

Chapter 10

TECHNICAL DISCUSSIONS



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Car Wash Detergency & Chemistry

GLOSSARY OF DETERGENT AND CHEMICAL TERMS

ACID

A chemical substance whose properties include the ability to react with bases or alkalies in water solutions to form salts.

Acids lower the pH of water solutions. When fatty acids, which are organic acids, are mixed with alkalies, soap is produced. Many soils are weakly acidic and are more easily removed with alkaline wash solutions.

Related Terms: Alkali, Fatty Acids, pH, Saponification, Soap

ALKALI

A chemical substance (such as a hydroxide or carbonate of sodium or potassium) which reacts and neutralizes an acid.

Alkalies are reacted with fats and oils of animal or vegetable origin to form soap. Hard soap is generally made from sodium hydroxide (caustic soda) and soft soap, from potassium hydroxide (caustic potash).

Related Terms: Alkalinity, Saponification, Soap

ALKALINITY

A property of water soluble substances (or mixtures) causing the concentration of hydroxyl ions (OH⁻) in water solutions to be higher than the concentration of hydrogen ions (H⁺).

Alkalinity is exhibited in solution by alkalies such as sodium hydroxide and by alkaline salts such as sodium carbonate.

Soap and soap-based products are alkaline, since soap is a moderately alkaline salt and performs well only in an alkaline medium. Detergent products can be formulated with any desired level of alkalinity as dictated by the needs of the cleaning tasks to be performed. Since the alkalinity is useful in removing acidic, fatty, and oily soils, most detergents are more effective on laundry soils when on the alkaline side. Generally, alkalinity is supplied to laundry detergents by builders.

All automatic dishwasher detergents utilize alkalinity, as do most cleansers and hard surface cleaners. In contrast, most hand dishwashing detergents are close to neutrality, performing efficiently without alkalinity because of the mechanical action of hand rubbing with sponge or dishcloth.

Related Terms: Automatic Dishwasher Detergent, Builder, Cleanser, Detergent, Hard Surface Cleaner, pH, Soap, Sodium Carbonate, Surface Active Agent.

AMPHOTERIC

(AMPHOLYTIC) SURFACTANT

A surfactant that, in water solution, may be either anionic or cationic, depending on the pH.

The application of amphoteric surfactants include shampoos and personal care products, where mildness is important, industrial cleaners, because of their wide compatibility with builders, acids, and alkalies; and to some extent, household detergents.

Related Terms: Anionic Surfactant, Cationic Surfactant, Surface Active Agent

ANIONIC SURFACTANT

A surfactant derived from an aliphatic hydrocarbon and usually a sodium salt, in which detergent and other properties depend in part on the negatively charged anion of the molecule; hence the name "anionic".

The surfactants most widely used in the detergent industry are anionic, and these are usually high sudsing. Linear alkylate sulfonate is the most commonly used anionic surfactant. Others include alkane sulfonate, alkyl ethoxylate sulfate, alkyl glyceryl sulfonate, and alkyl sulfate.

Related Terms: Amphoteric Surfactant, Cationic Surfactant, Nonionic Surfactant, Surface Active Agent.

ANTIREDEPOSITION AGENT

An ingredient used in laundry detergents to help soil from resettling on fabrics after it has been removed during washing. Sodium carboxymethylcellulose (CMC) is the most widely used antiredeposition agent; Also polyvinylpyrrolidone (PVP), polyvinyl alcohol, and polyethylene glycol (PEG). Antiredeposition agents are absorbed on both soil and fabrics, where they keep soil particles from resettling on fabrics being washed and act as a dispersing agent. Surfactants and complex phosphates also help prevent soil redeposition, although this is not their primary function.

Related Terms: Carboxymethylcellulose, Dispersing Agent

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BIODEGRADABILITY

The capability of organic matter to be decomposed by biological processes.

Both the rate and the completeness of decomposition are factors in biodegradability. In the context of detergents, biodegradation refers to decomposition of the organic ingredients in the formulation by bacteria present in waste treatment systems, surface waters, or in the soil. Since surfactants constitute the largest quantity of organic materials in detergent products, their biodegradation is of greatest interest. The surfactants in today's car wash detergents are readily biodegradable, as is soap.

CATIONIC SURFACTANT

A surfactant with a positively charged ionic group.

The most commonly used cationic surfactants are known as quaternary ammonium compounds, such as alkyl dimethyl benzyl ammonium chloride. Some are widely used in disinfecting / sanitizing household and bathroom cleaners. Others are active ingredients in wash / rinse / dryer fabric softeners. They are not used for cleaning per se.

Related Terms: Amine Oxide, Amphoteric Surfactant, Anionic Surfactant, Disinfectant, Fabric Softener, Nonionic Surfactant, Quaternary Ammonium Compounds.

CAUSTIC

A strong base; the term when used alone, usually refers to caustic soda (sodium hydroxide). Caustic soda is the alkali used in the hard soap manufacture. It's also used as a neutralizing agent in detergent manufacture.

Related Terms: Alkali, Soap

CHELATING AGENT

A special type of organic sequestering agent that inactivates water hardness and other metallic ions in water. Chelating agents are used in detergent formulations because they inactivate the hardness minerals calcium and magnesium, and reduce ill effects of other dissolved metals such as iron and manganese. Currently, there is sparing use of chelating agents in U. S. detergent formulations. One such agent is ethylene diamine tetraacetic acid (EDTA). Sodium citrate functions as a chelating agent when used as a builder.

Related Terms: Ethylene Diamine Tetraacetic Acid, NTA, Sequestering Agent, Sodium Citrate.

DETERGENCY

The ability to clean or remove soil. Generally detergency is associated with the action of a cleaning agent such as soap, detergent, alkaline salt, or a combination of these. In the context of consumer cleaning products, especially those designed for washing clothes and dishes, detergency can be described as the removal of soil by employing one or more of the following mechanisms (generally in conjunction with mechanical action) :

1. Lowering surface and interfacial tension
2. Solubilization of soil
3. Suspension and/or emulsification of removed soil
4. Inactivation of water hardness
5. Neutralization of acid soil

Related Terms: Alkalinity, Detergent, Emulsification, Sequestering Agent, Soap, Surface Active Agent, Water Softener

EMULSIFICATION

The dispersion or suspension of fine particles or globules of one or more liquids in another liquid.

The emulsification process is important in all types of cleaning where oily or fatty soils are encountered. The principal agent in emulsification is the surfactant, with aid from a builder that ties up hardness minerals.

Related Terms: Surface Active Agent

FOAM

"A mass of bubbles formed on liquids by agitation". (American Society for Testing and Materials definition) In the context of soaps and detergents, foam is synonymous with suds.

Related Terms: Lather, Suds, Sudsing

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HARD SURFACE CLEANER

A product formulated for cleaning painted surfaces, washable floor coverings, plastics, metals, porcelain, and other surfaces. Hard surface cleaners come in a variety of physical forms and formulas. Their form varies; there are powders that must be dissolved before use, liquids that can be diluted or used full strength, to be used with mechanical pump dispensers. Or they are products found in aerosol containers. The powders generally depend on alkalinity for cleaning and water softening for reducing filming and streaking. The liquid detergent formulations are highly individualized. They all have a soap or detergent surfactant base, and, generally, water-softening ingredients (such as EDTA and potassium pyrophosphate) and alkaline builders (sodium carbonate, ammonia). Petroleum distillates and pine oil may be included for grease and oil cutting. Those products designed to deodorize / disinfect as well as clean normally contain pine oil, quaternary ammonia, or phenol disinfectants.

Related Terms: Alkalinity, Disinfectant

HYDROPHILIC ACID

Water loving; defined by the American Society for Testing and Materials as "a descriptive term applied to the group or radical of a surfactant molecule that makes or tends to make it soluble in water."

Associated with the hydrophilic portion of a surfactant molecule is the opposite hydrophobic (water - hating) portion. The special capabilities of surfactants in loosening dirt are a direct consequence of these incompatible component parts, which have opposite attractions toward dirt and toward water.

Related Terms: Surface Active Agent

NONIONIC SURFACTANT

A detergent surfactant that contains neither positively nor negatively charged (ionic) functional groups, such surfactants have been found to be particularly effective in removing oily soil. In contrast to anionic and cationic surfactants, nonionic surfactants do not ionize in solutions. Some nonionics are low sudsing and are found in low sudsing laundry detergents and machine dishwashing detergents. Commonly used types include ethoxylated alcohols and alkyl amine oxides.

Related Terms: Anionic Surfactant, Cationic Surfactant, Surface Active Agent

pH

A chemical symbol expressing the degree of acidity or alkalinity of a solution. The pH scale runs from 0 to 14, with 7 indicating neutrality. The numbers increase as alkalinity increases and decrease as acidity rises. See ALKALINITY for the relationship to cleanliness products.

SURFACE ACTIVE AGENT

An organic chemical that, when added to a liquid, changes the properties of that liquid at a surface. This is a basic function for products serving as detergents and as wetting, foaming, dispersing, emulsifying, and penetrating agents. Surface active agent is commonly shortened to surfactant.

Surfactants are classified by whether or not they ionize in solution, and by the nature of their ionic or electrical charges. Categories of charges are called anionic, nonionic, cationic, or amphoteric. The anionic and nonionic surfactant types (for example, LAS, ethoxylated alcohol, alkyl sulfate, and soap) possess good cleaning properties and are important ingredients in household soaps and detergents.

In most detergent products designed for washing clothes and dishes, the surfactant is a basic ingredient; soap is basic to most body-washing products. All surfactants and soaps perform the important function of lowering water's surface tension, commonly known as making water "wetter". This enables the cleaning solution more quickly to wet out the surface being cleaned so that soil can be readily loosened and removed (usually with the aid of mechanical action). Surfactants are also instrumental in removing soils, both fatty and particulate, and in keeping them emulsified, suspended and dispersed so that settling back on the surface is minimized.

In addition to their leading role in laundry and light duty formulations, surfactants are used to some degree in most other household cleaning and washing products. They are the base of most liquid hard surface cleaners and relatively small amounts are in cleaners, cleansers, and automatic dishwasher detergents. Specialized surfactant applications include the use of cationics (quaternary ammonium compounds) to provide deodorizing and disinfecting action, while nonionic wetting agents are available for adding to the last rinse in automatic dishwashing to provide better draining of rinse water.

Related Terms: Amphoteric and Anionic Surfactant, Automatic Dishwasher Detergent, Bathroom Cleaner, Built Detergent, Cationic Surfactant, Hard Surface Cleaner, Laundry Detergent, Nonionic Surfactant, Quaternary Ammonium Compounds, Rinse Agent.

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SYNTHETIC DETERGENT

A term describing washing and cleaning products based on synthetic surfactants rather than traditional soaps. Over a period of years the adjective "synthetic" (which in this context means put together chemically, or synthesized, from a variety of raw materials) has been gradually dropped so that today non-soap washing and cleaning products are simply called detergents.

WATER HARDNESS

Soluble metal salts, principally those of calcium and magnesium, and sometimes iron and manganese, that when present in water in sufficient amounts create cleaning problems.

In the case of soap, insoluble soap curds are formed. In general, water hardness reduces the ability of surfactants to perform their cleaning function. Hardness is expressed in grains per gallon (gpg), grains per liter (gpl), or parts per million (ppm), the last more accurately being expressed as milligrams per liter. One gpg equals 17.1 ppm. Water essentially free of calcium and magnesium is described as soft; if appreciable amounts of either or both are present, it is called hard.

Related Terms: Detergent, Soap, Water Softener

The U.S. Geological Survey categories of hardness are:				
	Soft	Moderately Hard	Hard	Very Hard
Grains per gallon	0.0-3.5	3.6-7.0	7.1-10.5	10.6-
Grains per liter	0.0-.89	.90-1.76	1.77-2.64	2.65-
Parts per million or				
Milligrams per liter	0.0-60	61-120	121-180	180+

Table 1. Water Hardness

WETTING AGENT

A compound that increases the ability and speed with which a liquid displaces air from a solid surface, thus improving the process of wetting that surface.

Wetting agents are all surfactants. They function by lowering surface and interfacial tension. Soap and detergent surfactants serve as wetting agents in washing products, in addition to their other functions. In automatic dishwashing, nonionic surfactants are sometimes introduced into the last rinse for the purpose of maximizing drainage of water from dishes and utensils.

Related Terms: Rinse Agent, Surface Active Agent

WHITEWALL TIRE CLEANERS

Without a doubt, the cleaning of whitewall tires is the single most difficult thing to do in the car washing industry. The original basic method for cleaning tires was by steam cleaning either manually or with a wheel washer. With low cost energy and low cost chemicals, it was an effective method of cleaning.

But the problem associated with an unpleasant job is always present. Energy and chemical costs shot up dramatically. Keeping a wheel washer and a steam cleaning machine in satisfactory condition was practically a full time job.

Chemical tire cleaning is definitely an idea whose time has come. We have studied the cleaning of tires very thoroughly and have seen excellent results obtained in the field when the right chemical is used in conjunction with a properly designed continuous system.

Such problems as yellowing to whitewalls, the difficulty of cleaning narrow pencil stripes, and the special problems in cleaning butyl tires are with us all the time. What makes this tougher is the problem associated with the aluminum hubcaps which is of paramount importance.

We feel that the safest way to effectively clean whitewalls is by spraying a strong non-caustic chemical on a DRY tire, allowing about five to ten seconds dwell time before the tire is scrubbed with a stiff nylon tire brush turning at a high rpm. We can make a strong enough non-caustic chemical, which when given said dwell time, will clean whitewalls and because the chemical is non-caustic it will all but eliminate the chance of staining aluminum. Unfortunately life isn't quite this simple; with tunnels becoming increasingly more compact many operators just don't have the space to facilitate such dwell time. Enter the wet tire.

There are two basic principles behind the wet tire theory. First of all, a strong caustic chemical can be sprayed on to the wet tire and because the aluminum hubcap is also wet the effect of the chemical on it has been weakened. Secondly, the wet tire allows the chemical to literally run around the whitewall insuring that the entire whitewall feels the effect of the chemical. Again, always allow as much dwell time as possible before scrubbing with a tire brush. The tire scrub brush should usually be run dry. There is more than enough water from the brushes and arches to keep everything lubricated. The greater friction from the dry brush will definitely result in better cleaning.

Cleaning whitewall tires is a problem for any car wash, especially for the smaller car washes who have no mechanical provisions for cleaning tires. For the people who must "detail" their whitewalls clean, SIMONIZ® offers chemicals specifically designed for this purpose. See the chart on the following page to help make the best selection.

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PRODUCT	FORM	CAUSTIC	SOLVENT	FULL/SELF SERVICE	APPLICATION AND DILUTION
Snow White	powder	non	no	both	Manual or automatic approx. 1/2 lb. per gal. for wet or dry tire
Dazzle	powder	slight	no	full	Automatically at approx. 1/2 lb. per gal. for wet tire
6-117A	powder	slight	no	full	For hard water areas. Automatically at 1/2 lb. per gal. for wet tire
206 B	powder	heavy	no	self	Manual or automatic Approx. 1/2 lb. per gal. for wet or dry tire
Correct	powder	non	yes	both	Dilute approx. 1/2 lb. per gal. to wet or dry tire. Manual or automatically
Golden Foamy Whitewall	liquid	non	yes	self	Dilute 1/4 for wet or dry tire. Manual or automatically
Brake Away	liquid	non	yes	full	Manual or automatically dilute up to 1/8 for dry or wet tire
Breakthrough	liquid	slight	yes	full	Manual or automatically to 1/10-20 for wet or dry tire
Crush Plus	liquid	non	yes	full	Manual or automatically to 1/8 for wet or dry tire
Foamy Whitewash	liquid	slight	yes	full	Dilute automatically approx. 1/8 for dry tire
Cyclone	liquid	heavy	no	full	Automatically apply 1/8 to wet tire.
Prime Pak Tire White	liquid	no	yes	self	Dilute 1/12
Prime Pak Whitewall	liquid	yes	yes	full	Dilute 1/15

Table 2. Whitewall Cleaners

CLEANING RADIAL WHITEWALLS

With more and more people (and auto manufacturers) switching to radial tires, cleaning whitewalls has become even a tougher job than it already was. The increased use of synthetic polymers in the tire industry has only added to this problem. In fact, one phenomenon we have witnessed is that some radial whitewalls actually leave the car wash "dirtier" than when they entered. How can this be?

There is a common (mal) practice, because of the difficulty associated with cleaning radial whitewalls, to increase the strength of the (con-ventional) caustic whitewall chemical. When combined with a carbide silicon impregnated tire brush there is almost a synergistic effect that actually works to the detriment of the cleaning operation. We begin to rub some of the "blackwall" onto the whitewall. So simply increasing the strength of the whitewall solution is not the answer to cleaning radials.

SIMONIZ® has looked into this problem and developed a product, SPECIAL SOLVENT, a unique combination of wetting agents, dispersants and solvents that will improve your whitewall cleaning operation. Because of its nature, SPECIAL SOLVENT can not be blended into original powder formulations, nor is it soluble in concentrated caustic liquid formulations. It must be employed as an additive.

POWDERS - For those using powder, simply add 1/4-1/2 gallon of SPECIAL SOLVENT to 55 gallons of solution. This minimum effort will provide maximum results!

LIQUIDS - For those using a liquid and an automatic proportionating device there has always been a problem with such additives. SIMONIZ® is proud to offer a DUAL FEED PROPORTIONATING DEVICE, made especially for us by Hydro Systems, Inc., Cincinnati, Ohio. This Hydrominder is based on the same volumetric flow rate as Hydro's standard model 510. This system will allow the operator to "bleed" SPECIAL SOLVENT into this "at strength" solution.

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If you are manually diluting a liquid, use in the same manner as those using a powder, 1/4 - 1/2 gallon of SPECIAL SOLVENT to 55 gallons of solution. SPECIAL SOLVENT will help wet and penetrate even the toughest to clean radials. It will represent an additional cost of about \$0.01 per car.

In general, lower cost cleaning can be obtained by using a powder, plus a powder has a greater ability to inhibit the caustic attack of aluminum. Liquids have a high convenience factor. We have a whole range of products, liquids and powders, to clean tires. Tell us your method of cleaning and chances are we'll have the right chemical for your application.

WHEEL TREATMENTS: WIRE WHEEL CLEANING, BRAKE DUST REMOVAL & VINYL PROTECTANT

One of the most profitable areas of extra service merchandising is in the proper application of wheel treatments. For many years, wheel treatments were just limited to whitewall tire cleaning. However, as we all know, many late model cars now come equipped with fancy spoke and wire wheels or designer hubcaps. Additionally, more and more vehicles come equipped with front wheel disc brakes, which create a major nuisance in that they produce an iron oxide film, called brake dust, which accumulates on the rims of the tires. Additionally, a new market has developed to apply vinyl protectants to tires, which will restore them to their original lustre and shine. All of these trends have translated to more opportunity for the car wash operator.

The tenaciousness with which brake dust adheres itself to the wheel rims, is in large part due to the fact that the dust is thrown off hot and almost becomes baked onto the wheel. Its removal is complicated by the fact that many of the rim alloys are soft and are not inert to strong acids. Therefore, the product choice and application must be tailor made to your car wash and your employees. The following guidelines should be used:

1. For best results, wheel brightening and brake dust removal should be done by hand. Typically, the product is sprayed onto the wheels with a low pressure sprayer at the entrance tunnel and followed with a mechanical brushing action or high pressure blasting. Dwell time is important, the longer the better.

2. For the best combination of safety and cleanability, a nonacid wheel brightener should be used. Brake Away, Simoniz® Wheel Brite, and Crush Plus, are all fine, nonacid brake dust removers. These are best manually applied.

3. Putting safety aside, wheel brightening, brake dust removal and light rust removal, is best accomplished with an acid cleaner. Most chrome wire wheels are inert to acids, including those containing hydrofluoric acid and phosphoric acid. Avoid applying acids to Porsche and Corvette rims, as they have been found to be susceptible to such treatments and expensive to replace. Many experienced operators will arm their employees with two types of wheel brighteners, acid and nonacid and encourage them to use acid products on chrome wire wheels and the nonacid on all others.

4. Wheel brighteners can also be applied automatically on line. When applied automatically, you are limited by dwell time and therefore, for best results the product should be applied hot. Also, it should be followed by a high pressure wheel blaster that will give at least two sweeps over the wheel area.

Another very important extra service being sold by full service car washes is vinyl tire protectants. Again, this is a manual application that needs to be done at the exit of the car wash after the car has been cleaned and dried. Tire Shine Plus offers excellent protection and water resistancy. It is best applied either through a pump up garden type sprayer or hand held trigger spray bottle. Many operators simply spray the tire thoroughly and let it naturally dry without rubbing. Due to the difficult nature of the tire's surface, more consistent results can be accomplished without rubbing.

