

The facts about...

PPD and hair colorants

What is PPD?

PPD (paraphenylenediamine or p-phenylenediamine) is an ingredient used in permanent (also known as oxidative) hair colorants.

The use of PPD is strictly regulated in the cosmetics safety legislation. PPD may only be used in hair colorants up to a certain level and products have to carry specific labelling instructions and warnings.



Is PPD banned anywhere?

No. Contrary to media reports claiming that PPD is banned in several European countries and the US, this is not the case. The manufacture and supply of cosmetic products, including hair colorants, is covered by stringent safety laws – the UK and EU Cosmetics Regulations for the UK and EU respectively. PPD is not banned in any European country, nor is it banned in the US.

What does PPD do?

PPD is typically used in permanent (oxidative) hair colorants and is needed for almost all shades, but definitely for the darker shades. Almost all oxidative hair colorants contain a PPD type hair dye because they are the best way to achieve permanent hair colour and are the only way of successfully colouring grey hair.

Is PPD present in all hair colorants?

PPD is very widely used in permanent hair colorants and is needed for most shades, but it is not present in all hair colouring products. However, it, or a related ingredient, will be present in the darker shades.

As well as having to be listed in the Ingredients list on pack, when a hair colorant contains PPD, or a related hair dye, the product also has to be labelled with “Contains phenylenediamines” or “Contains phenylenediamines (toluenediamines)”.

PPD will be labelled in the Ingredient list as paraphenylenediamine.

Is PPD dangerous?

No. PPD is safe to use in hair colorants as directed in the product instructions. There is a legal requirement for cosmetic products, and their ingredients, to be strictly assessed for safety by a duly qualified, professional assessor before they can be sold.

- The use of PPD is strictly regulated in the cosmetics safety legislation.
- PPD may only be used in hair colorants and only up to a certain level (up to a maximum of 2% when applied to the hair). Products have to carry specific label warnings and clear usage instructions, which should be followed.



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Does PPD accumulate in the body?

No. Hair colorants are formulated to work specifically on the hair. Although they do come into contact with the scalp during application, a negligible amount of the product is likely to be absorbed, and that will be eliminated from the body within 24 hours. This is acknowledged by the European Commission's expert panel (the Scientific Committee on Consumer Safety, SCCS).

The development of an allergy to PPD, and related hair dyes, over time is an immune response to repeated, separate exposures to PPD. Exposure could be via a number of contact points including printed inks or 'black henna' tattoos. It is not because PPD accumulates (builds up) in the body.



Is PPD used in any other cosmetic product?

No. The strict cosmetics legislation that covers the manufacture of cosmetic products only allows the use of PPD in hair colorants. However, PPD is sometimes used illegally in so-called 'black henna' temporary tattoos – the sort that you might be offered at fairs and on beach holidays. You should always avoid these tattoos because PPD can cause nasty reactions if applied direct to your skin in such high concentrations.

- It can leave you with a swollen, sore, red 'burn' and can sensitise you to PPD. This means you could also react strongly to otherwise safe products such as hair colorants which also contain PPD .
- There is no such thing as 'black henna', henna extract is orange-red in colour.
- Hair colorants themselves are regulated under the UK and EU Cosmetics Regulations and are safe to use when the instructions are followed carefully.

Should allergy alert tests always be performed before hair colorants are used?

If a hair colorant is labelled with the directions to carry out an allergy alert test, then yes it is extremely important that these instructions are followed carefully every time you want to colour your hair. Always remember to buy the product far enough in advance to be able to do the test 48 hours before you want to colour your hair, exactly as explained on-pack and in the instruction leaflet. You don't need to buy two packs in order to be able to do the allergy alert test.

Why do people react to PPD?

The vast majority of people in Europe (over 98%) do not have the potential to react to the substance PPD. Of those individuals who have the potential to react to PPD (under 1.5%), only a very small number will develop an allergy after hair colorant use (around 0.1% of the population).¹ If someone has the potential to react to PPD, they will not react the first time they encounter PPD but those early exposures prime their immune system which may then over-react when they meet PPD again. Their immune system essentially mistakes PPD for an invader and retains a memory of it. When that substance is met again, it is the over-reaction rather than the ingredient itself that causes the damage.

Not everyone has that potential to develop an allergy. Those who have the potential will, sooner or later, produce an allergic reaction if they continue to be exposed to PPD. The best advice is to always perform an allergy alert test 48 hours before colouring the hair, exactly as directed on-pack and in the instruction leaflet.



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Are allergic reactions to hair colorants common?

No, they are rare. Millions of people all over the world use hair colorants without experiencing any unwanted effects. In the UK, around 100 million hair colorant applications are carried out every year in homes and salons. Hair colorants are one of the most thoroughly studied consumer products on the market and their safety is supported by a wealth of scientific research.

