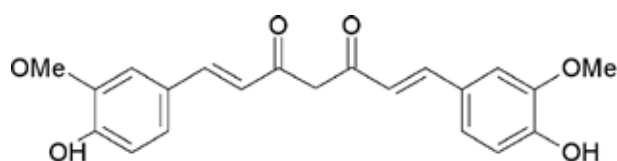
## CTFA NAME

the CTFA (abb. for Cosmetic, Toiletry & Fragrance Association, the American cosmetic association) has published a directory of cosmetic raw materials, including dyes, and assigned them CTFA generic names under which these materials can be declared on the list of ingredients in a product.

This is difficult when it comes to dyes because most European cosmetic dyes are not permitted for use in the US and thus have no C.; the → declaration on package labeling is carried out with the → Colour Index number. C. is often identical to the → INCI and has replaced it in the meantime.

### CURCUMIN

(E 100, C.I. 75300, not in the DRAGOCOLOR® product range) yellow dye that can be synthetically manufactured or extracted from the curcuma root. Curcumin is soluble in ethanol and, to a limited extent, in water. This dye is not used often, as it is not very lightfast and becomes instable at pH levels < 3; instead, extracts of the curcuma root or curcuma powder are used.



Curcumin, C.I. 75300 (E 100)

**CUTTLEFISH** → sepia

**CYANIDIN** → anthocyanin

### D&C DYES

(abb. for Drug & Cosmetic) the dyes approved for use in drugs and cosmetics in the US, in accordance with the → Code of Federal Regulations 21. Some are available in the DRAGOCOLOR® product range (see below). Used in the US only with a → FDA certificate. → DRAGOCOLOR®-*Farbmittel f. Kosmetika* brochure.

COLOR	PRODUCT NO.	ABBREVIATION/ SOLUBILITY	CAF	C.I NO.
yellow	656804	D&C Yellow No. 10 C.I.47005	w.-s.	*
<p><b>Uses:</b> mouthwash, alcohol-based perfumery, body soap, syndet soap, shampoo, shower gel, bubble bath, liquid soap, multi-purpose cleanser, dishwashing liquid. * Because of its isomere mixture, D&amp;C Yellow No. 10 does not correspond to food dye → Quinoline Yellow E 104, in spite of the fact that they have the same Colour Index number, and therefore technically it may not be used for cosmetics in the EU.</p>				

COLOR	PRODUCT NO.	ABBREVIATION/ SOLUBILITY	CAF	C.I NR.
green fluorescent	656847	D&C Green No.8 C.I.59040	w.-s.	3
<b>Uses:</b> body soap, syndet soap, shampoo, shower gel, bubble bath, liquid soap, multi-purpose cleanser, dishwashing liquid.				
green	656848	D&C Green No.5 C.I.61570	w.-s.	1
<b>Uses:</b> mouthwash, body soap, syndet soap, shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, fabric softener.				
orange	656853	D&C Orange No.4 C.I.15510	w.-s.	2
<b>Uses:</b> alcohol-based perfumery, body soap, syndet soap, shampoo, shower gel, bubble bath, liquid soap, multi-purpose cleanser, dishwashing liquid.				
red	656855	D&C Red No.33 C.I.17200	w.-s.	1
<b>Uses:</b> shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, alcohol-based perfumery.				
red	100383	D&C Red No.30 C.I.73360	pigm.	1
<b>Uses:</b> toothpaste, lipstick.				

**D&C GREEN NO. 5** → Alizarine Cyanine Green w.-s.

**D&C GREEN NO. 8** → Pyranine

**D&C ORANGE NO. 4** → Orange II

**D&C RED NO. 30** → Indanthrene Brilliant Red R

**D&C RED NO. 33** → Red 10B

**D&C YELLOW NO. 10** → Quinoline Yellow

## DECLARATION

food dyes on the **list of ingredients in food** are indicated with the word “dye” and the appropriate → E-Number or → trade designation (e.g. “Dye E 104” or “Quinoline Yellow dye”); → product labeling. The declaration of dyes in **cosmetic products** is regulated by EU Directives. and the German cos. Dir.:

Dyes can be listed **by their Colour Index number** in **no particular sequence after** the other ingredients have been listed; dyes **without** a Colour Index number have to be listed in compliance with the other designations mandated in the cos. dir. If cosmetic products of different color shades are released as part of a product series, all of the dyes in the series can be listed on the individual products as long as the declaration of dyes states “can contain...” or is preceded by the sign +/- (in square brackets).

**DELPHINIDIN** → anthocyanin

**DENTAL CARE PRODUCTS** → oral care products

**DERMATOLOGY** → safety assessment

### **DETERGENT**

There are many ways to color detergent powders and liquids. The colorants used partially depend on the manufacturing procedure for the D. More information available in → DRAGOCOLOR®-*Farbmittel* f. special areas brochure

### **DIRECT DYES**

are absorbed directly into the textile fibers from the color bath without any further processing. Some D. are also permitted as cosmetic dyes; their use in tenside products can lead to discoloration on towels, etc. There are **no** D. in the DRAGOCOLOR® product range.

### **DISHWASHING LIQUID**

usually colored with food dyes., e.g. → Tartrazine 100296, → Quinoline Yellow 100290, → Brilliant Blue FCF 656601, in mixtures as well. The → fluorescent dyes → pyranine 656533 and → uranin 656846 are used. Fluorescent green: 656542 DRAGOCOLOR® Green POV.

### **DOSAGE**

as long as applicable legal restrictions are observed, → dyes can be used in nearly any dosage. Among other things, the diameter of the packaging can play a role (the same dosage of a product will appear more strongly colored in a larger bottle than in a smaller one, → extinction). Excess dosages can lead to undesired staining of the skin, mouth, or textiles. For information on the → maximum limits in foods, see → *Lebensmittelfärbung in der Europäischen Union* (Food Coloring in the European Union).

## RECOMMENDED DOSAGES FOR SELECTED COSMETIC PRODUCTS

(listed in the “DRAGOCOLOR®-Farbmittel f. Kosmetika” [The Coloring of Cosmetics] brochure)

n.a.: not applicable

n.r.: not recommended

Finished product w.-s.	wdisp. dye	o.-s. pigm.	color dye	pigm. lake	pigm. powder	paste
Body soap, Syndet soap	0.01- 0.05%	0.01- 0.05%	n.r.	n.r.	0.05- 0.05%	0.01- 0.05%
Shampoo, bubble bath, liquid soap, multi-purpose cleansers, dishwashing liquid	0.01- 0.05%	0.01- 0.05% +	n.a. not for clean- sers	n.a.	n.a.	n.a.
Bubble bath	0.05- 0.3%	n.a.	n.a.	n.a.	n.a.	n.a.
Toothpaste	0.02- 0.05%	0.02- 0.05%	n.a.	n.r.	0.02- 0.05%	0.05- 0.1%
Mouthwash	5 - 20 ppm	n.a.	n.a.	n.a.	n.a.	n.a.
Make-up, powder	n.a.	n.a.	n.a.	2 - 10%	2 - 10%	2 - 10%
					+ not for powder	
Lipstick	n.a.	n.a.	0.01- 0.05%	1- 10%	1- 10%	10- 25%
Oil products	n.a.	n.a.	0.01- 0.05%	n.a.	n.a.	n.a.
Alcohol- based per- fumery prod.	5 - 20 ppm	n.a.	n.r.	n.a.	n.a.	n.a.
Detergent powder	0.005- 0.2%	0.005- 0.2%	n.a.	n.r.	0.01- 0.05%	n.a.
Fabric soft- ener	0.001- 0.002%	0.001- 0.002%	n.a.	n.a.	n.a.	n.a.

## DRAGOCOLOR®

registered trademark for foods as colorants and all → colorants made by Symrise GmbH & Co.KG.

## DRUG COLORING

→ coloring; regulated by EU directives and by the German ordinance on drug colorants. Only certain → food dyes are permitted. This also applies to products for external use. As of 1998, the following additives are currently **not** permitted: E 128, E 129, E 133, E 154, E 155. → Die Färbung v. Arzneimitteln in der Europäischen Gemeinschaft (Coloring Pharmaceutical Products in the European Community).

## DRUG LABEL WARNING DIRECTIVE

states that drugs which contain alcohol or the food dye → Tartrazine must have a warning label. Among other things, this measure protects allergy sufferers (→ allergy).

## DYES

organic → colorants (natural, nature-identical, or synthetic) which are dissolved in the medium to be colored. In the context of food, the term D. is used differently than in the German industry standard DIN 55944; in food, “dyes” refer to all substances that color, regardless of whether they are soluble or insoluble in fat or water (→ pigments and → lake colors). → Foods as colorants are not counted as dyes. Purely synthetic D. are artificial and do not occur in nature. These can be produced in nearly unlimited quantities as petrochemical prod. with high levels of purity, strong → color intensity, and consistent quality. The advantage they offer in comparison to → foods as colorants and → natural dyes is their stability to heat, light, and chemical influences, their potent colors, and their neutral taste. The following categories of dyes are among those used as synthetic food dyes: → azo dyes, → triarylmethane dyes, → quinophthalone dyes, → xanthene dyes, and → indigo dyes. Cosmetic dyes include a few additional kinds of dyes, such as → anthraquinone dyes, → nitroso dyes, and → phthalocyanine dyes.

## DYES USED TO MARK FOODS

C-dyes such as → Methyl Violet (C 2) were once used in Germany to stamp meat. The C-dyes are no longer permitted. In accordance with EC dir 94/36/EC, the following may be used as stamps for identification: E 155 → Brown HT 656798, E 133 → Brilliant Blue FCF 656601, E 129 → Allura Red AC 100304, or a mixture of E 133 Brilliant Blue FCF and E 129 Allura Red AC. To decorate eggshells or mark them with stamps, only → food dyes may be used.

## E-NUMBER

the common system of numbers assigned to → food additives in the EU. Food dyes have the numbers E 100 - E 180. The E. and the additive category are listed together on the → declaration on the list of ingredients in a food, e.g. “food coloring E 104.”

**EARTH PIGMENTS** → mineral pigments

### EC DIRECTIVES

regulate, among other things, the colorings added to foods (Dir 94/36/EEC, 95/45/EEC), drugs (Dir 78/25/EEC), and cosmetics (Dir 86/179/EEC). EU member states are obligated to apply directives to national law. The relevant directives concerning colorants and → carriers (Dir 95/2/EEC) can be found in the archives of the colorants division.

**EGGS** → dyes used to mark foods

**EINECS** abb. for European Inventory of Existing Commercial Chemical Substances

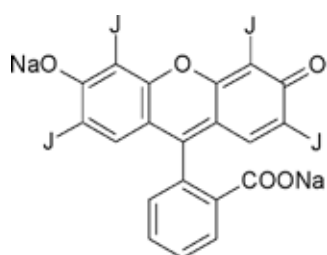
### EMULSIONS

O/W colored with w.-s. dyes, W/O with o.-s. dyes.

**ENOCYANIN** → anthocyanin

### ERYTHROSINE

(E 127, C.I. 45430, 656808) light red w.-s. → xanthene dye. **App.:** May only be used in the EU to color cherry preserves; → maximum limits must be observed. In pH 3 - 4 solutions, E. forms erythrosine acid, which is difficult to dissolve and therefore the only suitable dye that will color cherries in fruit salad without staining the juice as well. CAF 1, mouthwash.



**Erythrosine, C.I. 45430 (E 127)**

**EXPOSURE TEST** → lightfastness

### EXTINCTION

diminution of light by phenomena such as → absorption. The extinction of a dye solution depends on the concentration of the dye in solution, the length of the light path (e.g. the flask diameter), and a material constant specific to the dye or dye mixture being used. This constant, known as the specific extinction coefficient, indicates the intensity of the color of the dye or dye mixture. E. is measured at a defined wavelength of visible light using a → spectrophotometer.

