

# TEGO® Cosmo C 100

## Hair Care

### INTENDED USE

Active for hair care

### BENEFITS AT A GLANCE

- Amino acid derivative naturally occurring in the body.
- Rebuilds and strengthens hair structure from within.
- Improves mechanical properties of bleached and straightened hair.
- protects against heat damage by flat iron.
- effective on various hair types.

### INCI (PCPC NAME)

Creatine

#### Chemical and physical properties (not part of the specification)

Form	crystals
Water solubility	approx. 14 g/l (20 °C)
pH	approx. 7.4 (at 14.0 g/l, 20 °C)

Known already from the second last century Creatine is well known as dietary supplement especially for athletes. At the beginning of the 2000s it found entry into the personal care market.

Worldwide men and women style their hair using different technologies. The treatment habits vary widely due to different needs: all over the world hair coloring is a main topic, as well as the use of a flat iron while in Africa, the NAFTA region or Latin America people with curly hair love to straighten their hair.

Independent of the hair ethnicity a big overlap of all different styling technologies is the damage of the inner hair structure (Cortex). The chemical treatment causes a reduction of the crosslinking between the keratin fibers in the Cortex. This will lead to an increase of hair breakage and a decrease of the mechanical resistance of hair.

Creatine is an amino acid derivative with a low molecular weight which should enable it to penetrate into the hair cortex. Due to its amino acid structure it can built bridges between different amino acids of the keratin fibers and increase the crosslinking. This will

result in a decrease of fiber breakage and will improve the mechanical properties of hair.

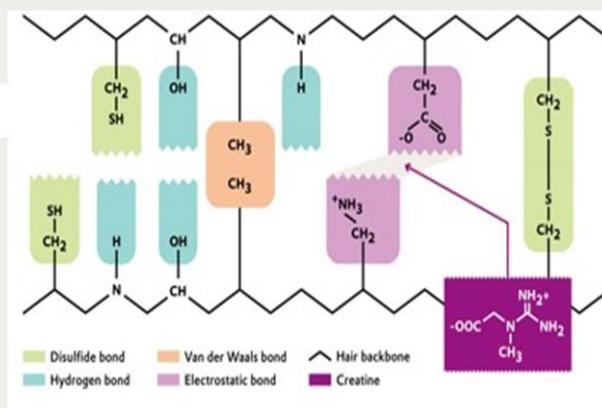


Fig. 1: TEGO® Cosmo C 100 supports mechanical hair properties by building electrostatic bridges.

TEGO® Cosmo C 100, manufactured via a patented process, is the highest quality and purity creatine available on the market.

### EFFICACY STUDIES

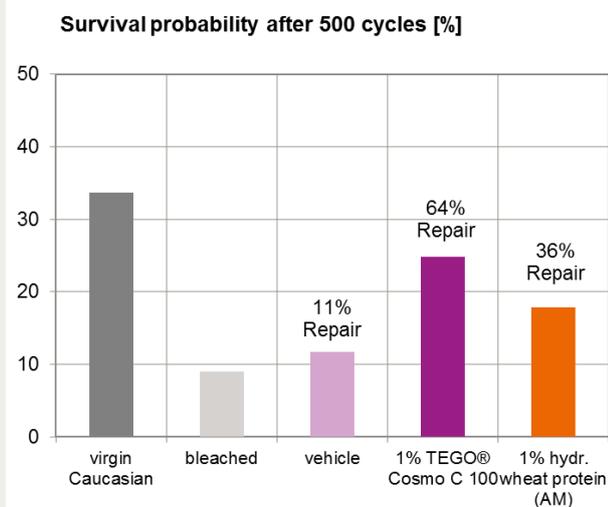
#### • Repair of bleached hair

European virgin brown hair was bleached using a standard salon formulation. After bleaching the hair tresses were treated with the test conditioners using the following procedure:

1. Washing with Sodium Laureth Sulfate (8%)
2. Application of the test conditioners for 5 min
3. Rinsing the tresses under tap water for 1 min.

The test procedure was performed five times. Subsequently hair fatigue was measured using an automatic system (Dia-Stron CYC 801 Automatic Cycling Tester).

The test conditioners contain **1% TEGO® Cosmo C 100**, 1% hydrolyzed wheat protein or no active ingredient (vehicle). The hydrolyzed wheat protein was chosen as benchmark. It is a well known ingredient for hair care applications with said repair efficacy for damaged hair.



**Fig. 2:** Survival probability of bleached European hair after treatment with different test conditioners

The bleaching of the European hair led to a significant decrease of the survival probability in the hair fatigue test, synonymous with increased hair breakage. After treatment with the test conditioners, the strongest repair effect was calculated for **TEGO® Cosmo C 100** (64%). The repair effect of the hydrolyzed wheat protein only accounts for 36%. The results of the study showed that hair breakage after bleaching is reduced the strongest after treatment with **TEGO® Cosmo C 100** and that **TEGO® Cosmo C 100** is superior to the benchmark hydrolyzed wheat protein.

