1,3-BG (COSMETIC QUALITY)

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1,3-BG (COSMETIC QUALITY) (CTFA / INCI denomination: butylene glycol) is a high purity, slightly viscous, water-clear and colorless liquid. It has long been used as a high performance humectant in top quality personal care products. OQ Chemicals is committed to a manufacture without genetically modified organisms and based on feedstocks that do not impact food production.

In addition, the product is a well-suited solvent for the production of natural cosmetic extract ingredients and pre-formulations of cosmetic relevance.

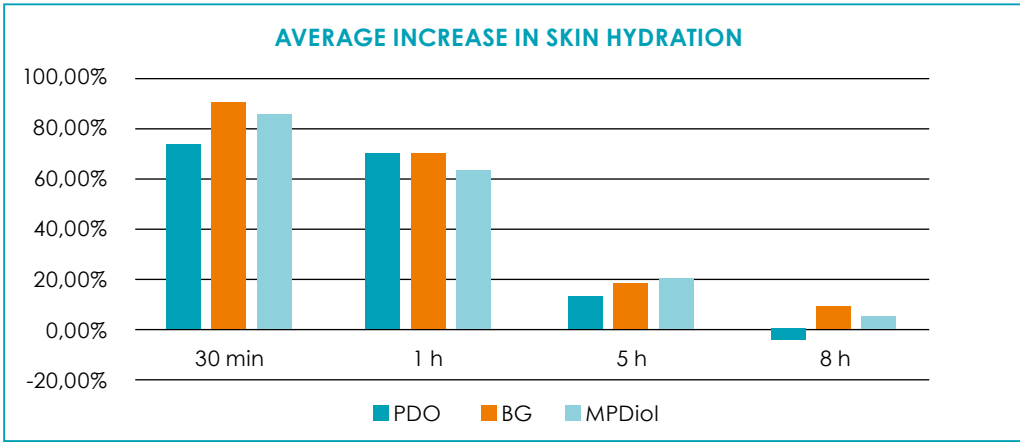
Due to its balanced property profile, 1,3-BG (COSMETIC QUALITY) is broadly used in a multitude of personal care formulation as:

- **Emollient**
- **Skin Moisturizer**
- **Solubilizer**
- **Viscosity Modifier**
- **Film Spreading Agent**
- **Fragrance Retarder**
- **Solvent for Plant Extracts & Actives**
- **Preservative Enhancer**
- **Foam Modifier**

HYDRATION TESTS

Skin hydration tests have demonstrated that 1,3-BG (COSMETIC QUALITY) delivers and maintains a higher level of skin moisture than other glycols over a period of 8 hours.

The study involved short term skin hydration measurements using an instrumental test. It was conducted according to a cosmetics clinical study protocol – using the Corneometer® CM 825. The results were averaged and are represented in the following chart.

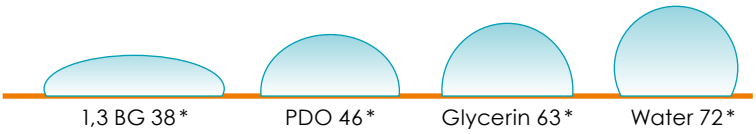


All measurements were carried out in a laboratory at a temperature of 18-22°C and 45-55% humidity. The average increase in skin hydration is expressed as % of change from baseline.

PRODUCT PROPERTIES

MATERIAL PROPERTY DATA

Visual Appearance	Clear, colorless, slightly viscous liquid, free of particles
Odor	Mild odor
Purity	min 99.5%
Water	max 0.5%
Melting Point	– 57°C
Boiling Point	209°C
Vapor Pressure	< 1 hPa @ 20°C 1.8 hPa @ 50°C
Vapor Density	3.2 @ 20°C (Air = 1)
Flash Point	115°C
Autoignition Temperature	410°C
Explosion Limits	1.9 – 12.6 Vol.-%
Density [20°C]	1.0035 g/cm^3
Viscosity [20°C]	131.8 mPas
Refractive Index [20°C]	1.44
Surface Tension [20°C]	72.6 mN/m @ 1g/l



* Dynes/cm at 20°C

1,3-BG (COSMETIC QUALITY) is a low molecular weight substance which contains 2 hydroxyl groups. It is stable in water, alcohols, polyols, ketones, esters and hydrocarbons. The hydroxyl groups may react in the usual way with Carboxylic acids to form a variety of Esters.