The Beer-Lambert law can be used to determine the specific extinction coefficient, provided that extinction, concentration, and the length of the light path are known. (Concentration can, in turn, be calculated if extinction, the specific extinction coefficient and length of the light path are known.) → analytical chemistry → quality control → measurement of color

## EYE

seen from the perspective of optics, the eye consists of the pupil, vitreous body, and retina. The retina has rod cells for perception of light and dark and cone cells for color perception. There are different cone receptors for perception of red, green, and blue. If the different kinds of cones are all stimulated to the same extent, the optical nerve in the brain of the observer transmits a “non-colorful” sensation, namely white. When the blue and red receptors are stimulated at the same time, purple is perceived. The eye does not see yellow as a basic color, but as a combination that occurs when the red and green are reflected.

## EYE MAKE-UP

collective term for cosmetics that are used to give color to the area around the eye, such as eye shadow, eyebrow pencils, and mascara. Colored with → pigments and → lakes of CAF 1, e.g. → Ultramarine, → Heliogen Blue, → iron oxides.

**FD&C BLUE NO. 1** → Brilliant Blue FCF

**FD&C GREEN NO. 3** → Fast Green FCF

**FD&C RED NO. 4** → Ponceau SX

**FD&C RED NO. 40** → Allura Red AC

**FD&C YELLOW NO. 5** → Tartrazine

**FD&C YELLOW NO. 6** → Orange Yellow

## FD&C DYES

(abb. for food, drug & cosmetic) the dyes approved for use in food, drugs, and cosmetics in the US, in accordance with the → Code of Federal Regulations 21. Some are available in the DRAGOCOLOR® product range (see below). Used in the US only with a → FDA certificate. Numerous restrictions apply, e.g. use near the eyes not be permitted unless otherwise stated. → DRAGOCOLOR®-Farbmittel f. Kosmetika brochure

COLOR	PRODUCT NO.	ABBREVIATION/ COLOUR INDEX NR.	SOLUBILITY	CAF
blue	100301	FD&C Blue No.1C.C.I.42090	w.-s.	1
<b>Uses:</b> → Brilliant blue FCF				
yellow	656802	FD&C Yellow No.5 C.I.19140	w.-s.	1
orange	656803	FD&C Yellow No.6 C.I.15985	w.-s.	1
<b>Uses:</b> → Tartrazine, → Orange Yellow S				
green	656806	FD&C Green No.3 C.I.42053	w.-s.	1
<b>Uses:</b> → Fast Green FCF				
red	620093	FD&C Red No. 4	w.-s.	1
red	100295	FD&C Red No.40 C.I.16035	w.-s.	1
<b>Uses:</b> → Allura Red AC				

## FDA

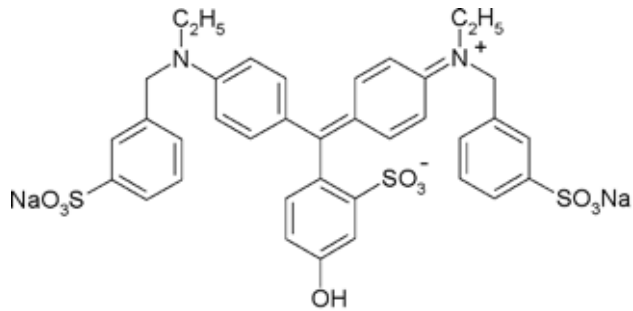
abb. for Food and Drug Administration (the regulatory body in the US)

## FDA CERTIFICATE

issued after a batch of the dye is analyzed at an → FDA laboratory. Every production batch must be tested individually. A test number is assigned (→ lot number). These are archived at the colorants division for DRAGOCOLOR® colorants.

## FAST GREEN FCF, FD&C GREEN NO. 3

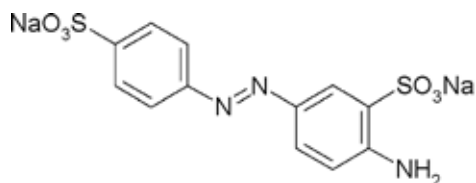
(C.I. 42053, 656806 FD&C) green w.-s. → triarylmethane dye. **App.:** CAF 1, e.g. mouthwash, deodorant products.



**Fast Green FCF, FD&C Green No. 3, C.I. 42053**

### FAST YELLOW

(previously E 105, C.I. 13015, 656800) yellow w.-s. → azo dye, no longer permitted for use in food in the EU. **App.:** CAF 1, body soap, syndet soap, shampoo, shower gel, bubble bath, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumery.



**Fast Yellow, C.I. 13015**

### FABRIC SOFTENER

colored with w.-s. dye and wdisp. pigm. → DRAGOCOLOR®-Farbmittel f. Sondergebiete brochure

**FAT BROWN B** → Ceres Brown B

### FAT DYES

(→ Sudan dyes, → Ceres dyes) → dyes that are soluble in fats, oils, and organic solvents. The EC cos. Dir. include only a few F. The DRAGOCOLOR® product range includes: 656873 Violet C.I. 60725\*, 656871 Green C.I. 61565 \*, 656870 Yellow C.I. 12700 \*, 656821 Chlorophyll (green) C.I. 75810, 656869 Brown C.I. 12010 \*, 656818 Carotene (yellow) C.I. 40800, 656816 Annatto (orange yellow) C.I. 75120 (\* also suitable for candles, waxes, and techn. oils).

**FAT RED G** → Sudan Red G

**FAT YELLOW G** → Sudan Yellow G

### FISH

salmon is most commonly colored with → Orange Yellow S and / or → Ponceau 4R. → Maximum limits must be observed in the EU.

## FISH ROE

(“imitation caviar”) colored with → Amaranth (red) or → Brilliant Black BN mixed with yellow, orange, or red dyes, since Brilliant Black by itself does not yield black coloring. → Maximum limits must be observed in the EU.

## FLAVONE DYES

important, naturally occurring dyes whose color results from the oxygen-containing flavone ring system; these include → anthocyanins

**FLAVOXANTHIN** → xanthophylls

**FLUORESCEIN** → uranin

## FLUORESCENT DYES

(→ uranin or → pyranine) not only absorb light within the visible area of the spectrum, resulting in the color that the observer perceives, but also reflect some of the absorbed light energy as radiant energy. The fluorescent effect is very appealing; however, the lightfastness of F. is usually limited over time.

## FOOD ADDITIVES

include → food dyes; F. are substances added to foods to influence their consistency or to bring about certain properties or effects. A substance is not considered a F. if it is of natural origin; chemically identical to the natural substance; generally used for its nutritional value, taste properties, or scent properties; or if it is used as a luxury good. Drinking water and mineral water are also excluded from this list, as is table salt.

## FOOD DYES

regulated in the EU by Dir. 94/36/EC. → Lebensmittelfärbung in d. Europäischen *Union* (Food Coloring in the European Union), DRAGOCOLOR® Food dyes brochure.

Synthetic food dyes usually exist in the form of sodium salts (with the exception of E 131, a calcium salt); potassium and calcium salts are also permitted, however, as are aluminum → lakes.

E-NUMBER	TRADE DESIGNATION	COLOR INDEX NUMBER	DRAGOCO PRODUCT NUMBER
E 100	→ Curcumin	75300	—
E 101 (i)	→ Riboflavin	none	115418 w.-s.
E 101 (ii)	→ Riboflavin-5´-phosphate	none	—
E 102	→ Tartrazine	19140	100296 w.-s., 656802 FD&C, 656828 Lake

E-NUMBER	TRADE DESIGNATION	COLOR INDEX NUMBER	DRAGOCO PRODUCT NUMBER
E 104	→ Quinoline Yellow	47005	100290 w.-s., 656829 Lake
E 110	→ Orange Yellow S Sunset Yellow FCF	15985	100291 w.-s., 656803 FD&C, 656831 Lake
E 120	→ Carmine	75470	656825 w.-s.
E 122	→ Azorubine, Carmoisine	14720	100293 w.-s., 656832 Lake
E 123	→ Amaranth	16185	100292 w.-s.
E 124	→ Ponceau 4R Cochineal Red A	16255	100300 70%, 656813 80%, 107043 Lake
E 127	→ Erythrosine	45430	656808 w.-s.
E 129	→ Allura Red AC	16035	100304 w.-s., 100295 FD&C
E 131	→ Patent Blue V	42051	100294 w.-s.
E 132	→ Indigotine	73015	100298 w.-s., 656827 Lake
E 133	→ Brilliant Blue FCF	42090	656601 w.-s., 100301 FD&C
E 140	→ Chlorophyll	75810	—
E 141 (i)	→ Copper chlorophyll complex	75810	656821 o.-s.
E 141 (ii)	→ Copper chlorophyllin complex	75815	100308 w.-s.
E 142	→ Brilliant Acid Green	44090	656805 w.-s.
E 150a	Plain → caramel	—	—
E 150b	Caustic sulphite → caramel	—	—
E 150c	Ammonia → caramel	—	656815 w.-s.
E 150d	Sulfite ammonia → caramel	— acid proof	103603
E 151	→ Brilliant Black BN	28440	100303 w.-s.

E-NUMBER	TRADE DESIGNATION	COLOR INDEX NUMBER	DRAGOCO PRODUCT NUMBER
E 153	→ Vegetable carbon	77268:1	—
E 154	→ Brown FK	—	—
E 155	→ Brown HT	20285	656798 w.-s.
E 160a (i)	→ Carotenes	75130	—
E 160a (ii)	→ Beta-carotene	40800	656818 o.-s., 656819 wdisp.
E 160b	→ Annatto	75120	656816 o.-s.
E 160c	→ Capsanthin	—	—
E 160d	→ Lycopene	—	—
E 160e	→ Beta-apo-8'-carotenal	40820	—
E 160f	→ Beta-apo-8-ethyl ester of carotene acid	40825	—
E 161b	→ Lutein	75136	—
E 161g	→ Canthaxanthin	40850	—
E 162	→ Beet Red	—	—
E 163	→ Anthocyanins	—	656824 w.-s.
E 170	→ Calcium carbonate	—	—
E 171	→ Titanium dioxide	—	656838 pigm.
E 172	→ Iron oxides and hydroxides	77491 Red 77492 Yellow 77499 Black	656836 pigm. 656835 pigm. 656837 pigm.
E 173	→ Aluminum	77000	—
E 174	→ Silver	77820	—
E 175	→ Gold	77480	—
E 180	→ Lithol rubine / Lithol rubine BK	15850:1	—

## FOODS AS COLORANTS

EC dir. 94/36/EC states that the definition of dyes does not extend to include “foodstuffs, whether dried or in concentrated form and flavourings incorporated during the manufacturing of compound foodstuffs, because of their aromatic, sapid or nutritive properties together with a secondary colouring effect, such as paprika, turmeric and saffron.” The foods that are most commonly used as colorants are beetroot, tomato juice, paprika extract, hibiscus, spinach, turmeric, grape juice and the juice of other strongly colored berries, carrot extract, and pure caramel (not to be confused with → caramel E 150a-d). The colors derived from the use of these foods are red, violet, orange, yellow, green, and brown. Variations of the color can only truly be achieved by altering the dosage, since reasons of taste limit the number of mixtures possible. In some cases the lack of color intensity mean that relatively large quantities of the colorant food must be added to the food in question so as to attain the correct coloration. In the course of doing so, undesired changes in taste may occur. Another factor that may restrict the range of uses of some foods as colorants is the low level of color stability that they may show.

→ DRAGOCOLOR® Food dyes brochure

## GELATIN CAPSULES

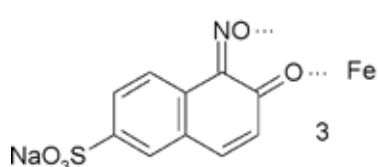
colored with w.-s. → food dyes or with legally permitted → lakes and → pigments.

## GOLD

(E 175, C.I. 77480, not in the DRAGOCOLOR® product range; inquiries about sources should be referred to the colorants division) gold-colored inorgan. → pigm. **App.:** decoration of bonbons, chocolates, and in liqueurs (“Danziger Goldwasser”). CAF 1; use not known.

