

**Chemistry Works! How do cleaning products work?** Every day, people use cleaning chemicals to remove dirt and unwanted contaminants from surfaces. Through the use of such products, surfaces are made more hygienic and the indoor environment is made safer for people.

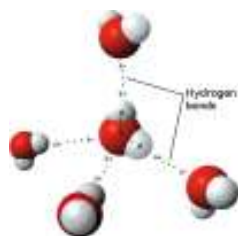
### Turning ordinary water into a powerful cleaning chemical.

The basic building block of effective cleaning products that make them work so effectively is a chemical called a “**surfactant**”. To understand what makes a surfactant transform ordinary water into a powerful cleaner, we need to start with a little chemistry lesson.



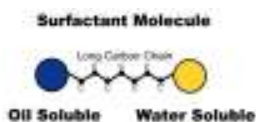
### Water and Surface Tension

Water is the most abundant chemical on the face of the earth. Water ( $H_2O$ ) is a simple molecule composed of 2 atoms of hydrogen and 1 atom of oxygen. The chemical structure of water is such that individual water molecules tend to stick together through a phenomenon called “hydrogen bonding”. This intense attraction between adjacent water molecules prevents water from spreading over surfaces. Instead, water tends to bead up as if being repelled from a surface. This means water has a **high surface tension** making it a poor cleaner all by itself.



### Water + Surfactant = Making Water Wetter

Adding relatively tiny amounts of a chemical compound called a **surfactant** radically changes the properties of water. The surfactant is able to interfere and prevent the hydrogen bonding allowing a cleaning solution to penetrate and lift dirt from surfaces. The resulting cleaning solution has a **low surface tension**.



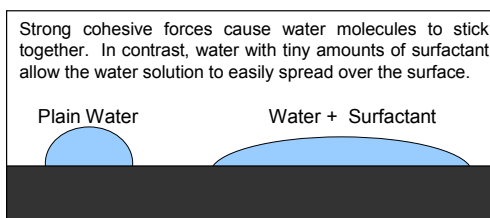
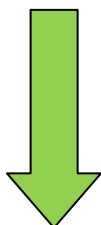
### Chemical Free Cleaning Products: Altering water to make what???

Can water be electrically altered to make a cleaning product without the need for surfactants? These type of systems go by such trade names as Activeion®, ecH2O™, Orbio® SC 5000 and others. Without getting into the validity of whether these products work, you should know that these systems do little to alter the surface tension of water.



### Show and Tell: A Simple Demo and a Dramatic difference with a Surfactant

If you are confronted with someone that has bought into the idea of chemical free cleaning, take the time to explain how cleaning chemicals work. Then you can do a simple visual demo, all you need is a disposable plastic plate.



**DEMO:** Start by putting test solutions into separate spray bottles. In our test, we sprayed equal amounts on individual plastic plates of plain tap water, Activeion® cleaning solution, Orbio 5000 Sc cleaning solution, and Multi-Clean Century neutral cleaner diluted 1 oz per gallon which contains 400 parts per million (ppm) of surfactant. The visual results are dramatic. Try it for yourself.

*Plain Tap Water Beads-Up on Surface = High Surface Tension*



*ActiveIon® Solution Acts Like Plain Water (photo 10 s after application)*



*Multi-Clean Century spreads on surface = Low Surface Tension*



*Orbio® Sc 5000 Beads-Up on Surface = High Surface Tension*



**Surfactants** are common chemicals used in a variety of applications. Hand soap, shampoo, cleaning products, toothpaste, and a wide variety of foods contain chemical surfactants. They are a necessary part of everyday life.

**More Proof that Chemistry WORKS!**