

Glycerin Research Paper

APPEARS INS



When you look at a skincare ingredient list, water is almost always at the top and right next to it, or near the top, is Glycerin. This is especially true for moisturizers like Three Ships' Harmony Cleanser, Dream and Radiance Creams, as well as most moisturizing serums, because Glycerin is a great humectant that is small in molecular size. Glycerin is a sugar alcohol, which means that it has a glycerol backbone with alcohol functional groups attached to it (OH groups).

THREE SHIPS SOURCES GLYCERIN FROM SOYBEANS

There are three main categories for moisturizing skincare ingredients and they are humectants, emollients, and occlusives.

HUMECTANTS

Chemicals that like to attract water molecules, plumping themselves up in the process; examples of these are Glycerin, hyaluronic acid, and urea.

EMOLLIENTS

Emollients work by smoothing out the cracks and the flakes on surface skin, overall softening the skin's texture and supporting its lipid barrier; these are typically oils high in triglycerides like rosehip and almond oil.

OCCUSIVES

Work like a sealing agent on top of the skin, trapping moisture in and not allowing it to evaporate to the air. These are silicone-based ingredients like dimethicone, or plant oils that are high in oleic acid like olive oil.



Typically, Glycerin is made through the process of extracting the glycerol molecule in triglycerides found in plant oils, such as soybean oil. This is done by heating up the plant oil under pressure while mixed with an alkali solution such as lye.

The alkali solution acts like a cleaver to triglycerides and breaks the covalent bond that holds glycerol and fatty acids together. Once the bond is broken, they will separate into layers and the glycerol layer (aka Glycerin) can be isolated and extracted. However, in the Glycerin that Three Ships sources, while it is plant-based and cruelty-free, the exact method of how it is made is proprietary.

GLYCERIN IS APPROXIMATELY 92 DALTONS AND, THEREFORE, WILL PENETRATE THE SKIN BARRIER

In some professional opinions, Glycerin is a superior humectant when applied topically. Glycerin is a small-sized molecule and that is what makes all the difference in how deep a compound can penetrate.

The rule of thumb typically used is the [500 Dalton rule](#). This rule suggests that a compound with a molecular weight that is less than 500 Daltons has a better chance of penetrating through the skin barrier and absorbing deeper, however, it is important to note that there are exceptions to these rules, e.g. molecules like coenzyme 10 or beta-glucans. Glycerin is approximately 92 Daltons and, therefore, will penetrate the skin barrier.

Once it penetrates, it will make its way to the dermis where its humectant properties will draw water from the bloodstream, plumping the skin, making it supple and moisturized in return. In extremely humid environments, it is also able to draw moisture from the air to your skin. Other humectant ingredients that are used in Three Ships products are propylene and butylene glycol, both small molecules that are less than 100 Daltons.

SCIENTIFIC STUDY

Studies on the Antibacterial Effects of Glycerin

Glycerin also has mild antibacterial properties. A study was done to investigate the short and long term antibacterial effect of high concentrations of glycerin used in the preservation of skin graft samples. Researchers tested this to see how suitable a high glycerin concentration solution would be for preserving skin grafts for burn patients. They tested for short term antimicrobial effects with 13 bacterial strains and 1 yeast and reviewed the results at the 20-hour mark.

At higher concentrations of glycerol, the amount of unbounded free water (water activity) is lowered. This means that the bacterial strains have a limited source of water and, therefore, will start using glycerol for their cellular function. Due to the physical properties of glycerol, however, bacteria cells will not function properly and weaken over time.

Glycerin is a key component in most moisturizers as its small size is able to penetrate through the skin barrier to the dermis where it works as a humectant to absorb water from the bloodstream to plump the skin. Three Ships uses plant-based Glycerin in products such as the Radiance Day Cream and Dream Night Cream to benefit the skin with its moisturizing properties. Other beneficial properties of Glycerin have been explored in literature, however, it's important to keep in mind that formulation is key and the concentration of an ingredient makes a huge difference in the effect that it has on the skin.