## GREEN PLX

(C.I. 10020, not in the DRAGOCOLOR® product range) green w.-s. → nitroso dye. **App.:** CAF 3, e.g. body soap, syndet soap, shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.



Green PLX, C.I. 10020

## HAIR DYES

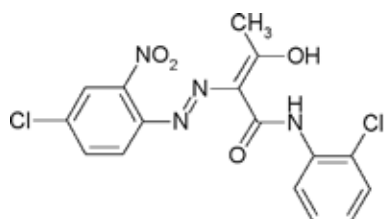
a distinction is made between permanent H. (oxidation dyes) which color the hair on a long-term basis, and semipermanent H., which only tone the surface of the hair and wash out over time. Oxidation dyes are not in the DRAGOCOLOR® product range.

## HANSA® PIGMENTS

→ azo pigments with acetoacetanilide and its derivatives as their coupling components. Some are permitted for cosmetic use.

### HANSA YELLOW 10G

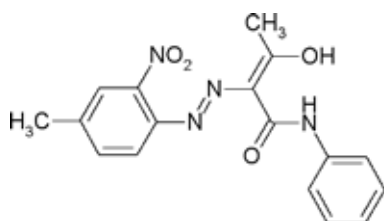
(C.I. 11710, no longer in the DRAGOCOLOR® product range) yellow → azo dye. **App.:** CAF 3, e.g. body soap, syndet soap.



Hansa Yellow 10G, C.I. 11710

### HANSA YELLOW G

(C.I. 11680, 656569) yellow → azo dye, also available in wdisp. form (656845). **App.:** CAF 3, e.g. body soap, syndet soap; wdisp. for body soap, syndet soap, shampoo, shower gel, liquid soap



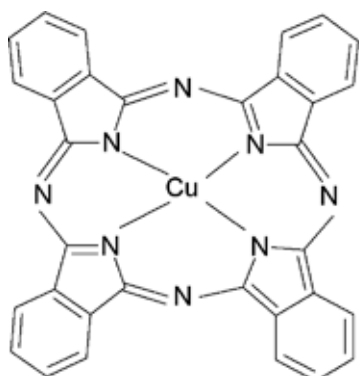
Hansa Yellow G, C.I. 11680

**HEALTH HAZARDS OF DYES** → consumer protection

**HEAVY METALS** → purity requirements

### HELIOGEN BLUE B, PHTHALOCYANINE BLUE

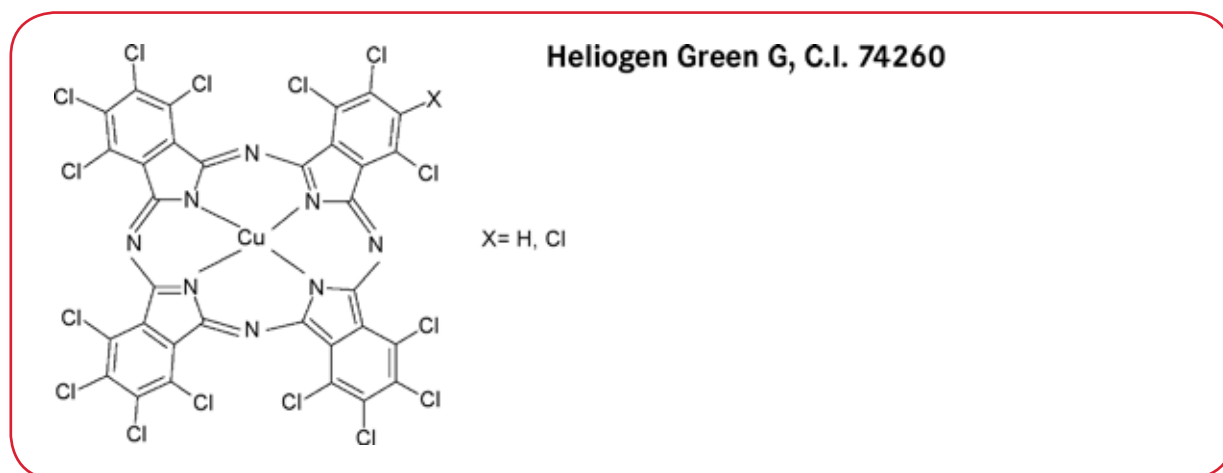
(C.I. 74160, 656568) blue → phthalocyanine pigm., also available in wdisp. form (656842). **App.:** CAF 1, pigm. (also as a paste, 656488) e.g. for toothpaste, body soap, eye make-up; wdisp. pigm. for body soap, syndet soap, shampoo, shower gel, liquid soap, dishwashing liquid, detergent (powder and liquid), fabric softener.



Heliogen Blue B, C.I. 74160

## HELIOGEN GREEN G, PHTHALOCYANINE GREEN

(C.I. 74260, 100379) green → phthalocyanine pigm., also commercially available in wdisp. form (656851). **App.:** CAF 2. Pigm. (also as a paste, 656558) used for body soap, syndet soap, toothpaste, detergent powder; wdisp. pigm. for body soap, syndet soap, shampoo, shower gel, liquid soap, dishwashing liquid, detergent (powder and liquid), fabric softener.



## ICE CREAM

colored with → foods as colorants or w.-s. → food dyes. → Maximum limit in the EU: 150 mg/kg ready-to-serve food.

## IDENTIFICATION

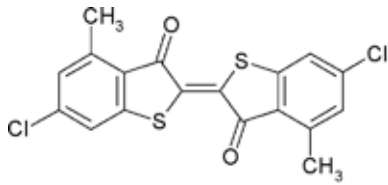
of colorants occurs using → chromatography or → spectroscopy. The absorption maximum determined via spectroscopy is only suited to I. purposes to a limited extent since overlapping absorption curves in dye mixtures can make it appear as if certain colors are present when they are not.

## INCI

abb. for International Cosmetic Ingredient Dictionary. The INCI designation of a cosmetic colorant is usually identical to the Colour Index Generic Name or, formerly, the → CTFA designation (for example → Tartrazine C.I. 19140 = C.I. Acid Yellow 23 or FD&C Yellow No. 5 for the colorant with → FDA certification). The → declaration of cosmetic colorants does not use the INCI designation but the → Colour Index number.

## INDANTHRENE BRILLIANT RED R, D&C RED NO. 30

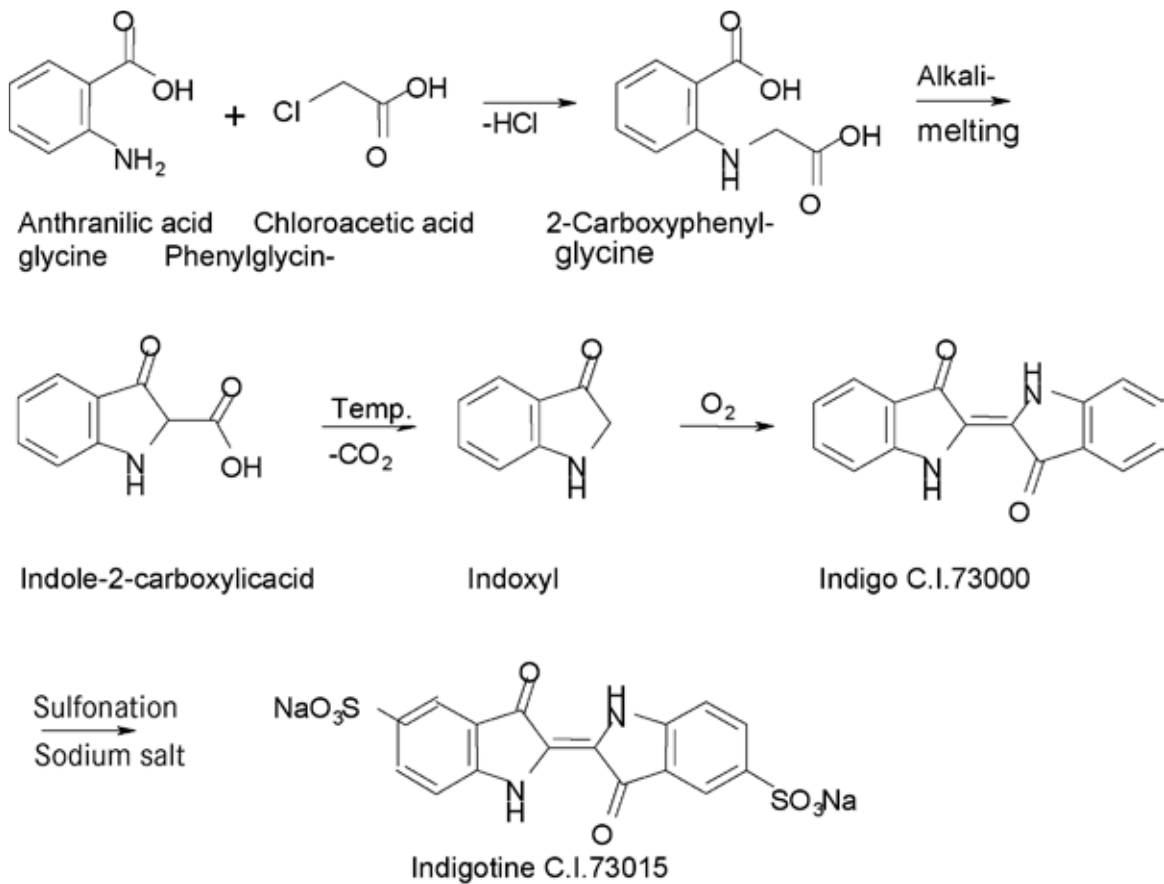
(C.I. 73360, 100383 D&C) red → indigo pigm. **App.:** CAF 1, e.g. make-up, powder, lipstick, also as paste for toothpaste (656263 15%, 656264 18%).



**Indanthrene Brilliant Red R, D&C Red No. 30, C.I. 73360**

## INDIGO DYES

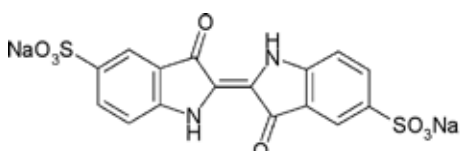
the only I. used as a food dye is → indigotine. Unlike the indigo that occurs naturally, indigotine contains two groups of sulfenic acid and is thus w.-s.



**Indigo synthesis according to Heumann**

## INDIGOTINE

(E 132, C.I. 73015, 100298) blue w.-s. indigo dye. **App.:** sweets, lake (656827) for coated tablets. → Maximum limits must be observed in the EU. CAF 1, e.g. mouthwash; lake for make-up, powder, lipstick.



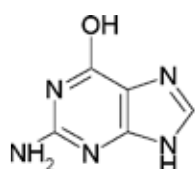
**Indigotine, C.I. 73015 (E 132)**

**INFRARED SPECTRUMS** → spectroscopy

**INSTANT PRODUCTS** → powdered drink mixes

### INTERFERENCE PIGMENTS

pearl essence (guanine) is the oldest interference pigment. The pearlescent materials most widely used in cosmetic applications (apart from bismuth oxychloride pigments) are mica platelets (→ mica) coated with → titanium dioxide or other → pigments. When light falls on interfacial boundaries, it is either reflected or absorbed. → Complementary colors are visible due to interference in the reflection or transmission of light, whereby the angle of observation determines which color is seen. Altering the angle of observation causes the changing play of color. The DRAGOCOLOR® product range contains pearlescent silver and gold of the titanium-dioxide-mica variety.

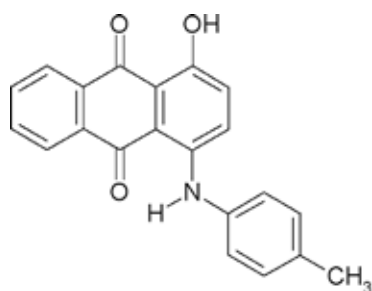


**Interference pigment Guanine (2-Amino-6-hydroxy-purin), C.I. 75170**

**IR SPECTRUMS** → spectroscopy

### IRISOL

(C.I. 60725, 656873) violet-blue o.-s. → anthraquinone dye. **App.:** CAF 1, oil prod.



