

Natural solutions for Asian hair care

INTRODUCTION

This article sets out to examine and explore the damaging effects of consumer products such as oxidative hair dyes and hair relaxers/texturisers on Asian hair. Included is data on irritation to the scalp by use of such products. It also introduces and reviews the use of three natural ingredients – Dimethicone, PEG-8 Meadowfoamate and PEG-2 Dimeadowfoamamidoethylmonium Methosulfate to protect and repair Asian hair; and Meadowfoam Delta Lactone to protect against irritation of the scalp.

This article is a continuation of a paper which was presented by the author at PCIA in March, 2002, entitled “Ingredient Technology for Significantly Improved Hair Colors,” and subsequently published in *Personal Care*.

The paper given two years ago concentrated on the damaging effects of oxidative hair dye systems. This paper expands on this research and presents additional test results as accomplished over the past two years.

Hair care is the single largest category – estimated worth approximately \$8-10 billion. This approximates the size of the USA market, and is slightly less than the European market. Needless to say, China constitutes the fastest growing market within the total Asian marketplace.

All categories of hair care products are expanding rapidly – shampoos, conditioners, styling aids, and reactive hair care products such as hair dyes, relaxers or texturisers (sometimes referred to as “straighteners”) and, I submit for the future, “permanents,” or “the curls.”

I have used the word “reactive,” to describe hair dyes, relaxers, and permanents. This is because in order for these types of products to be functional and accomplish their intended purpose, they must “react” with the sulfide bonds of the hair. To cause the “reaction,” these products incorporate harsh alkaline or acidic chemicals. As a result, this

“reaction,” causes severe damage to the hair itself and generates scalp irritation.

From a marketing point of view, this is especially significant in Asia where the consumer may not be aware of these undesirable results owing to the newness

of the products, but can definitely see and feel the damaging effects of these products. For a superior consumer product, the hair must be repaired and the scalp must be protected against these “harsh” effects.

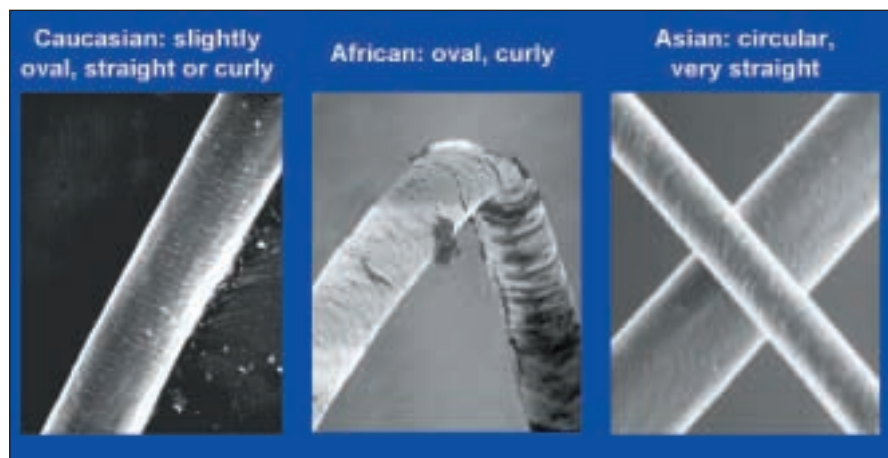


Figure 1: Ethnic hair architecture.

