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(54) Titre : COMPOSITION ET METHODE DE COLORATION CAPILLAIRE

(54) Title: HAIR COLORING COMPOSITION AND METHOD

(57) **Abrégé/Abstract:**

A hair coloring composition suitable for application to hair by containing one or more hair substantive direct dyes, in a controlled evaporation rate vehicle, and on an optional polymeric ruboff shield, and a controlled viscosity to be reasonably free flowing yet not drip or cause build-up on the hair.



Abstract

A hair coloring composition suitable for application to hair by containing one or more hair substantive direct dyes, in a controlled evaporation rate vehicle, and on an optional polymeric ruboff shield, and a controlled viscosity to be reasonably free flowing yet not drip or  
5 cause build-up on the hair.

## HAIR COLORING COMPOSITION AND METHOD

### Field Of Invention

5 The present invention relates to a semi-permanent hair dye composition and a process for its use on hair.

### Background

10 Many compositions for dyeing human hair are known. These are applied directly to the hair by, for example, squeezing dye liquid through a nozzle, or spraying a dye composition, or applying the dye by any other conventional method. Often hair dyeing involves first applying a dye composition and then fixing it by oxidation step using peroxide or the like.

15 U.S. patent No. 5,964,226 to Joan Lasker Sobel describes a unique hair product application system wherein hair coloring composition is maintained in a reservoir provided with an applicator tip extending from within the inside of the reservoir to absorb hair coloring solution and to deliver it to the outside of the reservoir by capillary action to an applicator tip for applying the coloring solution to the hair to be treated.

20 The present hair coloring composition is useful in the dispensers of the type disclosed in the aforesaid hair product applicator of U.S. patent No. 5,964,226 and to meet its unique requirements, but can also be applied in other ways particularly for touching up the roots of growing hair which was previously dyed with a permanent (e.g., oxidative hair dye), for highlighting hair, and for coloring sections of hair.

### 25 Brief Summary Of The Invention

The hair dyeing composition of the present invention comprises a cationic semipermanent dye. Particularly suitable dyes are capable of capillary flow when in solution. Such dyes typically include azo dyes, diphenyldiarnine dyes or quinone-imines containing a quaternary

ammonium group, anthraquinones and nitro dyes, they are generally free of or contain a low concentration of foaming agents such as surfactants or detergents. They suitably have a controlled, nearly free-flowing viscosity, such as in the range of from about 10 to about 200 cps to be nearly but not quite free flowing and yet not drip or cause a buildup on the hair. The  
5 semipermanent dye composition is dissolved in a liquid vehicle which has a controlled vapor pressure for a predetermined rate of evaporation, i.e. a controlled rate of drying. The dye compositions of the present invention can optionally also contain a clear polymeric dye-shield anti-ruboff component to prevent the transfer of the applied color from the hair to surfaces such as pillows, clothes, etc., such as a polymer of vinyl acetate and of vinyl pyrrolidone, or a  
10 copolymer thereof which has been found to be particularly effective for that purpose.

### Detailed Description

The composition of the present invention must meet various requirements to be suitable for use in a hair dye applicator with a capillary flow or other type of applicator which applies it  
15 to the hair through direct contact therewith, for coloring hair roots, highlighting and section coloring of hair. The method of the present invention involves applying the hair dye composition of the present invention through an applicator to the hair, wherein the material of the applicator tip hair contacting surface is substantially saturated with the semipermanent hair dye composition of the present invention. The applicator can be that of the aforesaid U.S. patent No.  
20 5,964,226, or a sponge or a wad of cotton or an absorbent dipstick or pen-type applicator.

The composition suitably contains a semipermanent dye capable of retention through a number of shampoos. It must flow through the applicator without clogging it. It should be capable of instantaneous application upon touching the hair and it must not drip. The dyes  
25 should be capable of penetrating the cuticle of the hair in a level fashion without leaving an undesirable coating. It should suitably be non-foaming and should be at least somewhat quick drying. The dye composition can also optionally contain a shielding antiruboff component to safeguard against color being transferred from the hair to pillows and other surfaces. It should have a sufficiently, low viscosity so that the composition flows easily from the applicator to the



hair surfaces contacted thereby, and should have a suitable pH to allow the desired degree permanence on the hair.

A principal feature of the present invention is the use of a hair substantive semipermanent dye. Suitable dyes are generally water or alcohol soluble, and are safe for use on human hair. There are many dyes that tend not to flow through a wick and capillary applicator and tend to clog the system. The ratio of water and alcohol or other volatile solvent can be varied in the vehicle of the hair dye composition to obtain a predetermined rate of evaporation thereof. The total solvent (e.g. water plus volatile solvent) can be up to 95% (wt) of the dye composition.

Butyl cellosolve or alcohol proportion in the vehicle can be varied up to 50% of the solvent with a proportionally lower concentration of water, when a higher rate of evaporation is desired. The appropriate proportions of water and the more volatile solvent can be determined by routine experimentation to obtain the desired evaporation rate.

Particularly suitable semipermanent dyes include azo dyes, diphenylamine dyes, quinone-imines containing a quaternary ammonium group, anthraquinones and nitro dyes. The composition of the present invention may contain about 0.05 to about 6.5 weight percent of one or more said dyes. The composition may also contain a plurality of said dyes, each at a concentration of from about 0.05 to about 2 weight percent.

The dyes are moreover capable of being instantly deposited on the hair. They allow for repeated touching to the hair with increased coverage upon each application. They penetrate the hair shaft leaving a clean, non-messy level of color molecules on the hair. No unsightly mess is left on the hair or scalp on drying.

While the dye composition can contain a small amount of suitably cationic or nonionic surfactant, its concentration should be low to avoid it from foaming. Level application can be promoted by the use of an alcohol solvent system, e.g., ethyl alcohol, isopropyl alcohol or a butyl alcohol.