SOLUBILITY

OQ Chemicals 1,3-BG (COSMETIC QUALITY) is completely soluble in water. It can be conveniently added directly to the aqueous phase of water-based cosmetic formulations.

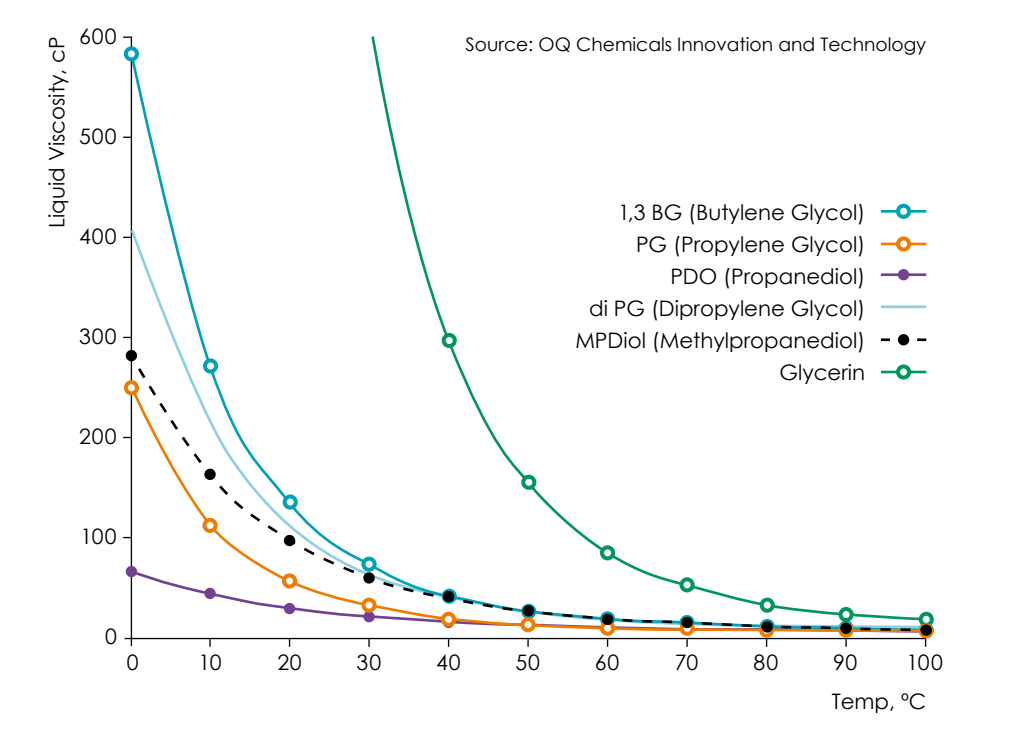
SURFACE TENSION

The illustration on the left shows the impact of surface tension in terms of wettability and film formation. Lower surface tension molecules have a better wettability and reduce the contact angle. Those molecules also have better spreadability or better film formation, helping in the formulation to enhance the texture of the final product.

VISCOSITY

Cosmetic formulators have many challenges balancing all the ingredients in a formulation. One of the most important challenges is the rheology of the components. Depending on the final application, you may likely add viscosity modifiers to get the desired final product viscosity. 1,3-BG (COSMETIC QUALITY) acts like a humectant, which typically has a direct impact on the final structure of the product. Thus, a simple comparison of viscosity could help us to understand how the final product could be impacted by 1,3-BG (COSMETIC QUALITY) used in the formulation.

This chart shows the viscosity of various glycols at different temperature conditions.



For typical glycols used in cosmetic formulations, the product with the higher viscosity gives a thick or sticky characteristic while products with the lowest viscosity give a thinner feeling. 1,3-BG (COSMETIC QUALITY) viscosity is in the moderate range and helps to avoid a blend of different glycols.

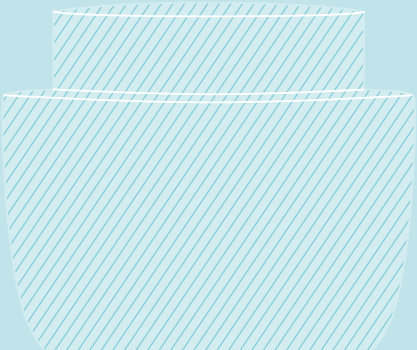
The minimalist trend tries to omit substances that are perceived as unnecessary in the formula. 1,3-BG (COSMETIC QUALITY) can be used in high concentrations without any problems in texture and will not provide a greasy feeling. It allows a balanced and steady emulsion.