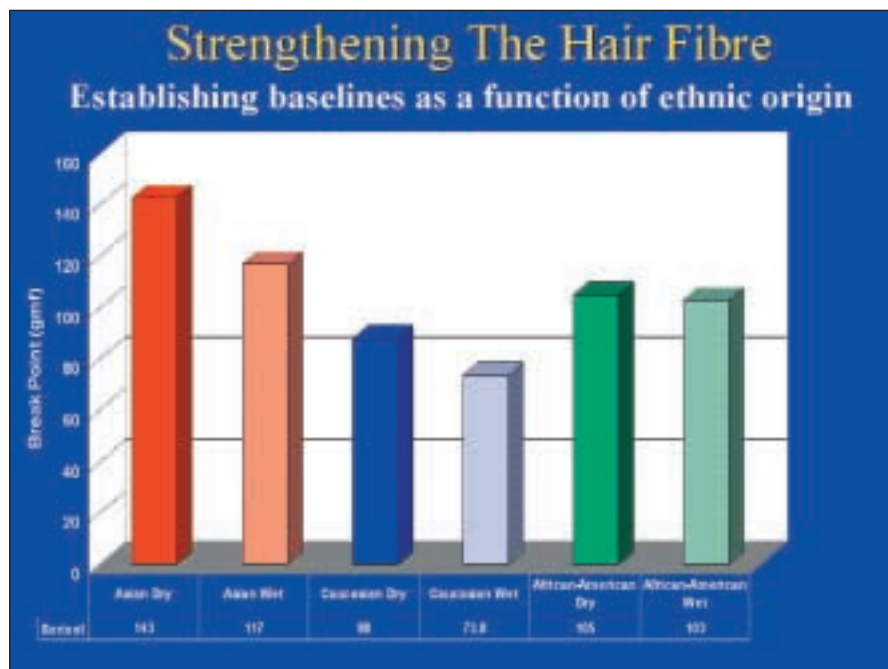


Figure 2

Figure 1 illustrates the comparison of Asian hair to Caucasian and African hair. As noted, Asian hair is round and straight while Caucasian tends to be oblong, and African is flat.

Tensile strength

Based on Diastron tensile strength studies, we have determined that Asian hair is the strongest of the three types presented – that is, the gmf required to bring the Asian fibre to break point is significantly higher than the other two types (Fig. 2).

Being stronger in tensile strength does not mean that Asian hair is more resistant to damage caused by high or low pH systems. Rather, our research shows that because Asian hair tends to be “thicker” than the other types of hair, it therefore tends to resist the effects of oxidative hair colours and straighteners. The consequence is that Asian hair requires a more “harsh” treatment either in the form of a higher percentage of “reactives” in a formula, or longer time of formula exposure on the hair. This can result in much more severe damage to the hair.

Our research has determined that the use of Dimethicone PEG-8 Meadowfoamate can help protect the hair from the damaging effects described, and repair, or return, the hair shaft to its original morphological state.

Dimethicone PEG-8 Meadowfoamate is available commercially under the trade name Fancorsil Lim.

The name “Lim” is significant in that it refers to the genus and species of the plant from which this product is derived – “Limnanthes Alba.” The common name for this plant is Meadowfoam, and the oil of the plant serves as the feedstock from which to produce Fancorsil Lim and other derivatives.

The structure of all hair, regardless of type, is the same. It consists of cuticle, endo cuticle and cortex. The following studies summarise some of the *in vivo* and *in vitro* tests which were conducted with Fancorsil Lim:

1. Cuticle repair – Using scanning electron microscopy, you see both the damaged hair fibre before treatment, and the cuticle lay down, or repair, following treatment (Fig. 3).
2. X-ray microanalysis – Using an EDAX microanalyser, you can see the hair untreated, followed by treatment with Fancorsil Lim (Figures 4, 5 and 6). The penetration into the hair shaft is evident. This penetration is further enhanced when exposed to “heat” or use of a hair “blow” or “air” dryer. Penetration is into the cortex region.
3. Polarised light microscopy – Using a technique known as “birefringence,” we can change the light patterns by use of polarisers and thereby orient the light

