

KeraTint EZ

Brilliant hair colour made Easy!

KeraTint EZ is a blend of ingredients designed to create a one-step conditioning and emulsifying package for hair colour creams. This easy-to-use pastille consists of an optimised ratio of Crodafos CES, Incroquat Behenyl TMS and Procetyl AWS to make the manufacture of hair tint creams simpler and more economical.

For customers seeking a sustainable palm alternative, Croda offers SP-Keratint EZ-MBAL which is manufactured via RSPO's Mass Balance System.

Product	INCI name	Appearance
KeraTint EZ	Cetyl Alcohol (and) Stearyl Alcohol (and) PPG-5 Ceteth-20 (and) Dicetyl Phosphate (and) Ceteth-10 Phosphate (and) Behentrimonium Methosulfate	Pastilles

Features / Benefits

- Delivery of brilliant hair colour
- Longer lasting hair colour
- Promotes better dye penetration
- Helps to condition and detangle wet hair
- Provides thickening and delivery of actives
- Easy to manufacture and formulate hair tints
- Can be used to create post-dye hair conditioners for further conditioning and additional cost savings

Applications

- Permanent, semi-permanent and temporary hair colour creams
- After-dye conditioners

Stable, cost-effective emulsions

KeraTint EZ can typically be used at 15-25% in formulations. We have shown that when used at 19%, KeraTint EZ creates viscous, homogenous hair colour creams between 10,000 and 30,000 cps that mix well with a hydrogen peroxide developer. It is easy to incorporate into formulations, as it is a complete emulsifying system created to be the oil phase of the formulation. This also, translates into cost savings in manufacturing by reducing inventory and simplifying production.

Composition & Function

Each component of KeraTint EZ was carefully chosen to provide optimum results in hair tint formulations. Crodafos CES is a phosphate ester emulsifier known to form multilayer lamellar structures, which help aid in the delivery of 'actives'. What is unique to phosphate esters is their ability to form very stable emulsions even in extreme pH environments, such as hair tints, relaxers and perms. They exhibit shear thinning, where upon application to the hair; the emulsion will break and allow the 'active', in this case the hair dye, to penetrate the hair fibre. Incroquat Behenyl TMS was chosen to aid in conditioning, as this quat is composed of a C22 fatty chain with a methosulfate counter ion. In-house evaluations of pure quats have shown this combination yields a molecule that gives excellent conditioning with ultra mildness and improves wet and dry comb performance of hair care products. It is perfect for hair colour systems as these attributes offset the bleaching damage of hair colour with a smooth and natural effect. Lastly, Procetyl AWS is added for its outstanding properties of emolliency and moisturisation.

Claims Substantiation

A series of tests were conducted utilising hair tresses dyed with each hair colour tint sample (in duplicate). Random hair fibres were selected for methods that require single fibres and then compared to another set of random hair fibres taken after dyeing the tresses. 65% grey hair, which is often harder to dye and loses artificial colour more quickly, was utilised in order to assess the ability of KeraTint EZ to cover grey hair for longer.

Longer Lasting Hair Colour - Colour Washfastness

Colour washfastness describes whether hair colour is durable over multiple shampoo washes. This durability is attained by the action of the dye penetrating the hair fibre.

Permanent hair colour can pass through the cuticle into the hair shaft, which then oxidizes to generate a larger, coloured molecule trapped inside the hair. The more hair colour that is able to penetrate, the less colour that will rinse off during daily shampooing. Hair colour retention is measured by analysing the colour change of the tress over repeated shampoo cycles. The hair colour was measured and recorded using a Spectrocolorimeter Labscan

XE for the following parameters:

+ ΔL = Sample lighter	- ΔL = Sample darker
+ Δa = Sample redder (or less green)	- Δa = Sample greener (or less red)
+ Δb = Sample yellower (or less blue)	- Δb = Sample bluer (or less yellow)
$\Delta E = [(\Delta L)^2 + (\Delta a)^2 + (\Delta b)^2]^{1/2}$ (Total Colour Difference)	
$\Delta C = [(\Delta a)^2 + (\Delta b)^2]^{1/2}$ (Difference in Chromaticity)	

In this study, 65% grey hair tresses were obtained and prepared for hair dye following an in-house procedure where they are cleaned and allowed to air-dry overnight. The tresses were then dyed with the appropriate hair tint, either the KeraTint EZ formulation (HP-

278) or a salon product (Product 1) specifically purchased for this evaluation, and a base line measurement ($L^*a^*b^*$ reading) was taken. Colour washfastness was evaluated by washing each tress with a 10% SLS/SLES shampoo for 5 cycles and measuring its $L^*a^*b^*$ readings. This was repeated 2 additional times for 10 cycles and 20 cycles of shampoo washes.

