

## TEGO® Cosmo C 100

Multifunctional Additive for Skin and Hair Care Formulations

- Amino acid derivative naturally occurring in the body
- For Skin Care Applications:
  - Revitalization of cell energy metabolism
  - Supports skin protection
  - Moisturizer
- For Hair Care Applications:
  - Improves volume and feel of damaged hair
  - Smooths the hair cuticle

Personal Care

## INCI-Name (CTFA-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)

Creatine is a natural amino acid derivative that has been shown to play an important role in cellular energy metabolism.

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

### Application

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

- Skin Care
  - Skin soothing formulations
  - Anti-aging formulations
  - After sun products
  - Moisturizing formulations
- Hair Care
  - Shampoos
  - Hair rinses
  - Conditioners
  - Styling products
  - Pre-treatments before chemical processes

### Skin Care

#### Properties

- Skin soothing
- Reduces irritation potential
- Moisturizing

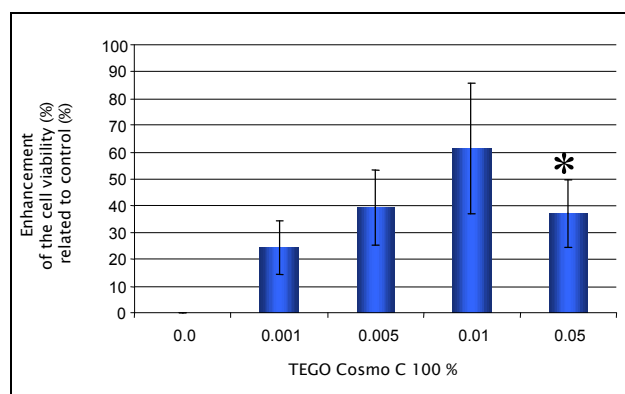
### Efficacy studies

- Revitalizing of skin cells' energy metabolism

The physiological fatigue of skin evidenced by the early signs of aging is caused by stress and environmental influences. The consequence is a decrease of the energy amount stored in the cells followed by a suppressed capability to synthesize proteins such as collagen, elastin, and keratin. Additionally, cells experience increased oxidative stress as they age, increasing the amount of energy required for internal defenses. So, a well-working energy metabolism is essential for skin cells vitality. TEGO® Cosmo C 100 is very effective at stimulating the cells energy metabolism.

The "cell energizing" effect of TEGO® Cosmo C 100 was assessed in-vitro in a cell culture (Human keratinocytes, NHEK cells). A pre-screen cytotoxicity study was conducted using the Neutral Red assay, showing the non-cytotoxicity of TEGO® Cosmo C 100.

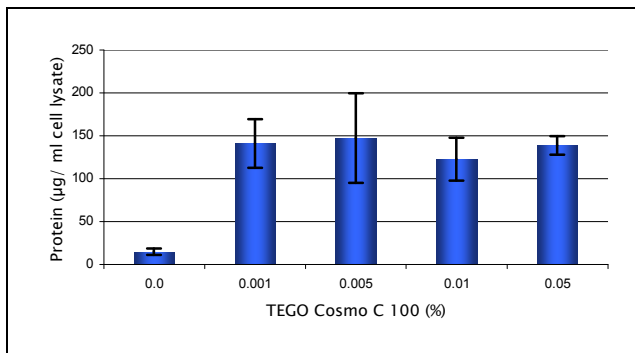
Keratinocytes were incubated with TEGO® Cosmo C 100 for 24 hours at 37°C. After this the cell vitality was measured with XTT, a water-soluble Formazan dye. The results are summarized in Fig. 1. The diagram indicates that the vitality of the cells treated with 0.01 % TEGO® Cosmo C 100 was about 60 % higher than the control vehicle.



**Fig. 1: "Cell energizing" test with keratinocytes**

\* Saturation of the cells with in vitro concentrations > 0.01 %

The cell energizing effect of TEGO® Cosmo C 100 causes an increase of the cellular protein content (Fig. 2). The effect was demonstrated after a 24 hours incubation with several concentrations of TEGO® Cosmo C 100. Keratinocytes were lysed followed by an analysis of protein amount (Method of Bradford).

