



# **DEVELOPMENT PROGRAM**

## **900**

### **CHEMICAL KNOWLEDGE**

**Handouts**

# CHEMICAL KNOWLEDGE HANDOUTS

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## CHEMICAL KNOWLEDGE OVERVIEW - 900

### *Chemical Knowledge Overview Handout 1-Safety*

The following are the chemical safety requirements and resources:

- Team Members must follow all rules and exercise caution in all work activities
- Immediately report any unsafe conditions to a manager at the location and/or an Area Director
- Report all work-related accidents and injuries, regardless of how minor they are, to the manager on duty immediately
- Caution should be exercised when handling all chemical products. Some chemicals should not come in direct contact with bare skin or eyes
- Read caution labels on any chemical product
- Make sure all chemical drums and bottles are labeled
- Do not use a chemical that is missing a label
- Wear recommended PPE
  - Eye protection is available in safety glasses, goggles, and face shields and should be worn anytime there is a potential risk to the eyes
  - Gloves should be worn when working with chemicals or cleaning products
- Keep the product away from eyes, nose or mouth
- Wash hands after using the product
- In the case of skin exposure, remove contaminated clothing and rinse the skin immediately with plenty of water for 15-20 minutes

### Chemical Identifiers

We use many different chemicals and cleaning supplies throughout the car wash. Each item has a corresponding SDS sheet, and the safety risks will be listed on the container. To quickly convey safety risks and hazards, containers for each product have symbols to identify whether the chemicals have the potential to cause physical harm or harm to the environment. The characters are distinctive, shaped like diamonds with red borders.

### Personal Protective Equipment (PPE)

Personal protective equipment, or PPE, is clothing, goggles, or other garments or equipment designed to protect the wearer's body from injury or illness. Personal protective equipment is provided at every location for team members to use anytime PPE is required. When using PPE, always inspect and test the equipment before use and only use equipment designed for the work. After use, ensure you clean, sanitize or throw away any used equipment and return it to its proper place.

- Never mix products
- Store chemicals in a well-ventilated area away from direct sunlight and sources of heat or ignition
- Use appropriate storage containers clearly labeled with the chemical name and hazard warnings
- Do not use products from unlabeled containers
- Keep food, beverages and tobacco products away from chemicals
- Wash your hands thoroughly before eating or using the bathroom

### Eye Wash Station

Many chemicals, including acids and bases, are corrosive and can easily damage team members' eyes. The severity of the damage depends on how strong the chemical is, the length of contact, and response time. The first 10-15 seconds after exposure to a hazardous substance are critical, and delaying treatment may cause severe and/or permanent injury. Eye wash stations provide on-the-spot decontamination, but their use may still need to be followed by additional medical attention. To prevent damage to the eyes, check the chemical's SDS to learn more about the first aid and emergency response procedures for each product and chemical.

## ***Chemical Knowledge Overview Handout 2-pH***

The pH scale is a measurement system specifying a water-based solution's acidity or alkalinity. It ranges from 0 to 14, with 7 being considered neutral. Substances with a pH less than 7 are considered acidic. In the car wash, these substances remove mineral deposits, rust stains, and other inorganic contaminants. A pH of 7 is considered neutral, and substances above 7 are considered alkaline. In the car wash, these substances break down organic materials like grease, oil, and dirt.

### **Acidic (pH < 7)**

Lemon Juice (pH 2)

Vinegar (pH 3)

### **Neutral (pH = 7)**

Water (pH 7)

### **Alkaline (pH > 7)**

Baking Soda (pH 9)

Bleach (pH 12)

## **Soft Water**

The pH of the water used in car washes is crucial to the performance of cleaning agents, maintaining chemical usage and costs, and overall wash quality. The water used to mix chemicals and rinse vehicles must be as free from minerals and other dissolved solids as possible. TDS (Total Dissolved Solids) measures the combined content of all inorganic and organic substances in a liquid, including minerals, salts, and metals dissolved in water. High TDS levels can interfere with the proper functioning of chemicals used in the wash process, leading to inconsistent application and reduced performance. Using water softeners, we can reduce the TDS of the incoming water to a level more conducive to car wash use.

The water softeners reduce calcium, magnesium, and other materials in the water, reducing the incoming water's TDS to generate soft water. Soft water ensures the optimal performance of car wash chemicals and is less likely to leave mineral deposits in the rinse process or interfere with soaps and detergents mixing accurately. This allows the chemicals to perform at optimal strength and effectiveness, ensuring that vehicles are washed and rinsed without leaving mineral spots or streaks, resulting in a clean, dry, and shiny finish.