**Irisol alcohol-soluble, C.I. 60725**

**IRON HYDROXIDES** → iron oxides

### IRON OXIDES, IRON HYDROXIDES

(Ferrous Oxide Red E 172, C.I. 77491, 656836; Iron Oxide Yellow, Iron Hydroxide, Iron Oxide Hydrate E 172, C.I. 77492, 656835; Ferrous Oxide Black E 172, C.I. 77499, 656837) inorgan. → pigments. In mixtures with each other and with → titanium dioxide, brown tones can be created (numerous prod. in the DRAGOCOLOR® product range). **App.:** sweets, coated tablets, and animal feed. CAF 1, body soap, syndet soap, make-up, powder, lipstick.

## JAPAN

there are some significant differences between the EU and Japan in terms of the food dyes and cosmetic dyes used; this is due to historic reasons.

## LD50

a means of measuring the toxicity (lethal dose) of a product. Indicated in mg/ kg body weight. LD50 500 mg/ kg means that at this dose, 50% of the animals tested (usually rats) died. Chemicals with LD50 > 2000 mg/ kg are not considered toxic; these include all → food dyes and → cosmetic dyes.

## LABELING CONTAINERS OF DYE

regulated by EC Directives. The following must be indicated on the label: name of the manufacturer or deliverer; date of manufacture or date on which dye was brought into circulation; some information to identify the batch; the words “food dye”; a list in decreasing order of the ingredients by weight, the names and E-numbers of the dyes, carriers, or solutions; and if the products contain components for which there are → maximum limits, the quantity in percent of each component for which such a restriction exists. If this restriction affects a group of components, the total percentage can be stated as a single value. **All of the DRAGOCOLOR® food dye product descriptions comply with these standards.** There are no legal guidelines about labeling containers of cosmetic dyes. For safety reasons, the → Colour Index number and → cosmetic application field are listed on the labels of DRAGOCOLOR® cosmetic colorants.

**LACTOFLAVIN** → riboflavin

**LAKES (LAKE COLORS)** → pigments created when a precipitant causes precipitation of a dye in solution; these pigments can also contain substrate, which is usually aluminum hydroxide in the aluminum lake colors from → food dyes.

## LIGHTLY

the naturally occurring or artificially generated radiant energy of the spectral range within 350-750 nm ( nm → nanometer).

## LIGHTFASTNESS

Stability of a dye in the presence of light. Suntest® rapid UV exposure systems are often used for testing lightfastness. Exposing the product (in its original packaging if possible) to two Osram Ultra Vitalux lamps (300W, 220-230 V, E 27) at a distance of 40 cm from the sample provides a simple method for testing. (This yields a light intensity of 5000 lx; the light intensity on a mid-summer day, by comparison, is approx. 100,000 lx). The test lasts for 72 hours; results are evaluated a) using a spectrophotometer and b) by visually comparing the sample to a freshly dyed standard. Initial intensity of the color = 100%. Rating system: 80 – 100% of the initial intensity = excellent; 60 – 80% = good; 50 – 60% = still usable; < 50% = unsatisfactory.

## LIPSTICK

colored with → pigments and → lakes; → phloxine is also used to create a long-lasting colorant for the lips. → recommended dosages

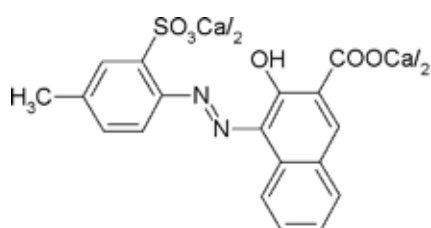
## LIQUID SOAP

the dyes that are especially suited include → Brilliant Blue FCF 656601, → Patent Blue V 100294, → Quinoline Yellow 100290, → Tartrazine 100296, → Fast Yellow 656800, → Alizarine Cyanine Green w.-s. 656555, → Allura Red 100304, → Amaranth 100292, and → Brilliant Black BN 100303, in → mixtures as well.

**LISSAMIN GREEN BS** → Brilliant Acid Green BS

## LITHOL RUBINE BK

(E 180, C.I. 15850:1, calcium salt, 656572) red → azo pigm., **App.:** in the EU, the only food application is coloring cheese rinds. CAF 1, make-up, powder, lipstick.



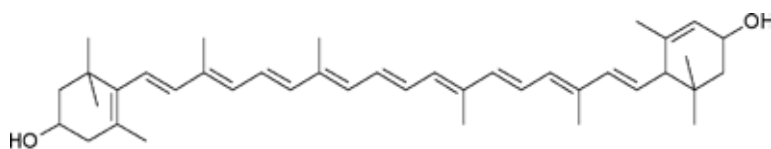
**Lithol Rubine BK, C.I. 15850:1**

## LOT NUMBER

test number assigned by the → FDA to identify a batch of colorant. The number consists of 2 letters and 4 digits, such as AH 2245. Must be indicated whenever colored products are exported to the US.

## LUTEIN, XANTHOPHYLL

(E 161b, C.I. 75136, not in the DRAGOCOLOR® product range) yellow to orange o.-s. → carotenoid; lent the group of → xanthophylls its name. Not commercially available in its pure form, but as a component of plant extracts in a mixture with other carotenoids. **App.:** fats and oils; CAF 1, use not known.



**Lycopene, C.I. 75125 (E 160d)**

## **MAKE-UP**

colored with → pigments and → lakes. → recommended dosages

**MALVIDIN** → anthocyanin

## **MARGARINE**

colored with → carotenes, → curcumin (both → quantum satis), and → annatto (max. limit 10 mg/kg in the EU).

**MARZIPAN** colored with w.-s. → food dyes.

**MASCARA** colored with → pigments and → lakes. → recommended dosages

## **MATERIAL SAFETY DATA SHEETS**

contain the safety-relevant data about a given product. In the case of dyes, serves as product documentation along with the → specification.

## **MAXIMUM LIMITS**

the use of food dyes in foods is regulated by EC directive 94/36/EC; quantities vary by food. M. refer to a) the pure (100%) dye and to b) one 1 kg or liter of the ready-to-serve food.

## **MEASUREMENT OF COLOR**

the use of → spectrophotometers has become the standard for measuring colors of liquids and transparent products. Measurements are carried out in the visible spectrum at wavelengths of 350 to 750 → nanometers (nm); → spectroscopy. If the curve plotted by the spectrophotometer matches that of a standard in terms of both the shape and the strength of the signal at the absorption maximum, both the shade and intensity of the sample are equal to that of the standard. This is only true if both sample and standard are measured at the same wavelength and if both contain a chemically identical dye with the same optical absorption spectrum. These conditions are met by manufacturers operating with standard formulations and according to standard manufacturing guidelines. Differences detected in color indicate coloring errors (too much or too little dye, missing color components, components added in incorrect proportions, incorrect components). With a little practice, the spectrum can be used in cases like this for determining error components, such as the quantity of material involved. → extinction. The color of non-transparent or insoluble products (such as powders, coated tablets, or pastes) is measured by means of either spectral analysis or tristimulus methods (measurement of the spectral reflectance of a standard illuminant). In the international → CIE Lab\* color system, measured reflectance values can be broken down into the following three numerical values: L is a measure of sample brightness, whereby larger numbers indicate brighter samples; a indicates the position of the color on the red-green axis; and b indicates the position of the color on the blue-yellow axis.

$\Delta E$  is a measure of the difference in color between the sample and the standard, and is calculated using a color difference formula. Modern colorimeters perform all of these calculations automatically. Products are released when the difference in color between sample and standard falls within specific, numerically defined tolerances.

**MEAT STAMPS** → dyes used to mark foods

### METAL COMPLEX DYES

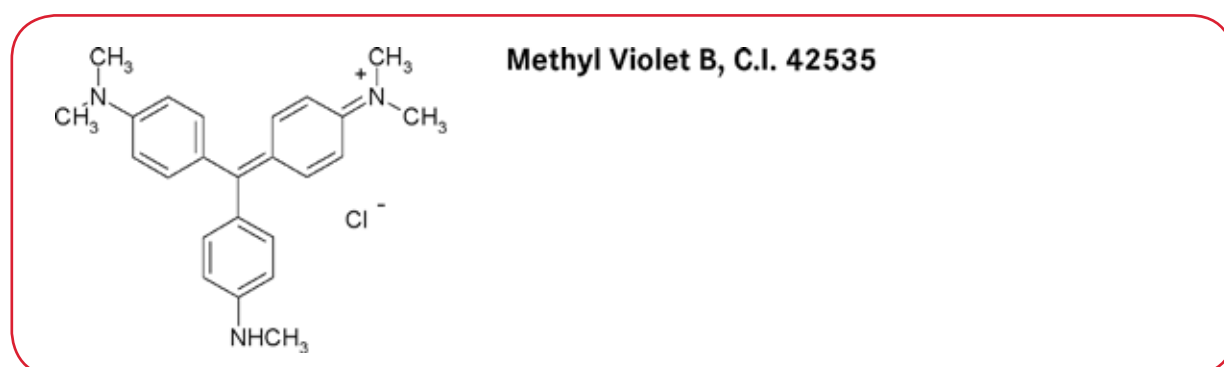
dyes which contain a complex-bound metal atom, such as → chlorophyll (magnesium), copper chlorophyll (copper), → phthalocyanine blue (copper), or the colorant in blood, hemoglobin (iron). The classic chromium or cobalt M. are not represented among dyes for food and drugs.

### METAMERISM

(metamere: similar to a limited extent) an example would be colors that look identical in daylight and clearly different under artificial light.

### METHYL VIOLET B

(C.I. 42535, no longer in the DRAGOCOLOR® product range) violet, cationic, w.-s. dye. **App.:** once used as a stamp to mark meat; no longer permitted in the EU.



### MICA, MUSCOVITE

(C.I. 77019, part of the DRAGOCOLOR® product range as a component of the interference pigments) white to opaque inorganic → pigm. → Interference pigments result when coated with → titanium dioxide. **App.:** decorative cosmetics.

### MINERAL PIGMENTS, EARTH PIGMENTS

outdated term for inorganic → pigments which were once obtained from quarries (example: “Terra di Siena,” an → iron oxide pigment classically used in painting). To ensure a constant → color intensity and low levels of heavy metals, M. are now usually produced synthetically.

## MIXTURES OF COLORANTS

in addition to the → colorants listed in this dictionary, the DRAGOCOLOR® product range also contains some 250 mixtures of colorants for a wide variety of applications. Selecting different dosages and nuances of colorants can create several thousand different color tones. The color theories apply here that are familiar to us from painting, e.g. blue + yellow = green, red + yellow = orange, red + blue = violet, blue + yellow + red = brown to black.

## MONASCUS

dye in red fermented rice. **App.:** used in Asian countries to color such products as ham, sausage, protein prod., beverages. Not registered in the EU.

**MUSCOVITE** → Mica

## NANOMETER

abb. nm) unit of measurement for the wavelength of light. 1 nm = one-millionth of a millimeter (mm).

**NAPHTHOL RED S** → Amaranth

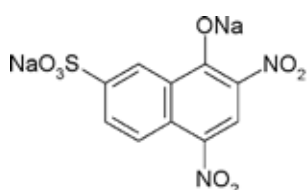
**NAPHTHOL YELLOW S** → nitro dyes

## NATURAL DYES

the most frequently occurring dyes in nature are → **chlorophylls**, the leaf green dyes found in all plants; → **anthocyanins**, which are found in many berries and belong to the → **flavone** dyes; and → **carotenes** (alpha, beta, and gamma) and their derivatives, → **carotenoids**. Other substances that are of importance in dyeing foods: → **riboflavin** (lactoflavin, vitamin B2) and its phosphate; → **curcumin**; betanin, the dye found in → **beetroot**; and the colorant obtained from a certain kind of scale insect, → **carmine**, or the w.-s. carminic acid. The uses of N. have proven to be limited in general, regardless of whether they occur in foods, are isolated from them (e.g. chlorophyll), or obtained from non-food products (→ carmine). They often show inadequate stability against light and temperature and react extremely sensitively at certain pH levels or pH fluctuations.

