



## [AUT]OXIDATION OF FRAGRANCE INGREDIENTS

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The oxidation of fragrance ingredients is an important issue for perfume suppliers and the cosmetic industry. Oxidation, or autoxidation, is linked to the product's safety, shelf life, off notes, and finally the fragrance/product integrity in general. Fragrance ingredients that do not reveal a potential to induce dermal allergy may be susceptible to oxidation reactions that can give rise to additional chemicals that are potent allergens, leading to delayed type contact allergies. The oxidation/autoxidation of some fragrance ingredients have been thoroughly investigated.

Fragrance ingredients that are susceptible to oxidation include both synthetic and naturally occurring ingredients and derivatives thereof. Several of them are listed in annex III of the EU Cosmetics Directive 76/768/ECC and subject to standards laid down in the IFRA Code of Practice. These types of ingredients must be protected and stabilized by antioxidants and/or light absorbers, particularly if they are used in high concentrations. Additionally, protection from unnecessary contact to air/oxygen is an important pre-requisite to avoid such autoxidation processes.

Organic chemicals with branched chains and double bonds are especially prone to autoxidation upon contact with air. These free radical chain processes, once initiated, can continue as long as reactants are available or until a chain termination step occurs. Peroxides and hydroperoxides are formed as part of this process and can then undergo further reactions with other chemicals present, to form ketones, epoxides, alcohols and acids. Among these intermediates and their decomposition products skin irritating and sensitising substances can be found. Antioxidants are highly effective in terminating such reactions by stabilising and stopping the free radical chain process.

All the reactions described above can occur in nature as well as in finished products. Thus, the manufacturers of cosmetic products have to control and protect their products against such processes in order to:

- avoid excessive oxidation
- maintain the product safety
- maintain the product quality.

Thus, it is of utmost importance to protect perfume raw materials against oxidation at an early stage in the production of fragrance materials in order to effectively avoid the chain reactions associated with oxidation/peroxidation and to minimize the presence of unfavourable by-products in the finished cosmetic product.

It is therefore recommended to add adequate antioxidant systems to the used raw materials and at an early stage in the perfume oil production. In addition, it is recommended that contact with oxygen should be minimised, wherever possible.