## ***pH in the Car Wash***

In the car wash, products at each end of the pH scale help to create a critical balance between the cleaning components and the endline results. Car wash detergents are designed to work at certain pH levels and are formulated to achieve those levels based on proper dilutions. Both high- and low-pH products ensure that all dirt and contaminants are effectively removed from the vehicle and that the rinse and drying processes produce the desired result of a dry, shiny car. In the car wash, we utilize alkaline (high-pH), acidic (low-pH), and Balanced (neutral-pH).

Since high- and low-pH applications are doing different things with the surface tension, it is important that the second part of the process begins at the right time to reduce surface tension before the vehicle reaches the rinse section. A neutral or slightly acidic pH on the vehicle surface creates the best possible situation for the effective rinsing and drying of the vehicle. As you go through this program, you will learn more about the products, their cleaning purpose, how and when they are applied in the tunnel, and how the application sequence impacts the wash outcome.

## **ALKALINE CLEANERS - 901**

### ***Alkaline Cleaners Handout***

The purpose of alkaline (high-pH) cleaners is to remove organic materials and other substances from the vehicle's painted surfaces. Their effectiveness is essential to producing a clean, dry, shiny car, as any issues with alkaline cleaners will impact every subsequent phase of the wash process.

With a pH of typically between nine (9) and eleven (11), they effectively break down organic materials such as:

- Bird Droppings: White, splattered spots on the car roof or hood.
- Tree Sap: Sticky, amber-colored drops on the windshield or paint.
- Bug Splatters: Small, smudged remains on the front bumper and windshield.
- Pollen: Fine yellow or green dust covering the car.
- Road Tar: Black, sticky spots on the lower panels and wheel wells.
- Leaves and Plant Debris: Accumulation of dried leaves around the windshield wipers and hood.
- Oil and Grease: Dark, oily patches on the car's exterior, often on the lower sides and near the wheels.

The alkaline products in the car wash tunnel include Bug & Brush Prep, Wheel Cleaner, Presoak 1, and Tri Foam. Now, let's review each one.

### ***Bug & Brush Prep***

Bug and brush prep are specialized cleaning agents applied to the front of vehicles by team members using trigger sprayers and hog-hair brushes during the prep and loading processes. These chemicals contain surfactants that help to emulsify and lift residues to effectively loosen bug residues, bird droppings, and other organic contaminants from a vehicle's surface.

### ***Wheel Cleaner***

The wheel cleaner chemical is a specialized cleaning product the CTAs apply as vehicles enter the tunnel. Wheel cleaner cleans tires without causing damage or drying out the material and helps remove surface layer contaminants to assist the tire brush with effectively cleaning the wheels and tires. For wash packages that include tire shine, this is a critical step in preparing the tires for the tire shine application at the end of the tunnel.

### ***Presoak 1 (High pH)***

Presoak 1 is applied in the tunnel right after the grand entry arch using a K-nozzle and foam generator. It is applied as wet foam and runs down the vehicle to ensure coverage of all surfaces and provide lubricity to the wraps. This product provides the bulk of the cleaning power and must function properly to prepare the vehicle for the next phase of the wash process.

### ***Tri Foam***

Tri foam is a specialized cleaning solution that combines a blend of surfactants and conditioners to achieve cleaning and conditioning in one step. Tri foam consists of three different colored foaming solutions. The three colors, blue, red, and yellow, do not correspond to different functions but are used to create a vibrant, attractive display that enhances the customer experience.

All three colors are applied simultaneously as thick foam after the grand entry arch using a max foamer. The thick foam keeps the product on the vehicle longer and allows the wraps to massage it into its surface. This ensures even coverage and consistent results across the entire vehicle.

## **ACIDIC CLEANERS - 902**

### ***Acidic Cleaners Handout***

The purpose of acidic cleaners is to neutralize the alkaline (high pH) cleaners from the previous phase to ensure no alkaline residue is left on the car, which could interfere with subsequent rinse and drying stages. Their effectiveness is essential to producing a clean, dry, shiny car, as these products balance the surface tension to ensure effective rinsing and drying.

With a pH of typically between three (3) and five (5), acidic cleaners effectively break down inorganic materials such as:

- Dust and Dirt: A thin, brown layer covering the car, especially noticeable on windows and the body.
- Road Salt: White, powdery residue on the car's undercarriage and body.
- Industrial Fallout: Tiny, rust-colored spots on the car's paint.
- Mineral Deposits: White, chalky spots on windows and the car's surface.
- Sand: Gritty texture on the car's body and windows.
- Brake Dust: Dark, metallic particles accumulating on wheels and lower body panels.
- Asphalt Residue: Black, tar-like spots on the lower parts of the car.