## NITRO DYES

a small group of yellow or orange w.-s. → acid dyes in which the nitro group (-NO<sub>2</sub>) represents the colorant (chromophoric) molecular group. N. are not used as food dyes with the exception of the cosmetic dye **Naphthol Yellow S** (C.I. 10316, no longer in the DRAGOCOLOR® product range).



**Nitro dye Naphthol Yellow S, C.I. 10316**

## NITROSO DYES

a small category of dyes in which the nitroso group (-NO) represents the colorant (chromophoric) molecular group. N. are not used as food dyes; two N. serve as cosmetic dyes. (→ Pigment Green B and → Green PLX).

**NM** → nanometer

**NO-ADVERSE-EFFECT LEVEL** → ADI level

## NOODLES

green noodles are colored with spinach, and black ones are colored with → sepia, a secretion of cuttlefish.

**NORBIXIN** → Annatto

## OIL BATHS

colored with → fat dyes, e.g. → Alizarine Cyanine Green f.-s. 656871 or → Irisol 656873. → recommended dosages.

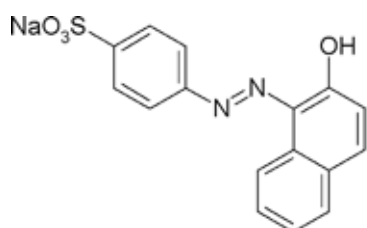
**OPTICAL BRIGHTENER** → UV absorber

## ORAL CARE PRODUCTS, DENTAL CARE PRODUCTS

colored with → cosmetic dyes (CAF 1 and 2); toothpastes colored with → pigments (especially → titanium dioxide 656838, ⇒ Phthalocyanine Blue 656568 and Green 100379, and → Indanthrene Brilliant Red 100383; because of the strong tendency to form dust during processing, also available as pastes in the DRAGOCOLOR® product range), toothpaste gels and mouthwashes with w.-s. dye (e.g. → Brilliant Blue FCF 656601, → Allura Red 100304, → Quinoline Yellow 100290, → Fast Green FCF 656806).

## ORANGE II, D&C ORANGE NO. 4

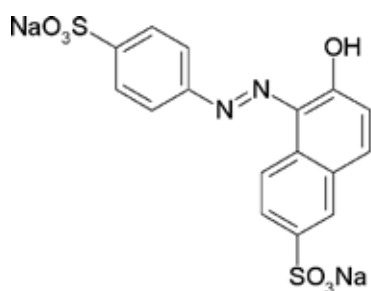
(C.I. 15510, 656852, and 656853 D&C) orange w.-s. → azo dye. **App.:** CAF 2, alcohol-based perfumery, body soap, syndet soap, shampoo, shower gel, bubble bath, liquid soap, multi-purpose cleanser, dishwashing liquid.



Orange II, C.I. 15510

### ORANGE YELLOW S, SUNSET YELLOW FCF, FD&C YELLOW NO. 6

(E 110, C.I. 15985, 100291, 656803 FD&C) orange w.-s. → azo dye. **App.:** beverages, sweets, desserts, ice cream, fruit preserves, canned or packaged fish, lake (656831) used in coated tablets; → maximum limits must be observed in the EU. CAF 1, e.g. shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes; lake (656831) used in make-up, powder, lipstick.



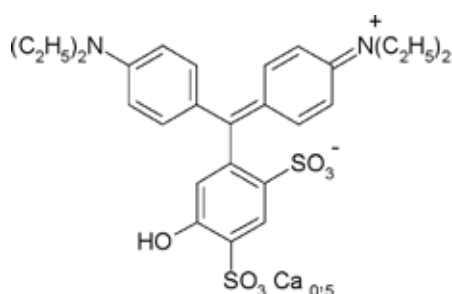
Orange Yellow S, FD&C Yellow No. 6, C.I. 15985 (E 110)

**OXIDATION HAIR DYES** → hair dyes

**PATENT BLUE AE** → Brilliant Blue FCF

### PATENT BLUE V

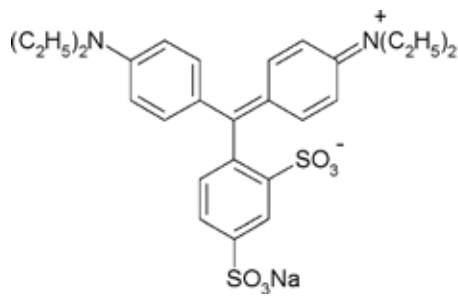
(E 131, C.I. 42051, 100294) blue w.-s. → triarylmethane dye, sensitive to acids: color changes to green. **App.:** beverages, sweets. → Maximum limits must be observed in the EU. CAF 1, e.g. tooth-paste gel, mouthwash, alcohol-based perfumery, shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.



Patent Blue V, C.I. 42051 (E 131)

### PATENT BLUE VF, AMIDO BLUE VF

(C.I. 42045, 656477) blue w.-s. → triarylmethane dye. **App.:** CAF 3, e.g. shampoo, shower gel, bubble bath, liquid soap, multi-purpose cleanser, dishwashing liquid.



**Patent Blue VF, C.I. 42045**

**PEARLESCENT PIGMENTS** → interference pigments

**PELARGONIDIN** → anthocyanin

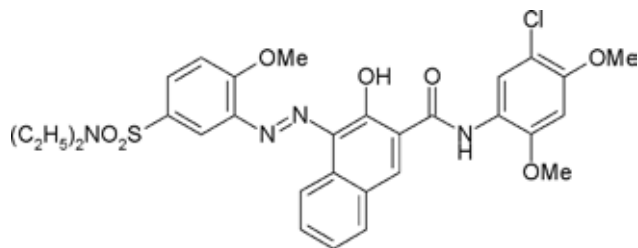
**PEONIDIN** → anthocyanin

**PEPPER EXTRACT** → capsanthin

**PERMANENT CARMINE FB**

(C.I. 12490, 100380) red → azo pigm., also commercially available in wdisp. form (656595).

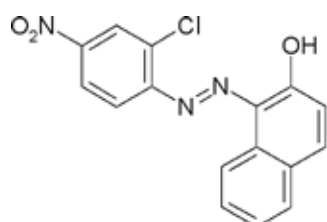
**App.:** CAF 1, e.g. make-up, powder, lipstick; wdisp. used for body soap, syndet soaps, shampoo, shower gel, liquid soap, detergent powder, and fabric softener.



**Permanent Carmine FB, C.I. 12490**

**PERMANENT RED R**

(C.I. 12085, 656575) yellow-reddish → azo pigm., **App.:** CAF 1, e.g. make-up, powder, lipstick; → maximum limit in cosmetic products is 3% in the EU. Only limited use in soaps, since the pigm. turns brown in this medium.



**Permanent Red R, C.I. 12085**

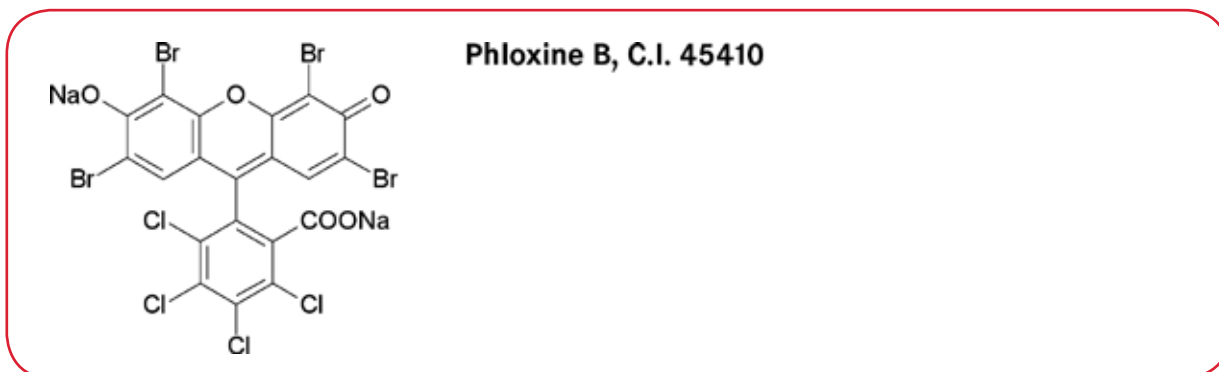
## PERMISSIBILITY STATUS OF DYES FOR FOODS, DRUGS, AND COSMETICS

regulated in a unified manner within the EU. Outside of the EU, widely varied national regulations exist, see → Japan, → USA. For detailed international information, see → G. Otterstätter, Coloring of Food, Drugs, and Cosmetics, New York: Dekker, 1999.

→ anthocyanin

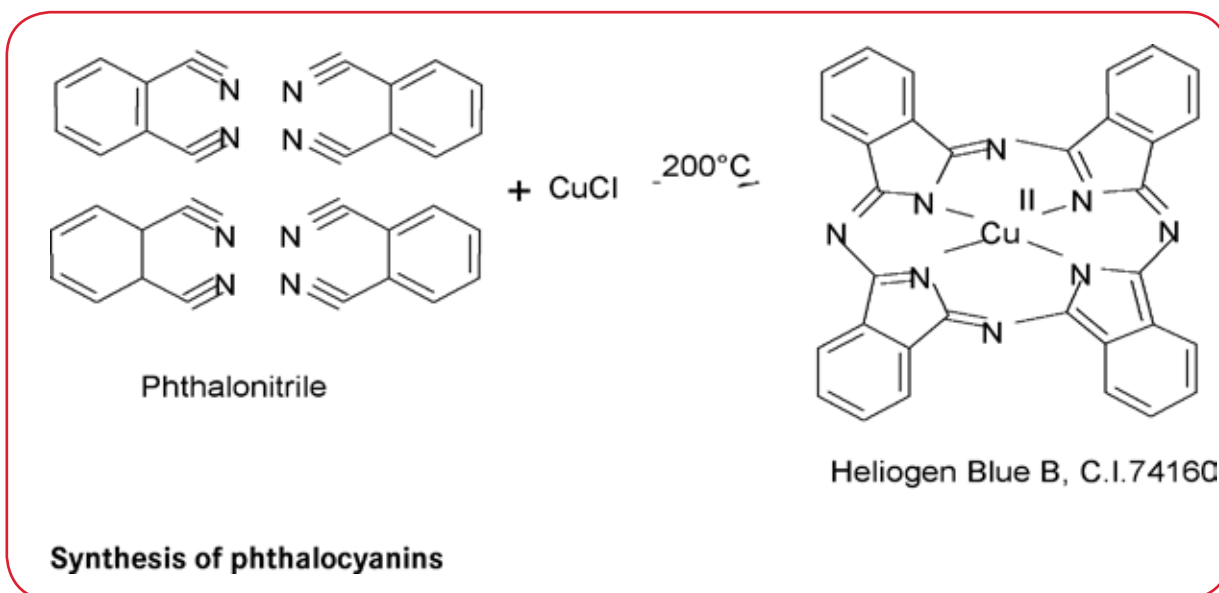
## PHLOXINE

(C.I. 45410, 656858) red, fluorescent w.-s. → xanthene dye. **App.:** CAF 1, lipstick.



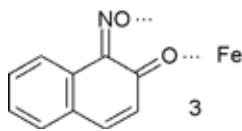
## PHTHALOCYANINS

group of dyes that is related to → chlorophylls in its chemical structure. Features very good → lightfastness and stability to acids and alkalines. The most important members of this group that are used in cosmetics are → Heliogen Blue and → Heliogen Green G.