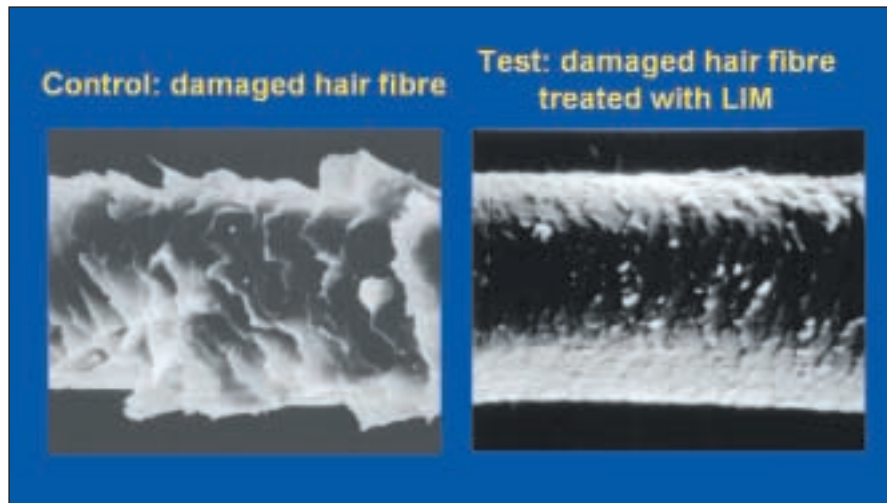


Figure 3: Cuticle repair.

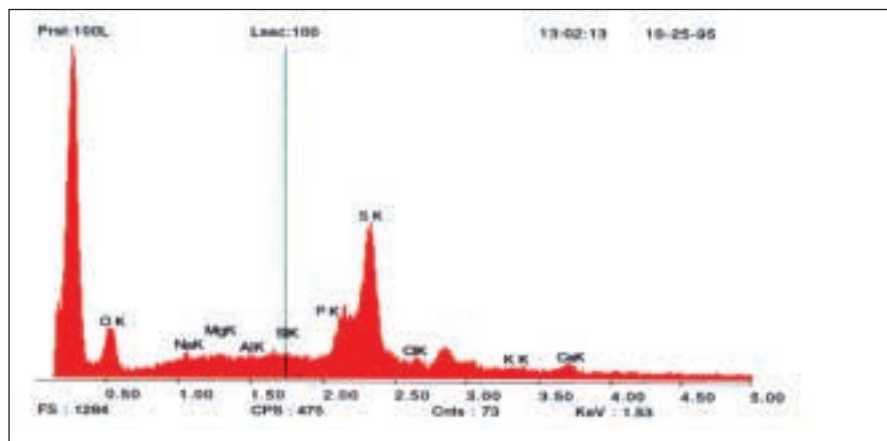


Figure 4: Control Edax scan – damaged hair fibre (no silicon on cuticle surface).

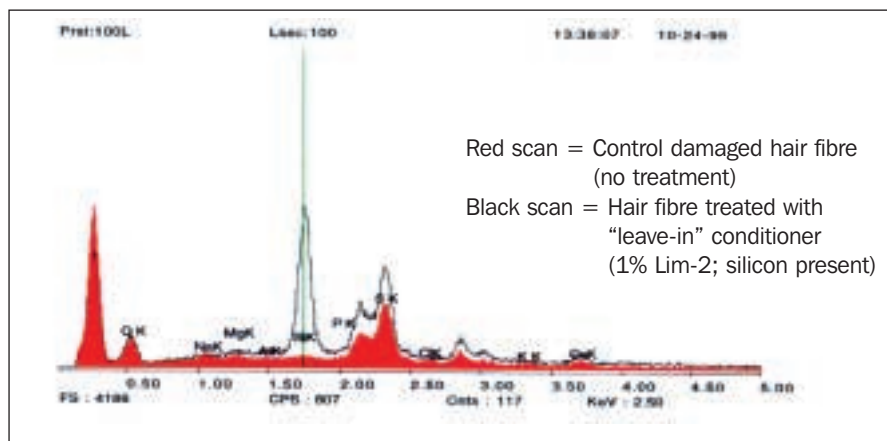


Figure 5: Edax scan: Cuticle surface “leave-in” conditioner treatment.