The acidic products in the car wash tunnel include Presoak 2, Presoak 3 (if applicable), Carnauba Wax, and Ceramic Smooth. Now, let's review each one.

### ***Presoak 2 (Low pH)***

Presoak 2 neutralizes the alkaline products from the first phase of the wash process, so proper application is essential. Any alkaline residue on the car will interfere with the subsequent rinse and drying phases. Presoak 2 is applied as a wet foam after the wraps using a K-nozzle and foam generator. The wet foam application allows the product to run down the vehicle to ensure coverage of all surfaces and provide lubricity to wraps, side washers, etc.

### **Presoak 3**

Depending on the tunnel length at your location, there may be a Presoak 3 application. The same acidic cleaner used in Presoak 2 is also used in Presoak 3. However, when a tunnel does have a third presoak application, the dilution of the product in both Presoak 2 and Presoak 3 is reduced compared to a tunnel with only two presoak applications.

If your location has two (2) sets of wraps or more, there will be a third presoak application to neutralize the alkaline products and provide lubricity to the subsequent set of wraps. While this is a good rule of thumb, it isn't always the case, and you should always consult a manager regarding the chemicals in your tunnel.

### ***Carnauba Wax***

Carnauba wax is a natural wax derived from the leaves of the carnauba palm tree. In the car wash, it is applied by a max foamer near the middle of the tunnel. Unlike the tri foam dispensed from a max foamer as a thick foam, carnauba wax is applied as a "wet foam" when applied to the vehicle. The product should run down the sides of the vehicle so that it can be massaged into the paint by the mitts or other equipment. The primary purpose of carnauba wax is to provide an additional protective layer that repels water and protects against environmental contaminants such as acid rain, bird droppings, and road salt. It provides a durable, protective barrier against environmental elements, enhances water repellency and is suitable for use on various surfaces, including paint, metal, and plastics.

### ***Ceramic Smooth***

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Ceramic smooth is part of a two-stage ceramic wax application that combines traditional car wax with ceramic technology to create a long-lasting protective layer against UV rays and environmental contaminants. Ceramic wax is a synthetic product that is harder and more resistant to minor scratches and swirl marks than traditional waxes. This increases the durability and, depending on environmental conditions and frequency of application, can last several months. Ceramic smooth is applied to the vehicle using arch-mounted banana foamers just before the last mitter in the tunnel. The product should appear as a “wet foam” on the vehicle to provide lubricity and allow the mitters or other equipment to easily massage the wax into the paint. The second application stage is completed in the rinse phase when the ceramic shine product is applied, which you will learn more about in the next module, Rinse & Protect.

## **RINSE & PROTECT - 903**

### ***Rinse & Protect Handout***

The purpose of neutral pH chemicals in the rinse and protect phase is to help maintain the vehicle's paint, trim, and metal parts, ensuring they stay in good condition longer. The products applied in this phase provide additional protection to the vehicle's surface and increase drying effectiveness.

Car wash chemicals with a pH between six (6) and eight (8) are considered neutral. Neutral pH chemicals do not corrode or strip the protective layers on vehicle surfaces. This helps maintain the vehicle's paint, trim, and metal parts, ensuring they stay in good condition longer. The following products in the car wash tunnel that are considered neutral include Drying Agent, Rain Repellant, and Ceramic Shine. Before learning more about each one, we must discuss the rinse applications.

### ***Rinse***

The soft water rinse uses deionized or softened water to remove any remaining soap residues and dirt from the vehicle. This process prevents mineral deposits from forming on the car, which can cause spots and streaks. By using soft water, the rinse ensures a clean, spot-free finish, enhancing the overall quality of the car wash.

### ***High-Pressure Rinse***

The high-pressure rinse employs powerful nozzles to spray water at high pressure, effectively dislodging and removing stubborn dirt, soap residues, and other contaminants from the vehicle's surface. This step ensures that all cleaning agents and debris are thoroughly washed away, reaching difficult areas and preparing the car for the final drying stage.

### ***Drying Agent***

After the rinse thoroughly removes all dirt, soap, and debris, the drying agent is applied using the rain bar and mirror rinse to ensure even coverage across the entire vehicle's surface. The drying agent is a rinse aid formulated to repel and facilitate the removal of water from the vehicle's surface by reducing the water's surface tension. This allows water droplets to sit on top of the vehicle surface as tiny beads, which helps prevent water spots and streaks, ensuring a smooth and shiny finish.