PRODUCT	SOLUBILIZING AGENT	NON -ACID	PROTECTANT
Black Back	-	-	Solvent Based
Breakthrough	D-Limonene / Alkali	X	Solvent Based
Dust Buster	Sodium Bifluoride/Solvent	-	-
Spoke Clean	Hydrofluoric Acid	-	-
Wheel Brite	Phosphoric Acid	-	-
Brake Away	Butyl Solvent / Alkali	X	-
Simoniz® Wheel Brite	Butyl Solvent / Alkali	X	-
Crush Plus	D-Limonene	X	-
Shine Plus	-	-	Water Based

Table 3. Wheel And Rim Cleaners

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PRODUCT NAME	CHEMICAL DESCRIPTION	USE	SELF SERVE	FULL SERVE	SCENT	FOAM
Bead Up	Cationic Emulsion	Drying Agent Ideal In Alkaline Environments		X	None	None
Max Wax	Cationic Emulsion	Drying Agent		X	None	None
Spray Gloss	Cationic Emulsion	Drying Agent		X	None	None
Super Wax	Cationic Emulsion	Drying Agent		X	None	None
Lemon Glo	Cationic Emulsion	Drying Agent, Or Self Service Pressure Wax	X	X	Lemon	None
Coin Op Foam Wax	Sudsing Cationic Emulsion	Coin Op Foam Wax	X		Lemon	Light
FC3	Cationic Emulsion	Drying Agent/Sealer		X	None	None
Blue Magic Foam Polish	Sudsing Cationic Emulsion	Coin Op Foam Wax	X	X	None	Light
Pressure Poly Glaze	Poly Functional Silicone Cationic Emulsion	High Pressure Wax	X	X	Cherry	None
Dri Brite	Poly Functional Silicone Cationic Emulsion	Sealer Wax/ Drying Agent	X	X	None	None
Poly Sealant	Poly Functional Silicone Cationic Emulsion	Sealer Wax		X	Lemon	None
Sillfoam	Siliconized Wax Base Foamer	Triple Foam Polish & Conditioner		X	Optional	Optional
Prime Pak Triple Foam	Concentrated Siliconized Foamer	Triple Foam Arch		X	None	High
Poly Clear Conditioner	Siliconized Surfactant Base	Foam Polish & Conditioner		X	Cherry	High
Envirowax	Non-mineral Seal Oil Emulsion	Drying Agent	X	X	None	None
Prime Pak Sealer Wax	Concentrated Cationic Emulsion	Drying Agent/ Sealer	X	X	Lemon	None
Prime Pak Drying Agent	Concentrated Cationic Emulsion	Drying Agent	X	X	None	None

Table 4. Drying and Wax Profile

Proper application of wheel treatments is an art, and safety needs to be the strongest of considerations. Develop a wheel brightening program and educate your employees as best as you can. When choosing a SIMONIZ® product the above chart is helpful.

SPRAY WAXES, WHAT ARE THEY AND HOW DO THEY WORK?

There are many different types of spray waxes employed in today's conveyORIZED and self-service car washes. For the most part these waxes are referred to as drying agents, hot waxes, poly glaze waxes, sealer waxes, foam polish, pressure wax, curtain waxes and most recently, clear coat conditioner and sealants. Spray waxes are of fundamental importance to the car wash industry. Table #4 should help to qualify the wide range of SIMONIZ® waxes and their uses.

As the chart illustrates, all drying agents are cationic emulsions and although it is true that waxes will lend to the car's surface some shine and protection, their basic role is as a drying agent. Their electrical nature allows them to literally get between the car's surface and the rinse water. The positive hydrocarbon end aligns itself to the negatively charged automobile surface, leaving the water resistant hydrophobic end orienting itself between the vehicle's surface and the water it is trying to displace. The wax will not allow the water to spread on the surface and in fact, works on the water in such an opposite manner that the water "beads" and rolls off the now distasteful surface.

Similarly, these same phenomena occur for the poly functional cationic emulsions, often known as pay waxes whether applied

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under high pressure or low pressure. However, instead of depositing a mineral seal oil on the surface, as is the case with drying agents, a silicone oil is left which imparts higher gloss characteristics. These silicone oils are the same quality found in most high grade furniture polishes.

Another type of wax or conditioner sold in commercial car washes is foam polish and now, clear coat conditioners, which are high sudsing siliconized soaps, which do not have any "beading" in and of themselves. Typically, these products are applied through air operated foaming devices and produce colored foams which have outstanding visual appeal. These silicone polishes not only clean, but deposit silicone on the surface, leave a beautiful gloss, and it is readily apparent to the customer that his car has been waxed. Typically these foam polishes or conditioners are followed by a poly functional silicone cationic emulsion, which deposits a second layer of silicone and more importantly rinses the foam polish and allows it to bead up. From a promotional point of view, it is safe to say to your customers that this is a two step process and that the negative charge of the foam polish reacts with the positive charge of the sealer wax leaving behind a silicone shine.

The complaint placed most often regarding a drying agent, is that it streaks the windows and windshields. This is a tough problem, inherent with the wax itself. The forces which attract the wax to the car's prepainted surfaces are that much greater between the wax and the glass. Used correctly, our spray waxes should not streak car's windows. If the problem occurs and you are getting a dry car, chances are you are using too much wax. Either cut back on the amount you inject into the arch or make a more diluted stock dilution. Finally, it is important to understand that the wax process in a car wash conveyor is very analogous to a wash process. By this meaning, all things work better with warm water. If warm water is used in applying the drying agent, the water will bead up quicker, which will result in a drier car.

Also, more dwell time or drip area between the drying arch and your blower will produce a drier car, and of course a slower line speed will also produce a longer dwell time, which will in turn produce a drier vehicle.

PRODUCT	ANIONIC/ NONIONIC			SURFACTANT/SOLVENT
	ANIONIC	NONIONIC	NONIONIC	
Super Foam	X			
Lustre Shine		X		X
Magic Luster		X		
Super Suds	X			
Special Wetting Agent			X	
Pink Magic	X			
Supreme	X			
Colored Foam Soap	X			

Table 5. Liquid Brush Detergents

LIQUID BRUSH DETERGENTS

Most liquid brush detergents are essentially neutral or of only slight total alkalinity. This is part of the chemistry of such products. There are four basic parameters we follow in formulating our liquid brush detergents. They must provide for good "detergent action" and possess the following properties:

1. Good wetting characteristics in order that the detergent may come into intimate contact with the vehicle surface to be cleaned.
2. Ability to remove or to help remove dirt from the vehicle surface into the bulk of the liquid detergent.
3. Ability to solubilize or to disperse removed dirt and to prevent it from being redeposited onto the vehicle surface.

Secondly, the liquid brush detergent must be such that it allows for great lubricity between the brush and the vehicle surface to help minimize "hazing". This is accomplished by using the proper amount of the right detergent.

Thirdly, the liquid must exhibit a high "suds profile." There is a misconception that the higher profile the better the detergent. This is not entirely true. The importance of high foam is measured in its visual appeal ... Foam does not clean.

Finally, because many car washes operate with reclaim, the detergent must possess foam stability. This is something not so readily apparent. Remember, it's not only initial foam that we have to be concerned with but also with detergent's ability to keep its foam in the reclaim pit.

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Conveyorized car washes use various means to apply detergent to a car. Some units have a central feed system, where individual brushes are fed through a Dema Injector. This is a controlled application. Other units simply add detergent to the reclaim pit. This method is the simplest, but sometimes the quantity control is not precise. Many car wash operators are installing a large injector in the flood rinse arch. This is very good because again, it is a controlled application. You only use detergent while the car is being washed.

Carrying some of these ideas a step further, SIMONIZ® foamers are an excellent way to apply colored foam to a car. The only extra expense, after the cost of the foamer, is the cost of the air that is used. Usually, foam is applied after the flood arch, at about the point where the top brush makes contact. Once everything is worked out, there is not wastage of detergent. It all flows back to the reclaim pit. The visual appeal is just great, and it is a big talking point. We know of nothing else that an operator can do to arouse customer comment and satisfaction as this relatively inexpensive setup.

Most liquid detergents are made up of anionic and nonionic surfactants. Typically anionic surfactants possess initial high foam and good detergent ability. They are not great oil emulsifiers, but have excellent foam stability and lubricity. Nonionic surfactants are not as common in the commercial car wash industry because they do not foam as well as the anionic types. Typically they are more apt to be found in presoak powders and liquids and those applications when foam is not a big factor. Nonionic surfactants are great oil emulsifiers and excellent detergents. Additionally, nonionic surfactants will not react with cationic spray wax emulsions and are finding a greater application in total reclaim systems. SIMONIZ® manufactures several types of liquid detergents. Tell us your type of feed system and cleaning requirements and we'll prescribe the right liquid brush detergent for your wash.

PRESOAK CHEMISTRY, ONE STEP VS. TWO STEP, ROAD FILM REMOVAL

The removal of road film deposits from vehicle's surfaces with detergents and pressure, has long been a problem for the conveyorized car wash industry. The most critical factors enhancing the efficiency of a presoak solution are dwell time and temperature. Properly applied, any one-step or two-step presoak works better at higher temperatures and with longer dwell time.

ROAD SOIL & POLLUTANTS	LOW pH SOLUBLE	HIGH pH SOLUBLE	SOLVENT SOLUBLE
Pollen		X	X
Dust	X	X	
Bugs		X	X
Tree Sap			X
Tar			X
Asphalt			X
Road Oil			X
Brake Dust		X	X
Salt	X		
Abrated Concrete	X		
Abrated Asphalt	X		
Lead Oxide	X		
Iron Oxide (Rust)	X		
Zinc Oxide (Tires & Exhaust)	X		

Table 6. Presoak Chemistry

There has been much debate as to what has been more effective, two-step versus one step presoak. The truth is that proper application of a two-step presoak system is most effective. The principle upon which this system is based is quite simple and it works as follows:

First an acid based cleaner (a low pH material) is applied at low pressure to the soiled surface. Immediately thereafter an alkaline cleaner (a high pH) is applied. The chemical reaction between the high and low pH materials, the heat of neutralization, breaks the static bond holding the dirt on the surface. Furthermore, certain road soils are solubilized by acids and others by alkali, so with two step cleaning we are able to attack a broader spectrum of road soils. Also, proper application of two step cleaners increases your ability to wash a car with less friction. In other words, properly applied, two step presoak applications will clean a wider variety of road soils and will allow you to use less friction in the soil removing process. However, two step cleaning is more expensive and requires more tunnel space than is always allowed. Because of shorter conveyors and the desire of some operators to just add a presoak to enhance their cloth cleaning equipment, one step presoak cleaning has also become quite popular. The same parameters regarding temperature and dwell time that apply to two step cleaning apply to one step also. One step presoaks are typically alkaline in nature because an alkaline presoak gives a broader cleaning spectrum. SIMONIZ® manufactures a wide range of one step and two step cleaners and which product you use will depend upon the length of your tunnel, line speed, area of the country, water condition, wet car vs. dry car application and many other factors. Please allow a SIMONIZ® representative to "job match" the proper presoak solutions for you.

Car Wash Detergency & Chemistry

UNDER CARRIAGE RUST INHIBITORS

One of the newest developments in extra services being offered in the car wash are the undercarriage rust inhibitors. These inhibitors help to remove corrosive elements from the vehicles underside and temporarily minimize its rusting process.

It should be understood that these under carriage sprays are only rust inhibitors, they will not prevent rust. In other words, we can prevent rust only as long as the inhibitor remains on the undercarriage. In the course of every day driving, such sprays will eventually "wear" or get washed off by either rain or snow. So in this sense we are able to temporarily "halt" the surface phenomenon, rust.

The customer can see clean whitewalls, or the shine left by a hot wax, but rust inhibition is not something so readily apparent. Because of this it is important for the operator to be convinced of and have faith in the service, to help operators do this we have designed two styles of attractive signage (electric and non electric), and consumer handouts.

We simply call our rust inhibitor UNDER CARRIAGE SPRAY. It does not contain spray wax, kerosene, or sodium nitrite, but it does contain a new raw material which yields rust inhibition on the order of sodium nitrite. Used as directed, the cost for UNDER CARRIAGE SPRAY will be about \$.06 per car and should pose no environmental problems. For best results we recommend the following procedure:

1. First remove salt and sand by spraying underside with fresh or reclaim water.
2. Follow with rinse of UNDER CARRIAGE SPRAY. Use dilution of 2-3 ounces of pure material per gallon of water.

Typically an arch consists of 202 Dema and 4-8005 nozzles. For best results dilute UNDER CARRIAGE SPRAY 1 part to 5 parts water, and then inject 10 ounces per car.

For high speed washes use 8010 nozzles with a 203 injector. Remember that 2-3 ounces of UNDER CARRIAGE SPRAY must be used with each gallon of water.

WHAT IS THIS THING CALLED pH?

It is the nature of the car washing industry to use soaps and detergents of various types. These products may be either liquid or powder, come in a variety of colors and viscosities, and all these products have certain measurable chemical characteristics.

One of these characteristics is a concept that chemists find especially useful. It is called pH. I am sure that many of you have heard the term and have used it in discussions with your suppliers. What does it mean? What doesn't it mean? Perhaps this explanation will help.

The symbol pH, and the way it is written, according to different writers, stands for either the power of hydrogen or the potential of hydrogen. This is because the accurate determination of pH is made primarily by measuring the electrical conductivity of the solutions in question. Such an instrument found in most laboratories is called a pH meter. For rapid use in the field, and even for quick checks in the laboratory, there are available a number of indicating papers, so called pH papers. When immersed in solution, these papers will change color and will indicate the pH of the material. So even before I tell you what pH is, I have told you how to measure it. Like putting the cart before the horse!

Properly defined, pH is the log of the reciprocal of the hydrogen ion concentration when the concentration is expressed in grams of ionized hydrogen per liter of solution. Now that's a definition that only a chemistry teacher would love. If you can understand it, that's fine. If you don't, no need to worry. All you really have to know is that pH is a term used to describe the intensity of the acidity or alkalinity of solutions. And it is expressed on a numerical scale running from 0 to 14. All values from 0 on up toward 7 are considered acidic. Seven is the neutral range and as we go from 7 to 14 we increase in alkalinity. Thus, a pH of 2 is more acidic than a pH of 5 and a pH of 13 is more alkaline than a pH of 9.

So now we know that pH is measured on a scale of from 0 to 14 with values approaching zero as being most acidic and values approaching 14 being most alkaline. Further, nowhere in our discussions have we brought out any relationship between pH and detergent quality. Because there is no direct relationship, pH is simply one of the characteristics that chemists determine when a product is analyzed. We know that high and low pH can be harmful to the skin. So hair shampoos, cosmetic products, liquid dish detergents, etc. are usually in the neutral range, with a pH of 6.5-7.0. Similarly, since most soils are acidic in nature, heavy duty whitewall cleaners, pressure wash detergents, and steam cleaning compounds are on the alkaline side with pH at use dilution usually from 10 to 13.

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I would like to give a few more examples. If I were to dissolve a tablespoon of caustic soda into a quart of water, I would find a pH of 14. If I dissolve a cupful of caustic soda in the same amount of water, I would still get a pH of 14. Yet, obviously one is several times stronger than the other. So, you can see that you cannot judge the quality of a product by measuring only its original pH. Now, in the case cited, if both samples were diluted 1/10 with water, a difference in pH would show up, and, depending on other ingredients, a difference in performance should be noted.

Another example: We make a liquid pressure washer detergent called Film Fyter. It is a specially formulated product containing surface active agents, water softeners, etc. It has a pH of 13.2. That caustic soda solution of one tablespoonful per quart would have a pH of 14. Which one is a better truck washing detergent? Film Fyter wins hands down.

So remember, pH is just one factor that chemists use to determine the characteristics of a solution. It does not measure quality. Properly used it can help in the control of your operation. Suppose you have been using a certain whitewall cleaner and its pH at use dilution is 13.0. If you ever find it to be 12, you will know that it has been diluted too much. If you run a coin-op car wash and the pH of your detergent at use dilution is 9.0 and suddenly it is 11.0, then somebody mixed that batch too strong.

I hope this lengthy explanation has helped clear up some of the confusion about pH. Drop us a note if we can be of further help.

THE NEW TRIPLE COAT GENERATION – "A RAINBOW OF COLORS"

There's a triple coat craze sweeping the car wash industry. Triple coat applicators are quickly becoming standard equipment inside car wash tunnels and have proven to be highly profitable. Triple coat polish applications entail a triple-fold effect:

1. The customer receives and perceives added wax protection and lustre to the vehicle's paint surface.
2. The operator adds an extra high value profit center with tremendous visual appeal to the consumer.
3. The car's surface rinses and dries more quickly and efficiently than the old soap-based silicone polish wax applications.

There are various types of triple coat applications and each features different chemical delivery systems. One application dilutes the chemical through a 506 or 511 Hydrominder. The mixed chemical

solution then passes through a small air driven pump straight into the applying arch where air can be injected directly into the arch above the chemical line. If an operator can not inject sufficient air into the arch, the arch itself can be aerated with plastic tuffly in order to increase the foam of the product. Other triple coat applicators dilute the chemical through direct pumping stations (Blue/White pump). Then that solution is pumped into the triple coat arch where air also mixes with that solution to produce excellent foam appeal. These type of applicators are superior in quickness of product delivery and foam appeal over the standard dema-injected foamer systems. Furthermore, triple coat arches are manufactured to be aesthetically attractive and are usually surrounded by or encased with neon or standard lighting displays. The neon lighting really demonstrates the vibrance and vividness of the triple coats' rainbow colors— yellow, blue, red, green, etc. Additionally, triple coat equipment is usually located before the last curtain mitter, rinse arches and wax arches in the wash process. Proper rinsing of a vehicle is quick and easy since wax-based triple coat products are compatible and work in concert with drying agents to produce a totally dry vehicle.

HYPER-CONCENTRATES: SIMONIZ® PRIME PAKS

Description

The most recent breakthrough in the formulation of vehicle wash detergents and waxes has been the development of hyper or ultra-concentrated products. These solutions are more concentrated versions of traditional wash products and in some cases they represent entirely new products. Simply stated, these formulations contain a higher percentage of active ingredients than traditional products. Because of the higher percentage of active ingredients in these solutions, smaller amounts of them are required per vehicle than with traditional products.

Simoniz® USA offers an exciting new Prime Pak line of ultra-concentrated solutions. This product line contains every product needed to operate any type of wash from a self service facility to a full service conveyor. These products are packaged in convenient 5 gallon tight heads. Each container is equipped with a handle, a Material Safety Data Sheet attached to the side and labeled instructions in both English and Spanish.

Benefits

The Prime Paks offer the following benefits:

Shipping – Reduces expensive freight cost and eliminates the need for power liftgate delivery.

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Storage – Requires far less storage room than bulky 55 gallon drums. Containers may be conveniently stacked and free up valuable floor space.

Ergonomic – These containers are far easier to move and much safer for employees to handle than 500 lb. drums.

Disposal – Eliminates problem of having to dispose of 55 gallon drums.

Product Use

Ultra-concentrates must be used properly in order to utilize these benefits to their fullest. Accurate proportioning and control of product use must be monitored. This may be done through a simple titration test (determines solution strength) and through accurate record keeping of product used for the number of vehicles

washed. Product may be drawn directly through a proportioner from the Prime Pak container or the product may be premixed with water and then drawn through a proportioner. Drawing product directly from the Prime Pak eliminates the need for extra space, secondary containers and another step in the diluting process. Most equipment manufacturers now offer proportioners capable of diluting ultra-concentrates in a single step and adapters capable of expanding the proportioning range of older equipment to accommodate ultra-concentrates.

Outlook

The future will bring an increased use in ultra-concentrates. As more operators become familiar with their benefits and comfortable with their use, they will gain a greater market share of vehicle wash solutions.

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SPEAKING THE CAR WASH LANGUAGE

Every industry has its own language and the car wash industry is no different. The following is a list of terms that will help the car wash novice better understand the language we car washers speak.

TYPES OF CAR WASHES

Tunnel Operation - This refers to a car wash operation that is a conveyerized operation typically ranging from 40-150 feet long.

Exterior Wash - This is a car wash service that simply refers to having the exterior car washed only.

Self Service Wash - The type of car wash where customers come in and do the car themselves (often times these are referred to as "bays") with a high pressure wand or foam brush.

Full Service Wash - This is a tunnel wash operation that offers "on line" interior vacuuming and towel drying along with other services. This type of operation generally requires that the customer get out of the car while the wash services are performed.

Roll-Over Car Wash - This is the type of wash that is typically found in gasoline retailing operations where the car sits stationary and the equipment literally rolls over the car. The advantages are that they do a good job of cleaning and require little or no labor. The disadvantage is that they limit production. Most roll-overs can wash only twenty cars per hour.

