By increasing the hydrophobicity of damaged hair strands, the overall appearance of the hair is improved.

The hair fibre is a composite which consist of a cuticle, cortex and the medulla. These three components handle moisture differently depending on how hydrophobic – does not like water – or hydrophilic (loves water) they are.

The cuticles of a healthy hair fibre are flat and result in the hair fibre being hydrophobic, smooth, shiny and water-resistant. The cuticles on a damaged hair fibre are lifted, causing the otherwise smooth layer to be disrupted, giving the hair a dull appearance. A damaged hair fibre has reduced hydrophobicity with the hair fibre becoming more hydrophilic because of the polarity that increases. The most cost-effective way to enhance the hydrophobicity of a damaged hair fibre is to use mineral oil in a conditioner formulation. In leave-in conditioners, the oil will provide a smooth film by filling up the spaces between the cuticles, giving the hair overall hydrophobicity, slip and the appearance of repaired damage. However, there are more specialised ingredients that can be used to enhance hydrophobicity with longer-lasting effects. The **Vegetamide** range (plant-derived) is based on an ionic complex that binds to the damaged sites of the cuticles, and peptides that penetrate the hair fibre to moisturise the hair.

The keratin protein core, the cortex, requires water – this is an integral part of its structure and normally runs around 8 -10% at normal humidity conditions. This helps the flexibility and the handling of the hair. The water will help to plump up or swell the hair shaft – this is specifically true if additional water is added.

One can promote the internal moisture content of the hair by adding humectant materials such as **Amitose R-PD,** a complex that consists of glycerine and an amino acid which penetrates and attaches to the hair, and low molecular weight quats such as **CustoQuat Honey** which penetrates into the hair fibre. These ingredients attract, bind and act as reservoirs for moisture which help to prevent damage from heat i.e. hot tongs, curling irons, hair dryers and the hot African sun.

The combination of these moisturising ingredients with fatty conditioning ingredients such as cetrimonium bromide or cetrimonium chloride results in enhanced hair appearance and manageability properties because the fatty conditioner will form a film on the hair surface. This film helps to reduce static build up, frizz and improves combability and post-conditioning styleability. Our conditioner concentrate, **aMaloco® CCB,** uses cetrimonium bromide and oil-soluble collagen, **Promois EU-118 (IS),** as active ingredients.

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Quats, which are cationic, are more substantive at lower pH's – they are used to treat the hair fibres effectively after hair straightener or hair colouring treatments. The high pH of these treatments causes the hair fibres to swell and the cuticles to lift. Because of this, the surface area available for substantivity to the quats is enhanced which optimises conditioning.

Neutralising treatments that usually follow the high pH treatments are conducted at lower pH's (about 4), when the hair shaft contracts, the cuticles tighten, the surface area is reduced and the conditions as the hair becomes more cationic in nature.

With proteins being available in high as well as low molecular weights, they can either be used to coat or penetrate the hair.

So with this background it is clear that two approaches are required to treat damaged hair fibre – small molecules enabling the moisturisation of the hair fibre and fatty or polymeric quats to coat the outside of the hair.

Please contact our office to learn more about the ingredients in this article.

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