

Zemea® Propanediol: Face Mask Study

Introduction

The objective of this study was to determine if Zemea® could improve humectancy and skin performance of a typical face mask impregnation usually formulated with butylene glycol (BG), dipropylene glycol (DPG) or glycerin.

Background

Previous studies have been conducted to evaluate the moisturization efficacy of various formulations containing Zemea®, glycerin and/or other diols.

In 2008, a study was conducted to measure the moisturizing performance of O/W skin care emulsions with 5 wt.% varying humectant that included Zemea®, propylene glycol (PG), butylene glycol (BG) and a control (water). Each test cream was applied on the forearms of 10 subjects. A Corneometer® was used to measure skin moisturization over a 4-hour period. Zemea® was found to be more efficient in moisturizing the skin throughout the entire testing period.

In 2015, a consumer sensory and moisturizing study was conducted with three high moisturizing formulations that contained either 20 wt.% Zemea® or 20 wt.% glycerin or a mixture of 10 wt.% Zemea® and 10 wt.% glycerin. This work demonstrated that the addition of Zemea® to glycerin-based formulations can improve the consumer perceived aesthetics without compromising hydration performance of the formulation.

In the current study, we evaluated the short-term and long-term benefits of an O/W face mask emulsion that contained either:

- 1) Zemea® / glycerin mixture (5 wt.% each)
- 2) Butylene glycol / glycerin mixture (5 wt.% each)
- 3) Zemea® / Dipropylene glycol (5 wt.% each)
- 4) Butylene glycol / Dipropylene glycol (5 wt.% each)

Experimental Design

A. Formulation

Ingredient	INCI	(wt%)	(wt%)	(wt%)	(wt%)
Water	Water	100	100	100	100
DPG	Dipropylene glycol	5			5
Butylene Glycol	Butylene glycol	5	5		
Zemea®	Propanediol			5	5
Glycerin	Glycerin		5	5	
Emanon CH-60(K)	PEG-60 Hydrogenated castor oil	0.2	0.2	0.2	0.2
Hyaluronsan HA-LQ 1% solution	Water, Sodium Hyaluronate	4.00	4.00	4.00	4.00
Nomcort ZZ 1% solution	Water, Xanthan Gum	6.00	6.00	6.00	6.00
Preservative		q.s	q.s	q.s	q.s
Citric Acid 10% solution	Water, Citric Acid	0.1	0.1	0.1	0.1
Sodium Citrate 10% solution	Water, Sodium Citrate	0.7	0.7	0.7	0.7

Table 1. O/W face mask emulsions tested

B. Assessments:

Evaluation was conducted on 40 Asian female volunteers (20 to 30 years old).

Short-term evaluation: parameters were measured at 30 minutes, 1, 4 and 8 hours after application of the formulation. Skin elasticity, skin hydration and hydration performance were evaluated.

Long-term evaluation: parameters were measured on face skin at 14 and 28 days. During that period face masks were applied twice a day (morning and evening). Skin elasticity, hydration performance and SELS (Surface Evaluation of the Living Skin) parameters including skin roughness, scaliness, wrinkles and smoothness were evaluated.

C. Test methods:

Skin elasticity was measured using a Cutometer® equipment. The two main parameters were evaluated:

- Elastic recovery: Q1
- Visco-elasticity: R2

Skin hydration was measured using a Tewameter® to evaluate the trans-epidermal water loss (TEWL).

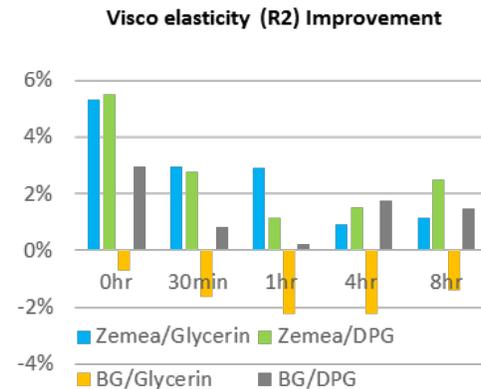
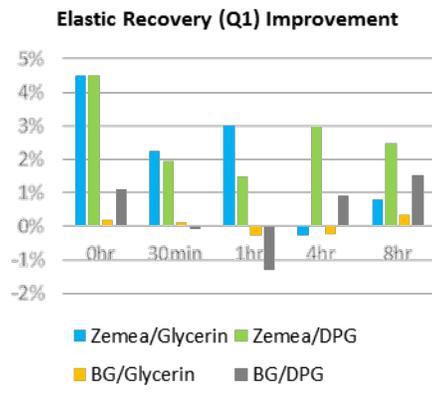
Hydration performance was measured using Capacitance Imaging – MoistureMap technology licensed under the L'Oréal SkinChip®.

SELS (Surface Evaluation of the Living Skin) parameters have been developed by the University of Witten, Germany using a flexible UV camera - Visioscan®. It is based on the grey level distribution in the image.