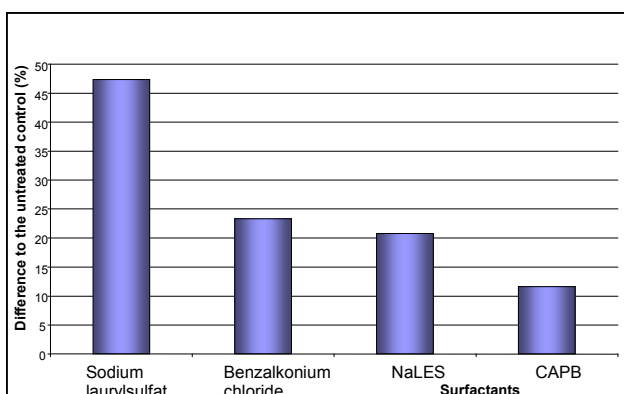


**Fig. 2: Protein assay of cell lysates**

Because TEGO® Cosmo C 100 stimulates both the mitochondrial activity and the protein synthesis of the skin, it provides longterm protection from premature aging and environmental stress, which is important for skin soothing and anti-aging formulations.

- Membrane stabilization by TEGO® Cosmo 100

TEGO® Cosmo C 100 helps to ameliorate skin irritation from various environmental factors. A modified red blood cell (RBC) test was used to evaluate this effect on cell membrane stabilization.



**Fig. 3: Modified red blood cell (RBC) test**

A defined number of erythrocytes (red blood cells) were treated for 1 hour with phosphate-buffered saline PBS as a standardized biological buffer (control) or PBS containing 1 % of TEGO® Cosmo C 100.

Afterwards, blood cells were stressed for 10 minutes with surfactants at defined concentrations. Damaged, or lysed, cells can be determined by a spectroscopic determination of free hemoglobin. Free hemoglobin is proportional to the number of lysed cells.

The efficacy of TEGO® Cosmo C 100 to reduce hemolysis (as compared to the blank) is clearly demonstrated in Fig. 3. A higher percentage difference indicates greater protection. It can be shown that damaging effects caused by surfactants are mitigated in cells preconditioned with TEGO® Cosmo C 100.

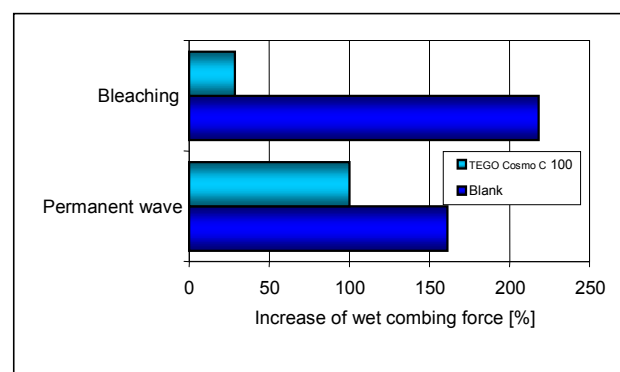
### Hair Care

#### Properties

- Hair Conditioning Properties

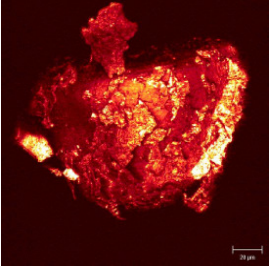
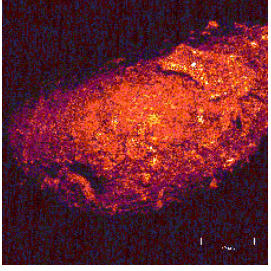
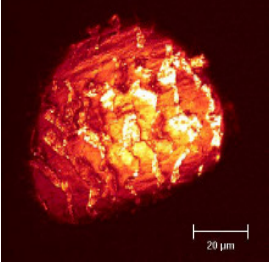
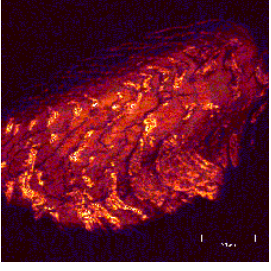
TEGO® Cosmo C 100 has a conditioning effect on hair. It improves body/volume and the dry feel of hair treated with TEGO® Cosmo C 100 before a bleaching or a permanent wave.

TEGO® Cosmo C 100 smoothes the surface of the cuticula (Fig. 5) and as consequence the increased combing forces by permanent waving or bleaching are minimal (Fig. 4). This in turn reduces the physical damage which results from combing damaged hair.



**Fig. 4: Wet combing measurements**

Predamaged (permed and bleached) European brown hair was treated with TEGO® Cosmo C 100 followed by a further damaging step (bleaching or perming). Afterwards the wet combing forces were measured.