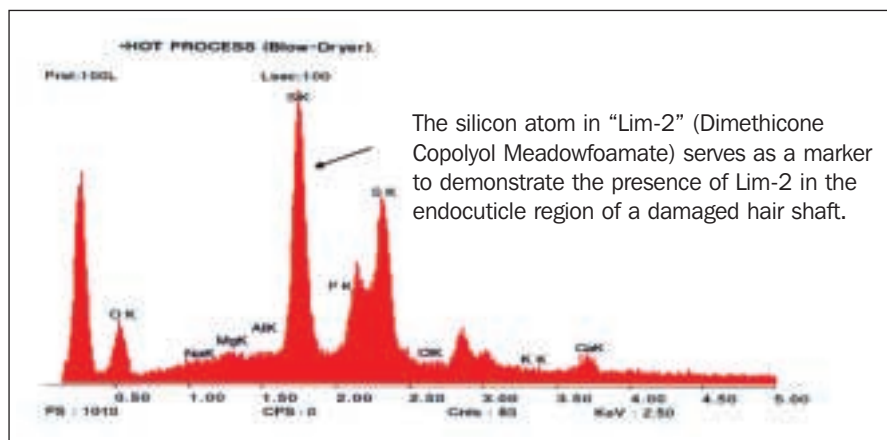


Figure 6: Edax scan: Endocuticle “leave-in” conditioner treatment.

