QUESTION AND ANSWER

At a scientific meeting of the Society held on 23rd March 1961, questions were put by the audience to a panel consisting of Mr. E. K. Clarke, Dr. R. H. Marriott, Mr. T. P. McLaughlin and Mr. J. Pickthall. The proceedings were recorded and subsequently edited by Dr. H. W. Hibbott (chairman of the meeting).

Question 1. What are the best laboratory methods of shampoo evaluation and how can such methods be correlated with consumer assessment ?

Answer : There is really no substitute for subjective tests for shampoo assessment. Moreover, the tests should be carried out in a reasonably standard manner with independent observers, and enough tests done to assure some statistical treatment of the results.

In screening the many detergents available and finding the desirable concentrations of suitable ones, laboratory methods must be used. Determination of actual grease removal gives one type of assessment. In assessment related to consumer acceptance, some work has been carried out, designed to find what happens in the shampooing process and after—the factors responsible for the final condition of the hair such as gloss and "softness of handle". That work, reported in the *Journal of the Textile Institute,* is mainly concerned with the state of hair after washing or other treatments. In such conditions, cortex cells and cuticle cells may be broken down from the hair in amounts proportional to the amount of damage sustained by the hair. By a quantitative count method, the ratio of cortex cells to cuticle cells will give an assessment of effect of shampoos which corresponds closely to corresponding subjective opinions.

Despite this, usage tests must still play a large part in consumer acceptance. Moreover, personal usage tests are to be preferred to salon testing. An expert hairdresser can get good results from a poor shampoo. The consumer, the self-user, with eyes closed during the operation, does not even see the lather produced on the hair but makes an assessment by the feel of the lather.

Question 2. Are antioxidants of any value in preventing deterioration on ageing of perfume, particularly those containing solubilisers ?

Answer : Antioxidants are of use but on the other hand a perfume usually carries its own antioxidant. Some of the most efficient antioxidants are phenolic compounds of which eugenol is a good example. In fact, traces of eugenol are often added to aldehydic raw material to prevent oxidation. It should not be necessary to deliberately add an antioxidant to a perfume in alcoholic solution. Indeed, a well-made

perfume may benefit from slight oxidation effects during the maturing period.

With regard to solubilised perfumes which will include some aqueous medium, the situation may be different. If the solubilising agent is based on an unsaturated fatty acid more antioxidant may be needed.

Supplementary Question : Arising out of the above, is there any value in the use of sequestering agents in perfumes ?

Answer : Use is made of sequestering agents to inhibit iron and copper ions from acting as oxidation catalysts in perfume raw materials. The addition of sequestering agents to perfumed soaps has not been very successful. A better approach is to remove iron and copper during preparation of the raw materials—natural and synthetic perfume materials are stringently tested for metal content nowadays.

The so-called sequestering of metal ions is not always effective. The metal may still have some reactivity even when complexed. For example, patchouli travels all over the world in iron drums and usually contains some iron. By adding amyl salicylate to patchouli the mixture quickly turns from pale yellow to purple. If an iron sequestering agent is added to the original sample, subsequent admixture with amyl salicylate will give less strong colour development, but the colour reaction cannot be entirely eliminated. On the other hand, if the test is repeated after removal of the iron by distillation of the patchouli, no colour development occurs even on boiling.

Question 3 : Can the panel give any views on applications of the H.L.B. system in emulsion technology ?

Answer : The system represents a real first step in classifying emulsifying agents. But many combinations of emulsifiers give a recommended H.L.B. number so that much painstaking work is still required in order to find the best combination for a particular purpose. It must also be remembered that, in the academic approach in general, very simple oil-water systems are used in order to avoid complicated side-issues. The cosmetic chemist has to deal with more complicated systems at the very start of an investigation. The oil phase may be liquids of varying viscosity or even solid, polar or non-polar ; the system may be complicated by the inclusion of solid powders of various types ; the aqueous phase may contain a number of ingredients ; some emulsifying agents have other effects in addition to keeping an emulsion reasonably stable. Perhaps the H.L.B. system has suffered from the early impression (albeit accidental) that it was the quantitative answer to all emulsion problems. W. C. Griffin certainly would not claim this. It is the only system yet devised and is qualitatively

useful. However it must be used with caution—after all, many emulsions are required to be less than perfectly stable in conditions of use.

Question 4 : What is the present position with regard to polypropylene for containers and is this material expected to be superior in any way to polyethylene ?

Answer : It is important to remember that polypropylene is not a new wonder plastic which can be universally applied. It does not differ in character from polyethylene, but only in degree. It has a little more resistance to vapour transmission than high-density polyethylene (and even more resistance than low-density polyethylene).

It has a higher surface hardness, can be moulded with a better gloss and cast into film of greater clarity. These properties could lead to production of decorative containers to compete in clarity with glass. It is more expensive than glass but is less dense and unbreakable, and will probably become cheap in time. The material may compete with cellophane film. Its rigidity will prevent competition with normal polyethylene in squeeze-bottle packs and in laminate materials.