		<p><b>Placebo</b></p> <ol style="list-style-type: none"> <li>1. Damaged by permanent waving + bleaching</li> <li>2. Treated 5 times with Placebo formulation</li> <li>3. Damaged again by bleaching</li> </ol>
		<p><b>TEGO® Cosmo C 100 (2 % solution)</b></p> <ol style="list-style-type: none"> <li>1. Damaged by permanent waving + bleaching</li> <li>2. Treated 5 times with TEGO® Cosmo C 100 (2 % solution)</li> <li>3. Damaged again by bleaching</li> </ol>

**Fig. 5: Effect of TEGO® Cosmo C100 on the hair surface**

#### Packaging

400 kg pallet (16 x 25 kg boxes)

#### Suggested use concentration

0.5 – 1.4 % by weight of TEGO® Cosmo C 100

#### 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 accidents and fires
- toxicity and ecological effects

is given in our material safety data sheets.

#### Literature

- Bünger et al., Proceedings XXI<sup>st</sup> IFSCC International Congress, September 2000
- Pape, W.J.W. & Hoppe, U. (1991) in *Arzneimittel-Forschung/ Drug Research*, 40(I), 4, 498–502
- WO 00/15187, Gloxhuber et al. (SKW Trostberg), "Creatine and/or Creatine Derivatives Used As Cosmetic Preparations Containing Moisturizers"
- Several publications of the Institute of Cell Biology, ETH Zürich, Switzerland
- Wallimann et al., *Biofactors* **8** (3–4), 229–234 (1998)
- Wyss and Wallimann, *Mol Cell Biochem*, **133–134** (Apr–May), 51–66 (1994)
- Wyss and Kaddurah–Daouk, *Physiol. Rev.* **80**, 1107–11213 (2000)
- Schlattner et al., *J. Invest. Dermatol.* **118**, 416–423 (2002)

## Guide Line Formulations

O/W Body Lotion with TEGO® Cosmo C 100 Ma 29/01		
<b>Phase A</b>		
TEGOSOFT® DO	(Decyl Oleate)	5.7 %
TEGOSOFT® OS	(Ethylhexyl Stearate)	6.5 %
TEGIN® 4100	(Glyceryl Stearate)	0.5 %
Stearic Acid		0.5 %
<b>Phase B</b>		
TEGO® Care CG 90	(Cetearyl Glucoside)	1.0 %
TEGO® Cosmo C 100		0.5 %
Glycerin		3.0 %
Water		80.8 %
<b>Phase C</b>		
TEGO® Carbomer 141	(Carbomer)	0.2 %
TEGOSOFT® OS	(Ethylhexyl Stearate)	0.8 %
<b>Phase D</b>		
Sodium Hydroxide (10 % in water)		0.5 %
Preservative, Perfume		q.s.
<p><b>Preparation:</b></p> <ol style="list-style-type: none"> <li>1. Heat phase A and B separately to approx. 80 °C.</li> <li>2. Add phase A to phase B with stirring.<sup>1)</sup></li> <li>3. Homogenise.</li> <li>4. Cool with gentle stirring to approx. 60 °C and add phase C.</li> <li>5. Homogenise for a short time.</li> <li>6. Cool with gentle stirring and add phase D below 40 °C.</li> </ol> <p><sup>1)</sup> <b>Important:</b> If phase A has to be charged into the vessel first, phase B must be added <b>without stirring</b>.</p>		

<b>Skin Firming Body Milk</b> <b>WR 3/04-15a</b>	
<b>Phase A</b>	
ISOLAN® GPS (Polyglyceryl-4 Diisostearate/ Polyhydroxystearate/ Sebacate)	3.00 %
Hydrogenated Castor Oil	0.25 %
Microcrystalline Wax (Paracera M, Paramelt B.V.)	0.25 %
TEGOSOFT® TN (C12-15 Alkyl Benzoate)	10.70 %
TEGOSOFT® DEC (Diethylhexyl Carbonate)	10.00 %
Tocopheryl Acetate	0.60 %
Phytosphingosine SLC	0.20 %
<b>Phase B</b>	
Glycerin	3.00 %
GluCare® S (Sodium Carboxymethyl Betaglucan)	0.20 %
TEGO® Cosmo C 100 (Creatine)	0.50 %
D-Panthenol (Panthenol, Roche Vitamins)	0.50 %
Magnesium Sulfate Heptahydrate	1.00 %
Water	69.80 %
<b>Phase Z</b>	
Preservative, Perfume	q.s.
<b>Preparation:</b>	
<ol style="list-style-type: none"> <li>1. Heat phase A to approx. 80 °C.</li> <li>2. Add phase B (80 °C or room temperature) slowly while stirring.</li> <li>3. Homogenize for a short time.</li> <li>4. Cool with gentle stirring below 30 °C and homogenize again.</li> </ol>	

