

WHY HYDROMER®

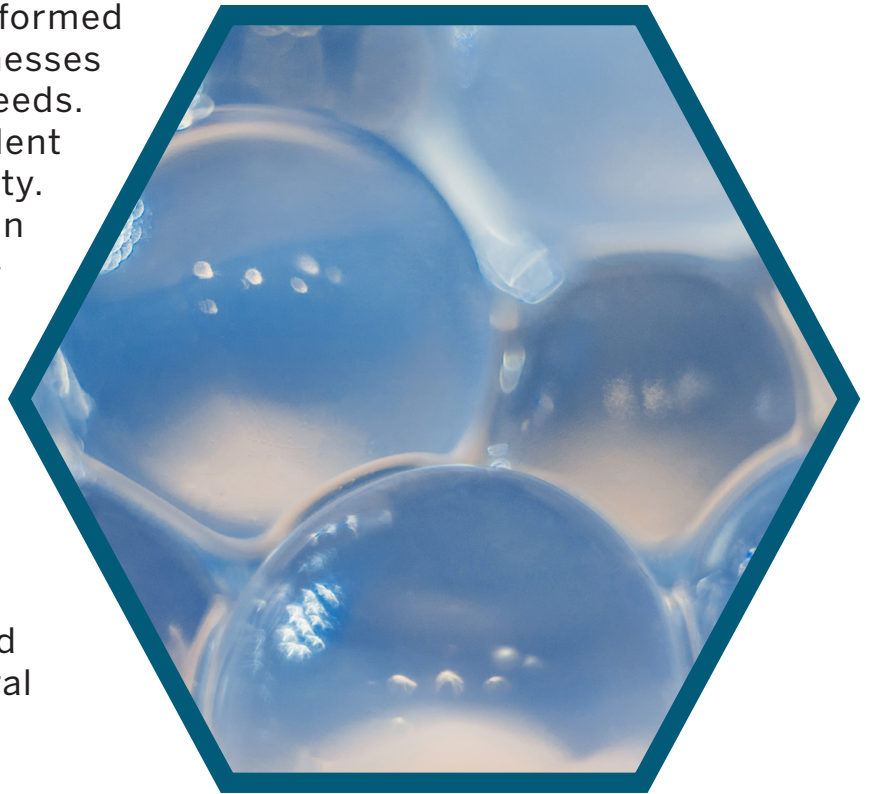
HYDROGELS?

What are hydrogels and why would you want to choose **Hydromer® Hydrogels** over the alternative?

