Advice to the Lab Lorn

"Advice to the Lab Lorn" is intended to offer advice, or maybe just solace, for confusing, challenging or downright murderous issues facing SCC members in their labs. Send us your questions at lablorn@caliscc.org and we'll track down an authority or two and get back to you in the Cosmegram. You can include your name if you wish, but we won't publish it for all to see! Your secrets are safe with us.

John Garruto & Rebecca James Gadberry

2. How do natural and synthetic fragrances differ and what guidelines should a chemist consider when working with each?

A. First, we need to define "natural" and "synthetic" relative to fragrance. A synthetic fragrance is a complex blend of aromatic chemicals often blended with some naturally derived essential oils and diluents such as dipropylene glycol. Commonly used aromatic chemicals include terpenes (limonene), esters (geranyl acetate), aldehydes (hydroxycitronellal) and alcohols (phenylethyl alcohol). A natural fragrance is generally a mixture of essential oils such as lavender, jasmine, sandalwood, sage and citrus oils, resins or other odorous materials of plant origin. Few materials are used today that are derived from an animal source. Keep in mind however that individual natural essential oils are complex compounds with often hundreds of chemical components. Constituents of lavender oil include linalool, linalyl acetate, cineol and geraniol. The diluent or carrier used in natural fragrances is generally composed of vegetable oil such as sweet almond oil or soybean oil.

The advantages of a synthetically derived fragrance are price, consistent quality, availability and diversity of scent character, while the disadvantages are that synthetics cannot always replicate the exact aroma of an essential oil. Additionally, they are not "natural." On the other hand, the advantages of a natural fragrance are that they have been used for thousands of years, have a documented history of therapeutic benefits and they are "natural." The drawbacks are consistency, stability, availability and price.

Formulating with fragrances, either natural or synthetic involve similar challenges. Fragrances can be reactive to air, light or heat during storage and in the finished personal care product. This is especially true of citrus oils and their man-made counterparts (citral and other terpenes), vanillin, musk xylol, oakmoss and heliotropin. This aspect may be catalyzed with the presence of metal ions. There are also potential problems with interaction of the fragrance and product base, which may include solubility issues (fragrance components and/or diluent), viscosity impact and overcoming base product odors from surfactants, alcohol, fatty materials, proteins and quaternaries. Interaction with packaging materials should also be a consideration.

So...what can be done to help avoid these pitfalls? A good place to start is with a solid fragrance profile or brief, which should be given to the fragrance supplier at the onset of a project. This is the time to divulge whether the fragrance requirement is completely natural or if it may contain synthetics. This profile should include the scent type, intended product (emulsion, cleanser, cologne, etc.) and specifics relative to product ingredients, pH and color requirements. Have you ever tried to formulate a light pink or blue product with a fragrance that has an intense yellow color? The addition of stabilizers such as UV absorbers, antioxidants and chelating agents is also advised.

Finally, thorough stability testing should be performed early on in the development process. This should include room temperature, elevated temperature, refrigeration, freeze thaw and UV exposure. It is also a good practice to provide the fragrance supplier with a quantity of base product to assist in the stability evaluation, if necessary.