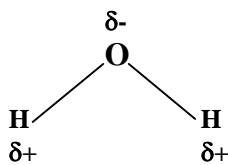


# Specialists in Maintaining Clean And Healthy Skin

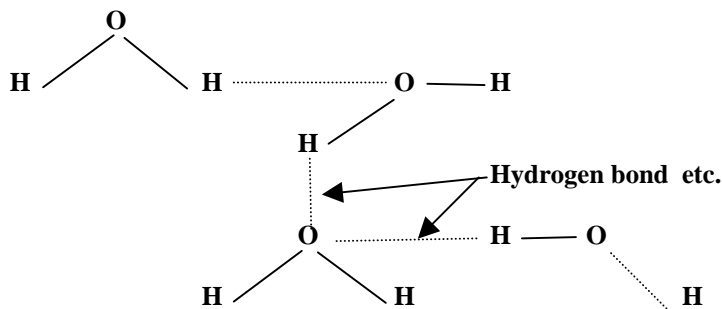


## A biochemical description of how Derma Shield works

The distinction of molecules as either hydrophilic or hydrophobic, "water-loving" or "water-hating", is one that can be made on the basis of whether or not molecules can interact with water molecules. These interactions, or the lack thereof, are electronic and structural in nature. Water, H<sub>2</sub>O, has a bent geometry and distinct electronegative and electropositive regions to its structure. There is a distribution of charge throughout the molecule so that the oxygen atom is more negative (denoted  $\delta^-$ , meaning partially negative) and the hydrogen atoms are partially positive.



Because each water molecule is thus polarised, adjacent water molecules orient so that the positive or negative ends face each other: this interaction is known as hydrogen bonding, and actually causes water to have a pseudo-structure like a lattice-work of all the molecules interacting with another



All of this is a prelude to showing that solubility in water, or the lack of it (and hence the ability of substances to be repelled), is a function of capability to interact with water molecules in hydrogen bonding. Polar or charged substances (salts, sugar, etc.) can hydrogen bond, are hydrophilic, and therefore dissolve well. Oil does not hydrogen bond, being nonpolar, and is therefore categorised as hydrophobic. In general, hydrophilicity is a property of compounds that can interact with water in hydrogen bonding. Hydrophobicity means that a substance cannot participate in hydrogen bonding.

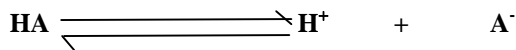
Derma Shield is an emulsification of mainly hydrophobic compounds in water, and it does not work effectively unless an application is allowed to dry thoroughly (letting the water evaporate). The active ingredients are these hydrophobic compounds, which actually function analogously to skin. Skin presents a hydrophobic barrier to penetration by charged and water-soluble molecules. The application of Derma Shield enhances this barrier to penetration by these types of substances (see attached schematic). Most of the components of biological fluids, for instance, are hydrophilic in nature, being dissolved in a water-based environment. They cannot therefore be expected to penetrate a hydrophobic layer, and test results have shown this to be the case.

# Specialists in Maintaining Clean And Healthy Skin



## A biochemical description of how Derma Shield works

The non-penetration of acids is simply explained by this model. Acids, and bases, dissociate in water to give charged components:



Where HA is an intact acid, and H<sup>+</sup> and A<sup>-</sup> are the hydrogen ion and resulting deprotonated compound, respectively. The resulting charge of these entities predicts that they will be able to interact with quasi-charged water molecules and other hydrophilic substances, but not with hydrophobic compounds such as are found in Derma Shield's barrier. The result is a lack of penetration through Derma Shield and an added protection to the natural skin barrier.