## PIGMENT GREEN B

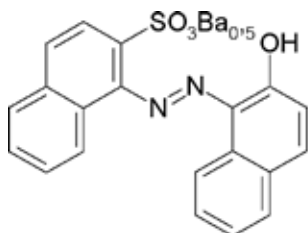
(C.I. 10006, no longer in the DRAGOCOLOR® product range) green → nitroso pigm., also commercially available in wdisp. form. **App.:** CAF 4, e.g. body soap, syndet soaps, shampoo, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, detergent powder, fabric softener.



**Pigment Green B, C.I. 10006**

### PIGMENT RED 49:2

(C.I. 15630:2, calcium salt, not in the DRAGOCOLOR® product range) red → azo pigm. **App.:** CAF 1, make-up, powder, lipstick.



**Pigment Red, C.I. 15630:1**

### PIGMENTS

inorgan. or organ. → colorants of natural or synthetic origin that are nearly insoluble in the medium to be colored. Its coloring effects are achieved by even particle distribution in the medium or product. The inorganic pigments used to color foods are → calcium carbonate, → titanium dioxide, → iron oxides and hydroxides, → aluminum, → silver, and → gold. In cosmetics, both inorg. P. and organ. P. are used. → wdisp. pigments are products that can be processed like w.-s. dyes.

### PILLS

adding dry w.-s. dyes does not bring about any color. The pill mass or a part of it must be sprayed with dye solution, dried, and then shaped into pill form.

**PLANT DYES** → natural dyes

**PLATELETS** → mica

### POLYAMIDE METHOD USES

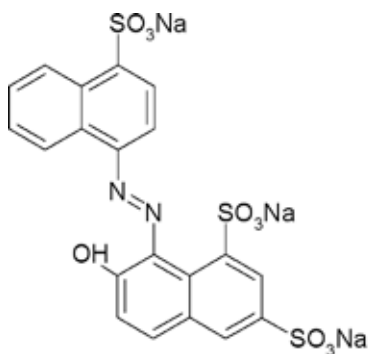
→ **adsorption as a means of isolating dyes from colored products.** The dye can be separated from other components because it remains attached to the polyamide. It is later separated from the polyamide and identified via → chromatography or → spectroscopy.

### POLYENE DYES

contain several conjugated carbon double bonds (conjugated = alternating between double and single bonds: -C=C-C=C- etc. ). Compounds with four or more double bonds appear colored. → Carotenoids are the most important members of this class of dyes.

### PONCEAU 4R, COCHINEAL RED A

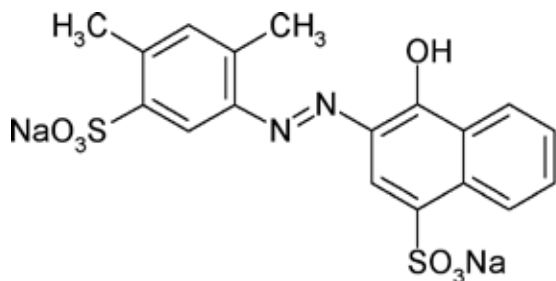
(E 124, C.I. 16255, 100300) red w.-s. → azo dye, not to be confused with natural cochineal → Carmine, which has a similar color tone to → Allura Red. **App.:** beverages, sweets, desserts; → maximum limits must be observed in the EU. CAF 1, e.g. shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes.



**Ponceau 4R, Cochineal Red A, C.I. 16255 (E 124)**

### PONCEAU SX, FD&C RED NO. 4

(C.I. 14700, 620093 FD&C) red w.-s. → azo dye. **App.:** CAF 1, e.g. shampoo, bubble bath, shower gel, liquid soap.



**Ponceau SX (FD&C Red No. 4), C.I. 14700**

### POWDERED DRINK MIXES

colored with w.-s. → food dyes. Occasionally dyes with particularly small granules are used (< 0.3 mm) (DRAGOCOLOR® instant dyes); discuss with the colorants division as needed.

**PUBLIC DISCUSSION** → consumer protection

### PURITY REQUIREMENTS

1) **Food dyes:** Purity requirements developed between 1962 and 1964 by the EC and adopted into the 1984 German additives ordinance, which is now outdated.

The EU developed new dye specifications (EC Dir. 95/45/EC) based on those used by international research organizations. These specifications have been adapted to modern manufacturing and analysis methods. All dyes are described according to a predefined system, which includes the dye's synonyms and a definition, followed by its classification, Color Index number, EINECS number, its chemical name, its overall chemical formula, molecular weight, the amount of pure dye it contains, and its features (such as appearance of the dye solution, absorption maximum, specific rotation). This is followed by the actual purity requirements (such as components that are insoluble in water, additional dyes, organic compounds other than dyes, unsulfonated primary aromatic amines, and components that can be extracted with ether). All purity requirements have been adapted to individual dyes and contain only those requirements that are relevant to the dye in question. Limits on heavy metal content are common to nearly all dyes: arsenic = 3 mg/kg max.; lead = 10 mg/kg max.; mercury = 1 mg/kg max.; cadmium = 1 mg/kg max.; heavy metals (as Pb) = 40 mg/kg max. Experience has shown that the amount of heavy metals in dyes generally lies well below these maximum values.

**2) Cosmetic dyes** which also have served or do serve as food dyes (e.g. → Fast Yellow) must fulfill the purity requirements for food dyes. The cos. ordinance outlines specific purity requirements for a few other colorants. These do not address heavy metals; instead, they focus on traces of organic starting materials and by-products that might be found in the colorant in question. **There are no purity requirements for the majority of cosmetic colorants.** Since most cosmetic colorants are only to be found in very slight amounts in cosmetic products (→ recommended dosages), a German legislature did not see a need for regulatory measures and instead limited the content of heavy metals in the cosmetic **final product**. A theoretical example: a dosage of 500 g dye per ton of shampoo (a very intense coloration). At an arsenic content of 200 mg/kg (an unrealistic and thoroughly exaggerated example), 500 g of dye would contain 100 mg of arsenic. These 100 mg are distributed among 1000 kg shampoo, i.e. the dye would give the shampoo an arsenic content of 0.1 mg/kg = 0.1 ppm. The permitted arsenic content in a cosmetic product is 5 ppm. Therefore it can be seen that an assessment of heavy metal content in cosmetic colorants is only necessary in rare cases. **3) Cosmetic products;** heavy metals: arsenic 5 mg/kg max., antimony 10 mg/kg max., lead 20 mg/kg max., cadmium 5 mg/kg max., mercury 1 mg/kg max. (German Federal Gazette 28 No. 7, July 1985). Nickel 10 mg/kg max. (German Federal Gazette No. 7, 1992). Heavy metal content in toothpaste: arsenic 0.5 mg/kg max., antimony 0.5 mg/kg max., lead 1.0 mg/kg max., cadmium 0.1 mg/kg max., mercury 0.2 mg/kg max. (German Federal Gazette 33 No. 4, July 1990).

## PROCESSING INFORMATION

**1) Soluble dyes:** Usually 10 to max. 50 g of dye are dissolved in one liter of hot water to process **w.-s.** dyes. It must be noted that the appearance of a dye powder (→ aspect), whether in individual dyes or mixtures of dyes, is normally **not** identical to the color of the solution and can vary from batch to batch. A comparison with the color standard must thus be performed by comparing the dye solutions (concentration of 1 g/l, for example).

**O.-s.** dyes are dissolved in the oil that is used in the formulation of the product being manufactured. The dosage of the dye in the finished product usually amounts to 20 - 500 g/ t and can be varied as desired, provided that legislature has not set any maximum limits. Care must always be taken that the dye used is completely dissolved before being added to the product being developed. If necessary, this can be monitored by filtering the stock solution.

**2) → Pigments and → lakes** are insoluble → dyes which achieve their colorant effect by being evenly distributed throughout the final product. Optimal processing of the dye and the desired color saturation can be ensured by means of appropriate technical equipment.

**3) → Wdisp. pigments:** Unlike pure pigments, W. contain a dispersion agent which makes it possible to process these colorants like w.-s. dyes. The use of cold water is recommended. Whereas w.-s. dyes form a clear dispersion, wdisp. pigm. yield a cloudy dispersion and an opaque solution. This is of no relevance in processing, however.

**PRODUCT DEVELOPMENT** → coloring

### **PRODUCT LABELING**

when indicating the dyes that are present in a food, a distinction must be made between → labeling containers of dye that are to be delivered to the food manufacturer and the → declaration of dyes on the package of a given food.

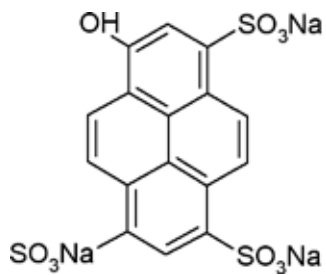
**PRODUCT SPECIFICATION** → specification

### **PROPERTIES**

the P. of dyes and their color, chemical behavior, and colorfastness are determined by their basic chemical structure and the group of atoms that give it color, the → chromophore, such as the azo group. → Azo dyes, for example, are sensitive to reductants (such as ascorbic acid) since they influence the azo group and can cleave it under unfavorable circumstances. This in turn brings about the complete decolorization of the product. The presence of electron-releasing, auxochrome groups (e.g. -OH, -NH<sub>2</sub>, -COOH, -SO<sub>3</sub>H) and electron-attracting, anti-auxochrome groups (e.g. =C=O) is also of importance. Introducing these atom groups into the colorant molecule brings about a shift in color towards yellow-red-violet-blue or vice versa. All synthetic → food dyes are w.-s. → acid dyes whose functional groups – the sulfonic acid group (-SO<sub>3</sub>H) or the carboxyl group (-COOH) – cause water solubility.

### **PYRANINE, D&C GREEN NO. 8**

C.I. 59040, 656533, and 656847 D&C) green fluorescent w.-s. pyrene dye. **App.:** CAF 3, e.g. body soap, syndet soap, shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dish-washing liquid.



**Pyranine, D&C Green No.8, C.I. 59040**

### QUALITY CONTROL OF COLORED PRODUCTS

in manufacturing, often performed by comparing the sample to be tested with a standard. This can only be done with the eye or the use of suitable equipment (→ colorimetry). A sight-based comparison is prone to subjective influences and is highly dependent on the tester's ability and discernment. Methods which involve an objective, quantifiable result (→ spectroscopy) are to be given definite preference.

### QUANTUM SATIS

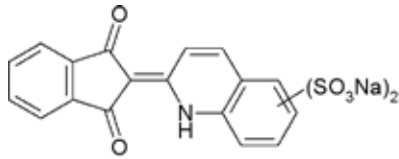
means that EC Directives do not specify a maximum limit of a dye in a food. However, it is expected that "additives shall be used in accordance with good manufacturing practice, at a level not higher than is necessary to achieve the intended purpose and provided that they do not mislead the consumer." → truth-in-packaging legislature

### QUASI-DRUGS

a special category of products in Japan; also dyed with cosmetic colorants. Q. include prod. for prophylactic treatment of nausea, other kinds of malaise, bad breath, or body odor; prod. for prophylactic treatment of heat rash, raw skin, or similar complaints; prod. for prophylactic treatment of hair loss, to stimulate hair growth or hair removal; hair dyes, permanent waves; prod. that have cosmetic effects towards prophylactic treatment of pimples, chaffed skin, itchy skin, rashes, frostbite, or combination skin and mouth disinfectants; bath treatments (separate from cosmetic bath prod.).