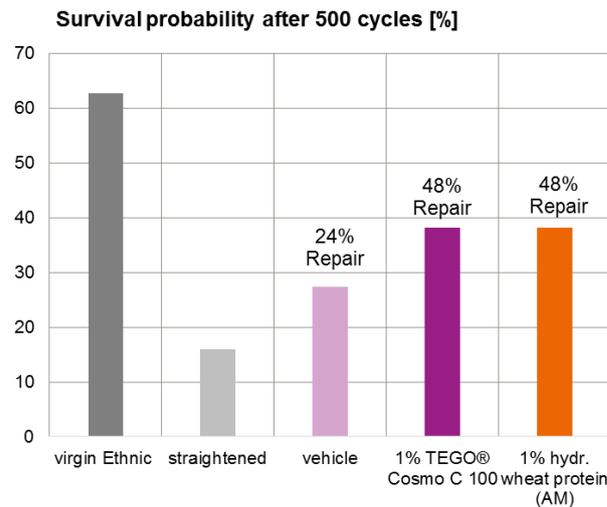
- **Repair of straightened hair**

Ethnic virgin hair was straightened using a relaxer formulation based on Guanidinium Carbonate and Calcium Hydroxide with a pH of approx. 12. After straightening, the hair tresses were treated with the test conditioners using the following procedure:

1. Washing with Sodium Laureth Sulfate (8%)
2. Application of the test conditioners for 5 min
3. Rinsing the tresses under tap water for 1 min.

The test procedure was performed five times. Subsequently, hair fatigue was measured using an automatic system (Dia-Stron CYC 801 Automatic Cycling Tester).

The test conditioners contain **1% TEGO® Cosmo C 100**, 1% hydrolyzed wheat protein or no active ingredient (vehicle). Again, hydrolyzed wheat protein was chosen as benchmark for comparison reasons.



**Fig. 3:** Survival probability of ethnic hair after straightening and treatment with different test conditioners

Straightening of hair, similar to bleaching, reduced the survival probability in the hair fatigue test. A treatment with the vehicle showed already a slight repair effect. This repair effect was doubled by **TEGO® Cosmo C 100**. For the benchmark hydrolyzed wheat protein, similar results as for **TEGO® Cosmo C 100** were found.

The test result clearly demonstrated that **TEGO® Cosmo C 100** was able to reduce hair breakage of ethnic straightened hair.

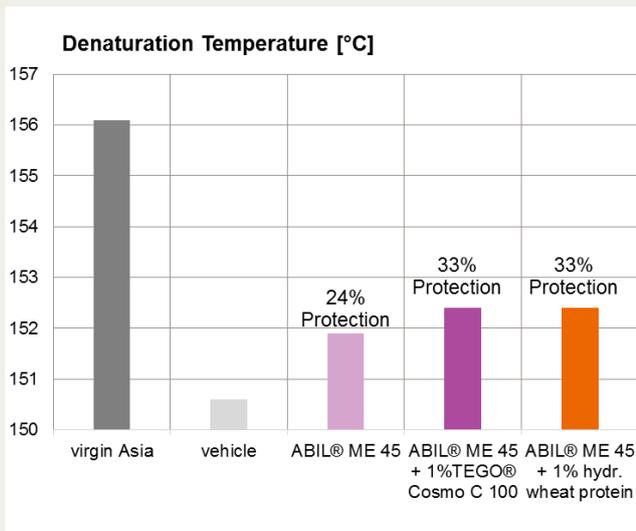
- **Protection against heat stress**

Although Asian people already have nearly straight hair, the application of a flat iron is very popular. The high temperature of the flat iron, which is necessary to achieve a satisfying straightening result, causes a severe damage of the inner hair structure (Cortex). This can be quantified using differential scanning calorimetry (DSC). With this method, the denaturation temperature of the keratin is determined. A degradation of the keratin structure will lead to a decrease of the denaturation temperature.

Asian hair was washed with Sodium Laureth Sulfate (8%) and treated with a test conditioner containing 3.3% ABIL® ME 45, 3.3% ABIL® ME 45 + 1% **TEGO® Cosmo C 100** or 3.3% ABIL® ME 45 + 1% hydrolyzed wheat protein. Leave-in time of the conditioner was 5 min, then the hair tresses were rinsed for 1 min with tap water.

ABIL® ME 45 belongs to the broad range of hair care ingredients of Evonik. It is a silicone-based quat known for its strong heat-protecting properties.