It is stable to higher temperatures than is polyethylene. It does become brittle at very low temperatures but should be satisfactory over the normal range of terrestrial temperatures. Polypropylene is free from environmental stress cracking and should prove much more satisfactory in this respect than polyethylene for wadless caps, etc.

The long-standing problem of adhesion, say of labels, to polyethylene will be accentuated in polypropylene and similarly there are difficulties in screen printing.

Question 5 : Is there a known reason for perfume deterioration in powder products, such as tinted face creams and talcum powders ?

Answer and Comment : There are some known and some unknown reasons. The deterioration of perfumes in tinted make-up preparations and powders is well known to perfumers and presents some baffling aspects. For instance, for many normal perfumes, particularly aldehydic ones, incorporation in face powders containing light-shade iron oxides may be reasonably satisfactory whilst in powders containing dark iron oxides, deterioration may occur at an alarming rate.

Another feature is the effect of various powders on perfumes. In a series of powders, say kaolin, talc and chalk, a standard amount of perfume gives completely different impressions from the different powders. This is probably due to preferential absorption and adsorption. It is not deterioration in the previous sense but the effect can be very unpleasant. Remarkable differences are noticeable over a series of talcs. For example, a perfume which gives a full unchanged fragrance with Indian talc may give a

very much weaker and modified fragrance when the same amount is mixed with Italian talc. This is a case of changed conditions giving a changed odour and it is immediately apparent (i.e. not a deterioration with time).

The differences in talcs are probably due to differences in crystal structure rather than any impurity—although complications may occur due to occluded traces of iron oxides. In talcs with platelet structure there may be varying weaknesses in the crystal structure in some planes, conferring a reactivity not usually associated with "inert" minerals.

Question 6 : What in the panel's opinion are appropriate and sufficient accelerated shelf life tests for emulsified products ?

Answer : An old, often-debated subject ! It is certain that relating temperature against time—on the principle that slow chemical reactions are speeded up by increasing the temperature—is of very limited application. In emulsions many possible changes are physical, not chemical, and it is misleading to subject emulsions to temperatures higher than would be encountered in practice. A temperature as high as 60°C is quite unlikely to be met with in practice, except perhaps in a shop window in England. People in the tropics are more accustomed to keeping products away from sunlight. Similarly at the lower end of the scale, some emulsions will break if the aqueous phase has been solidified, others will not. Shelf life testing should normally be limited to 10–50°C. An emulsion may have a threshold temperature for deterioration, i.e. it may deteriorate very rapidly above say 50°C and not at all below that.

It is impossible to lay down any "printed form" of storage tests. For any particular emulsion system it is necessary to consider, often from previous experience, what is likely to go wrong and investigate that—by accelerated tests where possible. Transit tests should not be forgotten—vibration and shaking can have ill-effects on emulsions.

Some information on stability of emulsions can be gained by the addition of small amounts of reagents. Admittedly this changes the system somewhat. But stability of an emulsion to acid or alkali, would in some cases be useful information.

Not enough use is made of the microscope in making a rapid assessment of emulsion stability. In some cases it is possible to see an emulsion breaking. In others, it is certainly possible to see whether or not an emulsion conforms in pattern to previously satisfactory products of the same kind.

Much work has been done on centrifuging as a quick method of assessing emulsion stability. It might be useful in special cases but it must be remembered that temperature rises often occur in such instruments while they are running. It is useful where there is a solid dispersion, but for

oil-water systems, the density differences are not great and viscosities are usually high. These conditions are not conducive to reliable results.

The consensus of opinion seems to be that a general scheme of accelerated shelf life testing can be very misleading. Something can be done for particular products provided the conditions to be met are known. As a routine procedure it can be useful when there is already a good history of a certain product.

Question 7 : Is the use of silicones of any value in coating the hair and in hair preparations ?

Answer : Silicones have some use in coating the hair. They improve its appearance, but mineral oil will do the same thing at very much less expense. What is possibly more interesting is something which has so far been restricted to the textile industry because of the difficulty of actually carrying out the reaction on the hair. This is the use of the various silicone monomers which still have reactive groups on them, which will combine with a good many of the groups in the keratin of the hair, and actually give a certain degree of water repellency to the outside cuticle of the hair. This can be done in the laboratory and there is no doubt that the hair becomes more water repellent and retains a set longer in the rain. But the main difficulty is that it has so far been impossible to carry out this reaction without doing some damage to the scalp as well. There are, of course, a large number of silicone monomers beside the simple ones like the chlorosilanes and some of these have been tried with varying success. So far none of them have been ruled as completely safe for use on the skin, but it is quite possible that there may be possibilities of doing this sort of reaction when more refined silicone monomers become available.