High Pressure Spray Automatic - This is the type of in-bay car wash where the car sits stationary and a high pressure unit circles the car similar to the old Robo-type of car wash.

Hand Wash - This is becoming an increasingly popular method of a conveyor line. People with large mitts, wash the car by hand as it travels down the conveyor line.

Brushless Car Wash - This is a term that came to be known for those car washes featuring all cloth and no bristles.

Touchless Car Wash - These are car washes that are completely frictionless and rely on proper detergent application and high pressure as its method of cleaning.

Reduced Friction Car Washes - These are car washes that combine detergent application, soft cloth and high pressure as a means of washing cars.

Bristle Car Washes - These refer to the old style car wash brushes that are made up of polypropylene bristles that are extremely efficient in terms of cleaning, but when under lubricated, tend to haze the car's finish.

DETERGENCY AND CLEANING TERMS

Brake Dust - Metal dust which accumulates on wheel rims. This dust is emitted from brake pads, typically found on import vehicles. Very difficult to remove!

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Wet Tire / Dry Tire - This terminology identifies whether whitewall tire cleaning solutions are being applied to a wet tire or a dry tire, typically in a conveyORIZED wash.

Cheater Wax - This is a term referred to a drying agent, which helps to dry the car. The word "cheater" was derived because it helps the dryer work better. This is the one kind of wax that every car gets whether or not they pay for it.

Reclaim vs. Fresh Water - These terms are used for obvious meanings. Many car washes run with reclaimed water and many car washes use fresh water, be it city or well.

One Step vs. Two Step - These are words that describe two generally accepted methods of presoaking cars on-line. Typically a one step detergent is of an alkaline nature and a two step application is a slightly acidic followed by a slightly alkaline solution.

Polish Wax - Polish Wax is an extra service that is foamed onto the car and typically buffed into the surface. Usually colored for visual appeal.

Hot Wax - Hot Wax is a term almost as old as the car wash industry itself, and for many years was the only extra service made available in car washes. Originally these formulations were based on carnauba wax. Carnauba wax has been replaced by silicone or polymer formulations, because silicones give greater shine and have no effect on the glass. The term hot wax was coined because this wax is generally applied with hot water.

Sealer Wax - Sealer Wax is the modern day terminology for hot wax, and derived its name from the fact that its cationic nature was opposite that of the anionic nature of the polish wax, which it usually followed. Typically, sealer waxes are sold as part of a two step process or alone.

Extra Service - Extra Services are those services that a car wash customer would pay extra for.

Rust Inhibitor - Rust Inhibitor is an extra service that cannot prevent rusting, but will inhibit rust for typically 4-5 days.

Clear Coat - The new way in which cars are painted. First the paint pigment is applied followed by a clear acrylic polymer.

Foam Brush - Foam Brush is a brush found in self service car washes that is separate from the wand in the bay. This brush revolutionized the self serve car wash industry, as it allowed the customer to "brush" his car with a highly visible, well-lubricated, foam brush, being fed with soap and compressed air.

CONVEYOR AND EQUIPMENT TERMS

Line Speed - Line Speed is the speed at which the car wash conveyor moves cars through the tunnel.

Over & Under Conveyor - An Over & Under conveyor is a conveyor in which the roller rides down the conveyor track as it pulls the car down, but returns underneath the conveyor. The advantage of this conveyor is that of safety and production.

On Demand Conveyor - An On Demand Conveyor is one in which a car can be pulled onto a car wash conveyor and the roller will not pop up behind the tire until the car wash operator pushes a button and demands the roller. The advantage of this conveyor is that you could pull a customer's car onto a conveyor line, let the car set while making your transaction, and then call the roller up and begin the wash operation.

Conveyor Spacing - Conveyor Spacing refers to the space between cars on a conveyor line. The shorter the conveyor spacing, the more cars per hour can be washed.

Surface Conveyor - Surface Conveyor is the type of conveyor where the rollers ride completely on the surface. The advantage of this conveyor is that less site work is required.

Pulse Switch - Pulse Switch refers to the switch typically located on the sprocket at the exit end of the conveyor, which counts pulses for the car wash computer which allows you to tell the computer when to turn pieces of equipment on and for how long.

The Enter Switch - The Enter Switch is a switch which is at the entrance of the car wash conveyor which notifies the computer that a car is entering the tunnel and initializes the system as well as measuring the length of each car.

Sequential Function - The Sequential Function is a function that every car gets, like soap, water, cheater wax, etc.

Programmable Function - Programmable Function is a function which the car will not receive unless it is programmed on the push button station. Conversely, a de-programmable function is one which can be de-programmed, as in the case of blackwall tires.

Push Button Station - A Push Button Station is the car wash computer push button station which allows the car wash operator to program each car.

Rocker Panel Brush - A Rocker Panel Brush is a detail brush used on a conveyor in a conveyORIZED car wash that literally scrubs the rocker panel area.

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Side Wheels - Side Wheels are brushes that clean the sides of the car and are either freestanding or attached to other equipment.

Front to Back Mitter - A Front to Back Mitter is a mitter curtain where the motion of the mitter curtain is front to back in relation to the car.

Side to Side Mitter - Similar to a Front to Back Mitter only the action of the cloth is across the car or vertical to the direction of the car.

Wrap Arounds - Brushes found in conveyerized car washes which rotate and "wrap around" the vehicle as it proceeds through the wash. The brush starts at the front bumper, wraps around to do the side of the vehicle, then "knuckles in" to do the rear bumper.

Pits - Pits are referred to as the settling tanks located in the ground underneath a car wash. This is where all the wash water flows.

On-Line - On-Line refers to services received on the conveyor line, like hot wax, polish wax, whitewall tire cleaning, etc.

Flooder Arch - Flooder Arch is an arch found in the beginning of many car washes. Reclaimed water is drawn out of the car wash pits at the rate of about 50-75 gallons a minute through a centrifugal pump, flooded onto the car which knocks off a lot of heavy dirt and puts on a good show.

SELF SERVICE HIGH PRESSURE CLEANING

Pressure washing can give very satisfactory results in car washing provided all of the following conditions are met:

1. The use of 120-130 degree water is essential. The water should be soft. If above 3 grains hardness, the use of a softener should be considered.
2. Pressure of 700-1000 psi with a minimum of 3 gallons per minute is necessary. A 40 degree nozzle is recommended.
3. Sufficient quantity of the right soap. This subject is the primary purpose of this bulletin and we will go into more detail as follows.

It is our honest belief that good soap content is probably the single most important factor in pressure washing. Many units do not clean properly because an insufficient amount of the wrong soap is used. Further, a powder is the only way that low cost can be

maintained. A liquid, for comparable cleaning, will cost 3-4 times as much. Remember, we are talking about cleaning and not just suds. We make thousands of gallons of liquids for brush car washing where liquids are really advantageous, so you see we are not anti liquids.

How much soap to use? Experience has shown that maximum hard surface cleaning is achieved by using a properly formulated powder at an overall use level of 0.10 - 0.20% in the wash water. This range of use will give good cleaning. For economy we will stay at the rate of the 0.1% level. What does this mean to you as an operator? How does this equate with what you are doing?

Let's take an example with a unit that puts out 3 gallons a minute. In 5 minutes that will be 15 gallons or 125 pounds of water. This will require a minimum of 0.125 pounds (1/8 pound) of pure detergent powder. If you have a stock solution of 1/2 pound per gallon, you will have to inject a quart of this solution in five minutes to give the right amount of soap.

We realize that there are a great number of different soap concentrations and injection rates. If you use 2 gallons per minute, you would need only 22 ounces of stock solution. Of course, if you use a less concentrated soap solution you would inject more.

For a great many applications, for reasons of economy and performance, powdered detergent products may be the products of choice.

The use of powdered products can seem like a real problem. If not mixed correctly, the resultant solution will separate and will be lumpy. Possibly you will end up with clogged nozzles. By following these simple directions you can overcome all potential problems and do a great job cleaning with powders.

1. Powders have a limited and definite solubility. Follow instructions for the amount of powder to be dissolved per gallon or per drum of water. Sometimes, if you use too much powder some of the product may not dissolve. Also, a separation of ingredients might occur. Follow the directions given by the salesman. Use measurements and not guesswork.

2. Dissolving powder is simple. SIMONIZ® manufactures powder mixing setups in a variety of sizes. A SIMONIZ® representative will help you choose one that best suits your needs.

One of the most frequently asked questions regarding high pressure cleaning, is whether to use a powder or liquid. The answer is simply that either will work just fine. It is true that some liquids produce a high foam (good customer appeal) and don't clean that well. However, many liquid products do offer excellent

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cleanability. The general rule of thumb is that powders offer the best economy, liquids are more convenient. Powders offer a medium suds level, liquids can be formulated to give higher foam, unfortunately at the expense of cleaning. SIMONIZ® offers a wide range of pressure cleaning liquids and powders.

In order to get a car clean, it is important to maintain the proper soap level. Many operators need a simple way of checking soap strength at the wand, and so we've devised a simple test kit. Use the test kit to control your operation. Some of the most successful operators in the country regard our test kit as their most important

PRODUCT	POWDER/ LIQUID	WATER HARDNESS/ TOLERANCE	SOLUBILITY LIMIT	CHARACTERISTICS
Power Wash	powder	fair	1/2-3/4 lb. per gal.	Excellent cleaning, medium suds
Power Solve	powder	excellent	3/4 lb. per gal.	Excellent in hard water, rinsing and solubility.
Klean Green	powder	good	1/2-3/4 lb. per gal.	Excellent cleaning, medium suds
Special Power Klean	powder	good	1/2-3/4 lb. per gal.	Excellent cleaning, medium suds level, use above 7 grains hardness
Correct	powder	good	1/2-3/4 lb. per gal.	Unique blend of water conditioners, pH builders, surfactants and solvents
Power Plus	powder	fair	1/2-3/4 lb. per gal.	100% active, medium suds
Glide	liquid	good	N/A	Excellent cleaner, presoak. Contains solvents for extra cleaning.
Appeal 100	liquid	good	N/A	Cleans best at 1/ dilution. Medium sudsing
Ultra	liquid	good	N/A	Excellent combination of suds & alkalinity. Unique liquid, can be used in foam brush
Supreme/Hi-Lite	liquid	good	N/A	High suds, OK as pressure cleaning liquids. Excellent foam brush liquids.

Table 7. High Pressure and Frictionless Detergents

tool in maintaining wash quality, and it is available to SIMONIZ® USERS. GET A TEST KIT ... AND GET A CLEAN CAR!

WATER, A RENEWABLE RESOURCE

Water is one of the most abundant substances on the face of the earth. In fact, about 75% of our good earth is covered with water. Until recently, the availability of fresh water, because of this abundance, has never been much of a concern to anyone. However in the last twenty years and especially at this writing, environmental concerns relating to water and its conservation, have become once again important, especially with regard to pollution. Consider the following:

* 97% of the water on our earth is virtually unusable sea water.

* The vast majority of fresh water is tied up in polar ice caps.

* Deep wells, until recently unchangeable, contain vast amounts of the fresh water available to man.

* Only .3% of all the fresh, readily usable water in the world is "at our fingertips".

Now perhaps the urgency of water conservation and treatment begins to become evident, if you take the time to realize that the population of the earth has increased exponentially while the availability of water resources has not changed appreciably. The right place to start learning about water is to investigate the hydrologic cycle.

In the simplest of terms, the hydrologic cycle describes how water, as a renewable resource, runs in a perpetual circle. As water evaporates, moisture vapor begins to ascend into the atmosphere. The higher it goes, the cooler the surrounding air becomes and eventually the moisture vapor precipitates to form tiny droplets of water. When enough moisture vapor collects in one place a cloud is formed. At this point the water is purer than it will ever be again in its natural state. The moisture then comes back to the earth in the form of rain,

where 25 % of it falls back into the ground and 75% of it goes back into the oceans from where it came. As the water falls to the earth, and as it settles into the ground, it begins to become contaminated, and treatment becomes essential.

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This never ending cycle subjects water to an incredible number of opportunities to become contaminated. Water contaminants are as follows:

- *water hardness
- *iron
- *sodium
- *alkalinity
- *sulfates and chlorides
- *petroleum based contaminants
- *organic/chemical contaminants

Water is the most important part of any car wash chemical program. It is wise to continually check on its quality in terms of dissolved mineral matter, suspended matter, and pH.

Dissolved mineral matter is referred to as water "hardness", which is measured in terms of "grains". Total hardness refers to the concentration of calcium and magnesium ions in the water, expressed in parts per million. One grain is equivalent to 17.1 ppm. Hard water can lead to spotting (especially when water droplets are not removed) and scale buildup, especially in alkaline built soaps (typically to those traditionally used in self-service wands, now being employed in conveyorized operations). If your water is above 5 grains of hardness we suggest you make use of one of the following:

1. Use a detergent that contains a high percentage of water softeners. These sequestering agents combine with hardness ions in such a way as to form unassociated soluble compounds that do not precipitate.
2. Water softeners should be employed. These softeners remove calcium and magnesium ions from the water, replace them with sodium ions, which are softer and do not interfere with detergency. This is referred to as an ion exchange. Most self-service operations (again because they make greater use of alkaline built detergents) are forced to use such softeners.
3. Water treatment. Final rinse operations should consider purifying water either through reverse osmosis operations, or deionization units which actually remove calcium and magnesium and replace them with hydrogen ions. The result is a water quality that approaches distilled water. The draw back is that the equipment and processing costs are high. Reverse osmosis units generally are easier to operate and do not produce any effluent that must be backwashed. However, the drawbacks are that typically, it cannot process water above 80 degrees and roughly 50% of the water treated is usable. Deionization units yield 100% of the water

inlet, but require routine backwashing and recharging of the cationic and anionic "beds". Generally speaking, reverse osmosis and deionization units are only used as low volume final rinse.

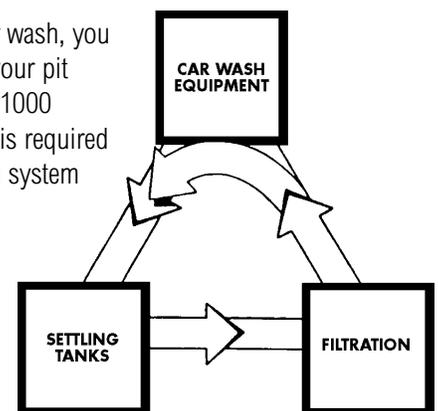
It is important to ascertain the quality of your water and select the water conditioning program based on necessity and economy. Remember, hard water consumes more detergent than is necessary. Soft water uses less detergent. Hard water leads to scale build up, especially in your heating coils, which leads to poor heat transfer and higher energy costs.

In conclusion, for those people on reclaim water systems, it is important to frequently check suspended solids and pH. A simple qualitative check should tell you quite a bit about your water quality. Fill a clean glass jar with some water feeding your brushes. If the water is brown and you can see suspended solids, you might check on your settling pits, filters or the filtration system you are using. If you are simply reusing your wash water without settling or filtering, you must accept the fact that your water will not be that clean or clear. Also keep an eye on your pH level. With whitewall solutions and alkaline detergents being flooded to your pit, the pH will have a tendency to rise. Try not to let it exceed 10.5. If it does you might want to dilute it down somewhat with fresh water.

DESIGNING A WATER RECLAMATION SYSTEM FOR YOUR CAR WASH

When designing a water reclamation system for your car wash, there are a number of important questions that first need to be answered.

1. If it is an existing car wash, you need to determine what your pit capacity is. A minimum 1000 gallons worth of storage is required for any water reclamation system to be affordable.
2. What percentage of water reclamation are you trying to achieve? Realistically, 90% water reclamation would be considered perfect. This is based on the fact that you will have roughly 10% runoff and will need to replenish your system preferably with a final rinse.



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3. How many gallons of filtered water and how many gallons of treated water will be needed per car?
4. What is the average cars per hour and maximum cars per hour to be washed?

Historically, reclaim systems, in the commercial car wash industry have always meant reused water, and the only treatment provided for was the settling that took place in properly baffled pits. As cloth equipment came to replace the plastic bristles in the mid-seventies, the need for "cleaner water" in the wash process became increasingly evident. Cloth brushes had the ability to hold on to suspended dirt particles and oils which affected the quality of the wash. As cloth equipment became more popular, more and more customers went back to fresh water systems.

In the eighties two things happened; first the use of high pressure equipment in conveyerized car washes drastically increased the amount of fresh water needed to wash a vehicle. Much of the high pressure cleaning equipment introduced into the marketplace required fresh water due to the nature of the positive displacement piston pumps supplying them. However, through experience, we found that cleaning a car under high pressure with reclaimed water puts a lot of "dirty water" into mirrors, underneath chrome strips, under vinyl roofs, into door handles, into other areas that make it much more difficult to rinse.

As more and more car wash operators began to employ pressure cleaning equipment into their wash process, the amount of water used to clean a car rose dramatically. This was accompanied in the 1980's with large increases in sewer costs and water usage costs, as well as growing environmental concerns. The need became apparent that water reclamation, filtration and treatment, would be a vital part of the car washing industry in the future, both from an economic and environmental point of view.

There are two levels of water treatment that can be achieved in a continuously operating water reclamation system. The first level of treatment is water filtration. Good water filtration begins with properly baffled settlement pits. By this we mean that water flows from your car wash operation into one settling pit, overflows into a second, and then overflows into a third. Water to be filtered is then drawn from your third compartment. A good water filtration device should remove particles down to 25 microns in size, and filtered water can be used for high pressure cleaning operations, flood arches, and can feed friction equipment as well.

Proper car wash filtration can be otherwise thought of as "pit cleaning". A water filtration system is the ideal way to reclaim wash water in a conveyerized car wash. Filtration is designed to operate

with maximum efficiency and a minimum of failures. It provides a reliable and continuous filtration of suspended solids.

In summary, it is important to remember that proper water reclamation begins with good pit design. Secondly, water filtration to remove suspended particles, can produce "wash quality" water only. Thirdly, oils, detergents, and all suspended solids can be removed to produce affordable water quality suitable for presoaks, detergent and final wax applications.

THE GENTLE TOUCH WASH PROCESS, FRICTION VS. FRICTIONLESS

The last ten years have seen a great transition in the way cars are being washed in conveyerized car washes. What's best for you? Totally frictionless or reduced friction car wash? Either way you win, because washing with less friction widens your market appeal. The Gentle Touch Car Wash Process by SIMONIZ[®], features proper detergent application, high pressure and soft cloth soil removal and Simoniz[®] extra service merchandising. Having operated a totally frictionless car wash, as well as hybrid systems, SIMONIZ[®] can speak from experience.

Our results are clear. We have found that you can improve the quality of cleaning a car by using the proper combination of detergents, dwell time, water temperature, water pressure, rinse pattern and water quality control. We are able to sell a high percentage of extra on-line services through our Simoniz[®] extra service profit centers, which feature genuine Simoniz[®] brand products. By introducing the name Simoniz[®] into the wash process, we have raised the level of consumer awareness and consumer confidence. With Simoniz[®] brand products an operator can apply high quality polymer based waxes, conditioners, and brighteners which revitalize and enhance a car's appearance. A combination of frictionless washing with cloth mitts can give outstanding results. It is more forgiving and the change seems to have immediate customer appeal. Washing totally frictionless does give you greater opportunity for market expansion, but it requires tighter controls, greater promotion and customer education efforts.

STEP I, PERFECT CHEMISTRY

SIMONIZ[®] is the leader in frictionless chemistry research. We have studied the nature of different soils and road film, their attraction to the vehicle's surface and their ability to be removed during different seasons of the year. We have amassed a tremendous amount of data by testing countless formulations under various conditions. Internal factors such as temperature, dwell time, concentration, etc., are critical, but we also found many external factors affected the wash quality as well. For instance, as

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the ambient temperature rises above 60 degrees, it becomes necessary to spray fresh water onto the car to cool down the surface and allow the detergent solution a safe path over the vehicle. Secondly, we found road film much harder to remove after a rain storm. This told us something about the nature of the film itself. Step I is the most critical part of the wash process. There is no one step magic here but rather a unique blend of wetting agents and oil emulsifiers applied in two steps.

STEP II, SOIL REMOVAL

How you remove the soil depends on the operator. SIMONIZ® high pressure cleaning equipment will blast the sides, front, top and rear of any vehicle with high pressure water streams up to a thousand pounds pressure. By leaving a mitter curtain in during this cycle, you will get extra cleaning on the top of the vehicle, which is the most difficult part to clean and will reduce operating costs as well. By leaving friction in the wash process, you will reduce the amount of dwell time needed, the amount of hot water needed, the level of soap concentration and generally speaking will produce a cleaner car.