### ***Rain Repellant***

Rain repellant is designed to help water bead and roll off glass surfaces, such as windshields, windows, and mirrors. This prevents water and other contaminants from spreading and forming a film on the vehicle. Rain repellants can protect for weeks to months, depending on the product, environmental conditions, and frequency of application. In addition to repelling rain, these products can also provide a barrier against dust, bugs, bird droppings, and other contaminants, making the glass surfaces easier to clean.

In addition to repelling rain from the vehicle, rain repellent also increases the effectiveness of the windshield wipers to improve visibility and driver safety when driving in rain or other inclement weather. When driving in rain, water will bead and move up the windshield as the vehicle moves forward. This makes it easier for the wipers to move the water off the windshield, and frequent applications can decrease the dependency on wipers during light rain. Rain repellants can also reduce glare from streetlights and oncoming headlights to improve visibility, comfort, and safety during night driving.

### ***Ceramic Shine***

In the previous module, Acidic Cleaners, you learned about ceramic smooth, stage one of the two-stage application of ceramic wax. Now, you will learn about the ceramic shine product used in stage two. Recall that ceramic wax is a synthetic product that combines traditional car wax with ceramic technology to create a long-lasting protective layer on the vehicle's surface that is harder and more resistant to minor scratches and swirl marks. Ceramic shine completes the two-step application process by integrating with the wax layer to fill micro defects in the vehicle surface, and seals in the wax by bonding to the vehicle surface. The result is a smooth, shiny, protected surface that is significantly easier to clean and maintain.



## DRY & FINISH - 904

### *Dry & Finish Handout*

#### **Blowers**

Blowers are powerful fans or turbines that generate high-velocity air to blow water off the vehicle's surface. Blowers are arranged in a specific sequence and positioned overhead and on side arches. Overhead blowers are mounted above the vehicle to direct the high-velocity air downwards onto the roof, hood, and trunk. On the other hand, side blowers are mounted alongside the vehicle and direct air at the doors, windows, and sides of the car. We utilize both overhead and side-mounted blowers to ensure all areas of the vehicle are dried thoroughly.

#### Flash Dryer

Flash dryers are installed at the beginning of the drying section, typically just after the last rinse arch. Their function is to remove as much water as possible, as quickly as possible. Removing a large amount of the water on the vehicle just after it exits the rinse allows subsequent blowers to perform more efficiently and achieve a better overall drying result. Flash dryer effectiveness heavily depends on placement in the tunnel relative to the final rinse arch and proper alignment of the blower nozzle with the top of the vehicle.

#### Oscillating Blowers

Typically, blowers are fixed in place on arches. However, at some locations, you may encounter oscillating blowers. Oscillating blowers can cover a larger area and provide more thorough drying by moving back and forth and directing airflow more effectively around the contours of the vehicle.

#### Elephant Ears & Mammoths

Elephant ear dryers feature large, flexible nozzles that resemble the shape of elephant ears. On the other hand, mammoth dryers are larger and more powerful, capable of producing higher volumes of air for intense drying power. Regardless of the style, their flexible design allows them to stay close to the vehicle's surface, providing concentrated airflow to all surfaces to thoroughly dry hard-to-reach spots like mirrors and door handles.

#### **Tire Shine**

Tire shine gives tires a glossy, black finish that enhances the vehicle's overall appearance, providing a finishing touch that makes the car look cleaner and more polished. It also creates a barrier that repels dirt, grime, and other contaminants, keeping the tires cleaner for longer. It also contains UV inhibitors that protect the tires from the sun's harmful rays and condition the rubber, preventing fading and cracking. After the tires are thoroughly cleaned and all dirt, brake dust, and other contaminants have been removed, tire shine is applied evenly onto a brush or pad, which then applies the product to the tires to provide consistent coverage and a uniform finish.

The main difference between solvent- and water-based dressings is the carrier system delivers the active ingredient, often a silicone polymer, to the intended surface. Solvent-based dressings use a chemical (solvent) to carry the active ingredient. Water-based dressings use water to carry the active ingredients to the intended surface. After application, solvents quickly evaporate, leaving behind a thin film of the active ingredient. Meanwhile, water evaporates slower than its solvent counterpart, so it takes longer to deposit the active ingredient.

Solvent-based tire shine gives tires a very glossy, wet look. While it is longer-lasting than water-based products, it can build up over time and sometimes look greasy. On the other hand, water-based products give a more natural, satin finish, and while they're easier to clean off and more environmentally friendly, they don't last as long as silicone-based products.

For the most part, we use water-based tire shine products in our tunnel. However, due to the freezing temperatures we experience in our Midwest markets, we change to a solvent-based tire shine at those locations during the winter months. This ensures that tire shine will not have any application issues on days when the temperatures are below freezing and that no damage is done to the tire shiner equipment.