Question 8 : What does the panel recommend for the practical definition and control determination of the consistency of products with non-Newtonian flow properties ?

Answer : This subject was treated by Dr. Marriott in Chicago a short while ago. The subjective effect of a cream being applied to the skin is difficult to describe or to measure. Properties such as flow and resistance to flow, contribute to the effect, and to this extent can be measured. Some form of rotating cup viscometer will give values which can be used as a criterion in the control laboratory for checking viscosity and thixotropy. Consistency of results will give some confidence in consistency of usage feel which the customer has found satisfactory.

Question 9 : What is the panel's opinion of medicated shampoos ?

Answer : A medicated shampoo can be formulated to have a bactericidal of bacteriostatic effect. Taking the case of hexachlorophene in soap, it is

fully accepted by doctors and bacteriologists as a satisfactory means of reducing the incidence of bacteria on the washed surface. Hexachlorophene, in shampooing conditions, is substantive to the hair. The reason for this is seen when the molecular structure is examined. It has the form of a synthetic tannin which is substantive to protein.

On the other hand, for antiseptics without this substantive effect, the power of an antiseptic to kill organisms is dependent on time, temperature and concentration. Even with a reasonable concentration it is unlikely that the antiseptic could be very effective in the period of shampooing—for it will be removed by the rinsing operation.

Use of a shampoo with a cationic base (some risk to the eyes) can give effective bacteriostasis. After subsequent washing with an anionic shampoo, bacteriological examination of the hair will show bacteria still present.

A medicated shampoo need not be confined to having only antiseptic properties. Many people complain of itching of the scalp after shampooing. The inclusion of an antipruritic material may be a sensible addition—coal tar for example. A coal-tar-like odour is not sufficient. When using coal-tar in a shampoo, the odour survives after washing, indicating that here again there is some sorption on the hair and possibly on the scalp.

What is expected of a medicated shampoo? Normally, people expect it to have an effect on dandruff. They also expect it to have an effect on secondary kinds of infection, on any inflammatory condition, and on any pruritis either connected with or subsequent to dandruff.

Time does not permit the discussion of the complicated question of dandruff. Suffice it to say that there are types connected with micro-organisms which are contagious. There is no doubt also that some types of skin-scaling are associated with over-washing and some consequent damage to the scalp. For the first type one should have an effective bactericide, substantive to the scalp. For the other, the shampoo should be as mild as possible, consistent with the removal of existent dandruff scales. One important advantage of treatment by shampooing is that the existing dandruff scales are removed so that an antiseptic is then more effective on the scalp.

In panel tests, it is worth remembering that in age groups above 50 years, dandruff may be resistant to bactericidal treatment and easily aggravated by severe shampoos, whereas with younger people, say in their early twenties, there is much more response to bactericidal treatment.

Question 10: If the skin needs water, why do wet hands chap more easily than thoroughly dried hands?

Answer: The back of the hands is noteworthy as having a rather poor supply of sebaceous glands. And those which are there are rather small

and not quite so well developed as in other parts of the body where sebaceous glands are found. The sebum in the duct, at a temperature just below 30°C becomes pasty and solid. It cannot flow out of the duct on to the surface of the skin, even though there may be contraction of the arrector muscle which normally causes a squeezing of the sebaceous gland. When the hand is wet, dry cold wind will bring about a greater lowering of temperature of the surface of the skin because of evaporative effects. In these conditions the sebum fails to flow and protect the skin, and chapping occurs readily. (Sebum requires to be heated appreciably above its setting point before becoming fluid again.)

Much has been said about the skin needing moisture, which it does. However, the skin needs moisture in special places. The skin becomes dry as the outer layer loses moisture. The cells dry out and become horny as they get nearer the surface and finally flake off. If the process starts too low down there is general deterioration, chapping and hardening of the skin. If water can be put back inside the cells so as to re-hydrate the plasma much can be done for the skin. It seems more important to retain the water already there by a protective layer of fatty matter. In this connection, care should be exercised in the application of humectants on the skin. If the atmosphere is dry such hygroscopic materials may extract moisture from the skin, doing more harm than good.

Liquid water may not be very efficient in softening the top layers of the skin. Moisture or water vapour is better. From water-in-oil emulsions water is released gradually in the form of vapour, particularly when in thin films as rubbed on the skin. This moisture release takes place at the oil-skin interface as well as the oil-air interface. Therefore moisture is held at the skin surface for a considerable time. In this sense there is some virtue in the term "moisturising."

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Second Congress of the International Federation of Societies of Cosmetic Chemists

SCIENTIFIC SESSIONS

TUESDAY, 3rd JULY

Event No.		
Tu. 1	9.00	**Opening of Congress** : School of Pharmacy, University of London, Brunswick Square, W.C.1. (1) The Dean of the School of Pharmacy. (2) The President of the International Federation of Societies of Cosmetic Chemists. (3) The President of the Society of Cosmetic Chemists of Great Britain.