STEP III, EXTRA SERVICES

SIMONIZ® offers a complete extra service profit center. You can offer your customers the following Simoniz® Brand products, on-line:

- * Wheel Brite
- * Pressure Poly Glaze
- * Poly Sealant, clear coat sealer
- * Poly Creme Conditioner
- * Poly Clear
- * Tire Shine Plus

Remember, the Gentle Touch Wash Process is a combination of proper detergent application, soft cloth and high pressure soil removal and Simoniz® extra service merchandising.

THE MARKETING OF FRICTIONLESS CAR WASHING

Having made the transition from operating (and promoting) an all cloth car wash to a "frictionless" car wash, SIMONIZ® can speak objectively on the customer reaction to this change.

At first, there was a lot of apprehension on the customer's part that his / her car was not going to come out clean. The sensation of having your car washed in a bristle or cloth brush car wash is quite dramatic. One hears the brushes or cloth moving over your car and it "sounds" as if your car is going to come out clean. In a

frictionless car wash, the sensation is less dramatic and thus, the results are less obvious. For this reason, we went to great lengths to communicate to our customers why we made this change. We had to educate them to the advantage of washing without touching because, remember, they were already happy with an all cloth wash service. They were already coming to us. This is important! The day you go frictionless you have to begin promoting the advantage to you customer.

The two advantages that we promoted were 1) high pressure cleaning cleans better, it gets into all the hard to reach places that equipment can't and 2) it is safer. We did not expand on our second point because we wanted to avoid all negativism. After running about two months we were finally getting positive response from our customers. They appreciated the service and we were slowly convincing them of its advantages. Also, we were beginning to see new customers. People who heard we were washing cars without touching them wanted to try our services. Many of these people stated that previous to discovering our new system, they would not use automatic car washes.

The point we are trying to drive home is, that if you go frictionless tomorrow, many of your customers will question your new system and you have to be ready to respond. And the best way to respond is with clean cars and positive promotional material.

CLEANING WITH CLOTH

Delivering a clean and sparkling car at the end of the car wash conveyor is no small feat. The entire process lasts only about 75 seconds. It is imperative then to strike the perfect balance between the chemical and mechanical energy used to insure a clean car. While it is chemical energy (detergents) that penetrate and soften dirt and grime on the car's surface, it is mechanical energy that gently "washes" it away.

Traditionally brushes constructed of polypropylene bristles have provided this mechanical energy. Such brushes do an excellent job of cleaning, and when properly lubricated, will result in a gentle, thorough wash. Recently new methods of cleaning have come onto the scene. Top brushes (or monster brushes) have been replaced by "friction curtains," "dynamiters," "whippersnappers," etc. and cloth brushes have replaced many of the plastic bristle brushes.

Cleaning with cloth presents a much more difficult task for the operator. For the most part wrap around brushes are rotating slower and the "action" of the friction type curtains is not as complete as the more traditional top brush. (In fact, recently there

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has been the emergence of cloth top brushes but at this writing they are too new to comment on.) It is now often necessary to introduce alkaline detergent boosters somewhere into your wash cycle. This can be accomplished by a variety of methods based on the following criteria:

1. Type of wash water used, fresh or reclaim
2. Length of wash rack
3. RPM of wrap around brushes
4. Temperature of water used
5. Quality of water
6. Conveyor speed, amount of wash equipment used, and its relative effectiveness

Introduction of such detergent booster can be accomplished in a variety of ways:

1. Through a chemical pre-spray arch
2. Through a foamer
3. Through a central soaper, dual feed hydrominder or injectors run in parallel

Ask your SIMONIZ® representative to evaluate your cleaning and we will help you determine what is best for your operation in terms of quality and cost effectiveness. Remember, the proof is in the pudding. Our objectives are the same - clean cars at the lowest cost possible and better chemical compounds.

SELF-SERVICE TRENDS

The self-service car wash industry has certainly made great strides in recent years in terms of investment (and its return), cleaning methods and the selling of extra services (or time). We will not attempt to discuss self-service car washing as an investment opportunity, but rather focus our attention on chemical and detergent aspects of self-service car washing and its trends.

The self-service operator generally has a good working knowledge of hard surface cleaning. He has had to concern himself with important cleaning parameters such as concentration, water temperature, water volume, water quality and pressure, in terms of cleaning, and economy.

The self-service operator knows that working pressure of 1200 psi cleans better than 600 psi but not much better than 1000 psi; that 120° water cleans better than 70° water; that the lower water volume, the more affordable it becomes to use the correct soap

concentration and higher water temperature; that sudsing liquid detergents cannot possibly clean as well as alkaline power wash powders; and that in hard water areas (see section on Water, A Renewable Resource) provisions must be made for softening water and a corresponding detergent selection must be made, one that contains a high percentage of water softeners or sequestering agents.

Additionally, two methods of cleaning have been introduced that greatly enhance the self serve value: The low pressure pre-spray and the foam or "bubble" brushes. The low pressure pre-spray cycle is an excellent method of cleaning. Basically this cycle is an application of a low volume, highly concentrated penetrant applied with warm water and allowed to soak or "dwell" on the vehicle before it is pressure-washed off. Such presoaks, when formulated correctly, help to loosen the dirt and road film and are generally neutral in the summer and slightly alkaline in the winter.

Foam brushes are a phenomena that seem to have swept the country. Vended out of a separate boom, these brushes create a high sudsing foam (generally through compressed air) and allow the customer to clean his/her vehicle with a space-age bucket and brush all in one. The following is required when employing a bubble brush:

1. Instruct the customer to wet their vehicle down first. This will cool off the surface (in the summer) and help to avoid any streaking.
2. Select a detergent that not only makes "suds" but provides excellent lubricity. The brush should not drag across the car but rather glide with a minimum of resistance.
3. To insure thorough cleaning, instruct the customer to power wash after use of brush.
4. Make some provisions for winter time use. (See section in Foam Brush, winter use.)

Other services are now being offered or vended on the self-service bays. One of these services is a whitewall tire cleaner / engine degreaser. This is an excellent service that is sold in two forms. First is simply a low pressure, low volume, soak cycle. This is (at this writing) more common and is quite effective. A newer method of applying such cleaner is by use of foam. A foaming tire cleaner / engine degreaser offers advantages such as "cling" (the detergent sticks to the surface it is sprayed on) and greater customer appeal. Again, compressed air is generally required to make adequate foam.

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Waxes are also offered to the customer. These waxes aid in drying by displacing the water and helping to enhance the gloss on the car. Using scented waxes will enhance customer use of such waxes because they will be able to smell it as it is being applied. Sudsing waxes will enhance the saleability of your wax even further by making it more visual. A good coin-op foam wax will look like soap going on the car but will then begin to bead up and roll off the car. With any wax, a final rinse is suggested to rinse off any excess wax.

SIMONIZ® manufactures a full range of self-service products to facilitate all your cleaning needs. We are familiar with your equipment and all different methods used to dispense products. Contact your SIMONIZ® representative and let him assist in selecting the proper products based on all the criteria we have mentioned.

THE EVOLUTION OF THE MULTI-PROFIT CENTER CAR WASH

Just fifteen short years ago, building plans for a new car wash were centered around the tunnel area. The plans usually called for a small area where customers could pay and wait for their cars to be processed. There was no need for a lobby or a waiting area for customers. An operator who would provide a seating area with a coffee machine for their customers' convenience was considered "on the cutting edge".

The car wash lobby is now considered, not just a waiting area for customers, but as another profit center. The car wash lobby evolved into a separate profit center that would carry auto accessories as well as drinks, snacks and greeting cards. This would be the beginning of many car wash sites becoming the multi-profit centers that they are today.

On the car wash sites of today, one runs a gauntlet of services. Car wash owners have added gas, detailing services, quick lubes, windshield repairs, truck retails, dry cleaning, fast food, deli and convenience stores, to name a few of the services you now find on a car wash site.

The evolution of the car wash becoming a multi-profit center location are twofold. The first, it is consumer driven. With most households today being comprised of two working people, there is a premium for time. In the 1980's it was acceptable for a business to offer goods and services at a fair price to succeed. Today that's just not good enough! With the demanding life of today's household, a business needs to offer one-stop shopping. Today's consumer is more likely to frequent a site where they can get more

done in less time, like getting their car washed as they eat lunch and drop off their dry cleaning. The multi-profit center car wash site will create more traffic to all profit centers.

Perhaps the most influential reason for taking a car wash site and making it a multi-profit center is pure economics. With the prohibitive cost of any site that has a high daily traffic count, you can not afford to run just one business from that site, particularly with a weather related business like a car wash. By building a multi-profit center, you will be able to reap profits even on rainy days when car washing is basically still. The other businesses on the site will be ones that will allow you to maximize revenues. With the future trend of the car wash business toward multi-profit center locations, the opportunities for an operator are greater than they have ever been.

THE EMERGENCE OF HAND CAR WASHES

During the past several years the car wash industry has seen the reemergence of the hand wash. Unlike the hand washes of the past, these new hand washes use conveyors in the tunnels and offer all the extra services of a traditional conveyor wash.

Part of the appeal to operators to run such a wash is that a hand wash can provide a competitive edge in an overcrowded and/or highly competitive area. Being the first and, perhaps, the only hand wash in an area usually enables the owner to charge more for their services. Besides an increase in price, in some cases there is actually an increase in clientele. The hand wash attracts customers that have never used a commercial car wash for fear of damage to their vehicles from traditional wash equipment. There is also the factor that customers feel that they are getting a better wash and more attention paid to their cars by the workers who are hand washing their vehicles. It is the principle of getting more for one's dollar.

Operating a hand wash is definitely more expensive than a traditional wash simply because of the manpower involved. Most hand washes will prep a car in the entrance with either pressure guns, presoak arches, flood arches or, in some cases, high pressure arches. Besides prepping the cars in the entrance, some locations will also do the whitewalls and apply the wheel treatment in the prep area.

As the car enters the tunnel after prepping most washes apply the soap with the foamers. After this, the cars are washed by hand and then, if purchased, polish wax is applied, the workers buff it into the vehicle. As the car continues through the tunnel any applicable

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waxes are applied to rinse and shine the car. The vehicle then continues through the blower and is towel dried. Window cleaning and tire dressing may then be applied upon completion of drying the car. Most washes will keep an all-purpose cleaner on hand at the exit to do touch-ups as needed.

Washing cars by hand has many advantages and disadvantages. Some of the advantages can be a competitive edge, higher pricing, less damage to vehicles, new customers and less equipment maintenance. Disadvantages include a higher cost in payroll and dealing with more employees, which can cause many headaches to owners. Because of the high turnover in this industry, it is always hard to find and keep good employees. Proper training and the right chemicals can make the whole process easier. Whatever way one chooses to wash cars the bottom line is that the car must come out clean. Using the following products will help an operator achieve this goal:

Whitewall Cleaner:	CORRECT
Pre-Soak:	BLUE LIQUID PRE-SPRAY
Soap:	SOFT SUDS
Polish:	SILIFOAM
Hot Wax:	POLY SEALANT
Pressure Wax:	POLY GLAZE
Drying Agent:	DRI BRITE
All Purpose Cleaner:	CRUSH PLUS
Window Cleaner:	S.W.C.

COMPUTERS IN THE CAR WASH INDUSTRY: New Technology Impacts The Bottom Line

Computers have emerged as one of the best tools to monitor productivity and profitability at the car wash. First implemented as controls for wash equipment and cash registers, computers in the car wash industry have now evolved into a complete management system. Management now has a wealth of information available at their fingertips to make financial decisions, thereby becoming a more profitable venture. With one key stroke, a manager can instantly examine the productivity of their location and make both day to day and long term operating decisions. Typical reports available would be:

Sales Reports

- Register
- Sales Commission
- Statistical Comparisons
- Register Transactions
- Hourly Performance Breakdown
- Salesman Analysis
- Cars Sold By Hour
- % Extra Sales By Hour
- \$ Sales Per Car
- Car Sold By Salesman
- Cars Buying Extras
- % Extras By Car

Labor/Staffing Reports

- Actual vs. Required Labor Staffing
- Employees Working/Not Working Today
- Time Clock Report
- Labor Cost Per Car
- % Labor To Sales

Customer Tracking

- Customer Frequency
- Customer Survey Responses/Coupon Redemption

Facility Management

- Chemical Usage/Cost Per Car
- Utility Usage/Cost Per Car
- Stock Inventory Reports

By using these reports, an operator or manager can make adjustments at the car wash and have the luxury of having the time to immediately do something about it before it adversely effects the bottom line. The key indicators in such decisions are typically such variables as cars per hour, labor percentages and extra services sold per car. In today's competitive marketplace, you have to be efficient and have information to make educated business decisions. With these computer management systems, owners/operators have the tools to positively impact the bottom line and the decision making capability to be proactive in the marketplace.

Properly Matching Chemicals to Equipment

Recommendations for getting the right result for the right conditions without labor.

Have you ever stopped to think about the fascinating dynamics of modern road grime? You could spend years analyzing the different types and combinations of soil, air pollutants, precipitation, insects, and thousands of other things that can get stuck on a vehicles surface. As a professional car wash operator, you have only one concern; how to get everything off in 3 to 5 minutes or less, with no damage, at a profit margin that makes sense to do so.

Seem challenging? Road grime is just the beginning. Now factor in the daily and seasonal weather changes under which you are expected to produce an identical product inside a semi-enclosed tunnel. It gets better. Every car is a different size at a different temperature, and that's before people start bolting aftermarket items onto the exterior.

Some of you may now be longing for the simplicity of owning a fast food restaurant; working inside a climate controlled environment with known inputs to production. For those of us who find the challenge of car washing fun and invigorating – We'd like to present a brief guide to equipment selection and its placement.

Be forewarned. There are many passionate opinions related to this topic, like deeply guarded and revered company secrets. We will use only generic equipment types and their basic properties, not manufacturer specific technologies or improvements. If we can't think of at least 2 manufacturers that make a similar product then it won't be included in this article. Let's get started.

The Golden Rule of Equipment Selection

Produce a clean dry shiny car with no manual labor for the maximum anticipated wash volume in 3 to 7 minutes, depending on how you plan to compete in the marketplace. It seems obvious but it is impossible to begin selecting equipment without knowing how many cars you need to process during the busiest hour on the busiest day. The equation is simple, how many cars pass your location (car count) multiplied by the percentage you will wash (capture rate). In reality, capture rate can be a tricky number to accurately predict. Average capture rates published by the International Car Wash Association are a good place to start, but how you run and market your business will dramatically impact the actual number. It all comes down to matching your quality, value, and convenience to what you believe is most desired by the demographic profile of the cars passing your wash. A business that is dead on can easily surpass the published capture rates. One that misses the mark can easily under perform, which is what a market economy is all about.

Maybe your entrepreneurial innovation has designed a new wash format and marketing plan that will capture 100% of your daily car count per month. Possibly you have decided that your customer base desires either the speed of service and discount price of an Express-Exterior or the personalized attention and interior cleaning of a Full-Serve wash. Regardless, the site style, combined with pricing, marketing, customer service, visibility, and your skill as an operator will contribute strongly to your actual capture rate and required equipment package.

Next throw in the inconvenient reality of land. We could not imagine attempting a well marketed \$3 dollar-3 minute Express-Exterior with free vacuums on a half acre lot with a 55,000 daily car count. We would anticipate a capture rate and peak volume requiring a larger tunnel than would fit on the property. Once you have

defined the variables that dictate your peak wash volume on your busiest day and evaluated them against the attributes of the land where the wash will sit, you are ready to begin equipment selection. There is not a specific wash package ideally suited to Full-Serve, Flex-Serve, or Express-Exterior. Equipment selection is all about how fast, how clean, how safe, and how much labor, if any, is involved.

The Hybrid Wash Advantage

Brushless, Touch-Free, Soft-Cloth, Touch-Less; there are enough terms floating around to thoroughly confuse customers and operators alike. Many simply try to tell customers that the wash doesn't use obsolete technology common over 50 years ago. All relate to either high-pressure streams of water or some form of material contacting a vehicle's surface to agitate a detergent and remove dirt. With that said we are going to stand behind our disclaimer – this is only how Simoniz® suggests – and say that no wash should use exclusively high-pressure OR friction wash material. There have been tremendous advances in technology with both formats. Either can produce a quality wash. The problem is that each has advantages and limitations. To produce the highest quality wash that is quick and economical, we recommend using a hybrid combination of BOTH technologies in every conveyORIZED tunnel. This leverages the ability of high-pressure to clean within wheels and other grooves while friction materials clean flat surfaces with less detergent, water, and electrical expense. In the same vein of mixing technologies for a better wash we recommend varying the types of friction wash materials within the same wash. Varying the selection of cloth, foam, and soft tufted media throughout the tunnel and even on the same equipment item can produce stunning results. The same logic applies; utilize the best suited technology to clean different parts of the vehicle. The goal is to produce the cleanest, shiniest, and driest car – safely, reliably, and economically – with absolutely no manual preparation.

The Hybrid Wash Process Step-by-Step

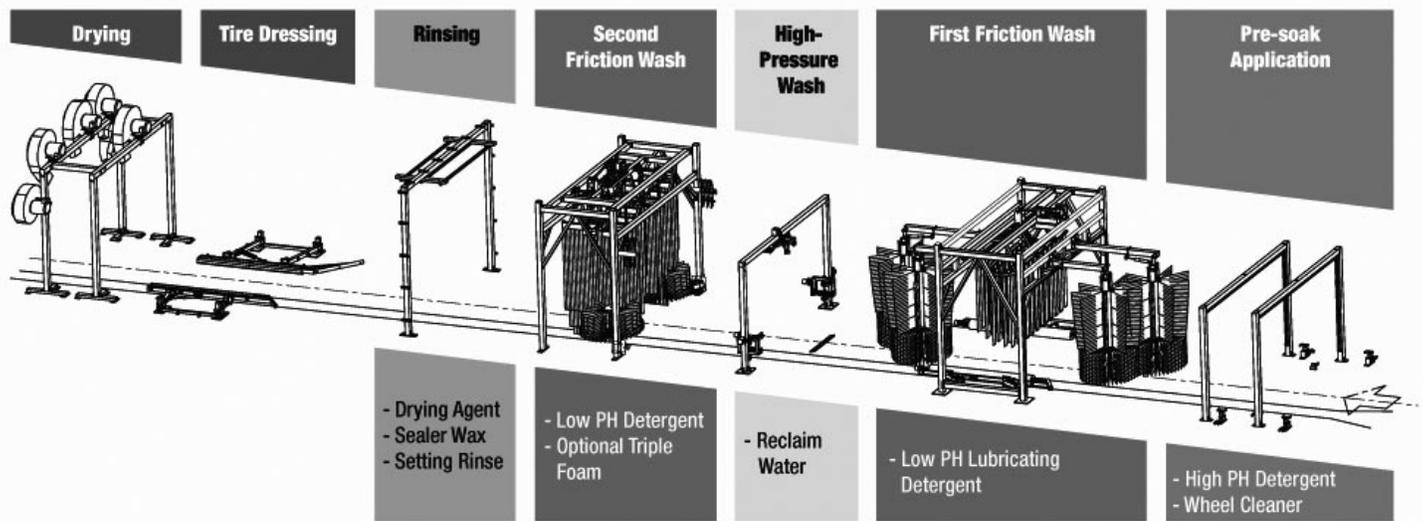
Step 1 - Detergent application: Upon entering the wash the first thing to touch the car is a wet foamed alkaline detergent. The combination of arches and floor mounted applicators required will vary depending on conveyor speed. Simultaneously wheels and tires will receive an application of a non-acidic cleaner. This too should be a wet foamed detergent applied via two floor mounted CTA applicators per side spaced 40 inches apart.

Next, a second application of a foamed low PH lubricating soap is applied immediately before the first friction wash component. This is commonly a mitter or wrap-around washer and often the foaming applicator is attached to the entrance of the wash unit. Lubrication of the wash material is vital. If your low PH detergent does not include a lubricant, then you must apply one separately. Three reasons support my preference for foaming all detergent. First, you can visually monitor that all areas that are covered. If the detergent does not reach a specific section such as the front and rear license plates, that area will not be properly cleaned no matter what equipment you use. Second, a properly applied wet foam detergent will drag dirt off the car even before the first equipment item touches the surface. Third, the lubricated detergent keeps friction wash media moving smoothly over surfaces for a safer wash. Developing a close relationship with your selected chemical supplier is vital. Ideally, the representative will function like a trusted member of your staff, tailoring detergents to your road grime considerations.

Step 2 – The First Friction Wash: After detergent and lubricants are applied, the vehicle will enter the friction wash. This increases the dwell time, agitation, and cleaning performance of the initial detergents before they are removed. It is important to note that modern wash materials do not hold dirt and that equipment is engineered to constantly flush the material with either fresh or reclaim water. The quantity and type of wash components is directly related to the type of dirt and maximum conveyor speed. This topic will be expanded upon later. Regardless of conveyor speed, all vehicle surfaces must receive at least one friction cleaning action before leaving this first phase of the friction wash. Additionally, it is recommended to always include at least one set of wrap-around washers. These can be mounted in either a standard or reverse configuration emphasizing rear or front surface cleaning respectively. Other products exist in the market to clean front and rear surfaces but it is difficult to get a complete result without at least one set of wraps.