Figure 1 shows that the KeraTint EZ formulation is able to maintain its true colour longer, with a minimal change in total colour (ΔE) of less than 0.5 after 20 washes. Through literature and in-house studies it is worthy to note that a change of greater than 1 is visible with the naked eye; therefore, the KeraTint EZ showed no discernable change in colour! In the same evaluation, Product 1 shows a change in total colour of 4.1 indicating that a visible difference can be perceived.

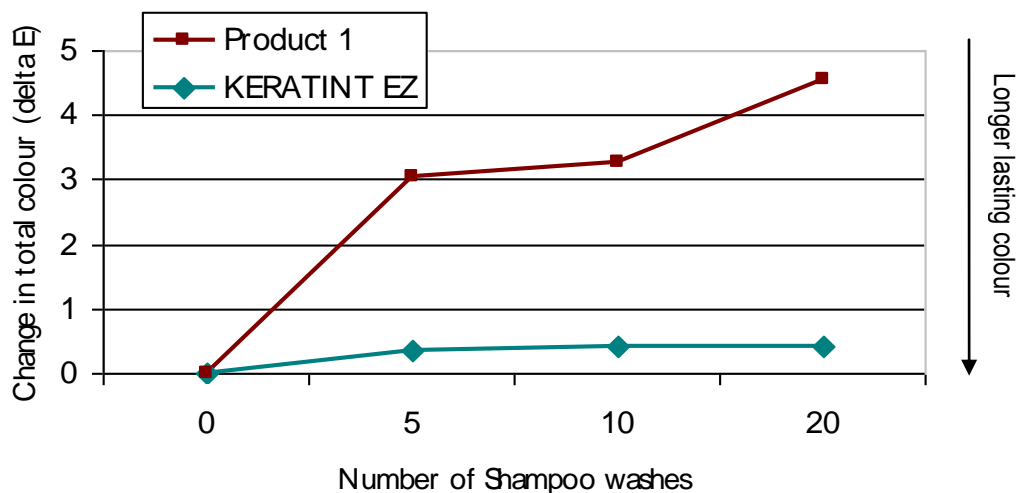


Figure 1: Colour washfastness of tresses dyed with different colour tints after a series of 10% SLS/SLES shampoo cycles

Outperforms Retail Colour Kits Containing Post Dye Conditioners

These two formulations were also compared with three retail hair colour kits that also included a post-dye conditioner (Product 2, Product 3 and Product 4). Tresses were dyed with each of these retail products and treated with the post-dye conditioner, per the manufacturers' instructions. Colour washfastness studies were performed, as described above, and all five dye formulations were compared (Figure 2).

Figure 2 shows that the easily formulated **KeraTint EZ** product performed as well as or better than comparable products on the market. It is remarkable that after 20 washes, the **KeraTint EZ** formulation is the only tint that kept the total colour change (ΔE) below 1, proving that it does help to provide truer colour longer!

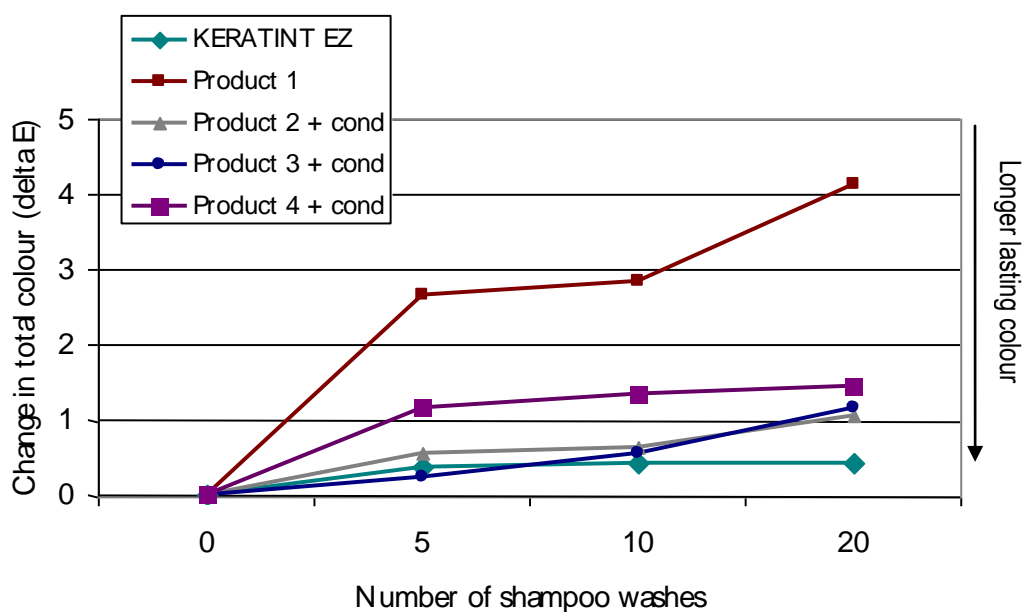


Figure 2: Colour washfastness of tresses dyed with different hair colour tints after a number of 10% SLS/SLES shampoo cycles

Truer Colour After 20 Shampoo Washes (Raw Data)

KeraTint EZ showed the least amount of change in all of the categories measured. A positive change in L indicates a lighter colour, where it seems that the three at-home products did become darker, but also were more yellow (positive Δb) and red (positive Δa) indicating the hair tress was more orange. Product 1 was a brown tint and did lighten and become more blue/green.