A White Paper By: The Hydromer Product Specialist Team

An Introduction to Hydrogels

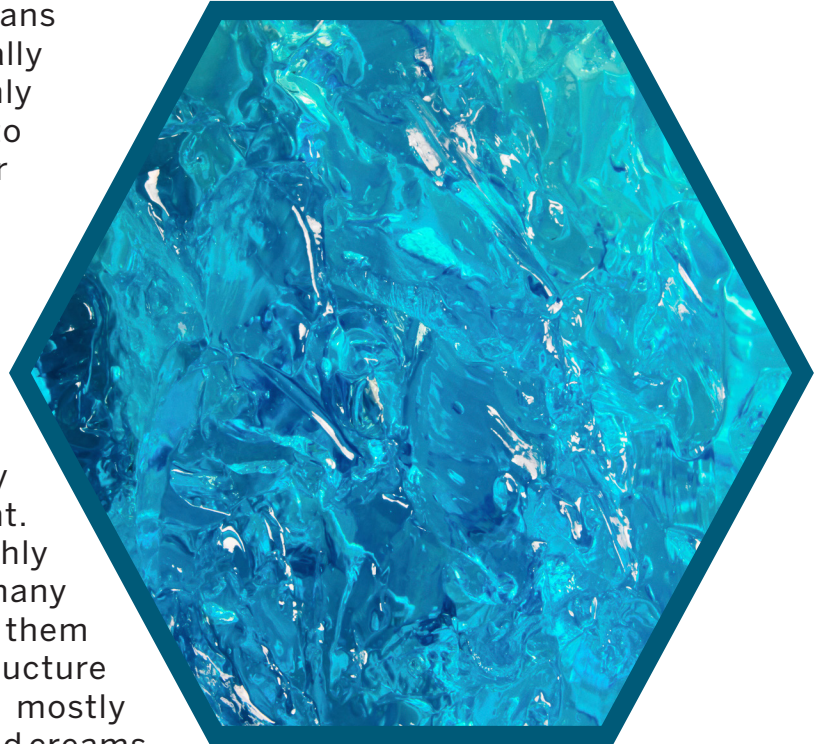
First, let's define the term 'hydrogel'. Scientifically, a hydrogel is a network of crosslinked polymer chains that are hydrophilic and are sometimes found as a colloidal gel in which water is the dispersion medium. A three-dimensional solid results from the hydrophilic polymer chains being held together by cross-links. Due to the inherent cross-links, the structural integrity of the hydrogel network does not dissolve from the high concentration of water. [1] Hydrogels are highly absorbent (they can contain over 90% water) natural or synthetic polymeric networks. In layman's terms, a hydrogel is a highly bio-compatible polymeric gel system. Think about it this way, "Hydro" meaning water, and "Gel" meaning a thick and sticky substance. Altogether, a "Hydrogel" is a thick, water-based substance. They are imperative in certain applications to help deliver ingredients onto a surface and can be formed into many shapes and thicknesses depending on the applications needs. Hydromer® Hydrogels have excellent physical strength and stability. They are highly adaptive and can be incorporated with various bio-compatible and pharmaceutical ingredients. Our Hydrogels can be used for many applications in the medical, industrial, and personal care industries. Hydrogels like Hydromer's are preferred because they are not only bio-compatible and highly adaptable but are comprised of commonly found natural derivatives.



What are they made of?

Why are they important?

Now, let us discuss what hydrogels are comprised of. Hydrogels are made from polymers, which are substances with a molecular structure consisting chiefly or entirely of a large number of similar units bonded together.[2] Hydromer® offers a variety of patented hydrogels including those based on hydrophilic polyvinylpyrrolidone (PVP) polymers and chitosan derivatives. So, what is chitosan, you may ask? Well, it is a derivative found either naturally in the outer shell of shrimp and other crustaceans exoskeletons or it can be synthetically derived. At Hydromer® we use only the highest quality ingredients to make our patented hydrogels. Our formulations require no irradiation, so active ingredients that are light and/or heat sensitive can easily be formulated into the finished gel without loss of activity or therapeutic value.



Finally, let us discuss why hydrogels are so significant. Since hydrogels are highly bio-compatible and adaptive, many ingredients can be formulated with them without changing the hydrogel structure or functionality. Hydrogels are mostly comprised of water, while lotions and creams contain oils and chemicals. Unfortunately, oils can cause your ingredients to separate or become runny, or even change the entire state of your ingredients. Unlike lotions or creams, Hydromer® Hydrogels are made up of stable polymers and water that hold their form. This allows your ingredients to keep their integrity and sit on a surface while distributing your ingredients evenly without having to rub them in or worrying that they may not be fully absorbed by the user.

By the scientific efforts of our chemists at Hydromer®, our patented hydrogels have been formulated to permit the maximum transdermal absorption, meaning virtually all your products ingredients will be consumed by the surface. This will give the customer the full potential of your intended use. With the background of what Hydromer® Hydrogels are and what they are made of explained, let us move on to how they are used and in what fields. Hydrogels are much needed in industries such as, personal care and cosmetic, medical, and industrial. Below are some examples and applications where Hydromer® Hydrogels are being used.

Personal Care and Cosmetic

Industries

PERSONAL CARE

COSMETIC

MEDICAL

INDUSTRIAL

For a personal care example, imagine you are a cosmetic company that wants to create a vitamin delivery system for skin. You would then discuss with your team what delivery system you want to use. Would you use an oil, cream, lotion, or hydrogel base? Well, although lotions, oils, and creams are highly popular in the cosmetic industry, they may change the integrity of the ingredients you are putting into them, therefore causing them not to be as effective. If you want a pure, water-based system, you will want a hydrogel. The stability of the system is second to none, and with the highest quality ingredients in Hydromer® Hydrogels, you will get the best formulations in the industry. More uses for Hydromer® Hydrogels for the personal care industry include:



- Facial Masks
- Vitamin Delivery
- Exfoliates
- Facial Cleansers
- Moisturizers
- Tattoo Care
- Scar Care
- Viscosity Modifiers
- Rheological Modifiers
- And many others

Medical

Industries

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An example for medical hydrogels would be wound and burn care. Since a burn victims' skin is so sensitive, creams or lotions containing oils and other chemicals can be highly dangerous. Oil holds heat because it is a hydrophobic barrier, which will not allow the excess skin heat to escape, causing severe pain to the patient. Hydrogels, however, are made from about 90% water, meaning they are more likely to cool, sooth, and heal the skin when applied with other essential ingredients. With Hydromer® Hydrogels, you can guarantee we will make sure your ingredients are the most effective. Hydromer® Hydrogels are used in the medical industry for applications including:



- Wound and Burn Care
- Drug and Gene Delivery
- Gene Delivery
- Bio-adhesives
- Bio-electrodes
- Dental
- Materials Tissue Engineering
- Viscosity Modifiers
- Animal Health
- And many others

Industrial

Industries

PERSONAL CARE

COSMETIC

MEDICAL

INDUSTRIAL

Industrial need for hydrogels is not far off from medical and personal care, as they all use the same general polymer concept. The only real difference is what gets added into them. A good example of an industrial use is agriculture. When you think of hydroponics, what comes to mind? Well, if you thought about plants without soil, you are correct! Hydroponics- “hydro” means water and “ponics” essentially means not grown in soil. Hydrogels provide valuable nutrients and moisture to the crop’s roots, without the need for any soil or additional water, thus the farmer saves money and helps save the environment, simultaneously! Hydromer® Hydrogels are used in all types of applications for the industrial industry including:



- Agriculture
 - Hydroponics
 - Horticulture
- Industrial Food Manufacturing
- Fire Retardants
- Hydraulics
- Viscosity
- Modifiers
- Batteries
- Conductive Adhesives
- And many others

About Hydromer®

At Hydromer, we not only offer various patented Hydromer® Hydrogels that are important to many applications, but we also offer first-in-class R&D and Specialized Analytical Testing, this ensures all your ingredients are incorporated to the highest quality. With our patented PVP and chitosan based hydrogel technology, we can offer you the best compatibility and highest performance formulations. Whether you need to add in vitamins, pharmaceutical drugs, or even chemicals, our Hydromer® Hydrogels will be perfect for every application.

Hydromer® is a leading global surface modification and coatings solutions provider. As a trusted partner to companies worldwide, our solutions add value to our clients' products so that they can stand out in the marketplace. We are an innovation-driven, customer-centered organization with a focus on meeting our clients' needs.

Hydromer collaborates extensively with clients to deliver superior, customized polymer-based solutions. We create or modify coating formulations that adhere to a multitude of substrates and match the unique requirements and geometries of any device. We are a leader in developing coating formulas and processes that meet a market-driven need for greener, more sustainable solutions.

We offer custom industrial and medical device coatings, contract coating services, customized coating equipment, contract manufacturing, and turnkey operations backed by outstanding teams of research and development, customer service, and tech support.

Hydromer's technologies enhance the value of our clients' products by delivering lubricity, thromboresistance, anti-fogging, antimicrobial, and other properties. Our coatings aid in the manufacture of medical devices, aerospace components, cosmetics, and products in a variety of industries. We are an FDA, GMP/ISO 13485, and ISO 9001 production facility.

References

[1] Warren, David S.; Sutherland, Sam P. H.; Kao, Jacqueline Y.; Weal, Geoffrey R.; Mackay, Sean M. (2017-04-20). "The Preparation and Simple Analysis of a Clay Nanoparticle Composite Hydrogel". *Journal of Chemical Education*. 94 (11): 1772–1779. Bibcode:2017JChEd..94.1772W. doi:10.1021/acs.jchemed.6b00389. ISSN 0021-9584.

[2] Polymer. Oxford Languages and Google Dictionary. <https://languages.oup.com/google-dictionary-en/> n.d.

Our Vision

Our vision is to continually expand on Hydromer's more than 40-year legacy of successful polymer and surface modification innovation.



Hydromer[®]

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