Step 3 – The High-Pressure Wash: This is the turning point of a hybrid wash. Emphasis will slowly shift from the wash process and begin preparing the surface for rinsing and drying. Flat surfaces of the vehicle are relatively clean. A healthy application of both high and low PH detergents has had ample dwell time to break the bond of road grime to the paint. The action of the friction wash media has moved detergent extensively, forcing it into grooves and crevices. Placement of the high-pressure wash system after the initial friction wash allows it to easily strip the loosened dirt. Simultaneously, a system of appropriate strength and placement for the conveyor speed will blast the mix of low and high PH detergent from all parts of the vehicle including mirrors and other troublesome crevices. Stripping all alkaline detergent is critical. It will hinder the rinsing and drying process.

Step 4 – The Second Friction Wash High-Pressure Wash: The function of the second friction wash is twofold. The motion of the wash equipment and type of media used should be different than that in the first friction wash. This will provide alternate cleaning actions to remove any residual dirt that was missed by the previous components. Secondly, foamed detergent applied during this stage will have a low PH. Upon leaving this final stage of the hybrid wash process the cleaned vehicle surface is prepared for efficient rinsing and drying.



Exceptions to the Hybrid Wash Process

Except during extreme weather conditions involving snow, ice, or mud, it is unnecessary and costly to pre-wash vehicles with high-pressure before entering the first friction wash cycle. Those conditions are periodic. If they exist for parts of the year at your location it is necessary to include a pre-wash capability, but it is only activated when the conditions demand. We are sure there is someone out there operating in a climate where days requiring a pre-wash greatly exceed those that don't. We will stand by our recommendation to pre-wash as the exception, not the rule. Pre-washing increases the consumption of electricity, detergent, and water, resources becoming increasingly expensive. Now a brief look at some common exceptions:

- *Regions with Heavy Mud, Ice, or Snow:* Regions with these characteristics will want to examine a supplemental application and pre-cleaning process. Prior to entering the foaming pre-soak applicator arch or system, vehicles should be cleaned with a high-pressure wash system emphasizing wheel wells and lower surfaces. It is imperative that the water is infused with an alkaline detergent that matches the PH of the first detergent application. This will prevent excessive dilution of the first pre-soak application which will disrupt the wash quality.

- *Regions with Heavy Bug Seasons:* Seasonal bug removal requires the same detergent infused high-pressure pre-cleaning involved for heavy mud, ice, or snow, though focus should be concentrated on the front grill and windshield. Additionally the vehicle will require an application of what is commonly referred to as “Bug Juice” before the pre-wash. This application can occur via a combination of floor and arch mounted applicators triggered before the photo-eyes. Another option found at some express-exterior locations are bug wash stations where customers can apply the solution themselves with a supplied brush. Using an attendant is a viable, but a costly option as well.

Complete Rinsing

When done correctly, the primary drying of a vehicle occurs while rinsing. The standard process is to apply a drying agent, followed by a sealer wax, with a final setting rinse of either fresh or spot-free water. This is another area where you will want to involve the assistance and specialized knowledge of your chemical supplier. The objective is twofold. First, remove all detergent from the surface, grooves, and mirrors so it does not spill out during drying. Second, bead the water so it breaks in large pools and runs off the car to begin the drying process. Rinsing, like everything in an automatic car wash, is dramatically affected by conveyor speed and water quality. Softeners and other equipment are available to correct water problems, and some types of chemicals work better with different water conditions. At slower conveyor speeds, rinsing is often handled by a series of manifolds that stream water like rain over the surface. This rinsing method breaks the bond the water has to the surface and helps it bead and flow. Additionally it doesn't produce mist that can get circulated by air dryers which is highly counterproductive. Faster chain speeds will require additional rinsing to strip excess detergent before entering a rain system. Normally powered with a pumping system, these products can be targeted at trouble areas such as mirrors, rocker panels, the entire vehicle, or all of the above depending on conveyor speed and the placement of your high-pressure wash components and detergent application.

Drying

Drying a car is easy. Drying a car with minimal electrical consumption at fast line speeds in a compact space is difficult. Add in the sound restrictions imposed by many municipalities. Now consider the limitations of your available electrical service along with changing requirements as temperature varies, and drying becomes a much more challenging task than it may have first appeared. Like high-pressure washing, results are directly related to conveyor speed. Many different blower designs are available. Some disperse air via a manifold to remove water from large flat surfaces, others direct a strong jet of air which covers a smaller area but delivers the force necessary to strip water out of grooves. Mixing blower types and power ratings is frequently necessary to provide complete surface coverage with enough strength to remove water from inside crevices. The optimal angle of the producer will also vary depending on conveyor speed. Look for products that have some ability to adjust to changing conditions. Although there is no perfect rule, plan for approximately 1 HP per car per hour for your peak anticipated volume.

Extra Online Services

Extra services can refer to anything not included in a wash's base exterior package. The variations on wheel cleaning packages, under carriage treatments, and other applications are endless. For brevity I'm going to highlight three of the most common and requested services; tire dressing, triple foam conditioner, and most recently, pay waxes & glass treatments.

Tire Dressing: The foundation for a good tire dressing is a clean tire. I referenced tire and wheel applicators above and high-pressure washers that clean out wheels, but the tire itself is most commonly cleaned with a horizontal tire brush. Some new brush designs available from several manufacturers have recently increased the scope of this unit's ability to deliver good wheel cleaning as well. Once you have a clean tire, automated online dressing machines are readily available. Tire dressing will either be wiped or sprayed on as the vehicle passes the unit, most commonly installed in the drip space between the final rinse and dryers.

Triple Foam Conditioner: The popularity of this service stems from the fact that a customer can see that they are receiving a special application even in the absence of signage. A powerful up-sell, triple foam conditioner is normally applied via a free-standing arch or foaming attachments. Its placement in the wash is constantly evolving. Traditionally it was located just before the final cleaning action immediately before rinse. This setup presents some difficulties in completely removing the conditioner and some operators have moved it earlier in the wash.

Sealants & Glass Treatments: The principle of this service is to provide a complete exterior coating that protects both the paint surface and glass. Your supplier should provide a separate application system with excellent signage to promote the service to customers. Your supplier should also supply proof or at least offer a warranty that the sealant or glass treatment actually works.

Guideline for Hybrid Equipment Selection

Here are some very generic guidelines for the minimum recommended cleaning actions to each surface and the required conveyor length to produce a clean, dry, shiny, car at each corresponding speed. Many options exist from the various equipment manufacturers to accomplish each item. The critical aspect when selecting equipment is to mix motion and wash media. If the conveyor speed dictates 2 top surface actions, they should be different. One might be rotational, the other side-to-side. If you do select two similar motions, then one should incorporate a flat cloth and the other a plush material or closed cell foam. Equally many options exist within high-pressure wash units. When choosing these components you will want to evaluate surface coverage and impact. Let's get started with the minimum guidelines:

Chain – Speed Cars per hour	Friction Top Surfaces	Friction Wrap-Around	Friction Side Washers	High-pressure Side/Wheel	High-pressure Top Surfaces	Rear Wheel Push Conveyor	Front Wheel Pull Conveyor
60 C.P.H.	2	1	1	1	-	70 feet	60 feet
90 C.P.H.	2	1	1	1	1	95 feet	85 feet
120 C.P.H.	2	2	2	1	1	120 feet	110 feet
150 C.P.H.	2	2	3	2	1	145 feet	35 feet
180 C.P.H.	3	2	3	2	2	170 feet	160 feet

**Assumes 17 foot average vehicle length with 3ft 6in roller spacing where chain speed = approximately the cars processed per hour*

The relationship between conveyor length, chain speed, and number of cleaning actions is relatively straight forward. The faster the chain speed, the less contact time the vehicle has with each equipment item. This in turn necessitates a longer tunnel with more equipment to produce the same result. The numbers above approximate the minimum tunnel length and wash actions to produce a clean, dry, shiny car without the need for manual prep in approximately 2.5 minutes. It assumes a well tuned hybrid equipment package in good repair. In most express-exterior and flex-serve locations the chain speed is set and seldom if ever changed. Customers at these formats are often promised a 3 minute wash and expect a consistent product. For many full-serve operators this may seem like a strange concept. The predominant practice at these washes is to constantly change conveyor speed depending on wash volume. Developing a rhythm to speed up or slow down the wash to match traffic has a strong argument. Slower conveyor speeds increase detergent dwell time and friction contact time for a better wash. When properly managed, this practice has a place, especially at existing locations that experienced a rapid market expansion. Land restrictions don't always permit a tunnel long enough to accommodate the peak wash volume.

Common Tunnel Equipment Items

Friction - Top Surface Components: The two most prevalent technologies are "Mitters" and "Top Brushes". Mitters were originally designed to simulate a human hand washing a car with a mitt that moves back and forth over the vehicle surface. They are very gentle and available in front-to-back, side-to-side, circular, and diagonal

movements. Top Brushes feature a balanced or weighted rotating hub that spins as it contours the car passing beneath. Recent improvements in wash materials and automated retract capabilities have dramatically improved upon the safety of this very effective cleaning technology.

Friction – Wrap Around Washers: These highly effective washers clean all vertical surfaces of a vehicle. They feature two slightly overlapped rotating washers that wash the front of the vehicle as it passes through. Slight pressure keeps the brushes in contact with the sides of the vehicle before moving in together to clean rear vertical surfaces.

Friction – Side Washers: Rotating brushes that clean the side of cars. Various heights and angles are available to provide concentration to different side surfaces. Shorter units will often focus on lower rocker panels while taller units can reach the tops of the highest SUVs.

High-Pressure – Side Washers: These washers blast high pressure streams of water at side surfaces and wheels. Many variations exist that are either stationary or feature some combination of spinning, oscillating, or pivoting movement. The spray pattern is normally very compact and preferably at zero degrees for greatest impact. When evaluating systems it is vital to consider conveyor speed. The simplistic guide above indicates an approximate number of manifolds, but as speed of vehicle travel increases you must combine this with the total number of nozzles, their movement, and the pressure of the water. Try to imagine a car passing by an oscillating stream of water. If the car is moving slowly it may perform well. If conveyor speed is increased and the coverage or speed of oscillation is not sufficient, you will have one clean stripe down the side of an otherwise dirty surface.

High-Pressure – Top Washers: As with high pressure side washers, there are many excellent choices on the market and the same considerations apply. Often mounted to an overhead arch, these washers feature a varying number and type of moving nozzles that blast high pressure streams of water at top surfaces. It is important to match surface coverage and impact with the maximum conveyor speed you anticipate running. It is common to use reclaim water in many high-pressure wash applications.

Summary

There are many approaches to getting a clean, dry, shiny, car with little or no manual labor. When selecting wash equipment always start with the car count and anticipated capture rate at the facility. The most important consideration is guaranteeing that your customers will receive a consistent product in a consistent time. Simoniz® has the opportunity to meet and work with hundreds of tremendously successful car wash owners all across the country. Many have drastically different equipment packages and approaches to washing a car. What they all share in common is the desire and dedication to put their customers first.

This article was written with the help of Anthony Analetto who is the Chief Operating Officer of SONNYS The Car Wash Factory and one of the company's driving forces behind new car wash equipment innovations. Prior to joining SONNY'S, Anthony was the director of operations for a national car wash chain featuring 74 locations across the country

ROLLER/CONVEYOR LENGTH CHART

Conveyor Length (feet)	Roller Spacing			
	3' 6"	5'	7' 4"	15'
30	18	12	9	4
35	20	14	10	5
40	23	16	11	6
45	26	18	13	6
50	29	20	14	7
55	32	22	16	8
60	35	24	17	8
65	38	26	18	9
70	40	28	20	10
75	43	30	21	10
80	46	32	22	11
85	49	34	24	12
90	52	36	25	12
95	55	38	26	13
100	58	40	28	14
105	60	42	29	14
110	63	44	31	15
115	66	46	32	16
120	69	48	33	16
125	72	50	35	17
130	75	52	36	18
135	78	54	37	18
140	80	56	39	19
145	83	58	40	20
150	86	60	41	20
155	89	62	43	21
160	92	64	44	22

HOW TO CALCULATE ROLLERS / CONVEYOR

Length of Conveyor X 2 / Roller Spacing = # of Rollers per Conveyor
(Round up to the next whole number)

EXAMPLE: 45' X 2 / 3' 6" = 25.71 or 25 rollers

HOW TO CALCULATE CHAIN SPEED IN CARS PER HOUR

(3600 Seconds per hour) / (Seconds / 20 feet of chain travel) = Chain Speed in Cars/Hour
(Round up to the next whole number)

EXAMPLE: 3600 seconds in 1 hour / 40 seconds for chain to travel 20' = 90 cars per hour

Topics Of Interest To Good Car Wash Operations —

TRANSPORTING HAZARDOUS MATERIALS

The Federal Department of Transportation has specific guidelines regarding the shipment of Hazardous Materials. Hazardous Materials are materials which have been determined to be capable of posing an unreasonable risk to health, safety and property when transported in commerce. What follows is a brief overview on our distributors' responsibilities when they ship these materials.

How To Determine If A Product Is A Hazardous Material?

All products you buy from SIMONIZ® USA are shipped according to D.O.T. regulations. To determine if a product is hazardous, see the enclosed sample bill of lading. Find the column marked HM. If there is an X in this column, it means that that product is a hazardous material. The description following the X is the official D.O.T. required description for this product. This description is the one you should use on your bills of lading when you reship this product. These descriptions are typically in 3 parts. The first part tells you the type of container and the D.O.T. proper shipping name for this product. The second part tells you the hazard class, the identification number and the packing group for this material. The third part is the product name as it appears on the label. This makes it easier to identify containers in an emergency.

Additional Requirements For Placarded Vehicles

The D.O.T. now requires that drivers of placarded vehicles must have a CDL type drivers license with a hazardous materials endorsement. Your state motor vehicle department can tell you how to obtain one and what special training may be required.

Shipping Hazardous Materials

In order to ship hazardous materials, D.O.T. requires that you do all of the following:

Bills Of Lading: All orders must be accompanied by a bill of lading with the proper hazardous description, the name and address of the shipper and consignee and as of Dec. 31, 1990, a 24 hour emergency contact number so that a responsible party may be contacted in case of a spill or accident. (See example on page 90.) All hazardous materials shipped by common carrier also require a "Shipper's Certification", stating that the materials are properly classified, packaged and labeled and are in proper condition for transportation, which is signed by the shipper.

Packaging: All products you buy from SIMONIZ® are in packaging authorized by D.O.T. If you repackage any of our products, make sure the packaging you use is DOT authorized for that specific material.

Labeling: D.O.T. has various labeling requirements for hazardous materials. Flammable and corrosive materials are required to be marked with the D.O.T. flammable or corrosive label and the D.O.T. hazardous description. Combustible materials are not required to be marked unless they are in containers larger than 110 gallons.

Placarding: The following are D.O.T. truck placarding requirements for the three main types of hazardous materials that SIMONIZ® produces.

Flammable Liquids: All trucks carrying 1000 pounds or more of D.O.T. flammable liquids must have flammable placards. (See also Dangerous) .

Combustible Liquids: Trucks carrying combustible liquids must be placarded only if they are in containers larger than 110 gallons.

Corrosive Materials: Trucks carrying 1000 pounds or more of corrosive materials must be placarded corrosive. (See also Dangerous) .

Dangerous: Trucks carrying mixed loads of flammable and corrosive materials of more than 1000 pounds but no more than 5000 pounds may be placarded Dangerous. Amounts greater than 5000 pounds must be placarded separately.

General: The rules and regulations above are Federal D.O.T. regulations. Your state or municipality may have other regulations regarding the transportation of hazardous materials. For example, many authorities in charge of tunnels and bridges may restrict the transportation of hazardous materials. Driver licensing regulations may require that your driver pass a test on hazardous material transportation. Although SIMONIZ® products are sold all over the country, we cannot possibly keep up on every municipality's rules and regulations so you may want to consult someone in your locality regarding regulations in your area.

CAR WASH CUSTOMER PROFILE STUDY

No matter what business you're in, you can't be successful without understanding your customer, and car washing is no different. In 1988 the International Car Wash Association commissioned a study to develop a better understanding of the driving public who utilize the commercial car washes. The results of this study are quite fascinating and should help any car wash operator or manager in their effort to attract a broader customer base.

Topics Of Interest To Good Car Wash Operations

3/28/2007 3:15:34 PM		SIMONIZ® USA, Inc. 201 Boston Turnpike Bolton, CT 06043 860-646-0172 · 800-227-5536 FAX 860-646-0691		STRAIGHT BILL OF LADING Page 1 of 1		BL DATE 3/8/2007	
		ORIGINAL		BL NO. 145590			
Any Company Name Any Street Anyplace, USA 00000		Simoniz® USA, Inc. 201 Boston Turnpike Bolton, CT 06043 800-227-5536					
CUST. NO.	SALES AG.	OPERATOR	REQ. NO.	SHIP VIA	TERMS		
249000	360	D.Simo		Our Truck	Net 30		
CUST. ORDER NO.	SHIP DATE	WHSE	FREIGHT	FOB REMARK	DATE	CHECKED BY	
308	3/28/2007	001	0	BOLTON, CT			
QUANTITY ORDERED	QUANTITY SHIPPED	PACKAGING	HM	DESCRIPTION	GROSS WEIGHT	CHARGES	
		BACKORDER					
		732-254-3100, EXT. 279 - DERYL					
		****deliveries must be made on thursdays between 7-9 AM ONLY.....****					
36	36	5 @ Pails	X	Compounds, Cleaning, Liquid (Contains Sodium Hydroxide) 8 Corrosive, NA1760, PGIII 24564005 Z Strip	1620	0	
		Part 1. Type of container and D.O.T. shipping name				Part 2. Hazard class, identification number and packing group	
36	36			Total Weights (LDC.):	1620		
				Part 3. Product name as it appears on label.			
MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS CLASS 65 CLEANING COMPOUNDS							
I, the shipper, warrant that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.		I, the consignee, warrant that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.		I, the carrier, warrant that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.		IN THE EVENT OF HAZARDOUS MATERIAL SPILL OR ACCIDENT, FOR 24 HOUR EMERGENCY INFORMATION CALL CHEM-TEL AT 1-800-368-3324	
SHIPPER		CARRIER		COD \$			
SHIPPER SIMONIZ® USA, Inc.		PLACARD'S OFFERED DRIVER PLEASE INITIAL		PLACARDED NAME OF PLACARD		Freight charges are PREPAID unless marked collect	
PER		AGENT				Check Box If charges are collect <input type="checkbox"/>	
201 BOSTON TURNPIKE BOLTON, CT 06043 860-646-0172 Permanent post-office address of shipper		PER		TOTAL NO. OF PACKAGES REC'D.		KEEP FROM FREEZING	

Table 8. Sample Bill Of Lading

Topics Of Interest To Good Car Wash Operations —

* Almost all drivers wash their vehicle, in fact only 4% of those surveyed never wash their car.

* 61% of those people who wash their car, use commercial car washes, and 39% wash at home only. However, a further breakdown of the 61% reveals that 44% use a combination of both home washing and commercial car washing and 17% use commercial car washes only.

* Most drivers wash their cars at least once a month (78%).

* Almost 3/4 of the washing public have tried self-service, coin operated and exterior conveyor car washes, while only 58% have ever tried a full service conveyor, 44% a roll-over, and 39% a high pressure spray automatic.

* Younger drivers are more likely to combine usage of car washes and home washing than older drivers.

* Lower income drivers are about as likely to use car washes as drivers with higher income levels.

* Males were almost as likely to wash their cars at a commercial car wash as female drivers.

* Self-service car washes are frequently used by younger drivers (under 35). Older drivers are more likely to use conveyor type or full service car washes.

* Self-service car washes are more popular with lower income drivers (under \$25,000) .

* Full service conveyor operations are more popular with higher income drivers (\$40,000).

* Men are more likely to use self-service car washes than women.

* Woman are more likely to use exterior conveyors.

* Car washes are most frequently used in the winter followed by the summer season.

* Full service users are more likely to use a car wash evenly throughout the year.

* Almost 3/4 of both full service and self service car wash users use a car wash near their home.

* Full service, conveyor type car washes were rated higher by their users on cleaning ability over exterior conveyors, roll-overs and high pressure automatics.

* Most car wash users travel three miles or less to the car wash they use most often, however, full service car wash users are more likely to travel ten miles or more to their car wash of choice.

* Almost all drivers believe that their car wash does a good job cleaning their car.

