

Abstracts

The Annual Scientific Meeting and Seminars of the Society of Cosmetic Chemists are important venues for informing the participants about the state of the art and recent technical advances in the field of Cosmetic Science. To provide broader dissemination of that information, the Publications Committee has decided to publish abstracts of the technical presentations made at these Meetings and Seminars in the Journal.—The Editor.

Society of Cosmetic Chemists Annual Seminar

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Anne Wolven-Garrett (A.M. Wolven, Inc.), Chair, 1990

SESSION A

INTERACTION BETWEEN RAW MATERIAL SUPPLIERS AND FORMULATORS

Optimizing the formulator–supplier relationship

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The relationship between the cosmetic chemist and the raw material supplier, will be examined emphasizing ways to optimize the productivity of both. Current trends in the cosmetic and related industries will be examined, forming the basis for suggestions on improving the partnership between chemists and raw material suppliers in the development of new personal care products.

Technical interactions between supplier and customer

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It is the purpose of this paper to touch on current interactions between suppliers of specialty chemicals and their customers, mainly product development chemists. We will then discuss some of the apparent difficulties of this relationship and suggest possible alternatives that will help make both the supplier and the customer more successful.

Gaining and maintaining a competitive edge will be a key factor to success in the 1990s. Competition will be tough not only for the supplier but also for

the customer. Consumers at every level are becoming more educated, and with that education comes increased expectations.

To meet these expectations, significant advancements will be made in cosmetic science as well as in related fields such as dermatology. This will require more complex interactions and development between suppliers and customers. It is this interaction, however, that will be a key factor in new product development, commercialization, and, ultimately, market success.

A Realistic toxicological profile for new cosmetic ingredients

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When exciting new cosmetic ingredients are being introduced into the consumer skin and hair care market, both the supplier and the cosmetic manufacturer want to be sure that consumers using their new product can realize the benefits of the product with minimal risk. Early evaluation of individual ingredients based on experience and testing, where required, will prevent unexpected and expensive problems late in the product development process. New materials can be evaluated first by comparing chemical structure with known classes of irritants and sensitizers. These comparisons will help the cosmetic product developer and the supplier to determine together whether minimal or extensive toxicological testing is desirable. Once the final proto-

type product has been selected, a series of skin toxicological tests are available; however, the selection of a reasonable combination of tests will depend on product use: skin care or hair care, single use or continuous use, probable site of application, probable misuse, intended function, and experience with similar products in the same category.

SESSION B REGULATORY ISSUES IN THE 1990S

New and Existing raw materials—A regulatory minefield

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The 1980s brought with it a new set of ground rules concerning the protection of our environment. The strong thrust of new regulations in the 80s challenged American industry to respond rapidly, while maintaining its position in highly competitive markets.

While regulatory pressures gain in strength, the number of companies that are willing and able to adapt has withered. This is a reflection of global consolidation and the financial impact compliance requires.

The author will examine some of the dangers and opportunities for the 90s based on the manufacture of specialty biocides. Included will be a focus on specialty biocides and the associated regulatory issues. Topics of discussion are:

- Acceptance of a preservative system for worldwide use
- Handling of hazardous basis raw materials and by-products
- Biodegradability
- Preservative safety testing
- Consumer needs vs. environmental requirements
- Negotiating with regulatory agencies

SESSION C FRAGRANCE SCIENCE AND TECHNOLOGY

The biology of olfaction: Focus on an odorant-binding protein

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The molecular basis of olfaction is poorly understood. Odorants must travel from air through the nasal mucosa to reach olfactory receptor cells located in the olfactory epithelium. To understand these processes, we studied the binding of radioactive odorants to homogenates of the cow or rat nose. We identified an odorant-binding protein (OBP) that is present in many species including humans. OBP is

a small, soluble protein that is synthesized in the lateral nasal gland. It is secreted from that gland into nasal mucus in high concentration. The pure protein can bind odorants of various structural classes including terpenes, aromatics, musks, and aldehydes. We cloned the gene for rat OBP. Analysis of the protein sequence indicates that OBP is homologous to a family of transport proteins, such as the retinol-binding protein that carries vitamin A to the eye. We propose that OBP is a carrier protein for odorants, delivering them to olfactory neurons within the nose.