Quick drying with a safe and clean solvent was realized with an alcoholic system such as with ethyl alcohol. It has a pleasant odor and works with water to evaporate at a faster rate than

water alone. Isopropyl alcohol can also be used but it has a less desirable odor. Butyl alcohol, such as a tert butyl alcohol butylene glycol, 2-butanol, or butoxy ethanol (butyl cellosolve) is also suitable as solvents for direct dyes and to improve penetration into the hair shaft.

5           The optional protective ruboff shield component provides against ruboff of the color to objects coming into contact with dyed hair, e.g., pillow cases, clothing, etc. The polymeric ruboff shield should not interfere with the coloring process. The polymer used in the present composition is compatible with the hair while forming a ruboff shield that surrounds each hair shaft and is gradually removed upon each subsequent shampooing. Polyvinylpyrrolidone alone  
10 or copolymers of vinyl acetate and vinylpyrrolidone monomers are particularly effective to serve this purpose, because they are not tacky and do not interfere with the free capillary flow of the dye liquids. Generally 50% solutions of these copolymers are sold by ISP Corp., and by BASF. Most or all nonionic or cationic polymers are likely to work, and many others can be identified by routine experimentation. Anionic polymers are not expected to work.

15           The viscosity of the composition to be used is important to be free-flowing and yet not drip or cause a build-up on the hair. Systems using standard thickening agents such as gums are not successful. However, a slight amount of a thickener such as a carbomer or a cellulose can be used especially to prevent a too rapid runoff from the applicator. A viscosity in the range of 10-  
20 200 cps, has been found to meet these requirements, more suitably between 10 and 100 cps to be sufficiently flowing.

          It has been found that the composition for hair coloring should be at a pH from about 8 to about 8.5 for best semi-permanent coloring of the hair, however, the most suitable pH will also  
25 depend on the identity of the dye and its host substantivity, as will be readily known to the skilled hair colorist.

          Some dyes, such as some nitro dyes, e.g. HC yellow #2, are not well or completely soluble in the aqueous alcoholic solvent. In that case the use of an additional solvent may be



needed. For example butoxyethanol (butyl cellosolve) can be suitably substituted for some (e.g. 10%) of the water.

According to one embodiment of the invention, a hair coloring composition is capable of capillary flow from a reservoir to the tip of a fibrous applicator. In this embodiment, the composition includes a cationic dye capable of directly applying color to hair without oxidation. The dye is at least one of an azo dye, a diphenyldiamine dye, a quinone-imine containing a quaternary ammonium group, and direct nitro dyes. Optionally, the composition also includes a polymeric shielding component that is a copolymer of vinyl acetate and vinylpyrrolidone.

According to another embodiment of the invention, a hair coloring composition is capable of flow by capillary action through a fibrous applicator immersed in a reservoir containing the composition to a tip of the applicator for application to hair. In this embodiment, the composition includes from about 0.05 to about 6.5 weight percent of one or more cationic direct dyes capable of providing color to the hair without oxidative treatment. Optionally, the composition also includes from about 2 to about 4 weight percent of a polymeric shielding component to prevent the color of the composition from rubbing off after application of the composition.

The following examples further illustrate the present invention and embodiments thereof. All parts and percentages are by weight unless otherwise indicated.

#### Examples

All parts and percentages in the examples and throughout the application are by weight.

#### 20 Component Glossary

PVP/VA is a copolymer of vinyl acetate and vinylpyrrolidone monomers which act as a polymeric ruboff shield.

Crotein Hydrotriticum QM is a cationic wheat protein compound sold by Croda, Inc. which acts as a conditioning agent for the hair.

25 Dow Corning silicone 193 is a dimethicone copolyol compound used to give a shine to hair, and is sold by Dow Corning Inc.

Arianor Dyes are cationic dyes having the structures set forth below, sold by TRI-K Industries, Inc.

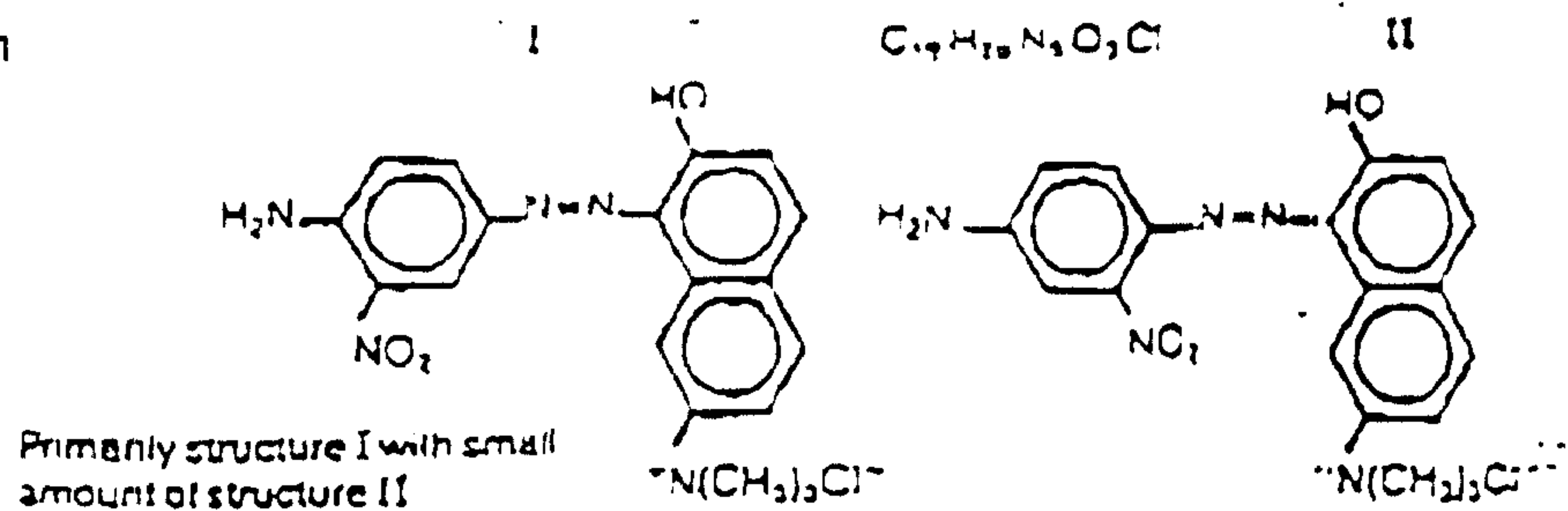
Lowacryl Dyes are also cationic dyes having the structure set forth below sold by the Jos.  
30 H. Lowenstein and Sons, Inc.