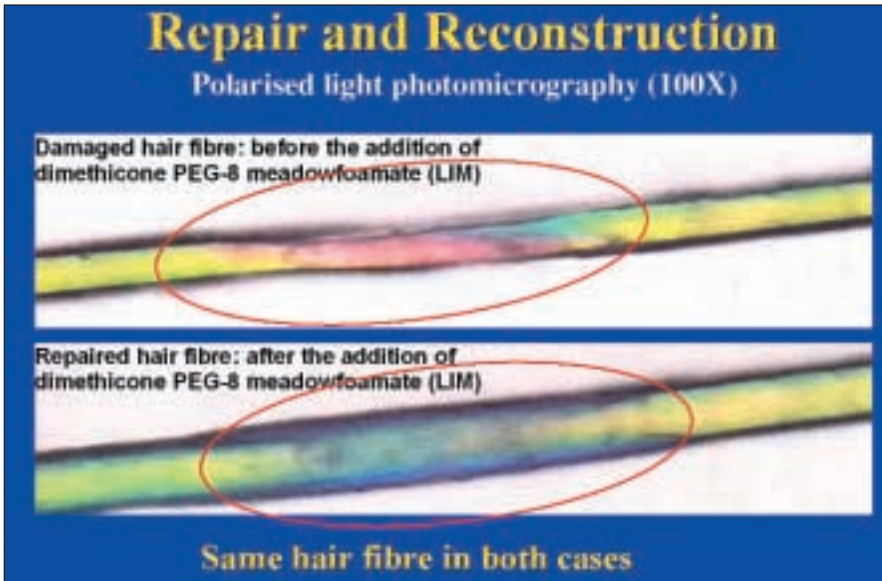


Figure 7

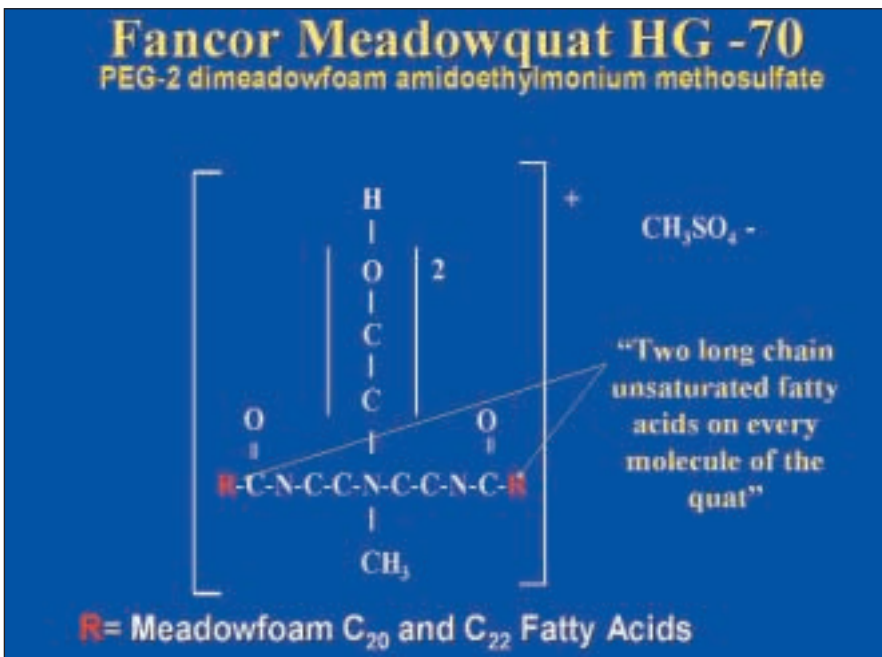


Figure 8

Study 2 Protocol Post-damage treatment

- Hair
 - 3gm tresses of dark brown straight oriental hair obtained from Demeo
- Damage (severe):
 - 9% thioglycolic acid (pH 9.5) for 45 min
 - 30 vol. H2O2 developer for 2 min
 - Pressing comb (230o F), 80 passes per tress
 - 2.2% NaOH relaxer for 18 min, thoroughly rinsed
- Treatment:
 - no treatment (control)
 - 1% Fancorsil LIM-1 in water (tress saturated for 2 min, blotted dry and then subjected to damage regimen)
 - 1% Meadowquat HG-70 in water (tress saturated for 2min, blotted dry and then subjected to damage regimen)
 - 1% of a 50/50 mixture of Meadowquat HG-70 and Fancorsil LIM-1 (tress saturated for 2min, blotted dry and then subjected to damage regimen)

Figure 10

Figure 9: Undamaged Asian hair (control).



leaving us red, yellow, and blue images. By passing this light pattern through the hair fibre, we can observe its inner structure. Combined with time lapse photography, this testing procedure allows us to see changes in the morphological structure as they take place. Figure 7 shows the damaged hair followed by the change in morphological structure by applying Fancorsil Lim.

Another product we have investigated is PEG 2 Dimedofeamamidoethylmonium Methosulfate. As its name indicates, this is also a product derived from the Meadowfoam (*Limnanthes Alba*) plant. It is commercially available under the trade name Meadowquat HG-70.

Its structure is as depicted in Figure 8. Note that it has two lipid groups on either end of the structure. It is 70% active. Its function is to provide protection and conditioning to the hair fibre from damage caused by harsh acidic or alkaline hair preparations.

It is also worth noting that Meadowquat HG-70 is stable in high pH systems, therefore it can be directly formulated as an ingredient in developers, straighteners, and relaxer bases.

In one of our studies, we used photo microscopy to evaluate the effect of this quaternary on Asian hair.

In figure 9, you see a swatch of Asian hair which is the control. Note that the shaft is round, and the shafts are perpendicular to each other, or straight.

We took tresses of such hair and deliberately damaged them according to the protocol outlined in Figure 10. We then treated two portions of the tress separately by saturating 1% solution of Fancorsil Lim in water, and 1% solution of Meadowquat HG-70 in water. We then exposed these two treated portions to the same conditions used to damage the hair as previously shown.

The results are in Figure 11. Both treated portions of the tress show protection and repair against damage. By using the techniques of optical detailing (Fig. 12), you see the positive effect on the damaged fibres.

Surface skin protection

Let us now turn our attention to the scalp and the necessity to protect the surface skin from irritation.

