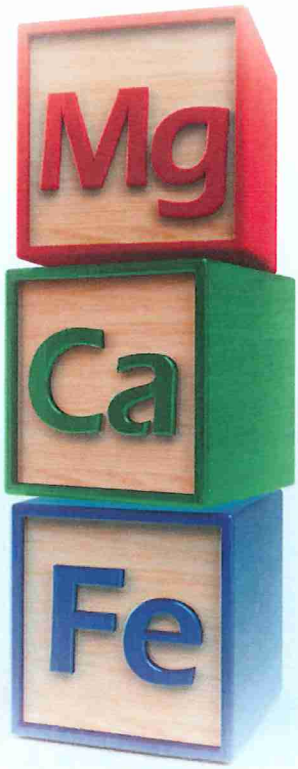
The cold, hard facts about water



Understanding how the types of water in a carwash impact product performance.

BY TONY VERTIN | CONTRIBUTING WRITER

In general, there are three types of water that are used in carwashes: Hard water, soft water, and reverse osmosis (RO) water. For this article I will not be discussing reclaimed water. Each of these types of water has an impact on a carwash owner/operator's goal of producing a clean and dry car. It is important to understand how and where to best utilize each of these types of water in a carwash.

Hard water analysis

Hard water is the result of dissolved or soluble mineral salts, particularly those of calcium (Ca) and magnesium (Mg), and sometimes iron (Fe) and manganese (Mn). Water hardness is measured in grains per gallon (gpg). Any measurement above 3.5 gpg is considered hard water. Many carwashes use "city" water that has been treated by municipal water facilities to about 8 gpg of hardness.

Hard water creates cleaning and rinsing problems when used with detergents and presoaks by consuming or reacting with some components in detergents. Detergent manufacturers use water-conditioning agents in their formulas to control the hardness. These water conditioners are essential for their role in:

- Overall cleaning,
- Soil dispersion,
- Rinsing, and
- Effectiveness on certain components of road film.

If needed for water conditioning, these ingredients are not available for cleaning. As a result, soap concentration might need to be increased to clean a car properly.

In addition, there are chemical components in detergents that can react with un-

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treated water hardness minerals and cause other problems.

A prime example is sodium silicate which is a key component for its detergency and soil suspension. Sodium silicate can react with calcium and magnesium hardness to form insoluble mineral silicate salts which can precipitate or fall out of solution and build up as scale in pipes and nozzles and boiler tubes.

Finally, hard water can react with common neutral and low pH foam detergents reducing foam levels.

Despite all the problems with hard water in the "wash" end of a carwash, waxes and drying agents work better in hard water. The chemical components of wax or drying agent compositions will not react with the components of hard water. Hard water has the highest surface tension of the three water types. As a result, hard water produces the roundest droplet for ease of removal. With no adhesion or contact to the surface the droplet is easy to blow off.

Soft water analysis

Soft water is created in a water softener by processing hard water through an ion exchange resin to remove the troublesome calcium, magnesium, and iron ions and replace them with sodium ions that form extremely soluble salts. Unlike hardness ions, these sodium ions do not have any negative effect on detergents and presoaks. Soft water is the best choice to use with detergents and presoaks.

Soft water produces the highest foam levels and most consistent cleaning performance. There is some question as to the value of softening other water used in the carwash such as high pressure rinses. Some believe that since softened water has a lower surface tension than hard water it should be used in the high-pressure rinse to keep soils suspended. However, since the high-pressure rinse is mixing on the car's surface with the concentrated detergent solution there is no need to further lower the surface tension by softening high pressure water. So there appears to be no benefit in softening the high-pressure water. As discussed above, waxes work better in hard water so there is no reason to counteract this process with soft water.

White spot culprit

Hard water contains minerals that end up as components of the wax/rinse droplets left on the car. As the water in the droplets evaporates, the minerals stay behind and cause white spots.

This spotting problem still occurs even

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if softened water is used in the waxes, but the sodium deposits in the softened water spots are easier to remove after the carwash process.

RO water and the final rinse

The spotting problem is one that created the need for an RO rinse. Softened water exchanges sodium ions for mineral ions. The softened water is then processed through an RO unit to remove the sodium salts leaving the water essentially pure or "spotless." This water makes an ideal final rinse as the RO water displaces the wax/rinse water droplets and leaves drops with no mineral or wax content. RO water flattens the water droplet more, but unrinsed water is no longer an issue because of its purity. Unrinsed droplets will eventually dry without leaving spots.

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Since RO water reduces surface tension beyond that of softened water, it has nothing but negative value when used with polishes, sealers, clear coats, hot waxes or drying agents. There are some misconceptions that drying agents can be added to the RO rinse. Why would we remove 3-400 PPM (parts per million) of mineral solids from water to make it RO pure and then put 2,000 PPM of wax solids back into it?

Some might consider using RO water for the entire wash process. From a presoak and detergent standpoint, there is no positive benefit to using RO water in place of soft water.

First, the soluble sodium salts left in the water after softening have no detrimental effect on cleaning. Also, RO water can reduce the foam level of friction foam detergents and touchless presoaks.

The RO water apparently interferes with the bubble formation dynamics causing the bubble wall to thin out faster because of intense surface tension reduction that breaks the wall formation of the bubble.

If softened water has no known value in the high pressure rinse cycle, then neither does RO water. Considering the water volume, the cost is very high and unnecessary. Leaving a residue free rinse water surface has no positive value for subsequent wax cycles.

Should an RO system be installed to process all the carwash water, it becomes a financial decision.

Please note that it's important to understand what is in your water. Understanding the type of water being used in the carwash will provide the carwash owner or manager with more information on selecting the right chemical products to use. Cleaner and dryer cars result from matching the performance specifications of chemical products with the water parameters on site. ❑

Tony Vertin, CEO of Ver-tech Labs, is a graduate of the United States Military Academy, West Point, and served as a commissioned infantry officer in the United States Army. He holds an MBA from the Wharton School - University of Pennsylvania and has over 23 years of business management and manufacturing experience. Tony is an industry expert on vehicle cleaning topics, and has been invited to speak at conferences and contribute to various trade publications. He can be contacted at tvertin@ver-techlabs.com.