Table 1: Changes in L*a*b* scale of hair tint formulations after 20 cycles of 10% SLS/SLES shampooing

	ΔE	ΔL	Δa	Δb
KeraTint EZ	0.41	0.03	0.22	0.15
Product 1	4.13	5.14	-1.9	-1.6
Product 2 + Conditioner	1.05	-0.61	0.54	0.54
Product 3 + Conditioner	1.15	-1.13	0.19	0.06
Product 4 + Conditioner	1.34	-0.2	0.71	1.11

Ability of Dye to Penetrate the Hair Fibre - Hair Swelling

As stated earlier, if more hair colour is able to penetrate into the hair fibre, the greater the potential for the dye to be more effective and last longer on the hair. Transversal swelling rate is an indicator of hair porosity and permeability and can be performed by using a LSM-5000.

In this study, 65% grey hair tresses were cleansed and dried overnight. A random selection of hair fibres were chosen from each hair tress and the central diameter and cross-sectional area of each single hair fibre was measured. Each fibre was then placed in deionised water for 5 minutes at room temperature and the swell was measured.

Tresses were then dyed and the process was again repeated to measure hair fibre swell.

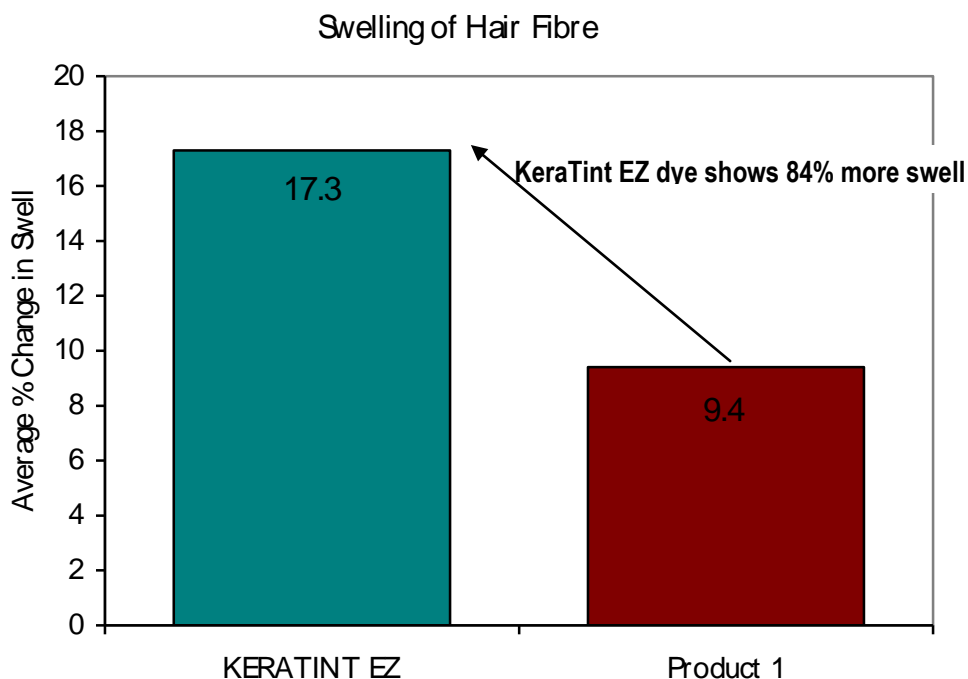


Figure 3: Change in Transversal Swelling Rate at 5 minutes in deionised water

The results show that KeraTint EZ generated a good amount of swell, thus the hair fibre is more likely to absorb hair dye. KeraTint EZ shows 84% more swell than Product 1, indicating perhaps that Product 1 did not fully penetrate the hair fibre. This could account for the inability of Product 1 to maintain colour washfastness, as shown in Figure 1.

Detangling and Conditioning of Wet Hair - Combing Force Measurements

It has been well established that colour treatments damage the hair, given the fact that the dye mixture is at a high pH. Hair that is hard-to-comb is one sign of damaged hair. As described in the colour washfastness study, 65% grey hair tresses were prepared and dyed with the KeraTint EZ and Product 1 formulations. Tresses were then measured for wet combing forces, before and after dyeing, to assess the peak force (detangling) and total work (overall conditioning) of each sample.