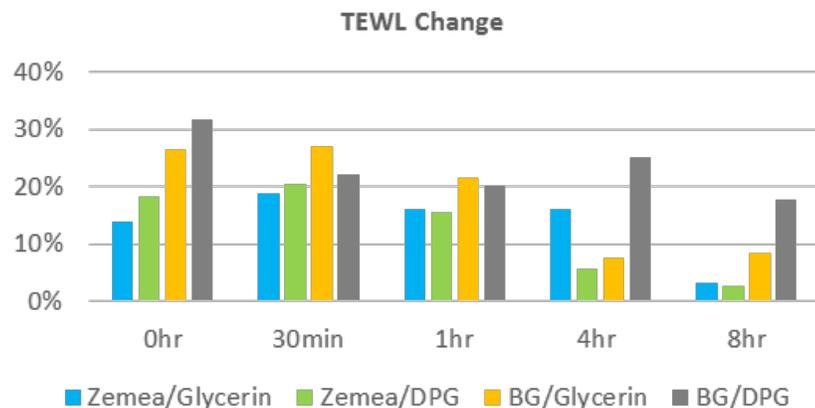
Results

Short-term evaluation:

Zemea® propanediol was more efficient than butylene glycol in improving the skin elasticity over the short-time testing period.

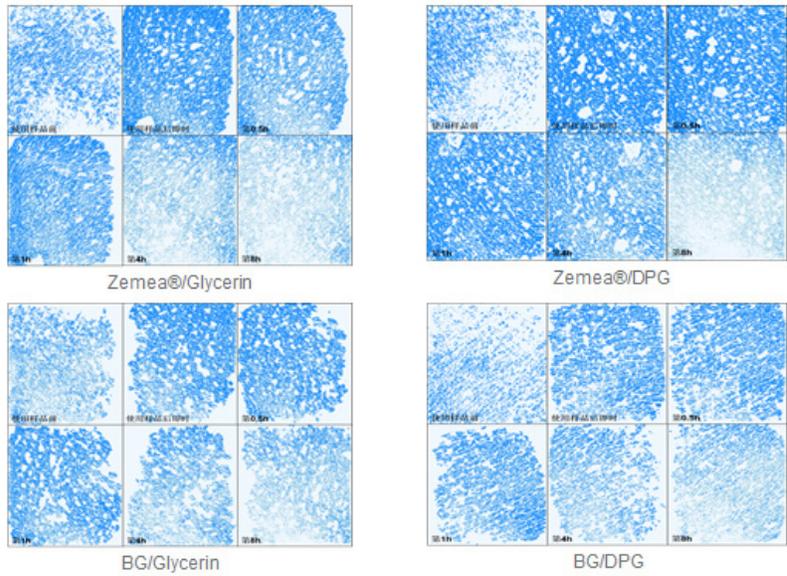


Zemea® propanediol was more efficient than butylene glycol in keeping the skin hydrated over the short-time testing period as noted by the TEWL data.



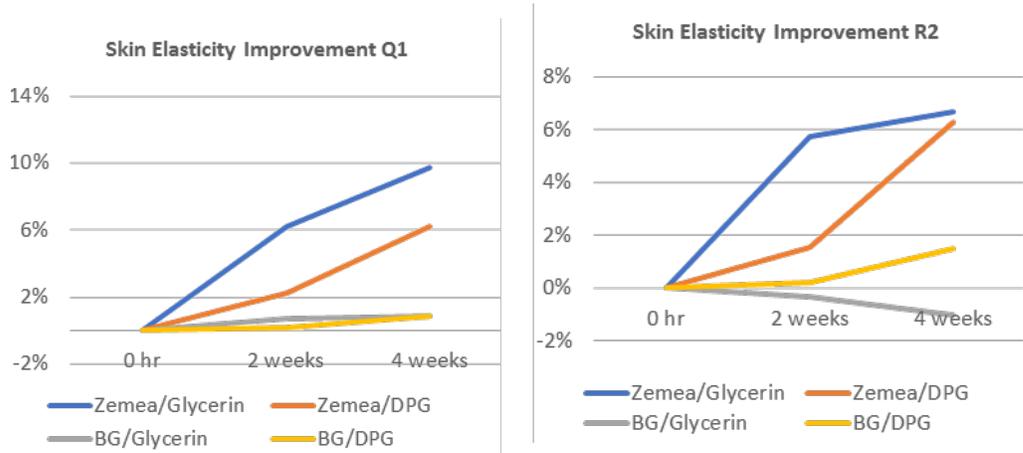
Hydration performance comparison between Zemea® and BG

A deeper and bigger blue area means better skin hydration. Zemea® hydration performance was found to be better than BG.