Examples of Arianor dyes and of Lowacryl dyes are:

## 306001 Arlanor® Sienna Brown

C.I. Basic Brown 17

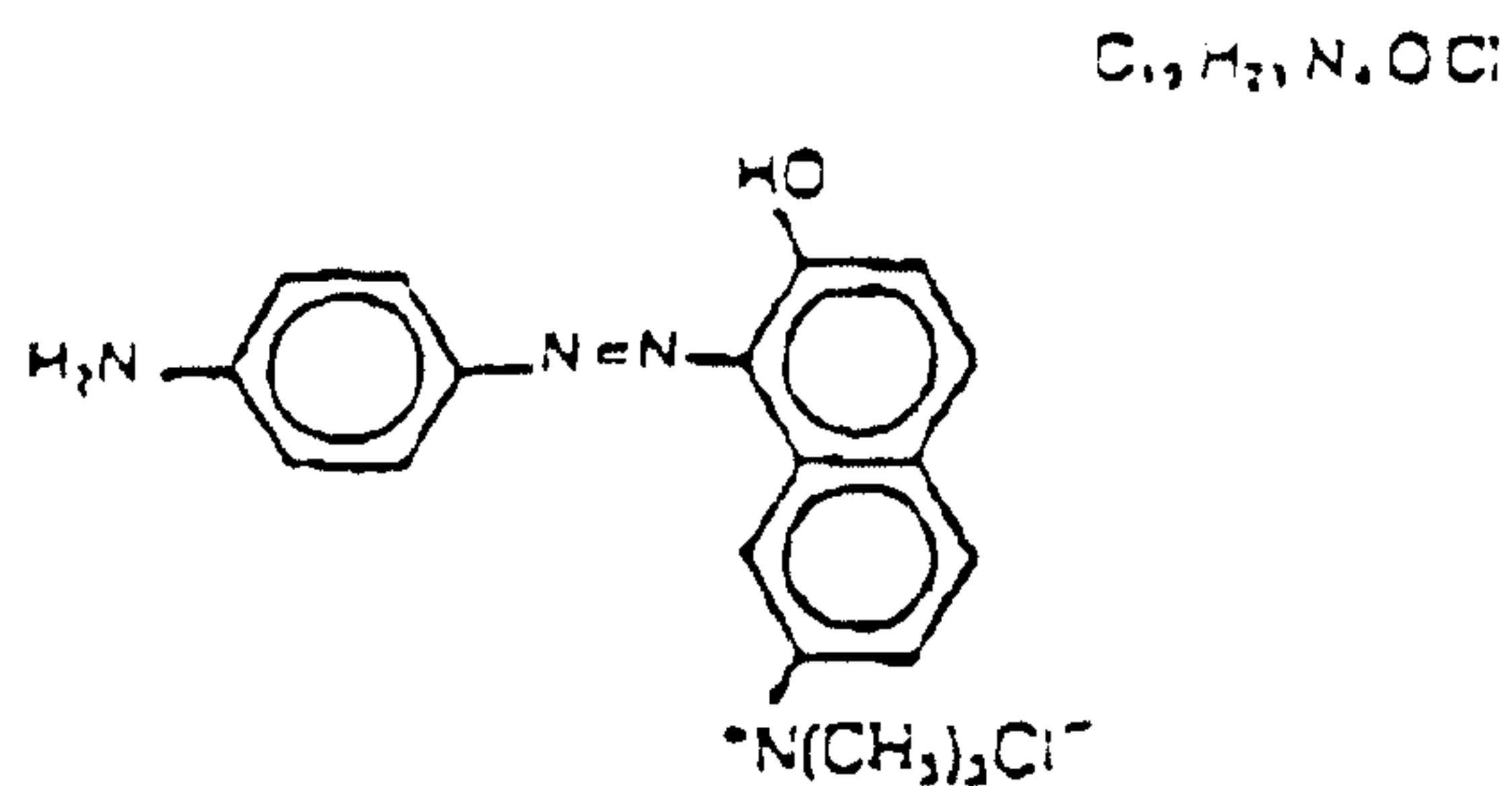
C.I. Number 12251



## 306002 Arlanor® Mahogany

C.I. Basic Brown 16

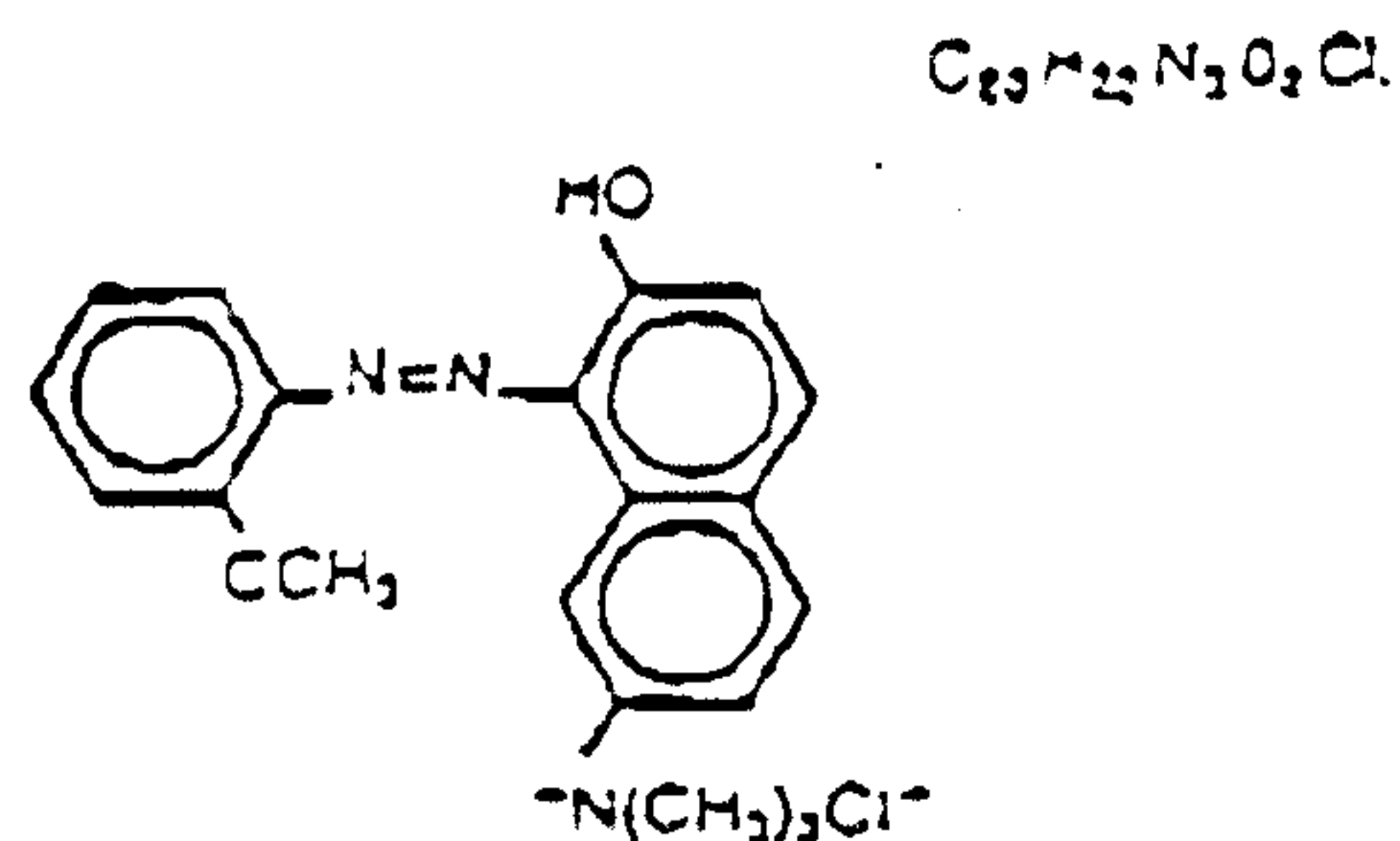
C.I. Number 12550



## 306003 Arlanor® Madder Red

C.I. Basic Red 76

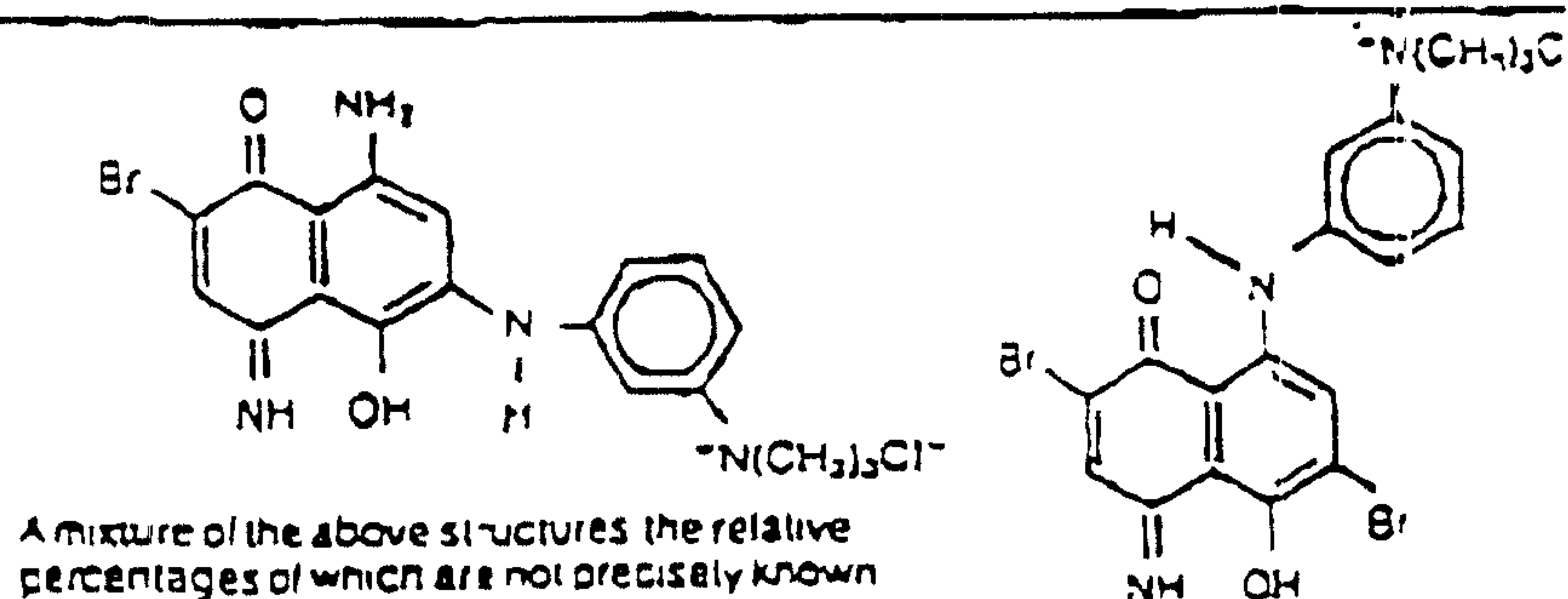
C.I. Number 12245



## 306004 Arlanor® Steel Blue

C.I. Basic Blue 99

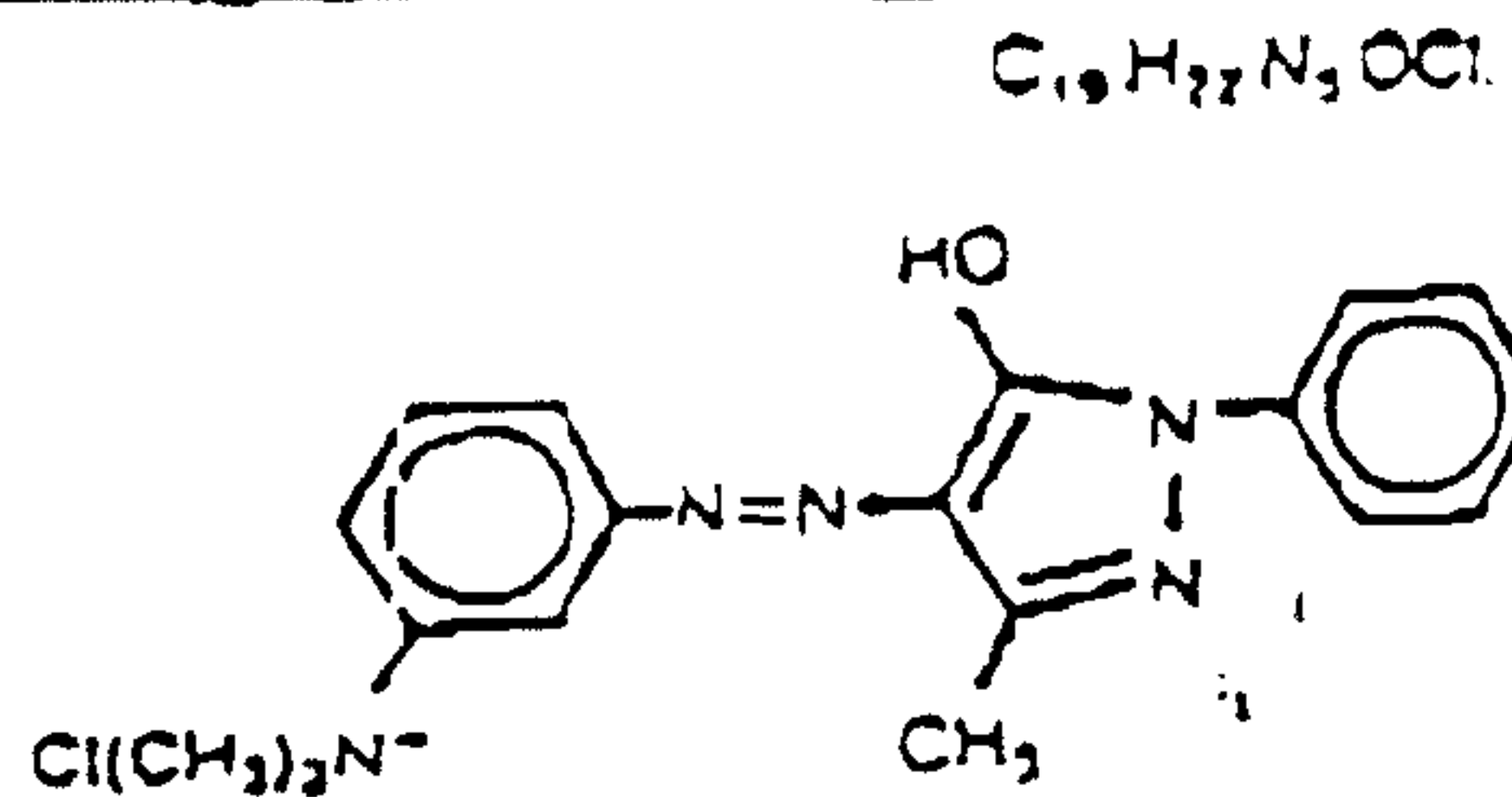
C.I. Number 56059



## 306005 Arlanor® Straw Yellow

C.I. Basic Yellow 57

