

# Olfactory Training of Worldwide Quality Assurance Personnel

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**W**e propose to discuss the problems involved in marketing quality fragrance products all over the world and the solution we have developed for one of the most perplexing of them. How do we go about selecting and training quality control personnel with the needed olfactory skills in order to staff this myriad of locations?

A typical manufacturing company producing at only one site has relatively simple quality assurance needs. An on-site quality assurance department can check the specifications of both incoming raw materials and outgoing finished products in a more or less straightforward manner. Traditional wet and instrumental methods are satisfactory for insuring quality.

If that company is in the cosmetic and toiletries business, however, the necessary analyses are considerably more complex. In addition to the more routine physical and chemical measurements, there must be a subjective olfactory evaluation of incoming fragrance compounds as well as other critical raw materials. Then the process must be repeated as cosmetics and toiletries are manufactured and prepared for shipment. Finally, stocks of raw materials and finished goods in inventory must be evaluated periodically to ensure maintenance of quality.

As the number of manufacturing locations increases, quality assurance becomes more complex. If the sites are within close geographical proximity to one another, it may still be feasible to operate out of one quality control laboratory. Consider, however, a multi-national corporation with twenty-three manufacturing locations in twenty-one countries on six continents. In addition to manufacturing sites, finished goods are kept in inventory in warehouses in many other locations.

The primary qualifications of personnel chosen for quality control work are those laboratory skills involved with traditional wet and instrumental methods such as titration or GLC. Sensory evaluation is not a primary consideration, therefore

quality control personnel may not be suited for sensory evaluation.

The question was how to go about determining qualifications for those employees who will exercise sensory evaluation responsibility and then to devise a system to train qualified novice personnel. The multiple locations provided as large a challenge to a training program as did the design of the training program itself. There were no personnel dedicated solely to the training program and free to travel more or less continuously to all training sites worldwide. It was also deemed impractical to transport quality control personnel to a central location for a training program. In considering these restrictions, the program was designed in such a way that it could be conducted by correspondence.

The written material was designed to be readily understandable to personnel with little or no sensory evaluation experience. Since obtaining explanations or answering questions was likely to involve international correspondence, the course was implemented in such a way as to enable the quality assurance managers to supervise the training program without any formal education in sensory evaluation.

The program as developed is divided into four

phases: panel screening, panel training, panel qualification and panel maintenance.

Phase I is concerned with the effort necessary to identify personnel with the potential to be trained for sensory evaluation work. Phase II consists of eight lessons of formal panel training studied periodically over sixteen months through which personnel with potential for this type of work were trained in the methods used for sensory evaluation and given a familiarity with the types of materials with which they will be working. In Phase III, panelists are challenged by a practical examination of what they have learned in the context of problems similar to those they will handle in quality assurance work. During Phase IV, sensory evaluation problems which arise in the course of routine quality assurance work will be addressed and suggestions offered for improvement.

### Phase I—Panel Screening

Phase I is performed with the aid of an odor testing kit. In order to determine whether an individual has the potential of sensory evaluation work, there are three characteristics we look for in a potential candidate. The first is odor memory, i.e., the ability to remember and associate odors smelled at some time in the past. The second characteristic is the ability to discriminate among similar odors. The third is sensitivity. The individual must be able to determine the relative concentration of specific fragrance notes. Accordingly, the screening kit consisted of six samples to test odor memory, nine triangles to test discrimination and three triangles to evaluate the prospective panelist's ability to judge concentration. These kits were prepared in quantity and distributed to the twenty-three locations initially participating in this program.

The twenty-three QA managers were asked to give the odor screening test to potential candidates at their locations. The quality most needed was a good sense of smell which the odor screening test was designed to discover. It was necessary to administer the test to a wide variety of employees in order to obtain a panel of at least five people. This was the minimum number of qualified personnel necessary to insure that a panel would be available to make olfactory decisions. Potential candidates included technicians, secretaries, managers and manufacturing people.

Detailed instructions for administering the test were provided to the managers. One sample or triangle at a time was to be presented to the candidates. They were allowed to work at their own pace. When everyone was finished, the manager would present the next triangle. Mention was also made in the manager's instruction guide in

reference to details such as storing the test kit at 40°F, allowing the kit to come to room temperature before administering the test, dipping the blotters evenly, and the proper way to fill out the test sheet.

As noted before, Part I of the odor screening test evaluated odor memory. This portion presented the candidate with six odors such as cedarwood or rose, each of which should be familiar based upon experience in daily life. The candidate was given a blotter dipped with one of the six materials and asked to identify this aromatic material. The candidates were told to work at their own pace and permitted to return to previous blotters if desired.

