

Have You Heard?

Additives in Hydrogel Adhesives

Many times, the physics associated with a particular situation becomes a factor in determining whether a product development endeavor is a success or failure. This factor could be physical or chemical in nature. In the case of hydrogels, chemistry plays a role in how the material is transformed from a liquid compounded solution or suspension into a cohesive adhesive with a high water content.

Polymer Science hydrogels are batch mixed in vessels which require materials to be stable over an extended period of minutes to hours while the material is dispensed and cured. The material being added must remain homogeneous via dissolution or be able to be mechanically mixed to provide a homogeneous feed throughout the entire mix vessel volume. Additives to the hydrogel should be compatible in a water based system.

Variation in the amount of an additive during the coating process could lead to improper cure due to cohesive failure. Variations in concentration may also yield inconsistent performance of the final product throughout the coating lot. Large concentrations of solids settling, or falling to the bottom of the vessel, in a mix may impact how the gel reacts and cures. This may result in light occlusion where the UV energy necessary to cure the mix cannot adequately pass through the gel for a uniform cure. Materials which remain solid in the compounded mix must be a size and shape that will allow a stable suspension and be loaded at a low enough concentration to allow the UV to pass to ensure a full cure. Some additives do not suspend well and result in an inconsistent end product over a mix and ultimately a hydrogel which is not commercially viable.

In some instances, these products initiate a catalyzed response to the compounded mix prior to coating. The product may start to polymerize in the vessel prior to coating. Some additives may compete in the curing reaction altering their ability to function as designed or may be locked into the polymer matrix, disallowing for transdermal drug release if desired. Both the suspension and chemistry should be checked and if either are not consistent with the desired end properties of the gel, the project could end up being a failure.

