

The Different Types of Hair Dyes

Hair coloring products are usually categorized by the length of time the coloring imparted to the hair survives shampooing. Based on this definition there are three main hair coloring systems available (see table below). In recent years, however, these distinctions have become blurred with the introduction of demi-permanent products and color refreshers.

Categories of Hair Dyes

- **Temporary Dyes:**

Essentially removed by one single shampooing

- **Semi-Permanent Dyes:**

Last through several shampooings

- **Permanent Dyes:**

Essentially stable to shampooing

- **Demi-Permanent Dyes:**

Last as long as semi-permanent dyes but based on permanent dye chemistry

- **Color Refreshers:**

Temporary dyes applied to counteract the fading of permanent and semi-permanent dyes

Permanent Hair Dyes

To color hair permanently a chemical reaction is necessary. Basically, coloring is carried out in the presence of an oxidizing system, almost always hydrogen peroxide, which simultaneously bleaches the natural hair color. This oxidant (or developer) then oxidizes the dye precursor (or dye intermediate) to develop the color. The chemistry and use of permanent hair dyes is rather complicated and not topic of this newsletter.

Semi-Permanent Hair Dyes

Semi-permanent hair dyeing is performed mainly with direct dyes which do not involve chemical reactions, like oxidation. The color of the applied dye solution is the color that will be produced on the hair. Basically, there are two major types of dyes used for semi-permanent hair coloring:

- Nitrobenzene dyes (e.g. 2-nitro-p-phenylenediamine, HC yellow 2, HC orange 1 HC blue 2) and
- Disperse dyes (e.g. Disperse Blue 1, HC Blue 8, HC Yellow 7).
- Natural dyes (e.g. henna, indigo, logwood, Brazilwood, chamomile)

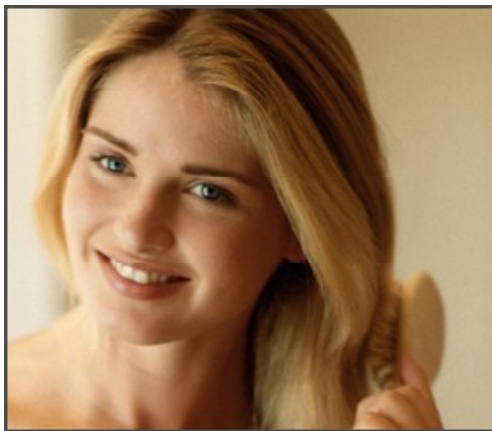
Nitrobenzene and disperse dyes are regulated in a similar fashion to the permanent dyes and require the mandated patch testing in the U.S. since they are considered as coal tar dyes. Again, the semi-permanent dyes are not chemically reactive, so sensitization and irritation do not usually occur.

Temporary Hair Dyes

Typically, temporary hair dyes are removed after one or two shampooings. Hence, if you want to have the hair permanently colored, dyeing will become part of a weekly hair care regimen.

Temporary hair dyes, however, have the advantage that they not damage the hair by oxidation and bleaching and that they usually are easier to apply. This type of hair color is typically used to give brighter, more vibrant shades or colors such as orange or red, that may be difficult to achieve with semi-permanent and permanent hair dyes. This phenomenon is due to the fact that temporary hair dyes do not penetrate the hair shaft. Instead, these dyes remain closely adherent to the follicle and can be removed with shampooing. However, even temporary hair dyes can persist if the hair is excessively dry or damaged.

Temporary hair dyes include dyes that are used also in other color cosmetics such as organic dyes (e.g. D&C violet 2, D&C orange 4, FD&C yellow 6) and cationic dyes (e.g. basic yellow 57, basic brown 16, basic red 76). These dyes can be incorporated into various hair dyeing products including hair rinses, colored hair sprays, styling gels and lotions, and color refreshers. As mentioned above, color refreshers are products to counteract the fading of permanent and semi-permanent dyes. Typically, cationic dyes are used for color refreshers as cationic dyes bind very strongly to chemically processed hair.



Semi-permanent and temporary hair dyes can be made with natural (e.g. henna) or organic dyes.

Henna

Henna is a natural dye extracted from the dried and powdered leaves, petioles and young shoots of the mignonette tree, or henna shrub (*Lawsonia inermis*). The natural dye is traditionally found in

India, Pakistan, Middle East, and Northern Africa. When ground the dried leaves become a greenish powder, but the dye is reddish to dark brown. Strong tea or coffee, lemon juice (or other acidic liquid) and essential oils (such as tea tree, eucalyptus, clove and lavender) can be used to release the dye from the powder.

The dye can be mixed with water to make a paste with mud-like consistency that will adhere well to the hair. The paste should be allowed to oxidize for a couple of hours before use. After the paste has been applied to the hair, it should stay on the hair as long as possible (usually for about 1-3 hours). Henna stains the hair temporarily for about 2-4 weeks. To create various shades with henna, another pigment, paraphenylenediamine (PPD), is often added. In rare cases, it can induce allergic reactions. The United States Food and Drug Administration (FDA) has listed henna as approved cosmetic hair colorant.

Other Natural Hair Dyes

A number of other natural colors are available for hair dyeing including indigo, logwood, Brazilwood and chamomile. They may naturally contain oxidizable phenolic substances as in logwood or indigo, but in almost all cases only low intensity coloration is produced. These natural colors have therefore to be applied several times to achieve more intense coloring.

Indigo is often used in combination with henna to create various black shades including raven black, blue-black, purplish black or burgundy black. The exact color result depends upon your original hair coloring as well as how you use your henna and indigo in this process.

Chamomile (e.g. tea or herbal extract) mixed together with an acid (e.g. lemon juice) has a mild bleaching effect if applied daily over the course of a few weeks. When used alone, indigo should be mixed with water to make a paste (consistency of yogurt) and then allowed to sit for 4 to 8 hours before applied to the hair.

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References:

M.L. Schlossman. Chemistry & Manufacture of Cosmetics. Volume II, Pages 397f