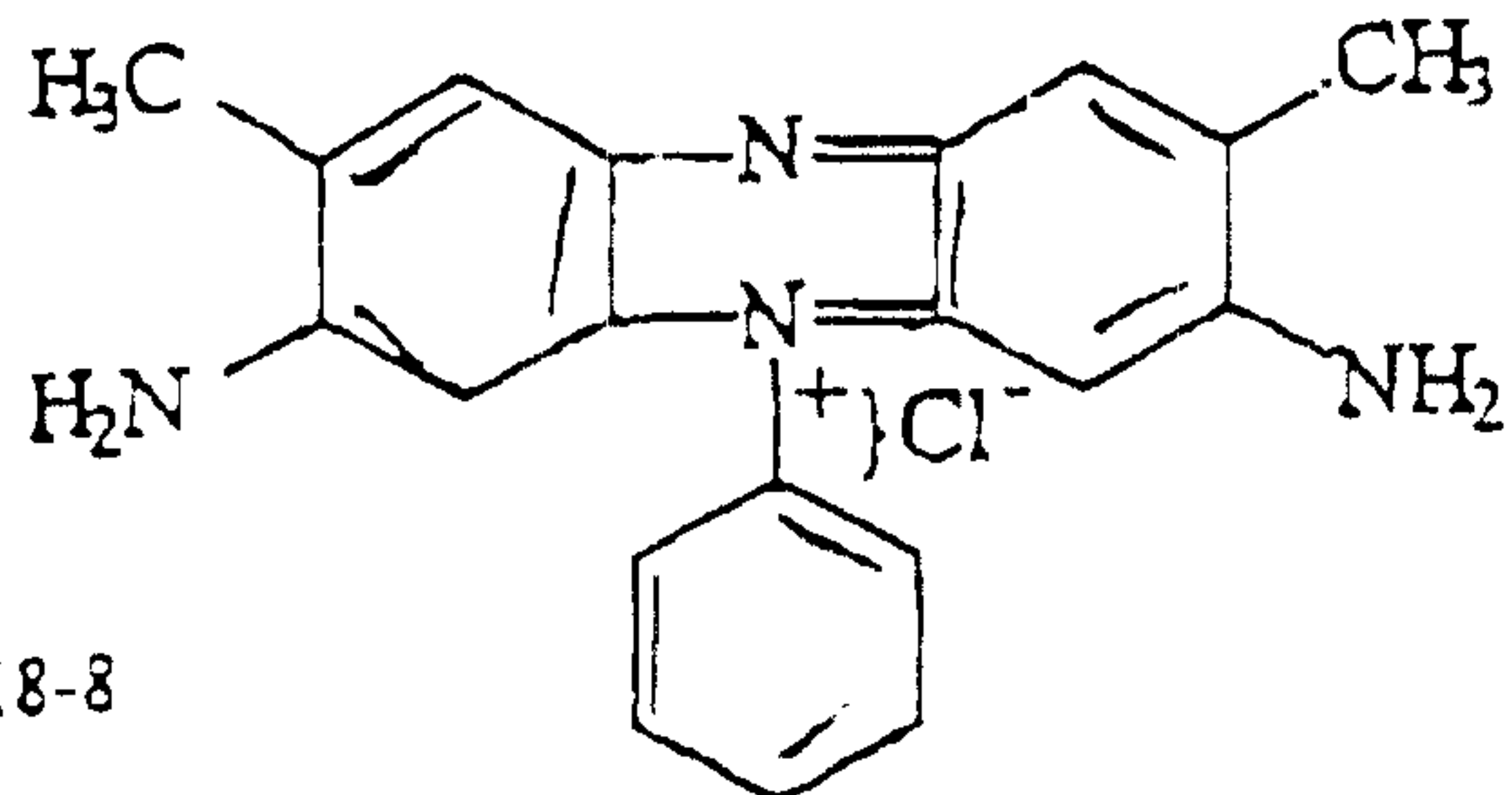
C.I. Number 12719





## LOWACRYL RED 2 CONC

CAS No: 477-73-6

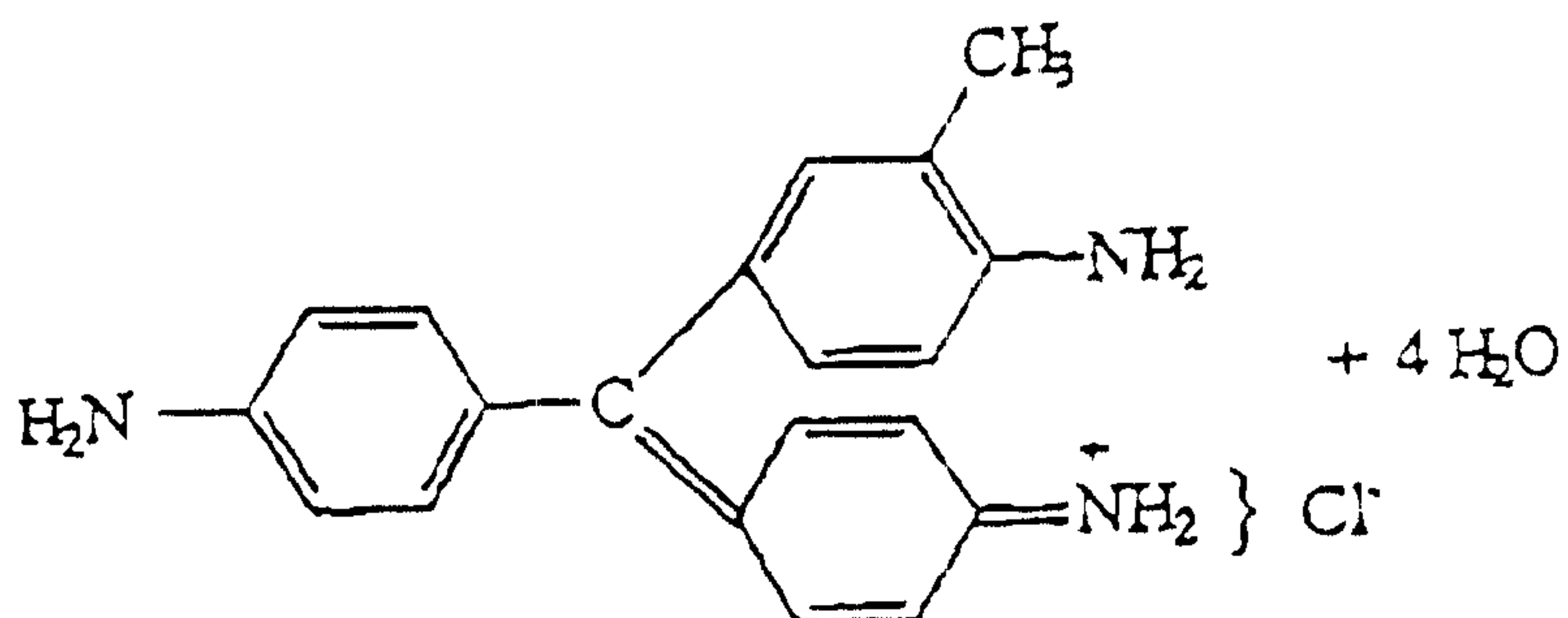
MF:  $C_{20}H_{19}N_4 \cdot Cl$ 

EINECS No: 207-518-8

MW: 350.85

## LOWACRYL VIOLET 14

(C.I. BASIC VIOLET 14)



CAS No: 632-99-5

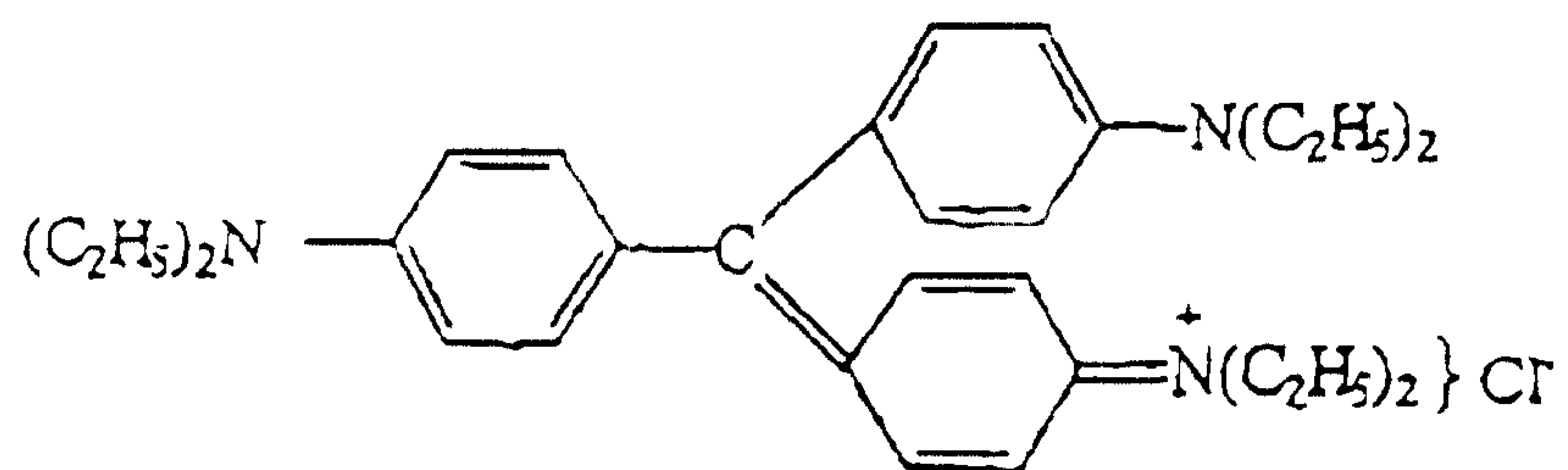
MF:  $C_{20}H_{19}N_3 \cdot ClH \cdot 4H_2O$ 

EINECS No: 211-189-6

MW: 409.91

## LOWACRYL VIOLET 4

C.I. BASIC VIOLET 4



CAS No: 2390-59-2

MF:  $C_{31}H_{42}N_3 \cdot Cl$ 

EINECS No: 219-231-5