### QUINOLINE YELLOW

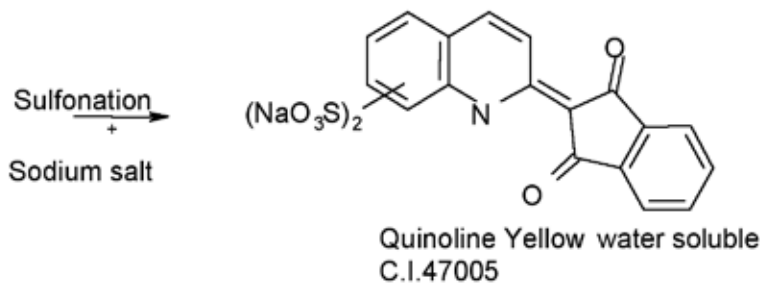
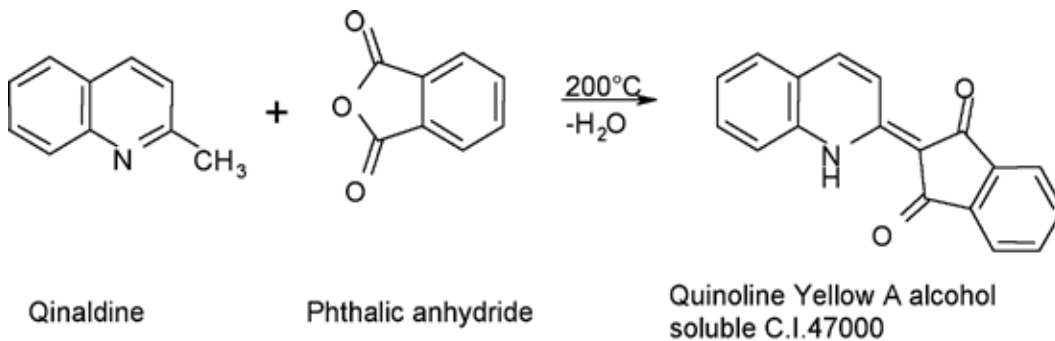
(E 104, C.I. 47005, 100290) yellow w.-s. → quinophthalone dye. Due to a different composition in the mixture of isomers (mono-, di-, and trisulfonic acids), it is not identical to → D&C Yellow No. 10 (656804) in spite of the fact that both have the same Colour Index number. To replace → Tartrazine, a trace of → Orange Yellow must be added to Q. **App.:** beverages, sweets, desserts, ice cream, fruit preserves, canned or packaged fish, lake (656829) used in coated tablets; → Maximum limits must be observed in the EU. CAF 1, e.g. shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes; lake (656829) used in make-up, powder, lipstick.



**Quinoline Yellow, C.I. 47005 (E 104)**

### QUINOPHTHALONE DYE

reaction prod. of quinoline derivatives and phthalic acid derivatives. The only Q. used as a food dye is → Quinoline Yellow.



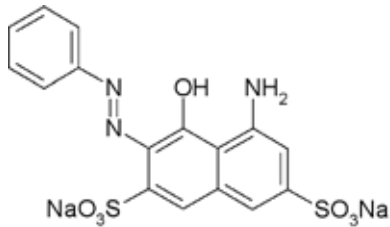
### Synthesis of a quinophthalone dye

### REACTIVE DYES

contain (in addition to their color components) special reactive residues called reactive components (such as cyanuric chloride); these anchor the dye to the textile fiber. R. have excellent fastness properties. There are no R. among the food and cosmetic dyes. The DRAGOCOLOR® product range contains a few R. for techn. colorations, e.g. → cleansers.

### RED 10B, D&C RED NO. 33

(C.I. 17200, 656855 and 656855 D&C) red w.-s. → azo dye, **App.:** CAF 1, e.g. shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes.

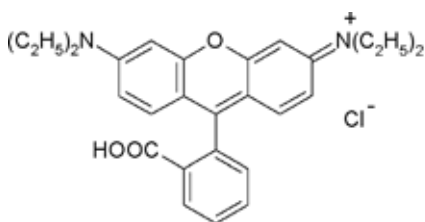


**Red 10B, D&C Red No. 33, C.I. 17200**

**RETINA** → eye

### RHODAMINE B

(C.I. 45170, no longer in the DRAGOCOLOR® product range) red fluorescent → xanthene dye. No longer permitted for cosmetic use in the EU. Used at one time in tenside prod. and soaps; can be replaced by → Sulforhodamine B.



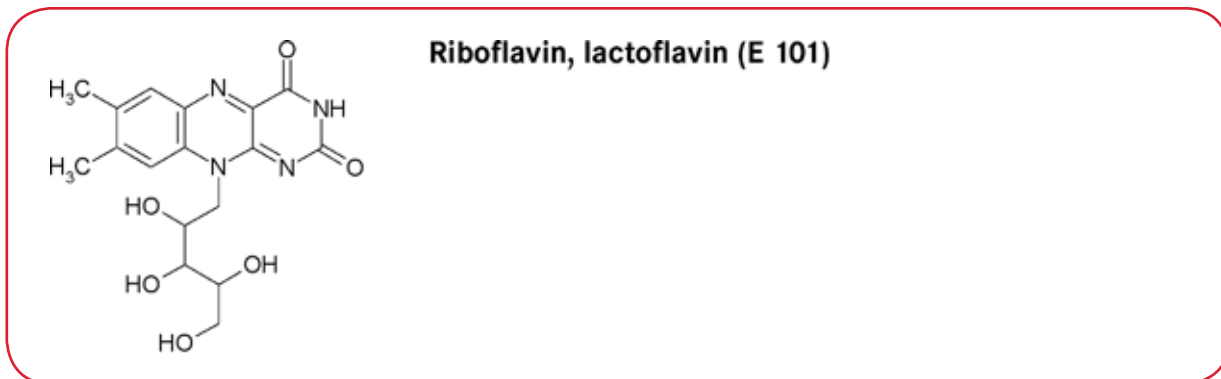
**Rhodamine B, C.I. 45170**

**RHODOXANTHIN** → xanthophylls

### RIBOFLAVIN, LACTOFLAVIN

(E 101i, no C.I., 115418) is yellow **vitamin B2**. Unlike o.-s. carotenoids, riboflavin is not easily soluble in water. Occurs commonly in flora and fauna, primarily in meat, liver, kidney, milk, eggs, yeast, and vegetables.

Involved in metabolism as a phosphoric acid ester. Riboflavin is manufactured synthetically on a large scale. The same applies to **riboflavin-5'-phosphate-sodium** (E 101ii), which is much more water-soluble than riboflavin and therefore offers many application possibilities. Both dyes are quite stable to heat and oxygen but are very sensitive to light in aqueous milieus.



**ROD** → eye

**RUBIXANTHIN** → xanthophylls

### **RUTILE**

crystal modification of → titanium dioxide; → anatase

### **SAFETY ASSESSMENT**

All components of food dyes and cosmetic colorants in the DRAGOCOLOR® product range are listed in Appendix IV of EC Dir. 93/35/EC to the 6th amendment of EC Dir. 76/768/EC (EC cosmetic Dir.). A summary of the biological-toxicological studies of food dyes and cosmetic colorants of the EU was published in Kosmetische Färbemittel/ Farbstoffkommission der DFG (3rd fully revised edition, Weinheim: VCH, 1991 [ISBN 3-527-27020-5]). *The German industrial society* of body care and soap manufacturers informed its members in bulletin number 53/94 (September 1994) that no more safety tests need to be conducted for cosmetic raw materials (including cosmetic colorants) whose use has been confirmed on an approved list by legislature. **Additional toxicological assessments of DRAGOCOLOR® cosmetic colorants is therefore not necessary.**

**SALMON** → fish

**SAUCES** mostly colored with → caramel to create a stronger brown tone.

### **SCHULTZ TABLES**

tables of dyes in which the formulae, syntheses, and dye processes are listed by **Schultz numbers**. The last edition appeared in 1931 and is in the archives of the colorants division. S. were replaced by the → Colour Index.

## SEPIA

the black-brown secretion of cuttlefish; once used in painting. Commonly used in Mediterranean countries to dye → noodles black.

## SHAMPOO

with consideration given to the CAF, dyes that are especially suited include → Brilliant Blue FCF 656601, → Patent Blue V 100294, → Quinoline Yellow 100290, → Tartrazine 100296, → Fast Yellow 656800, → Alizarine Cyanine Green w.-s. 656555, → Allura Red 100304, → Amaranth 100292, and → Brilliant Black BN 100303, in → mixtures as well.

## SHOWER GEL

the dyes that are especially suited include → Brilliant Blue FCF 656601, → Patent Blue V 100294, → Quinoline Yellow 100290, → Tartrazine 100296, → Fast Yellow 656800, → Alizarine Cyanine Green w.-s. 656555, → Allura Red 100304, → Amaranth 100292, and → Brilliant Black BN 100303, in → mixtures as well.

## SILVER

(E 174, C.I. 77820, not in the DRAGOCOLOR® product range; inquiries about sources should be referred to the colorants division): silver-colored inorgan. → pigment. **App.:** coated tablets, decoration, and shiny effects. CAF 1, use not known.

## SOAPS

colored well with some w.-s. → cosmetic dyes, although some → pigments and → wdisp. pigments show better → lightfastness (both also available as pastes in the DRAGOCOLOR® product range). → DRAGOCOLOR®-cosmetic dyes brochure.

## SOLUBILITY

of colorants is determined by the various functional groups on the colorant molecule. All w.-s. colorants used in foods and cosmetics contain sulfonic acid and/or carboxyl groups. O.-s. colorants do not contain any of these groups. Colorant solubility varies widely; w.-s. colorants are significantly less soluble in alcohol than in water. Experience shows that 0.5 – 1% stock solutions are used for coloring a product.

**SOUPS** → sauces

**SPECIFIC EXTINCTION COEFFICIENT** → extinction

## SPECIFICATIONS

defines the most important → properties and quality characteristics of a product. S. of European → food dyes stated in EC Dir. 95/45/EC. All DRAGOCOLOR® food dyes comply with the requirements of this Dir. S. for the food, drug, and cosmetic dyes permitted for use in the US are listed in the → Code of Federal Regulations 21. DRAGOCOLOR® colorants with an → FDA certificate comply with these Specification.

## SPECTRAL COLORS

when a prism is used to disperse sunlight (as Isaac Newton did in his experiments with prisms), the colors of the rainbow are shown: simply stated, these are violet, blue, green, yellow, orange, and red, although the transitions between colors are fluid and not clearly defined. When combined, the S. yield white light.

## SPECTROPHOTOMETER

generally consists of six components: a source of light; monochromator; cuvette holder with the colored sample and the pure solvent; detector; amplifier; and recording instrument. Used in → spectroscopy; the measurement of → extinction and corresponding calculations according to the Beer-Lambert law determine the color intensity. See literature reference under → spectroscopy.

## SPECTROSCOPY

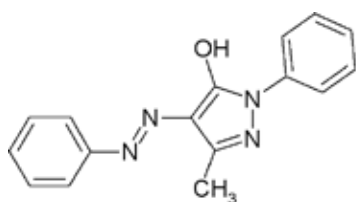
used to examine a substance by means of electromagnetic radiant energy (→ analytical chemistry). Infrared (IR) spectra are utilized to identify substances. The tone and color intensity of colorants and mixtures of colorants are analyzed with VIS spectra (VIS: visible); the measurement takes place within the wavelength range of visible light (wavelength 350 - 750 nm). The shape and intensity of the absorption curves are typical for the product. All DRAGOCOLOR® colorants are tested with this method. → G. Otterstätter: Coloring of Food, Drugs, and Cosmetics, New York: Dekker, 1999.

## SUDAN® DYES

o.-s. dye, usually → azo dye, some permitted for cosmetics use and in the DRAGOCOLOR® product range.

## SUDAN YELLOW 3G, FAT YELLOW G

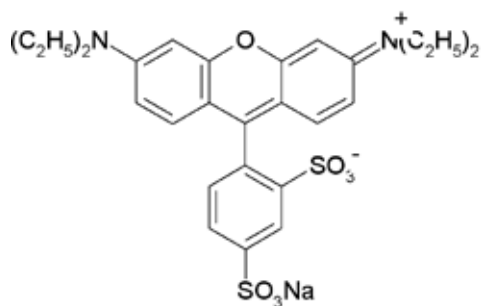
(C.I. 12700, 656870) light yellow o.-s. → azo dye, App.: CAF 4. oil prod.



