RSC | Advancing the Chemical Sciences

Environment, Health and Safety Committee Note on: Why Do We Worry About Perfumes?

What are perfumes?

Perfumes comprise a wide range of both natural and synthetic compounds that are selected for use based on their pleasant odour. Perfumes are made up of many different compounds that can vary widely in composition and structure. Perfumers have access to a vast selection of speciality chemicals that they can choose from when developing new scents.

Natural perfumes are generally based on a mixture of extracts from plants such as vanilla, citrus or flowers. Essential oils are derived from various parts of plants. The oils are usually relatively volatile, giving plants their characteristic odour, for example lavender, lemon, rosemary, clove leaf oil, etc.

Musk used to be obtained from the glands of the male musk deer found in Asia. However, nowadays, musk is reproduced synthetically, usually being added as polycyclic musks. Macrocyclic musks such as muscone and civetone are also common whilst nitromusks are rarely used. Some phthalates are found in perfumes, because they are used as the carrier for artificial musks. Ingredients of animal origin such as musk are no longer used in perfumery.

Synthetic perfumes contain a variety of odiferous compounds selected for their pleasantness and similarity to natural compounds. Many aroma chemicals are also found in nature and most natural odours can be reproduced synthetically, e.g. banana and peach.

Uses

Perfumes have a long history of use and are currently found in a huge array of products such as cosmetics, household cleaners, air fresheners, biocides and horticultural products. The purpose of the perfume may be to make the product pleasant to use, to mask the odour of some of the ingredients, or to impart a pleasant smell to a person, or surface being cleaned. In the case of biocidal products, the fragrance may actually be the active ingredient e.g. citronella oil acting as an insect repellent. The most important uses of perfumes are in:

- cosmetics – both alone as a perfume or as an additive to a wide variety of preparations including skin creams and deodorants;
- household cleaning materials – to replace a stale atmosphere, mask an existing smell, impregnate clothing. Fragrances for this type of use are generally selected because they smell “fresh” or “clean”;
- perfumes may be added to the recirculated air of public spaces such as shopping malls, sports halls and leisure centres. For this type of use they may be immobilised onto or impregnated in filters;
- pharmaceutical products such as sun block; and
- horticultural products where an intense perfume may be used to repel unwanted vermin or domestic animals, or perfumes may be used to mask the smell of active ingredients, e.g. in patio cleaners.

This Note was produced by a Working Party of the Environment, Health and Safety Committee [EHSC] of the Royal Society of Chemistry.

The Society is a registered Charity. Its Royal Charter obliges it to serve the public interest by acting in an independent advisory capacity. In order to meet this obligation the members of the EHSC are drawn from a wide range of backgrounds and serve on the committee as individual experts and not as representatives of their employer.

The EHSC welcomes comments on this Note. Please send your comments to: The Secretary
Environment, Health and Safety Committee
Royal Society of Chemistry
Burlington House
Piccadilly
London
W1J 0BA

Tel: +44 (0) 207 440 3337
Fax: +44 (0)207 734 1227
Email: ehsc@rsc.org

EHSC Notes are also available on the Society’s web site at www.rsc.org

EHSC Notes are updated from time to time and details of the most up to date versions can be found on the Society’s website www.rsc.org

Version 2: 17 February 2012

How do they work?

Fragrance molecules bind to sites in the olfactory epithelium (in the nasal cavity), stimulating the sensory nerves. These stimuli are perceived by the brain as having a pleasant odour. Memory of fragrance is long lasting and powerful and may evoke recollections of past experiences even more strongly than visual stimuli. Fragrances are selected for particular use. For example body or cosmetic perfumes are designed to give a pleasant odour to the wearer with the added questionable promise of attracting a potential partner. The perfumes used in pharmaceutical products are selected either for their ability to mask the smell of other medicinal ingredients or for masking unpleasant biological odours such as sweat. Examples of the former are shampoos for the treatment of head lice and of the latter, in deodorants.

Benefits

Whilst perfumes can neutralise unpleasant smells and can trigger pleasant associations, their use is nevertheless, for the most part, cosmetic, and as such is a matter for individual ‘taste’.

Risks to Health

The reaction of the individual to perfume depends largely on the route of exposure. Topical exposure, for example, can potentially lead to an allergic or irritation reaction resulting in skin rash. Inhalation, on the other hand, may cause respiratory symptoms such as wheezing, coughing or sneezing. More seriously, but rarely, an acute allergic reaction can occur which triggers an anaphylactic response. There is anecdotal evidence that some perfumes can trigger migraine-like reactions.

Allergic or irritation reactions can arise from several possible causes:

- reaction to the oil base;
- reaction to the perfume compound itself;
- enhanced skin allergic reactions; and
- reaction to chemicals inadvertently contained in the carrier liquid.

Fortunately, risks to health tend to be minimal in severity. Individuals, however, who suspect they are allergic to fragrances, may wish to seek advice from a doctor.

Exposure Routes

The use of perfumes by individuals, its presence in a wide range of products and the airborne nature of perfume, means that direct or passive exposure is likely and is extremely difficult, if not impossible, to eliminate. In the workplace, sensitivity of individuals involved in the production of perfume based materials, or in perfume production itself, can be minimised by the use of good factory design, the use of process controls including personal protective equipment and the provision of regular health surveillance in order to detect early warnings of sensitivities. An allergic response once developed, however, may preclude individuals from employment in specific processes or, indeed, from the particular workplace.

Outside the occupational setting, however, individuals who suspect that they have become allergic may be advised to stop using products which contain perfumes. In the case of cosmetic perfumes, the presence of perfumes must be declared by law on the label as “parfum”.

Certain substances have been identified as causing contact-allergy reactions in fragrance-sensitive consumers. In order to ensure that such consumers are adequately informed, the provisions of Directive 76/768/EEC have been amended to require that the presence of these substances be mentioned in the list of ingredients found on the label, if added at concentrations that exceed 0.01% weight/weight (rinse-off), 0.001% weight/weight (leave-on). Directive 2003/15/EC (7th amendment to Directive 76/768/EEC, annex III, part I), lists 26 allergenic substances which must be labelled on the packaging. This information will assist persons with sensitivities to make decisions about the products that they use. However, unlike cosmetics, other categories of consumer product may not have full ingredient labelling, so a person with an allergy to fragrance compounds should adopt a precautionary approach and avoid using such products or use them with care so as to avoid skin contact. There are several cosmetic and pharmaceutical products available both in shops and by mail order, which are clearly labelled ‘perfume free’.

Uncertainties

It is very difficult to predict individual susceptibilities. However, those persons with known acute allergies are likely, through personal knowledge, to be cautious about using new products. For any allergen, no safe limit can be defined with absolute certainty due to individual susceptibility. Adverse skin reactions or allergic type responses must always be treated with caution, as a low exposure which causes sensitisation on one occasion may give rise to a much more serious response in future. Identifying or predicting the presence of an allergic compound in a product is difficult as many manufacturers of domestic products containing perfume declare its presence simply as “parfum”. Estimates indicate that only a very limited number of people may become sensitised to some fragrances, but in most cases this is a minor inconvenience.

This Note was prepared by a Working Party of the RSC Environment, Health and Safety Committee.

The members of the Working Party were: Dr I Wrightson (Chairman), S J Cooper, Dr M Crookes, Dr C L Grundy, Dr N King, Dr P Lewis, Dr D H Lohmann, Dr C Maxwell, P Jackson, D M Sanderson and Dr S Lipworth (Secretary).