- 50 million home hair colorants are sold and 45 million salon applications are carried out in the UK each year.
- Reactions to hair colorants can occur for a very small number of people, in the same way that some individuals can react to a variety of foods and natural substances. They are far rarer than food allergies.
- Food allergies affect 1–5% of the general population.²
- European figures show that the incidence of allergic reactions attributable to permanent hair colorants, including serious reactions, is between 0.3 and 4.3 in every million products sold.³



Why do people react after colouring their hair if they didn't react to the allergy alert test?

The allergy alert test represents an important precaution and provides an indication that a reaction may occur if you go on to colour your hair. You should always perform the allergy alert test, even if you have used hair colours before. It must be conducted at least 48 hours before colouring your hair and all instructions must be followed exactly as explained on-pack and in the instruction leaflet.

There is published information,^{4,5} that such testing is effective when carried out as instructed. However, it is not possible to guarantee that an allergic reaction will not happen even if an allergy alert test has been carried out.

Whether or not an allergy alert test is performed, if you suffer a reaction after colouring your hair, it is really important that you contact the manufacturer so they can advise what to do (contact details are printed on product packs). Companies have your safety as a priority and will investigate each enquiry to help ensure the continued safety of hair colorants for the millions of people who use them regularly.



¹ Schnuch A, Lessmann H, Frosch PJ, Uter W. para-Phenylenediamine: the profile of an important allergen. Results of the IVDK. Br J Dermatol 2008; 159:379–86.
Plus Erratum: DOI: 10.1111/j.1365-1333.2008.08810.x.

² Moneret-Vautrin, 2008, doi:10.1016/j.allerg.2008.01.018.

³ Krasteva, M., Bons, B., Tozer, S., Rich, K., Hong, E., Hollenberg, D., Fuchs, A., Fautz, R. "Contact allergy to hair colouring products. The cosmetovigilance experience of 4 companies (2003-2006). Eur J Dermatol 2010; 20 (1): 85-95

⁴ Contact sensitivity to hair dyes can be detected by the consumer open test. Krasteva et al., European Journal of Dermatology, 12(4), 322-6, (2002)

⁵ Sensitivity & specificity of the consumer open skin allergy test as a method of prediction of contact dermatitis to hair dyes. Krasteva et al., European Journal of Dermatology, 15(1), 18-25. (2005)

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What safety assessments do hair colorants have to undergo?

Before any cosmetic product can be placed on the market in the UK, and across Europe, it must undergo a very strict safety assessment by a qualified safety assessor. The assessment covers the safety of the finished product, as well as each of the individual ingredients, taking into account how often and where the product is to be used and by whom (so the home user, salon client and hair salon professional).

These safety assessments are regulated by specific UK and EU cosmetics legislation, which are designed to protect human safety.

The safety assessment is a legal requirement that must be kept by the manufacturer and is open for inspection by law enforcers.



What are the different types of hair colorant?

There are three basic categories of hair colorants, depending on the colour effect produced and how long the colour lasts: temporary, semi-permanent and permanent (oxidative).

As the name suggests, temporary hair colorants modify the colour of the hair temporarily and are readily removed by washing. These products tend to be ready-to-use (no pre-mixing) and the colour settles on the hair surface.

Semi-permanent hair colorants last longer than temporary hair colorants because they settle within the natural scales of the hair coating – the cuticle. The colour gradually fades with washing, and normally stays in for up to 6-8 washes.

Oxidative or permanent hair colorants normally consist of at least two components which have to be mixed together immediately prior to use. Oxidative (permanent) hair colorants give the hair either “tone-on-tone” colour (also referred to as “demi-permanents”) or “permanent” colour. The effects of permanent colorants are resistant to washing and provide excellent coverage of grey hair.



How do permanent oxidative hair colorants work?

The key ingredients are the oxidative precursors (such as PPD and other phenylenediamines), the alkalising agent (typically ammonia), the oxidative couplers and the oxidant (hydrogen peroxide). The alkalising agent helps to open the outer hair layer. The oxidative precursors (like PPD) can then enter the hair fibre itself and react with oxidative couplers in the presence of the oxidant. This all takes place inside the hair fibre - to form coloured pigments which are too big to move out of the hair shaft so they remain in the hair providing the permanent colour.



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Are natural hair colorants safer?

No. All cosmetic products must be safe and are subject to the same cosmetics legislation including the safety assessment, irrespective of where the ingredients are sourced.

- The body cannot differentiate between a natural or a man-made substance.
- If an ingredient is safe to use, it doesn't matter where it comes from. If an ingredient is not safe to use in cosmetic products it will be banned, whether it is natural or man-made.



Formulated to work where needed

In order to get good mixing of the hair colouring mixture with the developer, the developer and colour need to be quite thin. However, thin products would simply run off the hair. To overcome this, gel networks form within the product on mixing to turn thinner products into a thick and easy to apply final form which will not drip or run off the hair.



Where can I find out more?

<https://www.thefactsabout.co.uk/hair-dye-safety>

<https://www.thefactsabout.co.uk/black-henna>