* Full service car washes are perceived as being reasonably priced and doing an excellent job of cleaning, However, self-service, coin-operated car washes are perceived as being even more reasonably priced and cleaning is a foregone conclusion.

* Full service car washes are thought of as having very high quality and value, exterior conveyors are best known for being reasonably priced with good quality. Roll over or high pressure spray automatics are best known for being reasonably priced.

* Most full service car wash users prefer to wash their car someplace other than where they buy gas (61%), while one in four prefer the same place (24%).

* People with lower incomes are more likely to buy gas and car washes at the same place.

* The most popular extra services are:

1. Under carriage wash (22%)
2. Polish wax (17%)
3. Sealer wax (16%)
4. Interior fragrance (13%)

* The most important services offered at self-service car washes are change machines, coin-operated vacuums, and foam brushes. The least important are air fresheners and air for tires.

* About half of the full service users are equally concerned about the exterior and interior of their car, while the other half is more concerned about the exterior only.

* Most self-service users spend twenty minutes or less at the car wash (69%) .

* The average amount spent at a self-service car wash is \$2.39 (nationally) .

Topics Of Interest To Good Car Wash Operations —

* Among nonusers of car washes, the more common reasons were; too expensive (34%), "I can do a better job" (27%), easier or more convenient to wash at home (23%), car wash ruins finish / paint (19%), "I enjoy washing the car myself" (18%).

* What would prompt full service car wash users to use your car wash frequently? Lower prices (22%), better or more convenient location (16%), improved cleaning (10%)

* What would prompt your self-service customer to use your car wash more often, Lower prices (18%), and better or more convenient location (11%).

CLEAR COAT FINISHES

Base coat / clear coat painting is the modern day way that cars are now painted. Rather than the old single layer of lacquer or enamel color coat, auto manufacturers now use two layers of paint on most of their models. The base layer contains the pigment or color, and the top layer is a clear coat of acrylic polymer, which brings out the brilliance of the color and gives a glossy, mirrorlike finish. The principle is similar to a mirror; the clear coat functions like glass.

With single coat finishes, the paint was exposed to the atmosphere, so sun, water, wind and dirt accelerated the degradation of the color. With clear coat finishes, the color is not exposed to the atmosphere, so the desirable characteristics of the finish last longer. Clear coat finishes also require less maintenance, but like all paints, they are susceptible to abrasives, which will scratch the finish or give it a hazy appearance, reducing both its gloss and imaging qualities.

The only bad news with regard to clear coat finishes, is that if you get a scratch or chip in the finish, and it's a deep one, you will probably have to seek expert repair advice on how to keep it looking good and to avoid exposing bare metal to the elements. Driveway touch ups on clear coats are a thing of the past.

Aside from the fact that the newer, after market paint system, designed for these base coat/clear coat finishes, often contain toxic chemicals in their formulation, it's much more difficult to apply them properly. Blending a new base coat over an old original, clear finish and then blending the new clear coat over both of them, is difficult for even a full time professional in a proper spray booth. It used to be that you could sand down a minor imperfection in the middle of your repair and continue on. Now the only alternative is wait until tomorrow, sand the whole mess off the side of the car, and start over again.

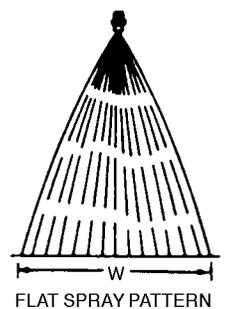
Here are some tips to properly maintain a clear coat finish.

1. Always wash with nonabrasive cleaners and waxes. If using reclaim water, make sure that your water is filtered to avoid any grit which might impair the clear coat layer. Also, if part of a friction wash, make sure that all of your friction equipment is fed with plenty of soap that has a lot of lubricity.
2. Keep all your cloth as clean as possible.
3. Clear coat finishes need not be polished as often as a lacquer or enamel because they don't oxidize as easily. When you do polish it (once or twice a year), use a mild cleaning wax not an abrasive. Also, polish by hand, if possible and try to avoid high speed buffing.
4. Avoid mechanical polishing or sanding of the surface.
5. Park and drive wisely. Try not to park under trees where bird droppings or sap, which contains compounds that can injure the finish, may fall onto your car. Try to park upwind from an industrial area. If you get cement or dust or fly-ash on your car from any fire or smoke stack, rinse it off immediately. When you drive, go easy on the gas pedal to keep stones from flying up and chipping the paint during quick starts. When traveling on dirt or gravel roads, put some extra distance between you and the car ahead, to avoid running into stones thrown into the air by that car's tires.

It is important for you and all your employees to understand what clear coat finishes are and to have educated answers for your customers when they come in and ask if your car wash is clear coat safe. Many new car dealers have put false ideas into new car owners' minds, that commercial car washes are not necessarily good for clear coat finishes. This could not be any further from the truth and you must make sure that you have all the information at hand so that you can reeducate your customer properly.

PROPER SPRAY NOZZLE SELECTION

The proper selection of spray nozzles is a very important consideration for the car wash operator. In a conveyerized car wash, nozzles that are too large result in a waste of the wax or soap. Nozzles that are too small can result in a brush that is too dry, possibly hazing or scratching a car's finish.



Topics Of Interest To Good Car Wash Operations —

FLAT SPRAY TIP CAPACITY										
ORIFICE	GPM (Gallons per minute) at p.s.i. (pounds per square inch)									
CAPACITY 40	100	200	300	400	500	600	700	800	1000	
SIZE	p.s.i.	p.s.i.	p.s.i.	p.s.i.	p.s.i.	p.s.i.	p.s.i.	p.s.i.	p.s.i.	p.s.i.
--04	.40	.63	.89	1.1	1.3	1.4	1.6	1.7	1.8	2.0
--05	.50	.79	1.1	1.4	1.6	1.8	1.9	2.1	2.2	2.5
--06	.60	.95	1.3	1.6	1.9	2.1	2.3	2.5	2.7	3.0
--08	.80	1.2	1.8	2.2	2.5	2.8	3.1	3.4	3.6	4.0
--10	1.0	1.6	2.2	2.7	3.2	3.5	3.9	4.2	4.5	5.0
--15	1.5	2.4	3.4	4.1	4.7	5.3	5.8	6.3	6.7	7.5
--20	2.0	3.2	4.5	5.5	6.3	7.1	7.7	8.4	8.9	10.0
--30	3.0	4.7	6.7	8.2	9.5	10.6	11.6	12.5	13.4	15.0
--40	4.0	6.3	9.0	11.0	12.6	14.1	15.5	16.7	17.9	20
--50	5.0	7.9	11.2	13.7	15.8	17.7	19.4	21	22	25
--60	6.0	9.5	13.4	16.4	19.0	21	23	25	27	30
--70	7.0	11.1	15.7	19.2	22	25	28	29	31	35

Table 9. Flat Spray Tip Capacity

SEE APPENDIX FOR COMPLETE NOZZLE LISTING

All above flat spray tips are available with spray angles of 15°, 25°, 40°, 50°, 65°, 80° and 95°. Dash lines in table above (as in --04) indicate space for digits to identify spray angle such as "15" in 1504.

Distance Away	15° Series	25° Series	40° Series	50° Series	65° Series	80° Series	95° Series
At 6" distance	2"	3"	6"	7"	8 1/2"	10"	11 1/2"
At 12" distance	4"	6"	10 1/2"	13"	16"	19"	21"
At 24" distance	6 1/2"	10"	17"	22"	27"	32"	37"

Table 10. Nozzle Spray Coverage – Approximate minimum spray coverage "W" in inches at various spray distances for flat spray nozzles --04 through --70 capacity operating at 300 to 600 psi.

In a pressure system, nozzle size and angle are absolutely critical to satisfactory performance. It is the nozzle that predetermines the pressure.

We are stocking distributors for Spraying Systems Co. and we have many hundreds of the more popular nozzles now in stock for your needs. Others can be obtained quickly. Listed below are some interesting facts about spray nozzles. Let us help you with your needs.

You must specify angle and orifice size: A 4004 nozzle would spray at 40 degrees and would deliver 0.40 gallons at 40 psi, 1.4 gallons at 500 psi, etc. A 4040 nozzle would spray at 40 degrees, 4 gallons at 40 psi, 14.1 at 500 psi, etc.

Use stainless for pressure systems and corrosion resistance. Use brass for pressures of 100 pounds or less for wax, water, etc.

ACID RAIN

What Is It?

Where Does It Come From?

What Are Its Effects?

How Will We Be Affected?

The subject of "Acid Rain" is now one of the most widely publicized environmental issues of the day. If you have not heard the term "Acid Rain", I would respectfully conclude that you have not read a newspaper, a business journal or a news magazine in quite some time. But to my surprise, while many people may have heard the term, there seems to be a great lack of knowledge about what it really is, where it comes from, what its effects may be, and what can be done about it. Because of this, we thought that this might be a good time to discuss the subject.

I suppose that to start with, before we get too far into our subject, we ought to explain what is meant by the term "Acid Rain." And before we can do that very well, we have to define the term, acid. And we will do so by using a term familiar to many of you (even if it is not fully understood). Chemists have devised a simple number and scale, running from 0 to 14 that we use to

measure the "hydrogen ion concentration" of a liquid. I am not going to go into the reasoning that gives us this scale as that is beyond the scope of this article. Suffice to say, that this scale is called a pH scale. And further, liquids with pH of 7 are considered neutral. Liquids with a pH above 7 are considered alkaline. The higher the number above 7, the more alkaline with a maximum being a pH of 14 for highly caustic solutions. Similarly, a pH of below 7 is considered acidic, with liquids with a pH of 0 to 1 being considered of maximum acidity. Now, ordinarily we like to think of pure water as having a pH of 7. And it does many times. But scientists have also found that pure distilled water, if allowed to, will absorb carbon dioxide from the air. In doing so, the water becomes slightly acidic with a pH of 5.65. So other scientists deduced that rainwater, if it absorbed nothing else, could absorb enough CO₂ from the air as it fell to the ground to reach a maximum low pH of 5.65. And environmental scientists have decided, that since naturally occurring rainwater could have a pH of 5.65, any rainwater that had a pH of less than 5.65 would be considered an Acid Rain. And that is the definition of Acid Rain. It is rainwater with a pH of less than 5.65.

Topics Of Interest To Good Car Wash Operations —

The next question might be "How does the rainwater ever get to be less than 5.65?" "What is doing it?" And the answer is quite simple. The rainwater is absorbing from the air. Out west, the rainwater might absorb some alkali dust and actually have an alkaline pH by the time it reaches the ground. In the Eastern United States, and in similar industrial areas of the world, the rain can absorb certain pollutants, become acidic, and yield an Acid Rain. These pollutants are primarily the oxides of sulfur and the oxides of nitrogen. For ease of use, we will use the term SO_x for the oxides of sulfur, and the term NO_x for the oxides of nitrogen. Rainwater becomes acidic because it absorbs the gases NO_x and SO_x.

Where do these oxides come from? A good deal of it comes from naturally occurring sources over which we have little or no control. Natural sources of sulfur emissions would include sea spray which contains sulfate salts which enter the atmosphere. Decaying animal and vegetable matter also give off sulfur gases. The smell of rotten eggs is the characteristic odor for hydrogen sulfide. Forest fires, volcanic eruptions, hot springs, etc. are other typical examples of naturally occurring sulfur emissions. At one time, it was thought that these naturally occurring sulfur emissions were the major source of SO_x pollution. But today, it is believed that naturally occurring sulfur emissions account for about 1/3 or less of the worldwide total. The other 2/3's are the rain caused emissions.

This is the area that is now receiving the attention of governments and citizens alike. The emissions are the result primarily of coal and oil fired plants, industrial plants and transportation. These same combustion sources give us NO_x pollution. Many scientific groups believe that man made causes are far and away the largest source of NO_x emissions. While naturally occurring sources seem to be evenly distributed around the world, the man made sources are concentrated in selected areas. In fact, it is estimated that in the Eastern United States, as much as 90% of the SO_x emissions are from man made sources. And the concentrations are high and that is why Acid Rain can be such a problem in Eastern North America. We have listed a table showing sources of man made emissions.

Source	% of U.S.	Total
Stationary Fuel Combustion	Sulfur Oxides	Nitrogen Oxides
Coal	61.9	26.7
Oil	15.2	10.1
Gas	1.9	12.4
	79.0	50.7
Industrial	17.8	4.6
Transportation	2.7	43.3
Estimated total in millions of tons	31.5 million	21.7 million

Table 11. Sources of Man-made Emissions

Looking at these figures, you can see that by far the largest cause for sulfur emissions are large plants. And the power plants and the transportation industry give us the bulk of our nitrogen emission. And so the question arises, "Where are these sources of emission? How are they distributed around the country, or even the world?" Obviously, power plants and transportation facilities would be concentrated in areas of heavy industry. Using the United States as an example, here is where the various oxides are emitted. These areas are grouped according to EPA regions and are as follows:

Region I - Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. This region has little heavy industry and has few coal burning facilities. It contains 5.6% of the U.S. population and contributes 2.1% of sulfur and 3.4% of nitrogen pollution totals.

Region II - New Jersey, New York, Puerto Rico, and the Virgin Islands. This region has 13% of the U.S. population. It contributes 5.3% of the sulfur and 7.0% of nitrogen emissions.

Region III - Delaware, Maryland, Pennsylvania, Virginia, West Virginia and Washington D.C. . This area has 11% of U.S. population. Contributes 15% of the sulfur and 10.7% of nitrogen emissions.

Region IV - Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee. This region has 16.3% of U.S. population. Sulfur emissions are 21.6% and nitrogen emissions are 17.5% of total U.S. emissions.

Region V - Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin. The "leader" in emissions. This region has approximately 21% of the population. It accounts for 29% of the sulfur and 23% of total nitrogen emissions.

Region VI - Arkansas, Louisiana, New Mexico, Oklahoma and Texas. These states comprise 10% of the population. They contribute 9% of the total sulfur and 17% of the nitrogen. The very high nitrogen content comes primarily from Texas which contributes about 10% of the U.S. total. I have not been able to determine the exact reason for this. It is reported that Texas has approximately 39 oil refineries. Perhaps they contribute.

Region VII - Iowa, Kansas, Missouri, Nebraska. These states have 5.3% of U.S. population. They contribute 6.7% of the sulfur and 6.6% of nitrogen emissions.

Region VIII - Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming. These states have 2.9% of U.S. population. They contribute 2.9% sulfur and 3.7% of nitrogen emissions.

Topics Of Interest To Good Car Wash Operations —

Region IX - Arizona, Hawaii, Nevada, California, Guam and American Samoa. These four states and two territories represent approximately 12% of U.S. population. This region contributes 7.3% of total sulfur and 8.1% of total nitrogen emissions. It is thought that up to 60% of California's nitrogen emissions are produced by transportation.

Region X - Alaska, Idaho, Oregon, Washington. This large geographic area accounts for 3.3% of the U.S. population but only 1.3% of sulfur and 3.1% of total nitrogen emissions.

A close study of this data will show that Regions 3, 4 and 5, with less than half of the U.S. population contribute almost two thirds of the SO_x and NO_x . This is the area of heavy industry. Regions such as 1 and 2, the Northeast, have less amounts of heavy industry. They contribute less pollution than their population would indicate.

Now I think we can more fully grasp the overall problems. Large quantities of sulfur and nitrogen compounds find their way into the atmosphere. These emissions are largely man made and are not uniform around the world. They are concentrated in heavily industrialized areas that have large power plants and other industrial facilities. These emissions are vented to the atmosphere. The prevailing winds are usually from west or southwest to east and northeast. The winds carry the pollutants from the Midwest to northeastern North America where they are finally absorbed by rain clouds and we have the result which we now call Acid Rain.

Now we know the problem and how it is caused. The next logical question is "Can we reduce the volume of pollutants that we are exhausting daily to the atmosphere?" Whenever something is burned, the products of combustion are primarily carbon monoxide, carbon dioxide and SO_x and NO_x . We now know that if we use coal and oil with very low sulfur contents, we can very significantly reduce sulfur emissions. Now you can understand why provisions of the Clean Air Act mandate the use of low sulfur fuels. Low sulfur fuels, though, are becoming less available and usually cost more. So a great effort is underway to "de-sulfur" coal. There are a great number of research groups working on this problem, and much progress has been made in this regard. Similarly, by controlling the combustion process, we are able to reduce the oxides of nitrogen and there have been important reductions in NO_x emissions in recent years. But the problems are really far from solved, and the controversy continues over Acid Rain and its effects.

The answers are not easy and whatever else happens these answers are very expensive. It is an interesting sidelight to mention that in this day of energy conservation, the Wall Street Journal noted that last winter the air was so smoky in Vermont from all the wood

burning stoves that many people found it hard to breathe. And the soot was like a black snow over many sections. I will borrow a line from the comic strip Pogo, "we have met the enemy and they is us."

We have spent a good deal of time explaining what Acid Rain is, how it is formed, and now we come to the \$64,000. question. "What is it doing to us?" "Is it causing any real problems?" The answer seems to be definitely "Yes." Problems are being caused, but it has taken us a long time to realize the causes.

If rainwater is acidic, it follows that eventually lakes may become affected. And sure enough, over the last 30 years or so, it has been noted that thousands of lakes, especially in Eastern North America are being seriously affected. Not all lakes are being affected, and a brief explanation may be in order. If a lake is alkaline to start with, as many lakes in the West and Southwest are, there will be little problem. If a lake is fed from limestone springs, or if the lake bed is on an alkaline base such as limestone, there will usually be no problem. But most lakes in the Northeast and Canada are not natural and are not fed from limestone springs. The acid rain is starting to affect them. In fact lakes in the Adirondacks of New York State, New Hampshire and Vermont and in eastern Canada are showing the effects of the acidity. In these areas the lakes are showing great stress and it manifests itself in the nature of the aquatic plants and in fish life. Since many of these lakes did not have naturally occurring alkalinity to help combat the acidity, it has been noted that the pH of these lakes has dropped to below pH of 5.0. Usually, at this level, fish have disappeared.

Officials in eastern Canada are especially upset at the "death" of their lakes from acid rain caused from Midwest power plants.

The effect of acid waters on fish life has been studied in the field and in the laboratory. But it is a hard subject to get at. For example, a snow melt, acidic in nature, might quickly melt with heavy run off into a stream or lake. The pH may quickly change resulting in a sudden fish kill. There is no simple way to duplicate these happenings in the field. But extensive tests have been run at constant pH and from these tests much has been learned. Species of fish vary in their tolerance to low pH. And even with the same species, age, size and water temperature are all factors which affect tolerance to acid pH. Several studies have shown a pH range of 6.5 to 9.0 is harmless to most fish. But as the pH drops below 6.5, the effect on fish population can be devastating. In the pH range of 5-6.0, rainbow trout do not occur at all and the population of many other species are reduced. And from pH of 5.0 or down, the situation gets rapidly worse with little or no fish life remaining. And this is what has happened in hundreds of lakes throughout eastern North America.

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There is also a marked effect on plant life and other aquatic organisms. Vegetation is affected with yields of garden crops showing marked reduction in yield and overall quality. This information is based on investigations at controlled pH. As yet, in the field, some of these effects have not yet been observed. But the danger persists that our food chain will be affected.

Acid rain can damage materials and structures. I think that many of us have read that the Acropolis in Greece safely withstood thousands of years of weathering to suddenly become so affected by acid rain that restoration must be undertaken. Similarly the Sphinx in Egypt is rapidly deteriorating, after thousands of years, from the effects of the acid atmosphere. So it is safe to say that concrete, limestone, marble and similar surfaces will suffer increasing deterioration. The effects on metals is a little less certain, except we know that in the long run, zinc, aluminum, copper and steel are affected by acidic waters. Paint films and paint pigments can also be affected. The ICA has reported that many car dealers have reported that there are spots on new cars in their lots. This unexplained spotting is being blamed on acid rain.

A common situation is that which occurs when the owner of a brand new car washes his car at the local car wash for the first time. Spots may be observed that were not observed at the time of purchase. These spots, which may not wipe off or buff out are indicative of real paint or pigment damage. These spots are believed to be caused by acid rain. The car should be returned back to the dealer. An examination of other new cars on the lot may show similar damage. It would be untrue to blame all spots on new cars on acid rain. There are other reasons. But complaints are now occurring with increasing frequency. In New York State, for example, the Commission of Environmental Conservation has reportedly told the Associated Press that "Acid rain is now blamed for ruining cars' finishes".

So, the effects of acid rain are being recognized. And there is now increasing evidence that the reduction of emissions from Midwestern power plants and heavy industry will go a long way toward reducing the problems in the eastern U.S. and Canada. Something is going to be done, and soon, to reduce emissions.

