DuPont Tate & Lyle BioProducts™

Zemea® Propanediol

Natural, Preservative-Boosting Humectant and Solvent

Cosmetics and Personal Care
Products and Ingredients

Zemea® Propanediol - for Natural Beauty

Replaces Glycols and Glycerin

- 100% naturally derived
- ECOCERT and NPA approved
- Skin friendly
- Boosts preservative efficacy
- Sensorial benefits
- Petroleum-free
- Environmentally sustainable

Zemea® Propanediol - Multifunctional and Versatile

Zemea® can provide enhanced functionality as a:

- Humectant
- Natural solvent
- Efficient active carrier
- Preservative-booster
- Emollient
- Skin feel modifier

Zemea® can be used in a wide variety of applications:

- Facial care
- Body care
- Hair care
- Oral care
- Deodorants
- Sun care
- Color cosmetics
- Toiletries
- Wipes
- Cosmetic Ingredients

Improve the Safety and Sensorial Profile of Your Products

DuPont Tate & Lyle regularly conducts technical studies to understand the performance benefits of Zemea® in different applications. Please visit our website (duponttateandlyle.com/cosmetics) to see our technical testing results and prototype formulations. Here are a few examples:

Skin Care:

- **Dermal Analysis –** Zemea® vs. PG – RIPT skin test on >200 individuals at different concentration and pH levels – Zemea® has no skin irritation or sensitization even at high concentrations.
- **Skin Hydration Test -** Corneometer measurements over 4 hours showing increased moisturization levels of Zemea® vs. PG and BG.
- **Consumer Efficacy Study –** Consumer sensorial evaluation of body lotions formulated with either Zemea®, PG, BG or glycerin. Consumers rated lotion with Zemea® higher than glycerin lotion on all attributes.

Hair Care:

- **Shampoo Hair Tress Evaluations -** Application, wet and dry stages evaluated showing benefits of shampoo made with Zemea® vs. PG, BG and glycerin.
- **Potential for Zemea® to Boost Efficacy of ZPT–** Mortality rates of *M.globosa* increased 90% using 1.2% ZPT and 4% Zemea® in a generic anti-dandruff shampoo formulation.

Antimicrobial Studies:

- **Zemea® Boosts the Efficacy of Preservatives-** CTFA challenge testing on O/W skin care emulsions with 6 different preservative systems used at 50% of the recommended use level and varying levels of Zemea® from 0-6 wgt.% to determine minimum amount of Zemea® needed to pass challenge testing.

Skin Care Products

Zemea® enables improved sensorial attributes:

- Soft, smooth, moisturized feel
- No tackiness
- No skin irritation
- Enhances moisturization effects
- Boosts efficacy of preservatives
- ECOCERT approved

Hair Care Products

Zemea® is a natural solution for beautiful hair:

- Boosts efficacy of ZPT, enhancing dandruff care products
- Improves hair moisturization
- Provides a cleaner feel with less static
- ECOCERT approved
- Improved viscosity with less salt

Deodorants

Develop PG-Free with Zemea®

- No skin irritation
- Feels moisturized
- Glides on smoothly
- Use less preservatives
- Naturally-derived
- Less stickiness
- Good solvency of actives

Zemea® - An Effective Active Carrier or Building Block for Ingredients

Unique solubility performance that can:

- Maximize the Solubility of an Active
- Extend Delivery Time of an Active
- Optimize a Formulation for Maximum delivery of an Active

Ideally suited for:

- *Preservative systems*
- *Esters*
- *Botanical extracts*
- *Cationic conditioners*
- *Dyes and pigments*
- *Polymers*
- *Antimicrobial stabilizers*

Environmentally Friendly

Formulate more sustainable products with Zemea®

- Less greenhouse gas emissions*
- Lower energy used*
- 100% USDA biobased
- Low VOC
- Readily biodegradable
- Made from renewable resources
- Petroleum-free

*Based on LCA

Zemea® Approvals, Certifications and Registrations

Approvals/Certifications:

- EcoCert
- DfE – EPA's Design for the Environment
- s-GRAS
- Natural Products Association (NPA)
- Health Canada - Natural Health Products Ingredient
- USDA 100% Bio-Based
- USP
- Kosher
- Halal

Registrations:

- INCI Name: Propanediol
- EINECS Number: 207-997-3
- CAS Number: 504-63-2
- REACH Registration Number: 01-2119489383-28-0000

DuPont Tate & Lyle BioProducts™

Delivering renewable solutions today, for tomorrow

Petroleum-free Zemea® Propanediol

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