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# TECHNICAL DATA SHEET

**Product Name:** Hydroxypropyl Methylcellulose

**INCI name:** Hydroxypropyl Methylcellulose

**CAS:** 9004-65-3

**Chemical classification:** Modified cellulose ether, hydrophilic colloid

**Functional category:** Viscosity modifier, thickener, emulsion stabilizer, film-former

**IUPAC name:** Cellulose, 2-hydroxypropyl methyl ether. This designation is used as a generic description of a modified cellulose ether in which the hydroxyl groups of cellulose are partially replaced with methyl and hydroxypropyl groups. Note: Because HPMC is a polymer with a variable degree of substitution, there is no single, complete IUPAC name that covers all possible structural variants – instead, this functional description indicating the type of modification is used.

**Description:** Hydroxypropyl Methylcellulose (HPMC-300) is a non-ionic, semi-synthetic cellulose polymer used in cosmetics primarily as a thickener, emulsion stabilizer and film-former. It is produced by chemically modifying natural cellulose, introducing hydroxypropyl and methyl groups to improve its solubility and functionality in aqueous media. In contact with water it forms a clear, pseudoplastic gel that enhances the sensory profile of a formulation and allows system stability without additional emulsifiers in some gel-emulsions. Owing to its chemical stability and inertness, it is compatible with most active ingredients, so it is used in facial gels, lotions, serums, as well as in ophthalmic preparations and products for sensitive regions, such as the area around the eyes. It does not clog pores, does not cause irritation and is suitable for formulations intended for sensitive skin. It is also employed to tailor the rheological properties of formulations, providing good spreadability, uniform application and retention of active components on the skin surface. Thanks to its biodegradability, non-toxicity and origin from natural cellulose, HPMC is considered an environmentally friendly ingredient and is often found in natural and vegan cosmetics.

**Physico-chemical properties:** Hydroxypropyl Methylcellulose (HPMC-300) appears as a white or pale cream fine powder, odourless, with pronounced hygroscopicity. It dissolves in cold water without heating. It forms a stable, medium-viscosity gel of

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pseudoplastic structure, making it suitable for formulations that require controlled thickening while maintaining a light, non-greasy texture. In a 2 % aqueous solution at 20 °C it develops a viscosity of 28 000 - 35 000 mPa·s. The pH of a 1 % solution is 6.6, within a neutral-to-slightly-acidic range. It is compatible with a wide spectrum of active substances, including acids, peptides and botanical extracts. Moisture content is 4.84 %, while ash content, indicating inorganic residues, is 2.60 %, confirming the chemical purity of the raw material and storage stability. With at least 90 % of particles passing through an 80-mesh sieve, HPMC-300 disperses easily without clumping, ensuring homogeneous distribution in a formulation. Thanks to balanced rheological characteristics, HPMC-300 serves as an emulsion stabilizer, viscosity regulator and film-former in diverse cosmetic systems – from moisturizing gels and lotions to light serum emulsions.

**Mechanism of action:** The performance of Hydroxypropyl Methylcellulose (HPMC-300) in cosmetic formulations rests on its ability to form stable, medium-viscosity gels in the aqueous phase, due to hydrophilic methoxy and hydroxypropyl groups that interact intensively with water molecules. Upon dispersion in cold water, HPMC molecules absorb water and swell, forming hydrogen bonds between polymer chains and water. This yields a three-dimensional rheological network that traps water within the system and creates a viscous, mechanically stable structure. Such a network enables precise control of flow and texture, facilitates uniform application and prevents phase separation in emulsions. Additionally, HPMC acts as a film-former, creating a thin, transparent film on the skin that helps retain moisture, shields the epidermis from external influences and prolongs the presence of actives on the skin. This film is lightweight, does not clog pores and does not interfere with skin physiology, making it suitable for sensitive regions, such as the area around the eyes. In emulsions, HPMC-300 stabilizes by increasing the viscosity of the continuous (aqueous) phase, slowing oil-droplet movement and reducing coalescence. Thus, a stable system is achieved and the need for high emulsifier levels is reduced. Thanks to its pseudoplastic rheology – reduced viscosity during mixing and rapid recovery at rest – HPMC-300 spreads easily yet forms a stable structure on the skin, contributing to a pleasant sensory feel and a protective film.

**Benefits:**

- Forms stable gels without heating.
- Provides medium-to-high viscosity at low concentrations.
- Compatible with a wide pH range and most active ingredients.

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- Acts as a film-former and protects the skin from dehydration.
- Does not clog pores and is suitable for sensitive skin.
- Stabilizes emulsions by increasing aqueous-phase viscosity.
- Improves texture and enables easy, uniform application.
- Exhibits pseudoplastic behaviour for easier spreading.
- Disperses readily and does not form lumps in a formulation.
- Biodegradable and safe for the skin.

**Usage:** Hydroxypropyl Methylcellulose (HPMC-300) is introduced into cosmetic formulations as a thickener and stabilizer by first dispersing it evenly in cold water with gentle stirring to avoid clumps, then allowing it to swell and hydrate until a homogeneous gel forms. In emulsions it can be added to the aqueous phase before emulsification; in gels it is used alone or with other polymers to adjust rheology. Recommended concentrations range from 0.1 % - 1 % for serums and light lotions to 2 % in gels and products requiring higher viscosity. Depending on the desired effect and viscosity, the level is adjusted: lower levels yield more fluid systems, while higher levels produce thick, stable gels with pronounced film-forming properties.

**Natural or synthetic ingredient:** Hydroxypropyl Methylcellulose (HPMC) is a semi-synthetic ingredient – derived by chemically modifying natural cellulose with methoxy and hydroxypropyl groups to enhance water solubility and gel-forming ability. Thus, although it originates from a natural source (plant cellulose), its final form results from industrial processing and is not considered fully natural under certified-natural cosmetics standards.

**Animal testing:** The substance has not been tested on animals

**GMO:** Non-GMO

**Vegan:** Contains no animal-derived components