Part II of the odor screening test was called the triangle. This is the portion that tested the ability of the candidate to discriminate among similar odors. Each triangle consisted of two aromatic materials which were the same and one that was different, but quite similar in type. Examples would be galbanum versus galbanol extra or Florida versus California orange oil. Each triangle was presented one at a time to the candidate, who was allowed as much time as was necessary to choose the one different material.

The third part of the odor screening test was the sensitivity section. All three items in each triangle were of different concentrations. The three tests consisted of a perfume compound at three different concentrations, a compound contaminated with three levels of camphor and the same compound contaminated with three levels of aldehyde C-16. The candidate was asked to identify the strongest and the weakest concentration in each triangle. This measures the ability to detect concentration differences.

A test score of 85% or better was needed in order for a candidate to be selected as a member of the panel.

### Phase II—Panel Training

Once selected, the members of the panel entered Phase II of the worldwide fragrance training program. This second phase of the panel training program consists of eight lessons.

Each lesson consists of twelve aromatic materials, general instructions for handling, a brief historical introduction to the aromatic materials and the category into which they fall, a detailed technique for olfactory evaluation, a glossary of fragrance terminology and a fragrance description summary sheet.

The general instructions for handling educate the panelists in how to keep the materials fresh and free from contamination. The brief historical introduction was written in an engaging and in-

teresting manner to capture the attention of the panelists and give them an enlarged scope and respect for the lesson being presented. The twelve aromatic materials were carefully chosen to represent often used ingredients and commonly found notes in Avon fragrances. An example would be the citrus category which consisted of bergamot, lemon, petitgrain, orange, mandarin and D-limonene. The categories become progressively more difficult going from simple florals to woody notes, spice notes, and animal notes along with a variety of commonly used synthetics falling into a specific category, and essential oils and absolutes.

All aromatic materials are distributed and studied at a concentration of ten percent in DEP. The detailed technique for olfactory evaluation describes a method of smelling that will eliminate the amount of variability in external conditions that could lead to a misjudgment in perception.

A very simple glossary of fragrance terminology was also provided with each lesson in order to provide a means by which the panelists could describe their experience since in most cases, they had no previous experience in verbally describing their olfactory perceptions. The panelists were encouraged to use the terms found in the glossary when filling out the fragrance description summary sheet, which was provided with each lesson. The description was to include observations on three stages—top-note, middle (body) and dry-down—of olfactory evaluation. This summary sheet, which was a consensus of the panelists descriptions was the means by which Fragrance Coordination could monitor the progress of the group. Each location received immediate written feedback thanking them for their effort and critiquing summary sheet.

The fragrance description summary sheet returns from various worldwide locations have proven the program to be very successful. We are especially pleased that we have been able to communicate the information to the panelists without a physical presence in the various locations. The descriptions we have received of the aromatic materials being studied are generally accurate and reflect a good understanding of the language of perfumery.

### **Phase III—Panel Qualification**

Subsequent completion of Phase III is the final step required to qualify a panel for sensory evaluation work. This phase was designed to test the ability of the panel to evaluate incoming receipts of fragrance oils and samples of finished goods. This phase is administered after the panelists have been exposed to the eight lessons in com-

mon perfumery materials. The panel was sent five unknown perfume compounds. Using any means available to them, they were asked to identify the first compound which was an Avon perfume currently on the market. Olfactory evaluation allowed the panel to easily identify the currently marketed fragrance. The panel checked their answer by comparing the GC curves of the standard and the identified compound.

The next three compounds were presented as a triangle and the panelists were asked to identify the adulterated sample and also with what it was adulterated. Again, olfactory evaluation was sufficient to allow the panel to identify which fragrance sample was adulterated and also the identity of the adulterant. The final perfume compound was composed of just four aromatic ingredients which were studied by the panel in Phase II. The panel was asked to identify the four aromatic ingredients which comprised the last perfume compound.

Use of olfactory evaluation alone allowed the panel to identify D-limonene, benzyl acetate, and eugenol. Phenyl ethyl alcohol was suspected as the floral component of the compound and was confirmed by GLC.

Having successfully identified the five unknown aromatic compounds of *Phase III-Panel Qualification*, the panel moved into *Phase IV-Panel Maintenance*.

### **Conclusion**

The need to provide a training program in olfactory evaluation for worldwide quality assurance personnel was identified. Based upon a need for timely implementation of such a program with a minimum disruption of the quality assurance work schedule, such a program was developed. The worldwide fragrance training program is administered by correspondence. Aromatic materials and complete instruction are provided to enable each location to test prospective panelists for olfactory potential, to familiarize panelists with aromatic raw materials which they are likely to encounter during their quality assurance effort, to test the panels on what they have learned and to assist the panelists in any olfactory issues which may arise in the course of their quality assurance effort.

Evaluation of the program to date indicates success. The enthusiasm, dedication and effort of the personnel participating in this program ensures that our quality will be the best possible.

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