The effects of odor administration on performance and stress in a sustained attention task

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Based on some data from EEG recording and subjective reports, we expected the administration of certain fragrances to enhance performance and/or reduce stress in a sustained attention (vigilance) task. Subjects were asked to detect the occurrence of a visual signal that was infrequently and aperiodically presented on a video screen, temporally interspersed among similar patterns. In experiment 1, subjects received a 30-second burst of either of two fragrances, peppermint or muguet, or plain air. Both fragrances had been judged pleasant in a pilot study; peppermint had been judged alerting, muguet relaxing. Subjects in both fragrance conditions showed superior performance accuracy to those in the plain-air condition. No effects on self-reported stress were found. In experiment 2, only peppermint was used, along with a plain-air and a no-air control. Subjects in the peppermint condition did better than the control subjects and also reported less stress. The exact mechanism for these effects has yet to be identified.

Fragrance use and social interaction

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This study investigated the relationship between individuals' use of personal fragrances and their social interactions. Subjects maintained a social interaction diary for three weeks. The diaries provided detailed summaries of the quality and quantity of subjects' social contacts, including subjects' beliefs about others' awareness of their fragrances and how pleasant their fragrances were to others. Subjects' perceptions of how often others were aware of their fragrances were unrelated to quality and quantity of their social interactions. Subjects' estimates of how pleasing their fragrances were to others were unre-

lated to the quantity of their interactions. However, these estimates were closely related to the quality of social interactions. The more pleasant subjects thought their fragrances were to others the more satisfaction and intimacy they found in social interaction and the more confident they felt in interaction. The results were similar for men and women. The data suggests that fragrances should be studied as social psychological phenomena in addition to being considered as olfactory stimuli.

SESSION D PATHWAYS OF SKIN PENETRATION

Biophysical evaluation of the skin's barrier function

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The stratum corneum (SC) is the morphologically unique outer layer of the skin that acts as the primary barrier in terrestrial mammals to water loss and the uptake of toxic substances. The techniques of differential scanning calorimetry (DSC) and Fourier transform infrared (FTIR) spectroscopy have been used to evaluate the biophysical properties of the SC. These techniques provide information on both SC protein and lipid structure that can then be correlated with permeability measurements. Results show that temperature-induced changes in water permeability through SC are remarkably similar to data obtained with lipid bilayers. Spectral results show that changes in the lipid acyl chain conformation are highly correlated with water permeability. Taken together, these results strongly support the role of SC lipids in barrier function. Furthermore, they provide a mechanistic interpretation of permeant transport that is independent of pore formation. Finally, if the lipid biophysics of water transport through SC and lipid bilayers are mechanistically similar, why do the absolute rates differ by over 1000-fold? The answer may be found in the unique morphology of the SC, where corneocyte "bricks" may serve to increase the tortuosity of water transport.

Polar pathway, transepidermal water loss, and moisturization

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The stratum corneum has traditionally been envisioned as a lipophilic barrier to skin penetration, and this viewpoint is in accord with most measurements. However, the slow but finite permeation of polar solutes through the skin, including water itself, suggests that there may be a special pathway for such molecules. The nature of this pathway has not been definitively identified, but several suggestions have been put forth. One is that polar molecules are transported via the shunts, such as the hair follicles and sweat gland ducts. Another notion is that spaces between polar head groups of the neutral intercellular lipids of the stratum corneum line up to permit water and other polar molecules to pass between the cells. Higuchi's pore model accounts mathematically for much data, but does not identify the location of the "pores." In recent experiments on simultaneous lidocaine and water transport through excised, dermatomed human skin, the enhancement of water penetration by surfactants was proportional to lidocaine enhancement. These data suggest that water is not restricted to the polar pathway in the presence of agents that perturb the intercellular lipids.

Iontophoresis and sonophoresis—Skin penetration through appendageal pathways?

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Conventional delivery of active materials into and through the skin is based on the driving force of a concentration gradient from the active in a topical formulation to a lower concentration in the dermis. Iontophoresis actively delivers substances across the skin by employing electrical potential energy, while sonophoresis invokes ultrasonic waves to enhance the transport of actives across the skin. Unlike passive diffusion, active transfer of charged and neutral molecules across the skin changes the relative contribution of proposed hydrophobic, hydrophilic, and appendageal pathways of penetration. As the cosmetic industry moves towards treatment of skin aging and reversal, rather than concealment, of skin blemishes and discoloration, greater specificity of the area and delivered dose of cosmeceuticals will be needed to normalize different skin conditions.