Perfumer's Notebook

By Calamondin

STABILITY OF FRAGRANCE PROFILE

An essential feature of any well compounded fragrance is its property of maintaining a constant profile during its exposure. This applies to fragrances applied to the skin, as with colognes or perfumes, or exhibited on the surface of toilet soaps. Marked change in profile during exposure may occur through lack of attention to relative evaporation rates of the perfume components. The rate at which a substance evaporates is, of course, a direct function of its vapor pressure, i.e. its tendency to change from liquid or solid to a gas.

Only limited information is available pertaining to vapor pressures of perfume chemicals and oils. We can readily determine the boiling points of simple, stable chemicals, such as phenyl ethyl alcohol, benzyl acetate, citronellol, etc., and we know that most solids, such as coumarin and the musks, evaporate very slowly. Generally evaporation rates at use temperatures parallel the boiling points, but for many substances, association and other phenomena affect the temperature/volatility curves.

The perfumer, and especially the novice or apprentice, will assist his development and increase his capability in the use of aroma materials by determining for himself the relative volatilities of the materials he uses. The methods can be simple.

The familiar blotting strip can provide valuable knowledge of relative volatilities. There are at least two techniques which can be used with it. The first is to dip the blotter to a predetermined depth into either the pure liquid or a 1:1 solution of the substance in pure alcohol. Then observe the change in odor strength with time as evaporation occurs.

This method requires a scale of odor intensities for comparisons. One such scale can be obtained from a series of dilutions of the test substance. From this experiment the observer may find that a test material will lose its odor strength at a rate such that after eight hours the odor of the original 100% strength blotter equals that of a dip into the one percent solution. By a series of such comparisons during evaporation the perfumer can prepare for that substance a curve of its rate of loss. It should be noted here that temperature and air flow affect rate and conditions should be kept constant for the tests.

Another scale is derived from a choice of odorant substances to represent high, low and intermediate intensities. As in the test above the perfumer may compare the test blotter with fresh dips of his scale substances and thus determine the rates of evaporation. This scale has the advantage that a series of dilutions need not be prepared for each test. However a consensus of perfumers on relative strengths of materials having different odor is not readily obtained. Accordingly, such a scale may be difficult to select.

A second approach to measuring volatility is to determine how long a blotter dipped into an odorant will retain that odor. This method is suitable for the bulk of perfumery materials, but may give somewhat erroneous results for chemicals and oils which readily undergo oxidation or chemical change during exposure. The method will not provide a rate curve but does give a coarse measure of volatility.

Whatever method is employed the knowledge gained will benefit the perfumer in creating perfumes that can be expected to retain their profiles. A portion of each working day spent in such activity will provide a library of relative volatilities.

It should be obvious how this knowledge can be helpful. For exageration, an equal mixture of two aroma chemicals which are approximately equal in odor strength but widely different in volatility are chosen. A fresh dip into the mixture will have the odor of the more volatile substance but on standing the blotter will acquire the odor of the other substance. Generally the closer the evaporation rates the more constant the odor of a blend.

It should be noted here that evaporation rates of single aroma materials are affected by the presence of other chemicals, especially if association can occur. In a sense this is a reaction between chemicals in a blend without chemical change. For the same reason the medium in which the blend is used can influence relative evaporation rates.

In my next column I shall discuss these factors and how some predictions can be made and experiments conducted to assist the perfumer.