INCI: Silicone Quaternium-22; Polyglyceryl-3 Caprate; Dipropylene Glycol; Cocamidopropylbetaine



**Fig. 4:** Protection of asian hair against heat stress

Already the pre-treatment of the asian hair with ABIL® ME 45 protects the hair against the heat stress. The protection could be further increased by adding TEGO® Cosmo C 100 to the conditioner. A similar protection was achieved with the combination of ABIL® ME 45 and the hydrolyzed wheat protein. Probably the increase of the concentration of ABIL® ME 45 would also cause an increased protection. On the other hand a too high concentration of a quat can have a negative impact on hair manageability and feel and might in addition lead to a weigh down of the hair. Therefore for an optimal protection against heat stress the combination of ABIL® ME 45 and TEGO® Cosmo C 100 is highly recommended.

The results of the hair care tests showed that TEGO® Cosmo C 100 is able to repair damaged hair and to protect against heat stress. The efficacy of TEGO® Cosmo C 100 is similar or even higher than the efficacy of the benchmark hydrolyzed wheat protein. In addition TEGO® Cosmo C 100 has some strong advantages compared to the hydrolyzed wheat protein: it is colorless and odorless while depending on the quality the hydrolyzed wheat protein is yellowish to even brownish with an unpleasant characteristic odor.

## PREPARATION

TEGO® Cosmo C 100 is water soluble and cold processable. The maximum solubility in water is 14 g/L. Therefore the maximum usage concentration depends on the amount of water present in the formulation.

Preparation of emulsion based formulations (e.g. conditioner, mask): TEGO® Cosmo C 100 is added to

the water phase and the emulsion is prepared in the usual way.

Preparation of clear, water based formulations (e.g. shampoo, tonic, gel): Because TEGO® Cosmo C 100 needs water as a solvent we recommend to add it after the addition of the water.

TEGO® Cosmo C 100 does not show a negative influence stability of hair care formulations.

## RECOMMENDED USAGE CONCENTRATION:

0.5–1.4%

## APPLICATION

TEGO® Cosmo C 100 can be used in the following products:

- Conditioner for stressed hair
- Hair masks for damaged hair
- Leave-In foams and fluids
- Protection sprays against heat stress

## HAZARDOUS GOODS CLASSIFICATION

Information concerning

- Classification and labelling according to regulations for transport and for dangerous substances
- Protective measures for storage and handling
- Measures in case of accidents and fires
- Toxicity and ecological effects

is given in our material safety data sheets.

## GUIDELINE FORMULATIONS

### Deep Conditioning Mask for Damaged Hair (AK 11/2)

Phase A	
TEGINACID® C (Cetareth-25)	0.50%
TEGO® Alkanol 16 (Cetyl Alcohol)	3.00%
TEGO® Amid S 18 (Stearamidopropyl Dimethylamine)	1.00%
TEGOSOFT® DEC (Diethylhexyl Carbonate)	1.00%
ABIL® Quat 3474 (Quaternium-80)	1.00%

Phase B	
Water	90.70%
TEGO® Cosmo C 100 (Creatine)	0.50%
Propylene Glycol	2.00%
Citric Acid Monohydrate	0.30%

Phase Z	
Preservative, Perfume	q.s.

#### Preparation:

1. Heat phase A and B to 70 °C.
2. Add B to A and cool down while stirring.
3. Homogenize at 65 °C, add perfume at 45 °C.
4. Stir until the emulsion is cool (30 °C).

### Restorative Conditioner – Ethnic Hair (RB13-5802-099)

Phase A	
TEGO® Alkanol 1618 (Cetearyl Alcohol)	5.00%
VARIOSOFT® BT 85 Pellets (Behentrimonium Chloride)	2.00%
ABIL® Soft AF 300 (Aminopropyl Dimethicone)	0.50%
Water	89.20%
TEGO® Cosmo C 100 (Creatine)	1.00%
Glycerin	2.00%
Citric Acid (30%)	0.30%

Phase Z	
Preservative, Perfume	q.s.

#### Preparation:

One phase production:

1. Heat the ingredients to 75 °C and homogenize.
2. Cool down while stirring.
3. Add perfume below 45 °C.
4. Adjust pH to 4.5.

### Sprayable Heat protecting Hair Milk (WP 285/1)

Phase A	
Lactic Acid (80%)	0.40%
TEGO® Cosmo C 100 (Creatine)	1.00%
Water	93.60%
TEGO® Amid S 18 (Stearamidopropyl Dimethylamine)	1.20%
TEGIN® G 1100 Pellets (Glycol Distearate)	0.60%
TEGO® Care PS (Methyl Glucose Sesquistearate)	1.20%
TEGOSOFT® DEC (Diethylhexyl Carbonate)	0.30%
ABIL® ME 45 (Silicone Quaternium-22; Polyglyceryl-3 Caprate; Dipropylene Glycol; Cocamidopropyl Betaine)	1.70%

Phase Z	
Preservative, Perfume	q.s.

#### Preparation:

1. Heat Lactic Acid, TEGO® Cosmo C 100 and water to 75 °C.
2. Add the other ingredients step by step in the given order and homogenize.
3. Add preservative and perfume below 40 °C.
4. Adjust pH to 4.5.

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