MW: 364.92

Other names are explained in the CTFA International Cosmetic Ingredient Dictionary, published by the Cosmetics, Toiletrie and Fragrances Association.

The hair coloring composition of the present invention will have the formula as shown  
5 below. The components are grouped in Phases A, B and C to correspond to the process steps used in their manufacture.

### HAIR COLORING FORMULA

	<u>Percent wt</u>
<u>Phase A</u>	
Deionized Water	40-50
PVP/VA or E735 (polymer)	2-4
Croton Hydrolyticum QN (a cationic protein compound for conditioning)	0.05-0.5
Dow Corning silicone 193 (for shine)	0.05-0.5
Triethanolamine (ph adjuster) qs to pH 8.5	
<u>Phase B – Cationic Dyes</u>	
Deionized Water	35-40
Arianor Steel Blue	0.05-2.0
Arianor Madder Red	0.1-1.0
Arianor Straw Yellow	0.05-1.0
Arianor Crazy Gold	0.05-0.7
Arianor Flame Red	0.05-0.7
Arianor Orange	0.05-0.7
Arianor Mahogany Brown	0.050-1.0
Arianor Sienna Brown	0.05-1.0
Lowacryl Violet 4	0.05-0.3



Lowacryl Violet 14	0.05-0.3
Lowacryl Red 2	0.05-0.3

Phase C

Ethyl Alcohol	10-20
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Phase D

Perfume	0.05-0.2
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The above formula will yield the complete range of colors needed for dyeing hair of all types of shades. If the shade is too weak it will be known to the colorist to increase the color in small increments until the desired shade is reached. If the color is too strong, a base without the color can be added until the color is the desired shade. The final pH of 8.5 is also important to dyeing the hair in a semi-permanent manner.