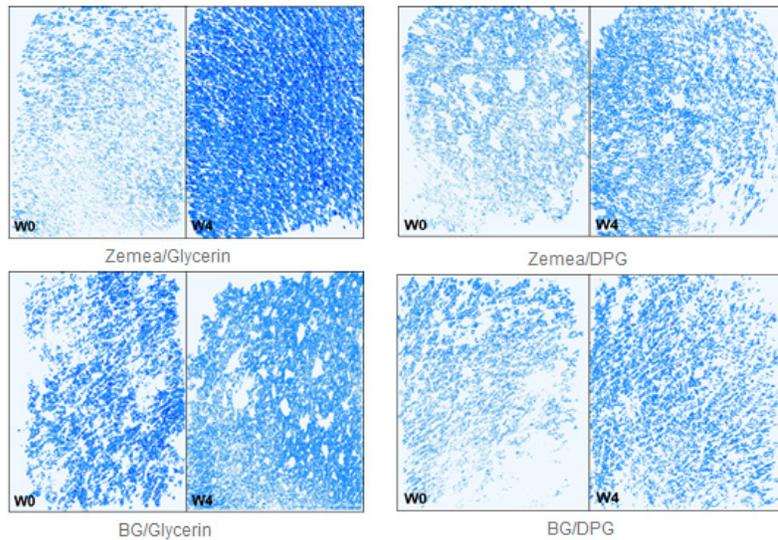
Long-term evaluation:

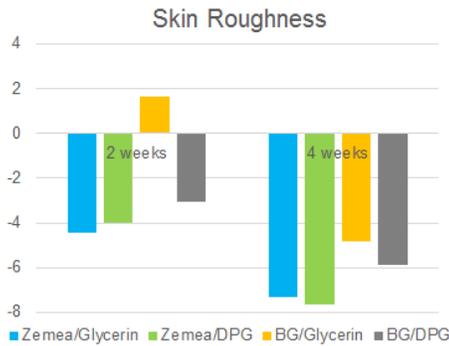
Zemea® propanediol was more efficient than butylene glycol in improving the skin elasticity over the long-time testing period.



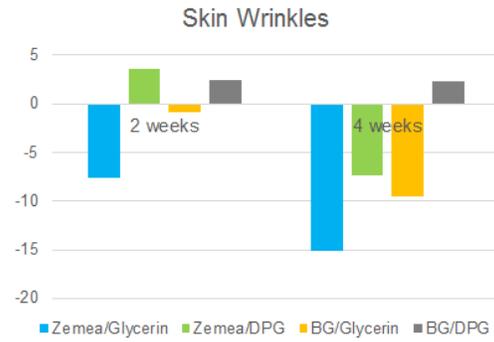
Hydration performance comparison between Zemea® and BG

A deeper and bigger blue area means a better hydration. Zemea® hydration performance was found to be better than BG.

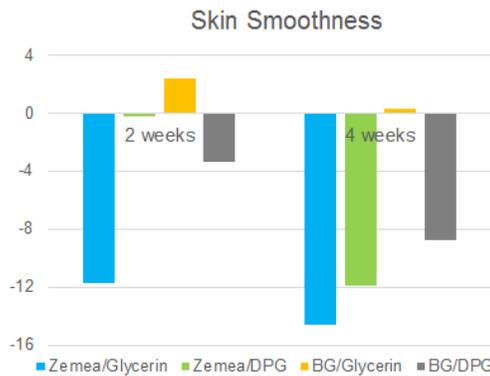




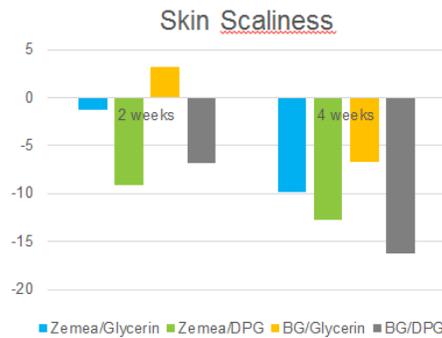
Zemea® propanediol has similar behavior for skin Roughness improvement compare with butylene glycol in over the long-time testing period.



Zemea® propanediol/Glycerin was more efficient than butylene glycol in improving the skin wrinkles over the long-time testing period.



Zemea® propanediol was more efficient than butylene glycol in improving the skin smoothness over the long-time testing period.



Zemea® propanediol/DPG was same efficient as butylene glycol/DPG in improving the skin scaliness over the long-time testing period.

After 4 weeks Zemea® showed a higher reduction than BG in Skin Roughness, wrinkles and scaliness while improving skin smoothness.

Conclusions:

This study shows that Zemea® can successfully be used in face mask applications bringing the following performance improves when compared to 1,3 Butylene Glycol (BG):

- Short and long-term improvement of skin hydration and elasticity;
- Long-term roughness and wrinkle reduction
- Long-term improvement in skin smoothness and a reduction in scaliness

Additionally, well-known Zemea® benefits will support the face mask application such as:

- Skin friendliness
- Good moisturization properties
- A sustainable plant based 100% bio-based ingredient
- NI and NOI = 1 according to ISO standard 16128
- No tackiness
- Positive and pleasant aesthetic experience
- Works well with a wide range of face mask ingredients

For additional information or samples:
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