BIODEGRADABILITY

Biodegradation:
81% (29d), activated sludge (domestic), aerobic, non-adapted (OECD 301 B).

PBT and vPvP Assessment:
1,3-BG (COSMETIC QUALITY) is not considered to be persistent, bio-accumulating nor toxic (PBT) nor very bio-accumulating (vPvB).

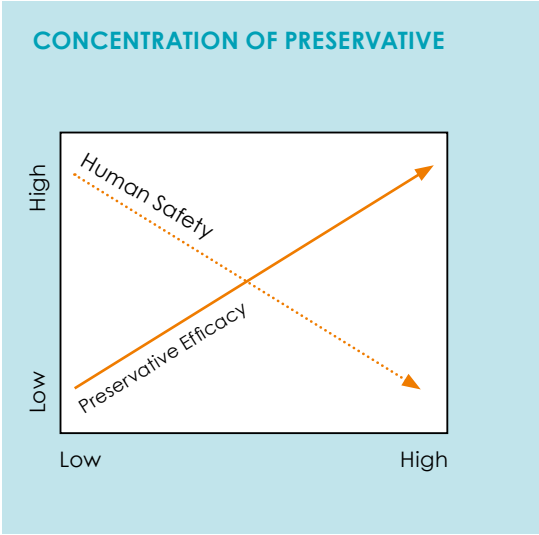
OSHA Regulatory Status:
1,3-BG (COSMETIC QUALITY) is non-hazardous as defined by the American OSHA Hazard Communication Standard (29CFR 1910.1200).



THE MULTIFUNCTIONAL 1,3-BG (COSMETIC QUALITY)

Above and beyond its moisturizing and solubilizing properties, good compatibility with water-based cosmetic formulations combined with a very pleasant, non-sticky skin sensation 1,3-BG (COSMETIC QUALITY) also offers opportunities to support the efficacy of preservatives in cosmetic formulations.

There is a global trend in the industry to move to preservative-free or self-preserving cosmetics. In this context water-based formulations present a special challenge as they inevitably need strategies to efficiently suppress microbial growth to ensure product and consumer safety. Technologies that comprise the intelligent combination of different ingredients to suppress microbial growth have been established. Following good manufacturing practice guidelines by the formulators, appropriate packaging, careful choice of ingredients, controlled low water activity and carefully adjusted pH values are significant variables for the control of microbial growth in cosmetic formulations. While preservative technologies are essential to cosmetic formulations, consumers often perceive preservatives as detrimental for health and environment.



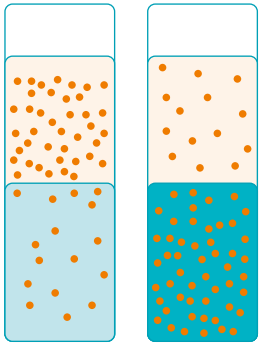
Thus consumers call for safe and, at best, preservative-reduced formulations. In this context, multifunctional ingredients that contribute to the management of microbial growth beyond their well-received primary cosmetic properties are of special interest.

1,3-BG (COSMETIC QUALITY) AS A MULTIFUNCTIONAL IN PRESERVATIVE FORMULATIONS

Certain preservatives are lipophilic but microorganisms typically grow in the aqueous phase, therefore, the hydrophilic 1,3-BG (COSMETIC QUALITY) helps to keep the preservatives in the aqueous phase where microbial growth risk is higher.

The illustration shows the effect of a high concentration of glycol in an emulsion. High concentrations of humectants solubilize the preservative in the aqueous phase increasing its antimicrobial activity.

Long chain diols show a higher compatibility with most preservatives and help keep the preservatives in the aqueous phase, too, however long chain diols may interact with other components destabilizing the emulsion. As 1,3-BG (COSMETIC QUALITY) is a medium chain diol, compared to other typically used diols, butylene glycol would be a better candidate for use in a preservative formulation.



