

Car Wash, window washing, Electric **photovoltaic cell** washing, mirror washing and washing other services using softened water and or demineralized water.

Water is known as the Universal Solvent because water will hold just about ever chemical or substance on the planet to some extent or another. That being the case, some chemicals and contaminates are only slightly soluble. Calcium carbonate (lime) is such a chemical. Most if not all ground-water has some lime dissolved in the water. Surface water's have lime in them too.

Water Softening:

Water softeners remove the calcium component of lime as well as magnesium, iron and other soluble heavy metals. Soft water, water where the heavy metals are removed, readily forms lather with soap, but it is more difficult to form lather with hard water, water with the metals dissolved in it. The dissolved calcium ions and magnesium ions in hard water react with the soap to form scum, so more soap is needed. The scum forms a film that coat the surface of your skin, dishes windows and other surfaces washed and rinsed with hard water.

A water softener does not remove the carbonate component of lime from the water. Softeners work by exchanging the calcium and other heavy metals for sodium. The sodium combines with the carbonate ion when the water evaporates to form sodium carbonate spots. However, the sodium carbonate compound is highly soluble where the calcium carbonate is not very soluble. So, when you wipe the sodium carbonate form the surface you are cleaning most of the sodium carbonate remains in solution and comes off, in the water, with the towel; whereas, the calcium carbonate will start to precipitate out of solution onto the warm surface of the metal being washed. In summary, soft water can leave spots but not as visible and wiping the surface will help if not eliminate the spotting.

Of course, if the water you are passing through your softener is very hard, then the sodium carbonate level in the treated water will also be high, and harder to wipe off. Knowing the Total Hardness of the water being treated is very important.

The calcium and other heavy metals remain on the softener resin bead until they are regenerated off by passing high dosages of salt across the resin bead to push off the heavy metals and replace them on the resin. This is the softener regeneration process. The frequency of the regeneration process is based on the amount of Total Hardness in the water being treated.

Demineralization:

Since a water softener removes heavy metals only and replaces the metals with sodium its use will not always produce a spotless dry surface. But, if a process is used that removes the heavy metals, the lighter metals, like sodium, pulse the non-metal acids such as carbonate, chlorides and the like then a spot free surface can be achieved. There are two commercially and affordable methods to achieve the goal of ion removal. They are demineralization by ion-exchange and reverse osmosis.

Ion-Exchange:

The ion-exchange process involves the use of two different types of resin; Cationic and Anionic resin. There are various types of both and those will not be discussed here. The reason these resins remove most of the ions in the supply water is that the cation resin is regenerated with an acid to replace the metals with hydrogen. The anionic resin is regenerated with a strong caustic solution to remove the anionic acid ions and replace them with hydroxide ions. So, when the raw water is run through these resins the hydrogen is exchanged for the metals while the hydroxide ions are exchanged for the anions. The result is a treated solution of H₂O, nearly pure water.

There are two technologies available, two bed ion-exchange, and Mixed bed ion-exchange. The advantages lie in the capacities, ease of transport and in some applications purification quality. This article focuses on the first two. The mixed bed is easier to handle and the two bed has a better capacity before the resin needs to be changed out. Both will produce Spotless rinses, but both are expensive to operate in comparison to a water softener.

Reverse Osmosis:

This process removes ions by the use of a semi-permeable membrane where water with salts is passed over the surface of the membrane under pressure. The pressure drives the water through the membrane leaving highly concentrated water with the salt going to waste. This process needs electricity and storage to operate the pumps associated with the process. However, once installed it is the most economical of the process to treat supply water for rinsing of surfaces requiring spotless finishes.

Commercial Car Wash Operation:

If you go into a commercial manual car wash you see a coin operated control where you put your money into. Once you've paid the water comes on so you typically follow the following steps with the two different water purities coming from the previous processes. The process goes:

1. Initial mud rinse using soft water or untreated water depending on the way the owner plumbed the installation,
2. Soap wash with softened water,
3. Initial rinse with softened water,
4. Final spotless rinse with demineralized water, typically treated by Reverse Osmosis. But, in some cases by ion-exchange demineralization.

Summary:

The best washing is done with softened water. However, a spotless rinse is not ensured. To ensure a spotless finish a demineralization system is needed. We here at MobileH₂O are able to supply both!

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