<b>O/W Cream with TEGO® Derm CBS</b> <b>WR 3/06-1</b>	
<b>Phase A</b>	
ABIL® Care 85 (Bis-PEG/PPG-16/16 PEG/PPG-16/16 Dimethicone; Caprylic/Capric Triglyceride)	1.5 %
TEGINACID® C (Cetareth-25)	0.5 %
TEGIN® M Pellets (Glyceryl Stearate)	2.0 %
TEGO® Alkanol 18 (Stearyl Alcohol)	2.0 %
Stearic Acid	1.0 %
TEGOSOFT® CT (Caprylic/ Capric Triglyceride)	3.0 %
TEGOSOFT® TN (C12-15 Alkyl Benzoate)	6.0 %
TEGOSOFT® DO (Decyl Oleate)	1.5 %
TEGO® Derm CBS	3.0 %
Tocopheryl Acetate	0.5 %
<b>Phase B</b>	
Glycerin	3.0 %
Allantoin	0.1 %
TEGO® Cosmo C 100 (Creatine)	0.5 %
D-Panthenol	0.2 %
<b>Phase C</b>	
Water	74.5 %
TEGO® Carbomer 134 (Carbomer)	0.1 %
TEGOSOFT® TN (C12-15 Alkyl Benzoate)	0.4 %
<b>Phase D</b>	
Sodium Hydroxide (10 % in water)	0.2 %
<b>Phase Z</b>	
Preservative, Perfume	q.s.
<b>Preparation:</b>	
<ol style="list-style-type: none"> <li>1. Heat phase A and B separately to approx. 80 °C.</li> <li>2. Add phase A to phase B with stirring. <sup>1)</sup></li> <li>3. Homogenize.</li> <li>4. Cool with gentle stirring to approx. 60 °C and add phase C.</li> <li>5. Homogenize for a short time.</li> <li>6. Cool with gentle stirring and add phase D below 40 °C.</li> </ol>	
<sup>1)</sup> <b>Important:</b> If phase A has to be charged into the vessel first, phase B must be added <b>without stirring</b> .	

<b>Mild and Creamy Facial Cleansing Foam JB 211/1</b>	
REWOPOL® SB CS 50 B (Disodium PEG-5 Laurylcitrate Sulfosuccinate; Sodium Laureth Sulfate)	8.00 %
TEGO® Betain 810 (Capryl/Capramidopropyl Betaine)	6.60 %
Perfume	0.25 %
TEGOSOFT® PC 31 (Polyglyceryl-3 Caprate)	0.50 %
Water	82.70 %
TEGO® Cosmo C 100 (Creatine)	0.25 %
TEGOCEL® HPM 50 (Hydroxypropyl Methylcellulose)	0.50 %
LACTIL® (Sodium Lactate; Sodium PCA; Glycine; Fructose; Urea; Niacinamide; Inositol; Sodium Benzoate; Lactic Acid)	1.00 %
Panthenol	0.20 %
<b>Preparation:</b> Dissolve the TEGO® Cosmo C 100 and the cellulose in the water and let it swell. Blend the other ingredients in the given order. <b>Remarks:</b> Very mild, refatting and moisturizing. Provides creamy and stable foam. For application with fingerpump foamer (e.g. of Airspray International, NL)	

<b>Conditioning Shampoo for damaged hair SG 968/5</b>	
Sodium Laureth Sulfate	32.0 %
VARISOFT® PATC (Palmitamidopropyltrimonium Chloride)	1.5 %
REWODERM® LI S 80 (PEG-200 Hydrogenated Glyceryl Palmate; PEG-7 Glyceryl Cocoate)	2.0 %
ABIL® Quat 3272 (Quaternium-80)	2.0 %
Perfume	0.25 %
Water	52.95 %
TEGO® Cosmo C 100	1.0 %
Hydroxypropyl Guar Hydroxypropyltrimonium Chloride	0.2 %
TEGO® Betain F 50 (Cocamidopropyl Betaine)	8.0 %
Preservative	q.s.
<b>Preparation:</b> Dissolve the Guar Quat and the TEGO® Cosmo C 100 in the water and let it swell. Solve the ingredients in the given order in the Sodium Laureth Sulfate. Then add the water with the Guar Quat and the TEGO® Cosmo C 100, and then the TEGO® Betain F 50.	

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**Especially concerning Active Ingredients**

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