Aqueous phase

Oil phase

Aqueous phase + Humectant

Preservative

Conservation stress test according to DIN EN ISO 11930 in two samples 158_20_2_12 and 158_20_2_13 including 10% of 1,3-BG (COSMETIC QUALITY) in the formulation. This conservation stress test shows the development of the germ count at 20-25°C after inoculating the samples with the germ suspensions listed:

CHALLENGE TEST ACCORDING TO DIN EN ISO 11930 AT DAY 7

	Pseudomonas aeruginosa ATCC 9027	Staphylococcus aureus ATCC 6538	Escherichia coli ATCC 8739	Candida albicans ATCC 10231	Aspergillus brasiliensis ATCC 16404
1,3-BG (COSMETIC QUALITY) 0% and Phenoxyethanol 0,5%	✔	✖	✖	✖	✔
1,3-BG (COSMETIC QUALITY) 10% and Phenoxyethanol 0,5%	✔	✔	✔	✔	✔

✔ Meets the requirements according to criteria A + B of the preservation stress test according to DIN EN ISO 11930.

✖ Does NOT meet the requirements of criteria A + B of the preservation stress test according to DIN EN ISO 11930.

CHALLENGE TEST ACCORDING TO DIN EN ISO 11930 AT DAY 14

	Pseudomonas aeruginosa ATCC 9027	Staphylococcus aureus ATCC 6538	Escherichia coli ATCC 8739	Candida albicans ATCC 10231	Aspergillus brasiliensis ATCC 16404
1,3-BG (COSMETIC QUALITY) 0% and Phenoxyethanol 0,5%	✔	✖	✖	✖	✔
1,3-BG (COSMETIC QUALITY) 10% and Phenoxyethanol 0,5%	✔	✔	✔	✔	✔

_inci	_158_20_2_12	_158_20_2_13
Tocopherol + Helianthus Annuus (sunflower) Seed Oil	0.25	0.25
Xanthan Gum	0.2	0.2
Cetearyl Alcohol + Cetearyl Glucoside	5	5
Butyrospermum Parkii (Shea) Butter	2	2
Caprylic/Capric Triglyceride	7	7
Aqua	82.05	72.05
Limnanthes Alba (meadowfoam) Seed Oil	3	3
Butylene Glycol	**0**	**10**
Phenoxyethanol	0.5	0.5

APPLICATIONS

Skin Care

General Body/ Hand Creams and Lotions, Face Creams, Face Mask, Toilet Waters

Makeup

Fluid Makeup Products, Foundation, Mascara, Makeup Remover

Serums, Ampoules, Eye Care, Anti-wrinkle/ Anti-aging

Specialty Skin Care

Deo-Sticks and Deo-Sprays

AP DO

Lip Care

Lip Sticks and Lip Balm

Hair Care

Hair Gels and Styling/ Leave-on Products

Sun Protection and After-Sun Products

Sun Care

Cleaning Wipes
Refreshing Wipes
Sanitary Wipes
Baby Wipes

Wet Wipes

1,3-BG (COSMETIC QUALITY) MULTIFUNCTIONAL MOLECULE

Due to the properties previously described, 1,3-BG (COSMETIC QUALITY) can be used as a humectant in a wide concentration range without any skin irritability. The following are benefits to using 1,3-BG (COSMETIC QUALITY) in a formulation:

Balanced Chemical Structure

Polar and non polar ends, provide wide solubility range with active ingredients and emulsifiers

A medium chain glycol helps to stabilize emulsions

Balanced Viscosity

At high concentrations in the formulation, the product will have **low thickness/low greasy feeling**

1,3-BG (COSMETIC QUALITY) balanced viscosity

Without decreasing the viscosity in formulations where a **higher viscosity** is needed.

Balanced Surface Tension

Balanced wettability

Improve film spreading

Work better as texture enhancer

Without foam formation

Multifunctional Molecule

Consumers call for safe and, at best, preservative-reduced formulations

All information on applications areas is derived from our experience and customer feedback. OQ Chemicals in no way states or implies that 1,3-BG (COSMETIC QUALITY) has been tested as safe or effective for all potential applications or that regulatory requirements for any specific customer use or application in all countries are met. The customer is solely responsible for ensuring that 1,3-BG (COSMETIC QUALITY) is suitable for customer's intended use and that all regulatory requirements in every applicable jurisdiction are complied with.

OQ Chemicals GmbH
Rheinpromenade 4a
40789 Monheim
Germany

Phone: +49 2173 9993-0
info@chemicals.oq.com

chemicals.oq.com