Recently, a panel from the National Academy of Science released findings from a commissioned study. The eight member panel unanimously concluded that there is a direct and identifiable link between the level of sulfur emissions in the eastern U.S. and the acidity of rain and snow that falls in the regions and damages the environment. Congress will be sure to act on their suggestions that sulfur emissions be controlled. What will be called for? The resulting battles will be interesting to watch because they will affect all of us.

What should the car wash industry do? This is a matter of opinion, but our belief is that there is a great opportunity for the car wash industry to help solve a problem that is caused by acid rain. I think the motoring public should be made aware of the potential damage that acid rain can cause to the finish of a car. More frequent car washing is the immediate answer that our industry can offer as a quick solution. Car washing, with a wash solution of a pH in the range of 7.5 - 9.0 can quickly wash off acidic deposits. Alkaline under carriage sprays, especially under high pressure, likewise can neutralize acid buildups. Coin ops, automatic pressure sprays, rollovers and of course conveyors, can all share in this increased market.

I don't believe in scare tactics, but an educational program by the car wash operators and effective use of signage can both help to educate customers as to the necessity for frequent car washing. SIMONIZ® will be pleased to assist in any way possible. We have the alkaline powders and liquids that can be of extra benefit when combating this problem. Our Power Wash and Special Power Kleen, Super Foam and Ultra, for example, are among the most effective detergents that any car wash can use. Let us help.

THE DEMA INJECTOR

The Dema Injector is one of the simplest, most useful tools in the whole chemical feed industry. At the same time, it is the subject of much misunderstanding in our industry. Briefly, we will try to explain the principle to you. Below, Figure 1 shows a cutaway section of a typical installed injector. Figure 2 is a sketch of the injector.

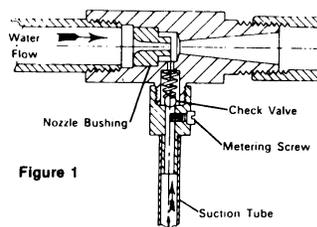


Figure 1

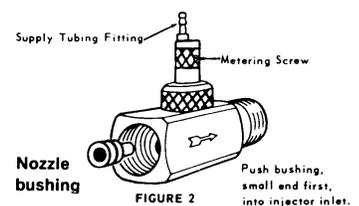


FIGURE 2

For a satisfactory Dema operation follow these suggestions. A Dema Injector is sized not according to the pipe line size you wish to install it in but according to the water flow that is expected through it. Each size Dema must have a certain minimum flow to actuate it.

For example, a typical problem case is a spray wax arch that had ten 8010 nozzles (Spraying Systems) in the spray arch. Feeding the spray arch is a 3/4 inch injector. The usual complaint with this type of installation is that it will give erratic results. Sometimes it

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will draw a little, other times it will not. Nine times out of ten the car wash operator will request a larger injector so that "it will draw a little more." Right? WRONG!

The 8010 nozzle is one that will spray 1 gallon per minute at 40 pounds pressure, with an 80° angle. There are ten nozzles in the arch, so the total water flow at 40 psi will be 10 gallons per minute. Looking at the chart in the Appendix, for a 3/4 inch 206 injector we see that it will operate in a 10 to 20 gallon per minute range at 40 psi. We are just barely in the operating range with this injector size and that is why the system is erratic. To prove it, simply take out one or two nozzles and you will see that the injector will operate very well. You have increased the flow through the injector. What's the solution? Use a few larger nozzles or a smaller injector. The smaller injector will be cheaper in the long run (less use of chemicals).

Please remember that there are three numbered interchangeable nozzle bushings for each injector size. These allow the injector to operate over its given range. For a given size injector use the lowest number tip if you are in the low end of the volume range. Use the highest numbered tip if you are at the high end of the volume range. In the problem example discussed above, we would use a number 15 tip in the 204C injector because we want it to work in the 10 gallon per minute range at 40 pounds.

SIMONIZ® has all sizes of Dema Injectors in stock for your use. Let us help you when you need it. For complete operational information on the Dema Injector, including bushing information and water flow, please see the chart in Appendix.

EFFECTS OF OVERSIZED VEHICLES ON THE CAR WASH MARKET

The first concern that comes to everyone's mind when we consider oversized vehicles is the labor associated with the increased size, namely vacuuming and cleaning the exterior. Labor, which is the highest single expense the car wash operator encounters, amounts to a reported 35 to 40%. The extra time needed to do the job can cause an increase to the labor costs as well as slowing down the wash process.

The most obvious solution is to charge more for these vehicles. Increased charges are reported to be in the range of \$1.00 to \$3.00 for full sized vans, pickups, limos, Suburbans and so on. This additional cost may or may not include the vacuuming of the cargo area. A typical wash will include vacuuming of the front and rear seat areas with additional charges added if the customer requests the cargo area cleaned. People who can afford to pay extra to have the job done typically drive these types of vehicles. However,

minivans bring a slightly different approach, being that a more varied type of clientele drive them. Minivans have become the workhorse vehicle being driven by both modest and higher income-producing families. Based on the number of these vehicles on the road, it is possible that they make up the largest percentage of the car washes on any given day. Careful consideration needs to be given on charging extra for this type of vehicle. Some operators report that it is better to do the complete job without an increase in price than to upset or alienate a large portion of their business.

The extra window areas on the sport utility vehicle add an extra challenge and potential problem area aside from just more glass to clean. Should the rear window on the cargo area door be the type that opens up and out, care should be taken when closing it so it is not slammed down and possibly break. Electric windows have been known to shatter if not fully closed when the cargo door is shut too hard. Employees may find it easier to climb over the seats than to get out and open the back of the vehicle to reach the back windows. Customers, however, may find this unacceptable.

Equipment can also be effected by the increased size. The extra weight and tire size of the large pickup trucks and sport utilities put extra strain on the conveyors causing the vehicle to potentially jump the rollers. The extra width can cause the side wheels to stall affecting the cleaning and possibly damaging the brush itself. At times it may be necessary to have an employee drive the vehicle or even walk the vehicle through the tunnel. On a busy day taking even one man from a crew can upset a good flow. The height and straight backs affect the action of the cloth making it difficult for the cloth to clean. Therefore, extra time is needed at the prep area where spare tires are mounted on the back. It will need to be opened in the prep area and brushed or high pressure sprayed with a strong detergent. The racks, that most sport utility vehicles have on the roofs, hold water and detergent making them more difficult to rinse and dry. In pickup trucks that have the chassis raised up, creating a large space between the tire and wheel well, the potential exists for the cloth on the side wheels to pick up large amounts of dirt and grease from the inside of the wheel well. To prevent this, extra time should be spent in the prep area, cleaning the wheel well areas. Although not as significant as labor costs, but still an expense, more time is required to run the prep gun, creating additional wear and tear, as well as, additional detergent usage. Towel drying the vehicle also becomes a more time consuming task and more difficult due to its height.

For all of the concerns discussed above, it seems reasonable that charging extra to perform the basic services on oversized vehicles is warranted. Some of the problems associated with large vehicles could be addressed with a touchless wash process. But this process, as you know, has its own set of cleaning problems.

Topics Of Interest To Good Car Wash Operations

RAPID GROWTH OF MAJOR GASOLINE RETAILERS IN THE CAR WASH INDUSTRY

The growth of the gasoline retailer in the car wash is growing at a rapid pace. Why are they growing so fast? One reason is that retailers now realize that a car wash can be a great profit center. Convenience may be one of the main reasons for the rapid growth but selling extra services and offering a good wash has a lot to do with it, as well. The equipment companies now have many good systems for bays and/or short tunnels. Many have argued that gas station car washes do not offer a good wash. However, a well run wash at a gas outlet can be a great profit center for the retailer.

The point is they offer a good wash to a certain segment of the population. The people who are using gas station car washes are looking for the convenience of one stop shopping. A recent trend at some gas station car washes is running videos at the pumps informing the customers of the wash services offered. Once the pump shuts off the customer may select the type of wash package they would like, right at the pump. This service has proved to be very successful with the gas pumps, functioning as good customer service personnel. They are always there, they greet the customer

in a friendly way and, most importantly, they ask the customer every time about purchasing an extra service. These gas station car washes offer a good wash to the person on the go but operators have found they can offer extra services, as well. Other trends at gas/wash outlets include touch-free car washes (due to the frequent complaints of car damage at many gas/wash stations), short tunnels with dryers, and switching to a national brand like Simoniz®, all of which have allowed operators to "up sell" extra services.

Many of the gas/wash customers buy on impulse. They are there getting gas and trying to wash the windshield when they realize it would be much easier to just wash the entire car. Or, as stated earlier, the talking pumps remind them of the other fine services that the retailer now offers.

It may be true that some gas/wash operations still offer a free wash with a gas fill up. That's fine, they are servicing a different segment of the people. These people probably would not spend the money or time at a full service car wash. But like any well run business, a well run gas station/wash operation is good for the car wash industry by making more people aware of our industry.

Safety Procedures

CAR WASH SAFETY

Many car wash operators, when trying to comply with the various rules and regulations that apply to their business, have difficulties because there is no single place to find all the proper regulations and as written they are difficult to read and understand. In this short article, we will attempt to review all the different aspects of safety car wash operation. Since laws vary almost on a town to town basis, this can only be a starting place. When a question arises, your local authorities are the best persons to ask. We at SIMONIZ® should be able to answer your questions regarding our products and the best way to use them.

MATERIAL HAZARDS

The first thing you should do is to determine the hazards of the detergents, waxes and any other chemicals you may have on site. Material Safety Data Sheets that you receive from your suppliers are a good source for this information. Pay special attention to anything marked Flammable, Combustible, or Corrosive.

1. Flammable materials are usually marked with a red flammable sticker and may include antifreeze detergents, solvent based cleaners, waxes, and perfumes. These materials can be ignited at normal temperatures by almost any source of heat or flame. Ignitable vapors from these materials can travel a considerable distance, so caution should be used when storing or handling these materials.

2. Combustible materials are not always marked to indicate their hazard. These materials may include any of the materials listed above as well as some whitewall tire concentrates. These materials require higher temperatures before they ignite. You still should avoid exposing these materials to heat, sparks or open flame.

3. Corrosive materials are another hazard found at car washes. These materials are marked with a black and white "Corrosive" sticker. These materials can injure you by attacking any exposed body surface, causing burns or tissue damage which may not be readily apparent. These materials may also damage metal, rubber or plastic. Sometimes these materials are incompatible with other items marked Corrosive, so check Material Safety Data Sheets for specific incompatibilities.

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4. The most difficult hazard to assess is the so called chronic hazard. These materials only cause damage if you are overexposed to them for a long time, sometimes many years. That is why it is important that you and your employees wear the recommended protective gear when using any cleaning product.

The hazards listed above are those that put you and your employees at risk. Next let's discuss hazards to the environment.

ENVIRONMENTAL HAZARDS

The Federal Environmental Protection Agency has restrictions on chemicals released into the environment. Your local sewer department also sets limits on the materials that go down your drains. Local limits are usually stricter than federal, so it is best to check with them to make sure you are in compliance. What follows is a list of the major types of environmental hazards and their sources.

1. pH. This is a measurement of the acidity or alkalinity of your wastewater. The federal government says that a pH of less than 2 or greater than 12.5 is hazardous to the environment. Your local government probably has stricter standards. A typical car wash has wastewater that is slightly alkaline but this can change dramatically if you have a leak or a spill from one of your containers. Your town may require you to have a way to contain leaks or spills of hazardous materials. Products with very high or very low pH include wheel brighteners, whitewall tire cleaners, and prep gun or power wash detergents.

2. Fats, Oils, Greases Or Petroleum Distillates. These materials are difficult to break down and can clog filters and drains in sewage treatment systems. They can also be ignitable or toxic to aquatic life. Products that contain these materials include solvent based degreasers, waxes, and soaps. Also be aware that rinse water from vehicle washing will contain these materials and if someone were to change their motor oil in your self-service bay your wastewater will contain a considerable amount.

3. Metals. Metals found in waste water are regulated due to the fact that some of them are toxic and do not break down. Although cleaning products do not typically contain hazardous metals, small amounts may be washed off of cars and new car wash equipment, especially when washed by highly acidic or alkaline materials.

4. Phosphates. These are compounds containing phosphorus and are found in powdered and liquid detergents. They act as fertilizer in wastewater and cause the rapid growth of algae in treatment systems. Large amounts of algae interfere with the breakdown of materials in wastewater which is why some localities limit the use of phosphates. SIMONIZ® has available low phosphate or zero phosphate products should you require them.

PHYSICAL HAZARDS

Physical hazards are those that can cause injury by falling on someone, things that can cause a fall, cut or other injury, or things that may burn or explode. Hazards such as reclaim pits, moving machinery or vehicles, wet or slippery floors, or even loud blower motors all enter into this category. The federal OSHA regulations that apply to these hazards are simple. They basically state that if an injury can be prevented by wearing a particular protective device, then an employer is required to provide it and an employee is required to wear it. This includes items such as safety goggles, rubber gloves, waterproof or steel toed boots, and hearing protection. Where corrosive materials are used, eyewashes and safety showers shall be provided. The guarding of chains and pulleys is also important. Pay special attention to conveyor chains and the pulleys on pump motors which can start up unexpectedly. Loose fitting clothing should not be worn near chains, pulleys, moving machinery or brushes. Since the nature of our business requires the use of water, it is impossible to avoid wet floors. Waterproof footwear should be provided and some means should be provided for making floors less slippery, such as sand or Speedy Dry.

Loud pump motors or blowers may require that you provide hearing protection for your employees. This is especially important for workers who spend a lot of time at the end of a conveyORIZED wash near the air dryers, which can be quite loud. Don't forget that hearing protection might simply mean forbidding employees from working in areas where loud machinery is running, such as pump rooms and next to blower motors.

When occasional maintenance is being performed on equipment, the person doing the work should have a way to shut off power to the machinery in his work area to eliminate the risk of injury due to moving parts or chemical sprays.

Drains or pits should have grates or covers adequate to prevent persons from falling into them. Unless you are doing work in them, covers should be in place at all times.

Safety Procedures

Fire safety is an important aspect of safe car wash operations. Flammable liquids, such as cleaning solvents, gasoline, or windshield washing fluids are usually present. Smoking should be prohibited from area where flammable liquids are used or stored and customers or other unauthorized persons should be kept away. Make sure containers are kept closed at all times and paper or rags soaked with these materials are kept in fireproof containers. Your local fire regulations may require that you have one or more extinguishers on the premises and that you and your employees know how to use them. It is best that you check with your local fire marshal to find out what is required.

STORAGE OF MATERIALS

Here are some basic rules to follow when storing cleaning materials.

1. Always store the material with the greatest flammability hazard furthest from the exit. In the event of an emergency, all persons should be moved from the area of greatest hazard to the area of least hazard. This should prevent persons from being trapped in the event of an emergency. Make sure enough space is provided for hoses and fire fighting equipment.
2. When storing materials, make sure that incompatible substances are not stored together. Some examples of incompatible materials are: ammonia and bleach, strong acids and strong alkalies, bleach and acids, and bleach and alcohols. If these materials come in contact with each other, they react and produce heat, flames, or hazardous gases. Check your Material Safety Data Sheets for chemical incompatibilities.
3. Never store materials in unmarked containers. Make sure that every chemical container is marked so that its contents can be identified in an emergency. Do not store chemicals in soda or juice containers.
4. Liquid materials should be kept from freezing and stored away from areas subject to extreme changes in temperature. Powders should be kept in a dry place. Avoid storing materials outside where containers may be spilled or tampered with. Avoid storing drums where they may be struck by moving vehicles.
5. Empty containers should be drained of all residues and rinsed thoroughly. Containers should be promptly reused or recycled. Keep all containers, whether empty or full, away from children. Do not expose empty containers to sources of heat or flame.

6. In general, try to store materials in a cool dry place protected from the elements. Make sure all containers are labeled and labels remain legible. Keep storage area well lit and accessible to fire and emergency personnel.

EMERGENCY RESPONSE

In the previous pages, we have discussed some emergency situations. How do you know if you have an emergency? Here is a basic explanation of emergency situations as they exist at a car wash.

You have an emergency if one of the following exists.

FIRE: A fire where chemicals are involved is nearly always an emergency. Products which are safe at normal temperatures may release dangerous gases or vapors when exposed to high heat. Always consider fire as an emergency situation.

INJURY: When someone is injured due to chemical exposure, unless you know the exact cause consider the event an emergency. Incompatible materials may be reacting, or hazardous materials may be leaking from a container. If someone is unconscious or incapacitated, it is always an emergency.

LEAKS OR SPILLS: When materials are spilled or leaking, an emergency exists when you lose control. If you cannot secure the area, an emergency exists. If you cannot determine what is leaking, an emergency exists. If you cannot safely stop the leak, an emergency exists. If you are unable to safely clean up and dispose of the spilled material, an emergency exists.

Before an emergency, you may want to do some or all of the following. Notify the local fire department of the materials you have on the premises, and their location. They may want copies of your Material Safety Data Sheets for the materials you use, since they provide helpful information for fire fighters. It is also a good idea to provide MSD Sheets to your local emergency room. Some materials you use may require special emergency treatment that your emergency room is unfamiliar with, or they may want to have materials ready in advance. Post emergency phone numbers near the telephone at your wash. This will save valuable time in an emergency. Locate the nearest available phone that you can use should your own phone be unavailable. Make sure all your employees are aware of what to do in an emergency. Otherwise everything depends on you and if you are injured or incapacitated valuable time may be lost and additional persons may be injured.

Safety Procedures

During an emergency you may need additional information about our products. During regular business hours someone here can answer your chemical questions. In addition, our products are listed with Chem-Tel Inc., who can provide you with 24 hour information on all our hazardous products. Their number is 1-800-255-3924. One more thing to consider before an emergency occurs is the size of your containers. A leak or spill from a 5 gallon pail is a lot less serious than the same substance leaking from a 55 gallon drum. This becomes especially important if your wash is unattended for any length of time. In order to reduce the risk of an emergency and reduce costly and time consuming cleanups, it is a good idea to purchase and store corrosive, flammable, or strongly colored products in smaller containers.

EQUIPMENT MAINTENANCE

Follow these guidelines when maintaining or repairing machinery and electrical equipment.

1. Make sure power is shut off to the equipment you are working on and any other equipment in your work area. There should be no possibility of equipment starting up while you are working on it. It may be necessary to lock out the main switch, disconnect the wiring, or posting someone at the main switch to make sure you are safe. Special attention should be paid when you are working out of sight of the power source.
2. Ventilate enclosed areas. Do not enter any pit, tank, or other enclosed or below grade area unless you know that it is adequately ventilated. These areas may contain hazardous gases or vapors that are not readily detectable. When working in an enclosed area, make sure you have a constant supply of fresh air. Do not enter enclosed areas while working alone.
3. Check the area for physical and chemical hazards. Make sure there is no equipment that may fall and cause injuries. Make sure that any stairways, holes and any moving machinery are guarded to prevent injury. Any chemical containers in the area should be checked. Special attention should be paid to any container marked "Flammable", "Combustible", or "Corrosive". Do not work near containers if their contents are unknown. All hazardous materials should be moved to a safe place before work begins.
4. Wear safety equipment. Most accidents and injuries are preventable if the proper safety equipment is worn. The short time it takes to put on your gloves and goggles is worth it when you consider the time you could lose due to injury. Make sure your equipment is in good condition and repair or replace it as necessary.

5. Avoid working alone. When you run your own car wash business, it is often tempting to maintain your equipment late at night or on rainy days to avoid any customer inconvenience or lost business. When you do so, make sure you have someone there with you in case you are injured or incapacitated. A small injury can become a large one if you are unable to get help, especially with the hazards found at the average car wash. Imagine being caught in a brush overnight or having something splash in your eye and being unable to see.

HANDLING LEAKS AND SPILLS

In the vehicle washing industry, we work with chemicals every day. Drums, pails and various other containers are routinely handled by you and your employees. Because these materials are normally in containers and are not in contact with incompatible materials, we don't always appreciate how dangerous some chemicals can be when they leak or are spilled. Follow these procedures when materials are spilled or leaked.

POWDERED MATERIALS

Under normal conditions, spilled or leaked powders will not pose an immediate hazard. Watch out for powders leaking into liquid tanks or onto wet floors. Reactions may occur that create large amounts of heat or dangerous gases. Spilled materials will make floors slippery. Large amounts of spilled powders entering the storm drain could contaminate local waters. Clean up spilled powders immediately, being sure that you wear the necessary protective clothing while doing so. See your Material Safety Data Sheets for additional safety information.

LIQUID MATERIALS

The majority of leaks and spills you will encounter will be those of liquid materials. When ordering liquid products, give some thought to the size of your containers. Remember, a leak from a five gallon container will be much easier to control and clean up than a leak from a fifty-five gallon drum. This becomes very important if your wash is a self-service and you are not there every day. Flammables and Corrosives are less hazardous when stored in smaller containers. Should it become necessary to move these containers, smaller ones are easier to move. Follow these procedures when a liquid is spilled or is leaking.

