# Synergistic 1,2-Diol Combinations – New Multifunctional Actives for Cosmetics

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## Introduction

Alkanediols are widely used in the personal care industry and have excellent safety record. They act as humectants and solubilisers for many ingredients like cosmetic actives and preservatives. Some of them show anti-microbial properties [1,2]. They are also compatible with most of the ingredients used in cosmetics. In this article we would like to present our research results on blends of aliphatic 1,2-diols, especially of a combination of 1,2-hexanediol and 1,2-octanediol (ratio 1:1; w/w), which possesses excellent moisturizing properties. Because of its antimicrobial properties, this blend can be also used as preservative helper to reduce the dosage levels of preservatives like parabens, phenoxyethanol and iodopropynyl butylcarbamate (IPBC). These preservatives are increasingly discussed as a potential cause of adverse skin reactions like irritation or contact sensitization.

Both 1,2-hexanediol and 1,2-octanediol are amphiphilic molecules. The molecular structures of 1,2-hexanediol and 1,2-octanediol (Fig. 1) are different from commonly used diols like butylene glycol or hexylene glycol, since there is a distinct separation of the positive and negative charges within the molecule. It gives these aliphatic 1,2-diols unique chemical and physical properties, which are most probably the reason for multiple application possibilities.

## Objective

The moisturizing properties of aliphatic 1,2-diols are already described in [1]. The objective of our first study was to look at the moisturisation properties of a blend of 1,2-hexanediol and 1,2-octanediol and compare it with that of glycerin. A second study was carried out to investigate whether diol combinations possess higher antimicrobial activity than single diols used at the same concentration level. Within a third study we additionally checked whether a 1,2-diol blend could help to preserve cosmetic formulations in combination with low doses of preservatives.

## Material and Methods

Aliphatic 1,2-diols used in these studies were synthesized in our labs with a purity >99%. The moisturisation study was in accordance with Good Clinical Practice regulations. It was designed as a 24 hours study with a panel of five human subjects. Minimum Inhibitory Concentrations (MIC's) of aliphatic 1,2-diols were determined by applying the agar dilution method according to DIN 58 940/ICS & DIN58 944/ICS [2]. For evaluation of the efficacy of combinations of individual aliphatic 1,2-diols, 1,2-diol mixtures and combinations with preservatives, we used the standard challenge test described in European Pharmacopoeia 4th Edition [3].

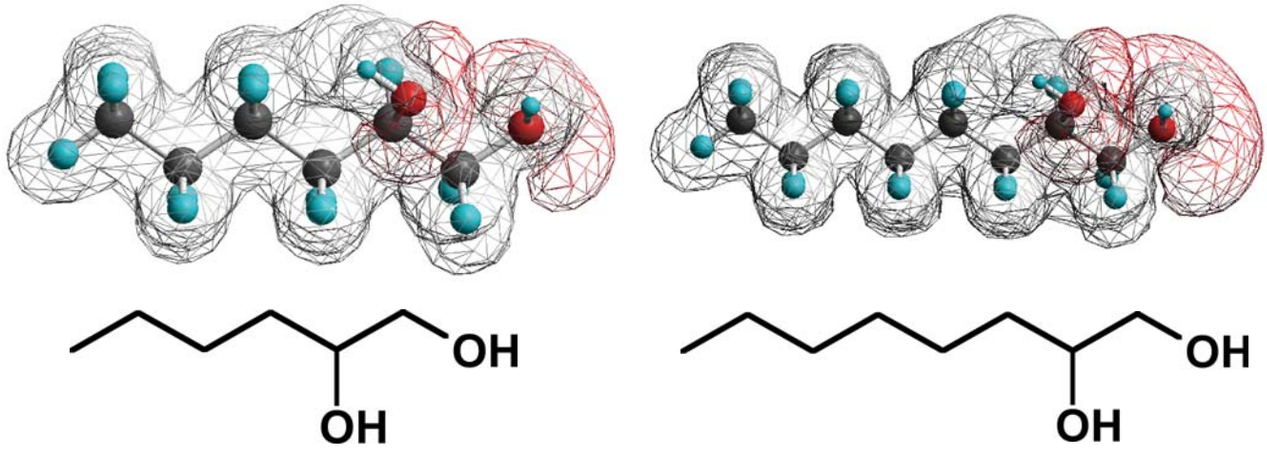


**Figure 1. Structural formulae and charge distribution of 1,2-hexnediol and 1,2-octanediol**