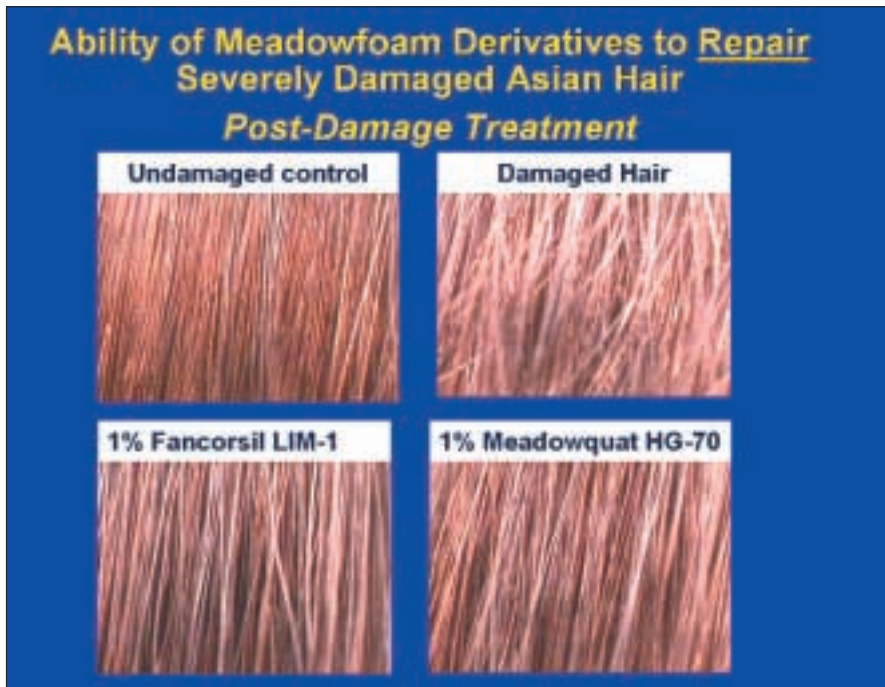


Figure 11

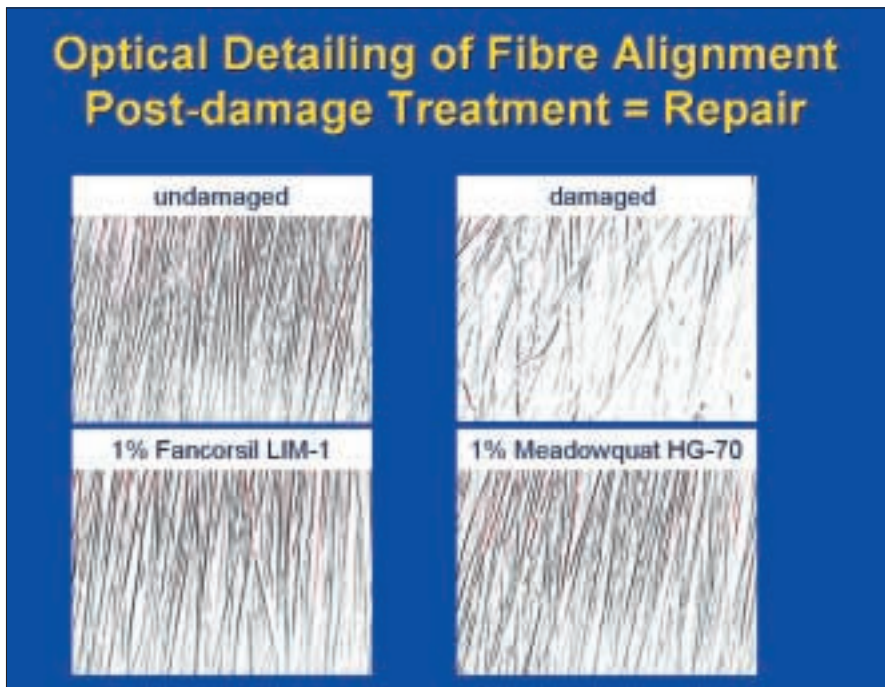


Figure 12

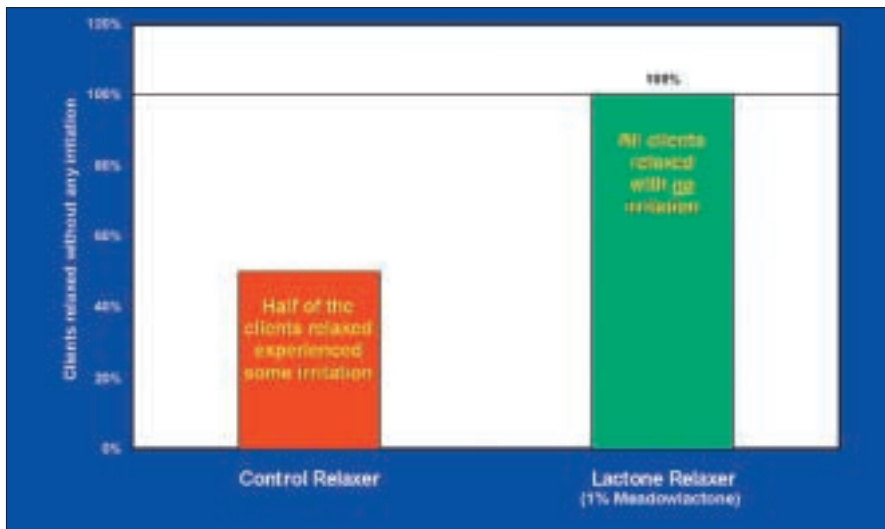


Figure 14: Ability of meadowlactone to eliminate irritation from reactives.

Figure 13: Meadowlactone.



The simple act of shampooing contributes to scalp irritation. For example, the surfactants tend to “de-oil” or strip away resident lipids which serve as a barrier against irritation. The mechanical action of rubbing the shampoo through our hair causes the surface layer to be abraded based on contact from our fingernails or stiff bristled brushes.

This abrading and stripping opens the door for acute irritation sensitivity when alkaline or acidic compounds are applied to the hair. This irritation is generally more severe in people of Asian descent. Hence, the need to incorporate ingredients into the hair preparation to protect against scalp irritation.

Our research is showing that a new derivative of the Meadowfoam plant, Meadowfoam Delta Lactone, functions as an anti-irritant.

This product is available under the trade name Meadowlactone. Figure 13 shows its structure. Of primary importance is the functionality of this molecule.

Meadowlactone is amphoteric. Under alkaline conditions of pH 8 or more, the ring structure will open. Conversely, under acidic conditions of pH 6 or less, the ring will close. As a result, this molecule can either “entrap” water or release lipids depending on the pH of its environment.

In our research, we evaluated Meadowlactone formulated into a standard relaxer base (pH 13) at a level of 2%. The effect of relaxers in causing severe irritation is well known and documented.

Figure 14 presents the results of salon studies wherein the clients reported virtually no scalp irritation from the relaxer containing Meadowlactone.

Summary

1. Asian hair is susceptible to damage caused by application of oxidative hair dyes and other hair preparations containing “reactive” compounds.
2. The Asian scalp is particularly susceptible to irritation from hair preparations containing “reactive” compounds.
3. The Asian consumer is sensitive to these conditions.
4. Dimethicone PEG-8 Meadowfoamate (Fancorsil Lim) can repair the damage caused by “reactive” compounds.
5. PEG-2 Dimeadowfoamamidoethylmonium Methosulfate (Meadowquat HG-70) can protect the hair from damage due to “reactive” compounds.
6. Meadowfoam Delta Lactone (Meadowlactone) interacts with the scalp to protect against irritation caused by “reactive” compounds.