The specific formula for a very dark brown shade is given by way of example:

<u>Phase A</u>	<u>Percent</u>
Deionized Water	42.0
PVP/VA E 635	2.00
Croton hydrolyticum	0.2
Dimethicone copolyol DC 193	0.1

Phase B

Deionized Water	33.0
Arianor Steel Blue	1.2
Arianor Madder Red	0.3
Arianor Straw Yellow	0.6
Arianor Mahogany Brown	0.2

Arianor Sienna Brown 0.2

Phase C

Ethanol 20.0

Phase D

Triethanolamine 99% q.s.pH = 8.0 - 8.5

Phase E

Belmay perfume Silk 0.1

The composition of the present invention can be suitably prepared as follows:

Phase A

- 5 Add deionized water to a stainless steel kettle. Then add the PVP/VA copolymer and mix until clear. After the solution is clear and the polymer completely dissolved, add the Crotein Hydrotriticum QM and the dimethicone copolyol and mix until clear. Then add the triethanolamine and check the pH. Adjust to pH 8.0 - 8.5.

10 Phase B (dyes)

In a separate stainless steel kettle add deionized water and carefully weight out the desired cationic dyes for a given shade. Mix until completely dissolved in the solution.

Then combine Phases A and B and continue mixing until uniform.

- 15 Then add Phase C containing the alcohol to the mixed Phases A and B and mix. Finally add the perfume component and mix.

Check the shade of the final composition.

Various modifications may suggest themselves to those skilled in the art with departing from the invention as defined by the following claims.

Another example of the composition of the present invention is given below in percent (wt) concentrations.

#### Phase A

Deionized Water	14.90
Tetrasodium EDTA	0.05
Disodium Cocoamphodiacetate	10.00
Cocoamidopropylbetaine	2.00
Croton Hydrolyticum QN	0.20 (cationic protein conditioner)

#### Phase B

Carbomer ETD 2020 (2% Solution)	50.00 (BF Goodrich)
Gormaben II	0.50 (preservative)

#### Phase C

Deionized Water	10.50
Ethyl alcohol	10.00
Butylene Glycol	5.00
Arianor Steel Blue	0.15
Arianor Madder Red	0.15
Arianor Straw Yellow	0.05
Arianor Mahogany Brown	0.30
Arianor Sienna Brown	0.00

#### Phase D

Lauramide DEA (Monamid 716 from Uniquema)	4.00
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Phase E

DC 193 (for shine, from Dow Corning) 0.20

Phase F

Triethanolamine 99%, pH adjuster to 6.5 - 7.0 0.50

Phase G

PVP or PVP/VA E635 or E735 2.00

**Manufacturing Procedure**

- 5            Make a 2% solution of the Carbomer ETD 2020 and set aside. Mix all of the ingredients of Phase A in a kettle and set aside. In a separate kettle, add the deionized water and butylene glycol. Next add the dyes and mix until dissolved. Add Phase A and Phase B to the dye solution of Phase C and mix well. Now add the Lauramide DEA of Phase D and mix. Then add the DC 193 and mix. Add the TEA until desired pH is obtained, and add the optional PVP or PVP/VA
- 10 ruboff protector and mix, and then check the shade.

## CLAIMS

1. A hair coloring composition which comprises:  
a cationic semipermanent dye or washable color in a liquid vehicle with controlled vapor pressure to have a predetermined rate of evaporation; and  
a polymeric ruboff protector component for preventing ruboff of the color of said dye, wherein said composition is substantially free of anionic surfactants and detergents.
2. The hair coloring composition of claim 1, wherein said dye is one or more of an azo dye, a diphenyldiamine dye, a quinone-imine containing a quaternary ammonium group, an anthraquinone, and a nitro dye.
3. The hair coloring composition of claim 2, containing a plurality of said dyes, each at a concentration of from about 0.05% wt. to about 2% wt.
4. The hair coloring composition of claim 1, wherein said polymeric ruboff protector component is at least one of vinyl acetate and vinylpyrrolidone.
5. The hair coloring composition of claim 1, wherein said polymeric ruboff protector component is a copolymer of vinylpyrrolidone and vinyl acetate.
6. The hair coloring composition of claim 1, the composition having a viscosity from about 10 to about 200 cps.
7. The hair coloring composition of claim 1, wherein the composition has a viscosity of from about 10 to about 100 cps.
8. The hair coloring composition of claim 1, further comprising an alcohol solvent.
9. The hair coloring composition of claim 8, wherein said alcohol is at least one of ethyl alcohol, isopropyl alcohol, and butyl alcohol.

10. The hair coloring composition of claim 9, wherein said butyl alcohol is at least one of tert butyl alcohol and 2-butanol.

11. A hair coloring composition which comprises:  
a cationic dye adapted for directly applying color to hair without oxidation, said dye being at least one of an azo dye, a diphenyldiamine dye, a quinone-imine containing a quaternary ammonium group, and direct nitro dyes; and  
a polymeric shielding component being a copolymer of vinyl acetate and vinylpyrrolidone,  
wherein said composition is substantially free of anionic surfactants and detergents.

12. The composition of claim 11, having a pH of from about 8 to about 8.5.

13. A hair coloring composition which comprises:  
from about 0.05 to about 6.5 weight percent of one or more cationic direct dyes adapted for providing color to the hair without oxidative treatment; and  
from about 2 to about 4 weight percent of a polymeric shielding component to prevent the color of said composition rubbing off after application of said composition,  
wherein said composition is substantially free of anionic surfactants and detergents.

14. The hair coloring composition of claim 13, wherein said polymeric shielding component is a copolymer of vinylacetate and vinylpyrrolidone.

15. The hair coloring composition of claim 1, wherein said liquid vehicle comprises up to 95% (wt) of said composition.

16. The hair coloring composition of claim 15, wherein said liquid vehicle comprises water and a solvent for said dye and has a vapor pressure greater than water.

17. The hair coloring composition of claim 15, wherein said solvent for said dye is an alcohol of up to 50% (wt) of said liquid vehicle.