**Sudan Yellow 3G, C.I. 12700**

## SULFORHODAMINE B

(C.I. 45100, 656859) red, fluorescent w.-s. → xanthene dye. **App.:** CAF 4, e.g. liquid soap, multi-purpose cleanser, dishwashing liquid, detergent powder, fabric softener.



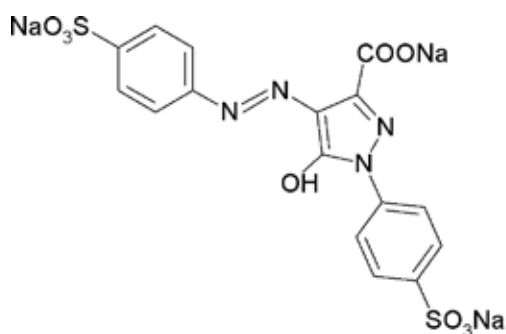
**Sulforhodamine B, C.I. 45100**

## SUPPOSITORIES

by mandate of the → German ordinance on drug colorants, S. can only be colored with → food dye. F.-s. dyes such as → chlorophylls or → carotenoids can be used, as can → pigments, → lakes from the DRAGOCOLOR® product range. The colorant is added directly to the melted S. mass and intensely mixed with it.

## TARTRAZINE, FD&C YELLOW NO. 5

(E 102, C.I. 19140, 100296 and 656802 FD&C) yellow w.-s. → azo dye. **App.:** beverages, sweets, desserts; → Maximum limits must be observed in the EU. CAF 1, e.g. shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid, mouthwash, alcohol-based perfumes; lake (656828) used in make-up, powder, lipstick.



**Tartrazine, FD&C Yellow No. 5, C.I. 19140 (E 102)**

## TITANIUM DIOXIDE

(E 172, C.I. 77891, 656838) white inorgan. → pigm. **App.:** coated tablets, sweets, and chewing gum. CAF 1, body soap, syndet soap, make-up, powder, lipstick, toothpaste.

**TOMATO EXTRACT** → lycopene

## TONING CREMES, TANNING CREMES

colored mostly with → iron oxides, in mixtures with → titanium dioxide as well. → recommended dosages

**TOXICOLOGY** → safety assessment

## TRADE DESIGNATION

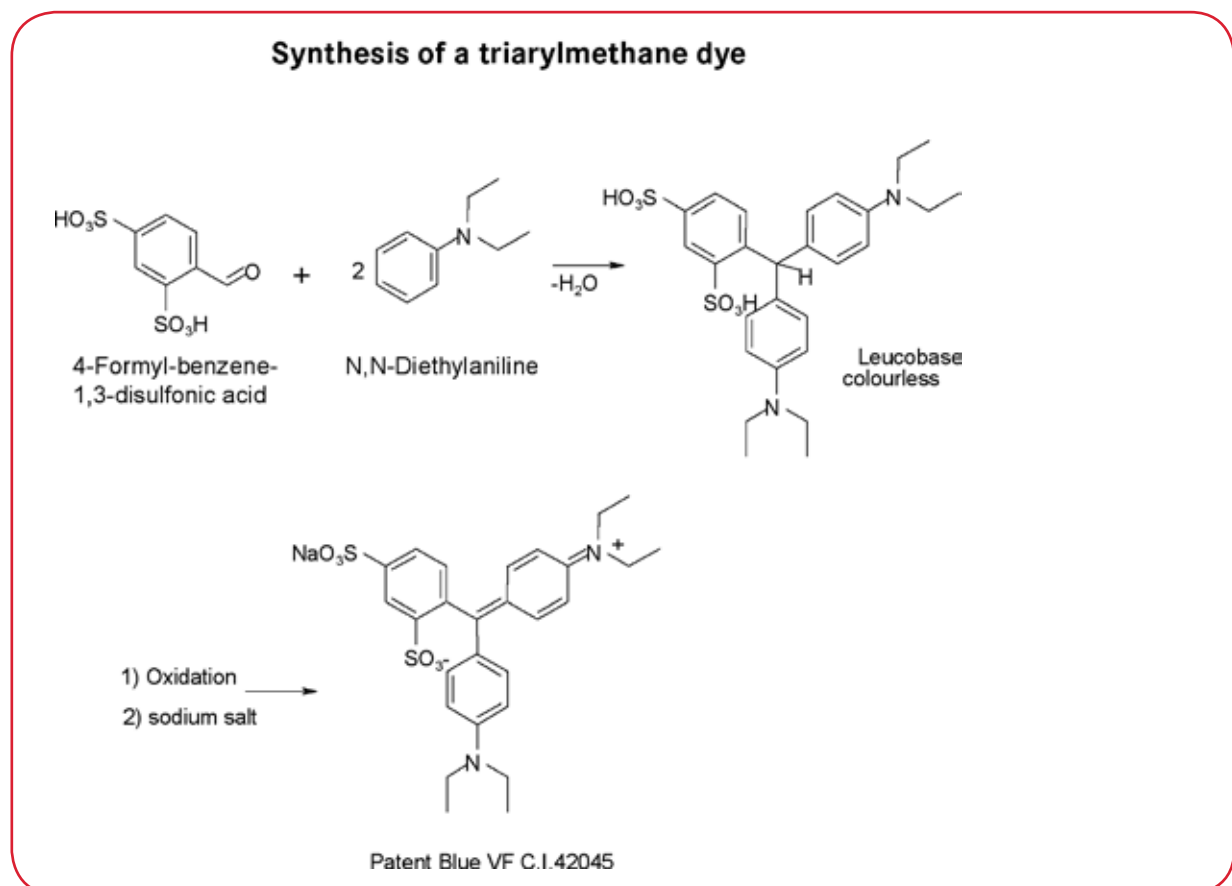
the official name given to food additives in accordance with food laws; this also applies to → food dyes. Can be used with the word “dye” as an alternative to the → E-number on the → declaration.

## TRANSPARENT SOAPS

colored with w.-s. → cosmetic dyes and with → wdisp. pigm.

## TRIARYLMETHANE DYES

characterized by a central carbon atom that is linked to three residual aryl groups (e.g. residual phenyls or naphthyls). If these three phenyls are residuals, such dyes are also referred to as triphenylmethane dyes. T. include → Patent Blue V, → Brilliant Blue FCF, → Brilliant Acid Green BS.



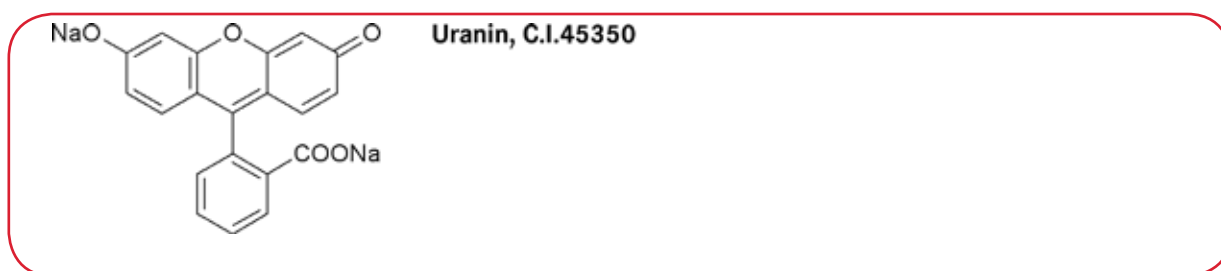
**TRIPHENYLMETHANE DYE** → triarylmethane dye

## ULTRAMARINE

(C.I. 77007, 656879 Ultramarine Blue, 656573 Ultramarine Violet) inorgan. pigments (sulfurous sodium-aluminum silicates). **App.:** CAF 1, body soap, syndet soap, make-up, powder, lipstick, detergent powder. **Not** suitable for acid media, because decomposition occurs as H<sub>2</sub>S develops.

## URANIN, FLUORESCEIN SODIUM

(C.I. 45350, 656846) yellow, fluorescent w.-s. → xanthene dye. **App.:** CAF 1; → maximum limit in cosmetic products is 6% in the EU. Shampoo, bubble bath, shower gel, liquid soap, multi-purpose cleanser, dishwashing liquid.



## USA

Regulations about dyes in food, drugs, and cosmetics vary greatly from the regulations in the EU and absolutely must be observed when exporting dyed products to the US. For details see → G. Otterstätter, *Die Färbung von Lebensmittel, Arzneimitteln, Kosmetika* (Coloring of Food, Drugs, and Cosmetics). DRAGOCOLOR®-cosmetic brochure.

## UV ABSORBER

chem. substance, such as cinnamic acid or benzophenone derivatives, which absorb ultraviolet light and thus protect the product from discoloring or bleaching.

Benzophenone products are often used in cosmetics. Example of a dosage of Neo Heliopan BB (Benzophenone-3) in an EdT: approx. 0.1%.

## VEGETABLE CARBON, CARBON BLACK

(E 153, C.I. 77268:1, not in the DRAGOCOLOR® product range) black inorgan. pigm. **App:** coated tablets, cheese rinds, CAF 1, → mascara.

**VIOLAXANTHIN** → xanthophylls

**VIS SPECTRUMS** → spectroscopy

**VITAMIN B2** → riboflavin

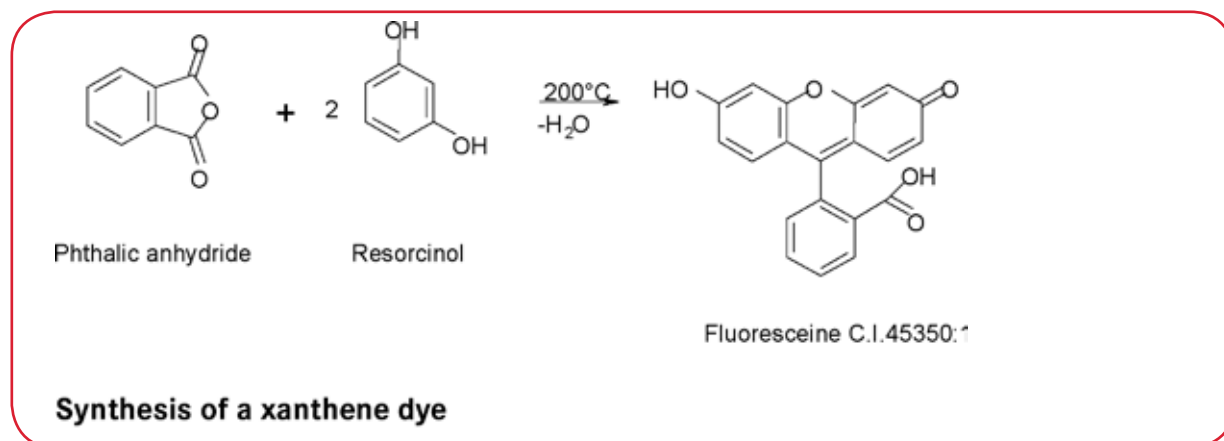
## WATER-DISPERSIBLE PIGMENTS

contain dispersion agents in addition to the pigment in question. This allows the pigment to be dispersed in water and precipitates only very little. Processed like w.-s. dyes. **App.:** coloring soaps.

**WOOL GREEN S** → Brilliant Acid Green BS

### XANTHENE DYES

related to → triarylmethane dyes. Both have a central carbon atom which is linked with three residual aryls; xanthene dyes, however, also have an additional oxygen bridge and thus another ring system. → Erythrosine is a xanthene dye.



### XANTHOPHYLLS

keto and hydroxyl derivatives of → carotenes. Of the many dyes of this class – **flavoxanthin**, **cryptoxanthin**, **rubixanthin**, **violaxanthin**, **rhodoxanthin**, **astaxanthin**, **citranaxanthin**, **zeaxanthin**, → **lutein (xanthophyll)**, and → **canthaxanthin** – only the latter two are of technical relevance and are registered for use as food coloring. Canthaxanthin is manufactured synthetically, and lutein is commercially available as a plant extract.

**ZEAXANTHIN** → xanthophylls

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