

Nitriles: their application in perfumery

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It is necessary for every perfume company to have an active chemical research team. The difficulties perfumers meet have become more complicated due to the great diversity of new chemicals that have become available during the last fifteen years. Too many products with very similar notes, even though their structures are different, are offered to our sense of smell. Perfumers really don't benefit by cramming their memories with too many names and formulae having nearly identical olfactive characteristics, even if retention times under certain conditions or spectra are quite different.

Research studies of synthetics are of utmost necessity, provided they are carried out according to the criteria we choose as perfumers. Our basic interest is (1) in a product with a note that can really improve a perfumer's already wide range of fragrances, (2) in a product the note of which may be common in the field of natural or synthetic products but is of greater use owing to its price and regular production, (3) in a product with a note close to another well-known reference but easier and safer to handle, and finally (4) in products the notes of which aren't very original but possess advantageous technical performance: stability in certain media and significant advantages based on toxicity tests. (These are two important points, what with the economic and legislative underground which our business is developing.)

For 50 years, Synarome has been taking perfumers' needs into account when studying the making of chemicals or specialties. Our technical developments include Ambrarome Absolute, which can't easily be classified but is increasing in use every year; aldehydes; lactones; research work on hexenol; settling the making of cis-jasmones; and studies with acetals and dioxanes in which there is a great deal of olfactive and technical interest. Nitriles now appear to offer interesting research directions leading to the creation of sufficiently distinct products.

Saturated aliphatic nitriles

Among the saturated aliphatic nitriles is myristic nitrile, which was first developed by

Mr. and Mrs. George Igolen. For this type the note of the nitrile can be considered to be halfway between that of the alcohol and that of the aldehyde with the same general structures. In other terms, these nitriles have a slightly greasy note with the same expansion as aldehydes, or even superior to that of aldehydes; but less dry, less rough, less "chemical." This note could be related to the "clean" smell users of detergents generally look for.

The main advantage of this type is its stability in both high and low pH media, i.e., in soaps and all types of detergents. The note neither weakens nor vanishes in these media. The note of a soap, scented with one of these compounds a year ago, is definitely the same as it was a few days after it was made. Also, if the technical quality of these products is good, and if they are made properly, the color of the soaps perfumed with these nitriles does not change. When using them for perfuming detergent bases and soaps, their notes are neither smothered nor eliminated as often happens with many a product available to perfumers when tried in these difficult media. Adding of 1.5% to 1% of these chemicals to a compound is sufficient to modify the fragrance. One could, however, use as much as 2% to 3% in soap or detergent compounds without causing too much variation in odor.

Two points might account for the fact that few perfumers use these products: their power causes a certain repulsion and, moreover, one can get the impression these notes are already known.

Unsaturated aliphatic nitriles

The notes of the second type of nitrile draw the perfumer's attention more easily, since they are typically more pleasant to smell, and more easily related to products we already know and which are already used.

This type has the same general formula as geraniol, citronellol, and nerol, i.e., aliphatic unsaturated chains which have isomers with very interesting olfactive differences. These nitriles behave in the same significant way as those studied before, in basic or acid media, in terms

of olfactive stability, and absence of coloration of the soap base on aging. Moreover, they are extremely powerful.

One nitrile of this type is geranyl nitrile. Its note is fresh and related to that of citral. The parallel drawn between the note of the aldehyde function and the note of the nitrile is still valid. Yet, clear differences should be underlined: instead of the dry note of a good citral, this product has a rather green or sharp note, a slightly rosy note thus approaching the corresponding alcohol. This product enables perfumers to create fresh, slightly floral notes with good tenacity and stability. The presence of two isomers that might be of quite different proportions, according to the manufacturing process, causes rather clear olfactive differences for products with the same general definition. Thus, one can get a geranyl nitrile with a definitely "verbena" note instead of the usually referred to lemon note.

The second nitrile to be discussed here is citronellyl nitrile. The note of this nitrile should be close to that of citronellal, possibly with an underlying citronellol touch. If the citronellol note can be selected as a reference, the top note would rather be similar to that of citral by its freshness and a certain roughness. For this product the manufacturing process used is perhaps more important than it was for the previous nitriles because one can witness rather different proportions if isomers as well as secondary compounds coming from the process which have a very important olfactive impact. Thus, one can obtain a definitely fresh and lemon note that might smell more like "lemon" than that of geranyl nitrile. The use of citronellyl nitrile in compounding is comparable to that of geranyl nitrile and it should be noticed that very small proportions of these products, less than 1%, result in remarkable modifications which are sufficient to give a definitely new note to fragrances.

Aromatic nitriles

Aromatic nitriles have the same structure as benzoic and cinnamic aldehydes. These nitriles are especially worth considering, because even though aromatic aldehydes have very interesting olfactive characteristics, they are difficult to use first, because their notes are so powerful—which implies only traces of them can be used, and second, because of the instability resulting in their turning easily into the corresponding acid—which brings a deterioration of fragrance and color and perhaps irritation and modifications when these products are used in cosmetics.

For the few nitriles we know with the same structures, their notes clearly resemble those of

corresponding aldehydes. This makes them easier to use as we are already acquainted with their value and possible applications.

Some of the aromatic aldehydes are sensitizers, especially cinnamic aldehyde, while the corresponding nitrile is said not to result in any irritation or sensitizing reaction. Its odor too is generally less powerful, less chemical than that of the aldehyde so it is possible to give a compound a new characteristic by using it in larger proportions than we could do with aldehydes. Nonetheless, these proportions are comparatively low, owing to the power and expansion of these notes, and consequently they affect the cost price of the compound in a very slight way even if these products seem to be quite expensive.

To give a more specific example, cinnamic nitrile will bring to a compound a powerful warm note, even if used in small quantity, which accounts for its being used for soaps or the perfuming of detergents as well as for the creation of feminine and masculine notes.

For this type one must pay close attention when choosing a manufacturing process so that the perfumers get a powerful but yet pleasant note. The aromatic nitriles we have selected are usually "spicy" either with a full spicy round note or with a sharp, spicy note. Thanks to these products, it is possible to renew and bring the characteristics of well-known formulas up to date, or to get interesting new creations.

We know that any product has a characteristic of its own, due to its subordinate notes which can completely change its olfactive interest. Research studies on the nitriles will continue. Our research for new nitriles will provide the perfumer's "palette" with even more useful products.

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