As shown by Figure 4, both dyes increased the wet comb force. However Product 1 shows a significant increase in combing forces after dyeing, the KeraTint EZ dye shows much less of an increase, demonstrating that it is able to provide conditioning to the hair from the dye itself.

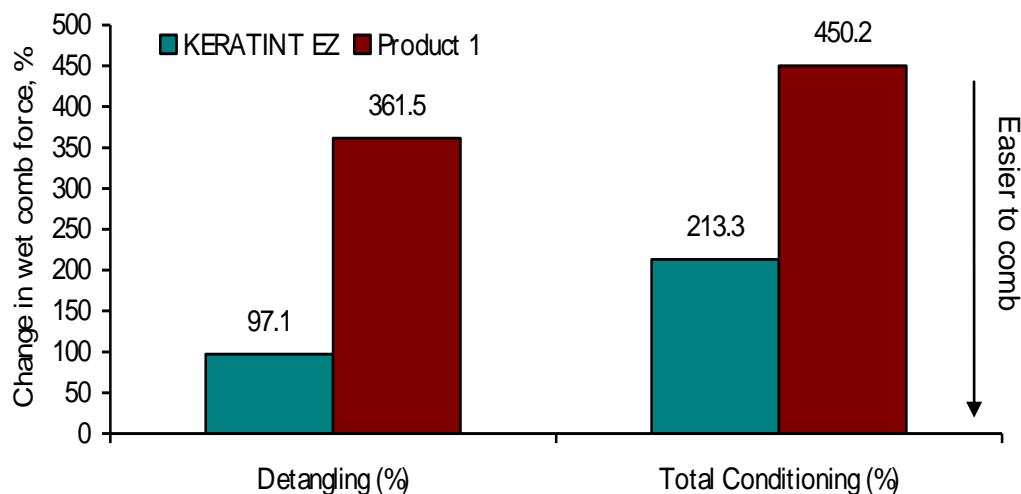


Figure 4: Change in wet combing force of hair tresses after dyeing

Conclusion

KeraTint EZ is the "EZ" emulsifying and conditioning system for brilliant hair colour. Tints that utilise this product are able to obtain the benefits from three exceptional Croda products all in an easy-to-use pastille. Not only can KeraTint EZ be used in a cream colour tint formulation, but it can also help to create post-dye conditioners that are able to deliver 'actives' such as peptides, proteins and lipids onto the hair to help bring out more vibrant colour!

Formulating

Recommended usage level is 15-25%.

Certified Sustainable Palm – Mass Balance

SP-Keratint EZ-MBAL is Croda's sustainable palm oil variant allowing customers to use sustainably sourced material if they wish. The product is manufactured by the RSPO's Mass Balance system. The Mass Balance supply chain allows certified sustainable palm oil material and non-certified material to be mixed throughout the supply chain but administratively monitors the mass of certified material produced and sold. The Mass Balance system is fully audited allowing buyers of the material to view the products life span. Another advantage of this system is that it actively encourages palm growers to produce sustainable palm and move towards a segregated supply chain system. By choosing these ingredients, you contribute to the production of sustainable palm oil. Products manufactured with sustainable palm oil do not in any way compromise on performance.

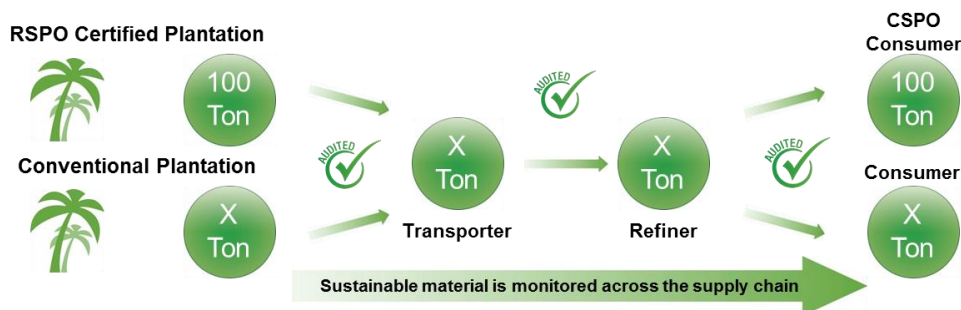


Figure 4: RSPO Mass Balance Supply Chain

Non-warranty

The information in this publication is believed to be accurate and is given in good faith, but no representation or warranty as to its completeness or accuracy is made. Suggestions for uses or applications are only opinions. Users are responsible for determining the suitability of these products for their own particular purpose. No representation or warranty, expressed or implied, is made with respect to information or products including, without limitation, warranties of merchantability, fitness for a particular purpose, non-infringement of any third party patent or other intellectual property rights including, without limit, copyright, trademark and designs. Any trademarks identified herein are trademarks of the Croda group of companies.
©2009 Croda Europe Ltd