1. Secure the area of the spill. Warn everyone in the area that a spill has occurred. Keep vehicles and persons away from the area.

Safety Procedures

2. Determine the identity of the spilled material. From a safe distance, materials usually can be identified by the label, the size and type of container, location of the container, or the physical characteristics of the spilled material. If you cannot identify the material, do not risk injury by exposure to unknown materials. Leave this job to properly equipped personnel.

3. Eliminate the source of the leak or spill. Once the identity of the material has been determined, properly equipped persons may close valves, plug leaks, or do whatever else may be necessary to stop the spill or leak.

4. Clean up the spilled material. It will be to your advantage to reuse or recycle as much of this material as you can. Before you dispose of any spilled material, check with your local authorities regarding your local rules and regulations for waste disposal.

DETERGENT MIXING

Since powdered detergents offer economy and in some cases better performance, many customers buy powders and mix their own solutions. Here are some safe procedures to follow while mixing solutions yourself.

1. Wear proper protective equipment. The Material Safety Data Sheet provided with each product will tell you what equipment you should have to protect yourself from injury. Always check before you begin.

2. Always add powders to liquids. Water poured onto powdered detergents may generate heat or dangerous vapors. In some cases the reaction may actually boil the water. Fill the mixing container with as much water as you can to minimize the amount of heat generated. Remember to allow some space for the detergents you are adding.

3. Avoid using water hotter than necessary. The products you are mixing should mix with room temperature water. Hot water will increase the hazards associated with mixing. And don't forget, heating water costs money, and that cuts into your profits.

4. Do not leave chemicals in unmarked containers. Make sure you rinse out any mixing tool you may have used, and make sure the containers that you have filled are properly marked. Do not use food or juice containers for mixing chemicals.

5. Leave chemistry to chemists, don't experiment! Use the recommended dilutions for the product you are using. Too strong a solution will be unstable and may separate. Adding other chemicals or detergents to your solution may have undesirable side effects or produce hazardous reactions. If you are not getting the desired results with the product you are using, contact your SIMONIZ® representative. We have the right product for your cleaning problem.

This article is being offered as a public service of SIMONIZ® and is based on information we believe to be reliable and accurate. We can make no warranty regarding the accuracy of the information contained in this article. Always check with your local authorities when you have a specific question regarding safety and health. We hope that this brief review of general car wash safety procedures is of some help to you and your employees. While we cannot possibly cover every aspect of your particular operation, this should get you started towards a safety program of your own.

Express Detailing & Customer Service Advisor Training

As all of us in the car wash industry look for new sources of revenue, none could be more appropriate than express detailing. Express detailing fits the car wash industry like a glove because, unlike traditional detail shops that must go out into the local community to promote and advertise to get customers on their lot, the car wash operator only needs to market and promote to his/her existing customer base. Therefore, the marketing and advertising costs for the car wash operator, as opposed to the traditional detail shop operator, are significantly less, which allows the operator to put more time, energy and money into service advisor and detail technician training.

Express detailing is modeled after the success of the quick oil change industry. It is a no-appointment, while-you-wait professional auto detail service performed by trained technicians using proven techniques and professional detail shop products. Express detailing allows the operator to easily and inexpensively transform their existing car wash customer base into an express detailing customer base. Cancelled appointments, the inconvenience of car drop-off and pickup, and the cost of the service to the customer long hindered the traditional detail shop operator. According to a 1997 DETAILING SURVEY, detail shops average only 20 cars per week. Express detailing is a program that will allow the operator to reach up to 50 cars - 10% of their daily car wash volume because it is convenient, affordable, quick and simple in its operation and represents value and quality.

What type of car wash will express detailing work best in? Express detailing is most ideally suited and will grow most quickly in a full-service car wash. In a full service car wash, the customer is already "out of their car" which, believe it or not, this is the biggest hurdle to overcome when trying to upgrade them to express detail services. Also, typical full-service car washes already have some type of "waiting area" for their customers. For the most part, the investment is less and the payback is quicker because the full service operator already has most of the fixed overhead, including management, in place.

Express detailing services can work for the self-service or exterior express operator, but more work will be required. Typically, space, including a waiting area, needs to be added on and additional staff needs to be hired. Unlike a full-service car wash, there is no excess capacity in these types of car washes. Careful planning, including demographic studies should be done to ensure that the area can support the investment. One thing is certain, you can't "sort of be" in the express detail business. An operator must make the commitment to space and staff, for if the buying experience isn't right for the customer, it won't work.

A successful express detailing program starts with a well-trained and properly motivated service advisor who greets the customer as they enter the car wash facility.

Every customer that pulls onto your property does so for one common reason. They are there to improve the appearance of their vehicles. However, we must assume that our customers do not know about the services that we offer. The job of the C.S.A. is to advise our customers on the needs of the vehicles and recommend a service which will improve the appearance of the vehicle and maintain it.

Our initial goal is to "WOW" each customer and overwhelm them with our services. The more services we perform on our customers vehicles, the more chance we have of a customer leaving our property feeling great about the investment they just made. NEVER forget the customer came in to improve his/her vehicle appearance. They just need to be assisted.

When a customer comes to your location part of what they pay for is a service review of their vehicle needs. They have come to expect that from us. If we do not accurately advise them of their needs and our corresponding services, we are cheating the customer out of what they paid for. Furthermore, we dramatically decrease the chances of "WOWing" the customer and gaining them as our client.

The following customer service advisor model is what you need to follow to master and provide to EVERY customer. If a service advisor is unable to stay focused on the model and consistently serves your customers by using it, they cannot remain in this critically important position. One of the reasons that this C.S.A. program was created was to ensure the same service to every customer, regardless of your location or style of wash.

Their vehicle gets them around every day, they may plan on keeping it for a long time. Part of what a customer pays for when they go to a quick lube, for example, is the service review. The customer pays for it and expects it. If the vehicle has a need, the customer wants to know about it. This exact approach applies to the car wash/detail integrated model. We can not cheat our customers by not observing the vehicle and letting them know what it needs. If we do, we only get dissatisfied customers. People want to purchase our services. They really just don't know what services we have to offer that will help them.

Customer Service Advisor Training

• SIMONIZ® HAND APPLIED WAX

For the customer who prefers that machines not touch the paint on their vehicle.

This procedure uses a soft terry cloth applicator pad. The paste or liquid wax is applied in straight back and forth motions by hand. This procedure should not be done in circular overlapping motions which cause swirl marks. This process is not necessarily any better than applying wax with a random orbital style machine. This is more time consuming to apply and remove. This process is strictly your customers choice. This is offered as an extra service to keep your customers at ease and comfortable while waxing their car.

• GLASS SHIELD

Glass Shield is an advanced glass treatment. This glass treatment greatly improves visibility in all inclement weather. One treatment of Glass Shield will last up to 6 months.

• SIMONIZ® POLISH COMPOUND & EXPRESS WAX

A two step paint cleaning process

This procedure is recommended for vehicles with oxidized and dull finishes. The first step, removes minor surface blemishes and deep cleans the paint. The second step, our Express Wax, restores oils and gloss to the paint. This will give a damaged painted surface a three month shine. Includes Full Service Wash, Wheel Bright and Black Trim & Tire Revitalizer.

• SIMONIZ® SUPER CLEAN INTERIOR

A meticulous cleaning of the vehicle's entire interior.

This procedure centers on the "hard to reach" areas of the dash, like the gauge packages and console. The interior is first carefully relieved of dirt and dust particles with a low pressure air tool. Start between and under the front and rear seats, then the crevices of the door panels and seat folds. After this is completed, the entire vehicle is thoroughly vacuumed. The air flow vents, gauges and instrument package, including the console are thoroughly cleaned with soft detail brushes and towels. Once completed, the dash is dressed to desired gloss, finished with cleaning windows and door jambs.

• SIMONIZ® INTERIOR LEATHER CLEANING & DRESSING

A deep cleaning and conditioning of all automotive leathers.

This procedure uses a one step leather cleaner specially formulated to clean and condition automotive leather. Simoniz® Cleaner & Leather Conditioner is applied to a terry cloth applicator which cleans the leather and conditions it in one step. This process will restore the original look, soft feel and smell of new leather.

• SIMONIZ® CARPET SHAMPOO

A precise machine shampooing of interior carpets.

This procedure will clean the carpets and mats using a low speed rotary pneumatic brush. All excess dirt and soil is then extracted

with a wet/dry vacuum and absorbent towels. This effectively removes most stains, soil, dirt and sand from carpets in high traffic areas. Carpet shampooing is an effective process in improving the life of the carpet and its appearance.

• SIMONIZ® UPHOLSTERY SHAMPOO

A thorough shampooing of fabric seats.

This procedure is also done with a low speed pneumatic rotary brush. This will carefully remove most stains and dirt from seats and door panels. All excess dirt and soil is then extracted from the fabric surface with a wet/dry vacuum. This leaves the fabric seats and panels damp with little to no drying time.

• SIMONIZ® SURE SHINE - SUPER WAX

Intended for new cars with near perfect finishes.

This procedure takes about 30 minutes to apply and offers a Simoniz® wax which lasts nearly twice as long as our Express Wax. Simoniz® Super Wax provides superior protection against all the elements.

EXTRA PACKAGES

• SIMONIZ® VINYL TOP DRESSING

This procedure uses an advanced liquid vinyl protectant that is applied to vinyl tops with a special foam applicator. This application will protect exterior automotive vinyl from drying and fading commonly caused by the effects of U.V. rays.

• SIMONIZ® TAR RESIDUE REMOVAL

Removes excessive road oils and grime.

This procedure uses a solvent to remove road tar and grime from the vehicle's lower body and rocker panels. Safe for all painted surfaces, chrome, glass and plastic ground effects, etc.

• SIMONIZ® BLACK TRIM & TIRE REVITALIZER

Added protection and shine to exterior rubber and vinyl.

This procedure uses an application of Simoniz® Black Back, a silicone petroleum-based exterior dressing. This will protect and revive all tires and black trim back to a factory "new look". All vinyl and rubber surfaces will be protected from the drying, fading and damaging effects of the sun's ultraviolet rays. This protection package can be towel dried to desired gloss.

• SIMONIZ® FABRIC PROTECTANT & TREATMENT

Will guard against staining and prolong the soil resistance process.

This procedure takes advantage of a liquid product fortified with easier and the result is a smoother surface with a deeper gloss. This process is safe for all painted automotive surfaces, i.e. clearcoats, basecoats and single stage paints.

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Teflon to protect all automotive fabrics. Simoniz® Fabric Treatment cross links and treats the top surface of cloth and fabric fibers. This prevents stains from penetrating deep into interior fabrics such as seats, door panels and carpets. Prolongs the excessive day to day wear and tear.

SIMONIZ® EXPRESS SUPER DETAIL VALUE PACKAGES

• SIMONIZ® ULTIMATE INTERIOR PACKAGE

Combines three interior packages for added value.

This procedure gives the ultimate look, smell and feel to any vehicle's interior. This includes shampooing of all carpets, seats and mats. It also includes the Simoniz® Super Clean Interior Service which detail cleans the gauge packages, console and instrument panel. All interior rubber and vinyl is cleaned, dressed and protected.

• SIMONIZ® BUMPER TO BUMPER SPECIAL

Combines three interior and exterior packages for added value.

This process is the absolute full service detail. Includes a full service car wash, Black Trim & Tire Revitalizer, Express Wax, Carpet Shampoo, Upholstery Shampoo, Leather Cleaner & Conditioner, Interior Super Clean and Interior Rubber & Vinyl Protectant.

• TRUNK SHAMPOO & CLEAN

A complete vacuum, shampoo and cleaning of trunk area.

• SIMONIZ® VINYL TOP DRESSING

Vinyl top is cleaned and dressed to protect against U.V. damage.

• SIMONIZ® BLACK BODY TRIM & TIRE REVITALIZER

This treatment protects moldings from damage from the sun.

All exterior trim moldings, tires and rubber effects are cleaned and treated with Simoniz® Black Back.

Note: All mini-vans, vans, pickups, sport utilities and trucks have oversize charges applied to them. The prices reflect the extra time needed to properly service the vehicle.

EXPRESS DETAIL SERVICES PROCEDURE

• SIMONIZ® EXPRESS WAX PROCESS

1. Pre-inspect for dents, dings and scratches, mark down on pre-inspection check list.

2. Before wash process begins, inspect and remove all tar, bugs, road film and grime with Simoniz® Multi-Solve.

3. Wash, thoroughly rinse and dry vehicle.

4. Using an OSHA approved air tool, blow trapped and settled water out of trim and crevices. Special attention should be given to rear view mirrors and body-side moldings.

5. Completely dry body, door and channel jambs with a chamois or clean terry body towels.

6. Beginning on the right side of vehicle apply Simoniz® Express Wax with a hand held random orbital buffer and a clean foam pad. Apply wax directly to foam pad about the size of a quarter. Starting with the roof, apply wax working in front-to-back motions, move down to hood, side body panels ending at trunk. Continue this process working right to left. Reapply wax to foam pad as needed. This must be done to ensure an evenly waxed painted surface. Remember only half of the vehicle is done at a time.

7. Repeat step 6 on opposite half of vehicle.

Detail Tip: Keep wax away from black body side moldings, black mirrors, etc.

8. When wax appears to be close to a "hazed or flashed" look (haze time will vary depending on humidity and type of wax used), start removing the wax with a clean dry terry cloth towel in the same manner it was applied. (Back to front motions, starting with the roof and continuing down the sides.)

Final Inspection: The final detailing and inspection are critical to the appearance of the vehicle. Care should be taken in removing wax from door jambs, black body side moldings, cracks and crevices. Using Simoniz® Detailer's Choice, soft towels and detail brush, inspect and eliminate dust, wax residue and streaks in windows. Install static sticker, recheck your work outside.

• **SIMONIZ® SUPER CLAY PROCESS** (This extra service to be quoted by Detail Manager only.)

Note: Claying the vehicle is the most important part of preparing the painted surface. A number of things are accomplished here by using the pre-polishing clay. Installing a coat of wax becomes

Customer Service Advisor Training

Procedure:

1. Make sure the painted surface has been washed and is clean and free of dust and dirt particles.
2. Using Simoniz® Detailer's Choice, spray half of the roof to lubricate surface. Work Simoniz® Super Clay over lubricated surface in back to front overlapping motions. Move down to hood following the same procedure in step #6 of the wax process. When area is free of contaminants and pollutants, clay will slide easily over the painted surface. Dry as you go with a clean soft terry towel.
3. Continue step #2 until entire vehicle is completed.

Detail Tip: Remember to pull and fold clay as needed to achieve a clean clay surface.

4. When clay process is finished, the painted surface now needs to be waxed for protection and gloss. Follow step #6 in the Simoniz® Wax Process.

• HAND WAX PROCESS

1. Wash and dry vehicle thoroughly.
2. Touch up any areas needing tar removal, bug removal, etc.
3. Use air an OSHA approved air tool to blow hidden water out of trim, crevices and rear view mirrors.
4. Completely dry body and door jambs with terry cloth body towels or chamois.
5. Apply Simoniz® Sure Shine or Simoniz® Paste Wax to wax applicator pad. Apply to vehicle in front to back motions. Start with the roof first work down to hood, front fenders, side body panels, finishing at the rear deck lid. Only wax half of the vehicle.
6. When wax has hazed, remove with soft dry terry towels, removing wax in the same motion the wax was applied.
7. Repeat steps 5 and 6 on opposite half of car.
8. Final Inspection: Dress tires and black trim. Check all windows for streaks, clean and inspect all door jambs. Place static sticker in the upper left hand corner of windshield.

Detail Tip: Reinspect the vehicle outside and check for any wax residue and remove.

• AQUA PEL INSTALLATION PROCESS

1. With an OSHA approved air tool carefully blow out all water and moisture from rubber windshield and chrome lip moldings.

Important Tip: There can be absolutely no water or moisture trapped in the moldings or on the glass surface.

2. With clean and dry paper towel, clean windshield with Simoniz® Multi-Surface & Glass Cleaner. Use a second towel to make sure the windshield is dry and free of any moisture. If any moisture comes in contact with the Aqua Pel applicator surface, the chemical will appear white in color. This will have to be removed and the whole process repeated from the first step.
3. Squeeze applicator "wings" until hearing a snapping sound from the Aqua Pel applicator. Start from the center of the windshield (driver side first) and apply Aqua Pel in straight horizontal overlapping motions ending at wiper blades. Lift wiper blade to apply product to bottom of windshield. Repeat process on the same side in a vertical motion.

4. Repeat step #3 on passenger side windshield.

5. Let the solution dwell on the windshield for 5 to 10 minutes. Then dry windshield to a sparkling finish with dry paper towel.

Detail Tip: It is very important that a lint free window towel is used in the window cleaning process. If it appears that the window is not free of road grime and pollutants the clay process is recommended. After clay process is completed, step #1 and #2 must be repeated before Aqua Pel is applied.

• POLISH COMPOUND & WAX

1. The vehicle must be washed and thoroughly dried before starting this procedure.
2. Inspect and remove tar, bugs and road grime from all areas as needed.
3. Use an OSHA approved air tool to blow hidden water out of trim, crevices and rear view mirrors.
4. Completely dry body and door jambs with terry cloth body towels or chamois.
5. Using a hand held random orbital buffer apply Simoniz® Correction Creme or Simoniz® Polishing Compound directly to foam pad then to vehicle using very little pressure. Starting with

Customer Service Advisor Training

the roof first, apply in back to front motions. A small area (4'x4') is recommended at a time (half of the roof, hood, trunk, complete door, etc.) Do not allow Correction Creme to dry. Remove with a soft terry wax towel by hand or place towel between foam pad, mounted on hand held orbital, and remove from painted surface. Work orbital machine over surface in a front to back motion until Correction Creme is removed. Remove all dust and residue off painted surfaces with Simoniz® Detailer's Choice and soft terry towel.

6. Repeat step #5 to complete the vehicle, one (4'x4') area at a time.
7. Apply appropriate Simoniz® wax. Refer to wax procedure, step #6.

• SIMONIZ® SUPER CLEAN INTERIOR SERVICE

1. Remove all floor mats from car.
2. Use an OSHA approved air gun to blow out and remove debris from underneath and between seats. Special attention to seats and between seat backs, crevices, vents, gauge package, steering column, console, etc.
3. Vacuum and inspect entire interior of vehicle for debris.
4. Start by using pre-diluted Simoniz® Cleaner/Degreaser. Clean door and channel jams with body towel.
5. Clean with pre-diluted Simoniz® Glass & Multi Surface Cleaner on dash, gauge packages and console areas. Clean all the nooks and crannies. Use soft bristled detail brushes and towels to clean.
6. To dress, spray Simoniz Vinyl Dressing directly onto applicator pad and use pad to dress all interior vinyl. Be careful to wipe excess with clean terry towel on dashboard.
7. Lightly mist air conditioning vents only with Simoniz® Spray Shine.
8. Inspect all vanity and inside rear view mirrors, windows and sunroof glass so they are streak-free and spotless.
9. Replace floor mats. Install Simoniz® paper floor mat, driver side only.

• SIMONIZ® LEATHER CLEANING & CONDITIONING

1. Use an OSHA approved air tool to blow out trapped dirt and dust from creases and folds of front and rear leather seats.

2. Inspect dust and dirt and re-vacuum seats.
3. Apply a moderate amount of Simoniz® Leather Cleaner & Conditioner to clean, dry applicator pad.
4. Work into leather surfaces in circular motions starting with the driver's seat. Some high traffic areas may need extra attention depending on how soiled they are.
5. Continue step #4 on all interior leather, including door panels, console and other leather effects.
6. Inspect for any excess product and wipe clean with a clean terry towel then buff to desired gloss.

• SIMONIZ® CARPET SHAMPOO SERVICE

Note: This service to be completed after vehicle has received full service wash.

1. Remove all floor mats from vehicle.
2. Use OSHA approved air tool to blow out under seats and between seats.
3. Re-vacuum vehicle.
4. Prespray carpets, carpeted kick panels and floor mats by misting Simoniz® Carpet & Upholstery Shampoo. For extra soiled or high traffic areas, apply extra product as needed.
5. Using pneumatic rotary brush, work shampoo into all carpets and mats and kick panels. The rotary brush is for larger surfaces only. Be careful to stay clear from trim and fabric edges with brush. When larger areas are finished, use horse hair detail brushes to hand scrub hard to reach and smaller areas.
6. Back brush carpets and mats with a dry body towel wrapped around small handled pot brush. Be sure to keep towel clean by rotating towel surface. Extra attention should be paid to high traffic and soiled areas.
7. Revacuum carpets and floor mats, place floor mats neatly in trunk, place Simoniz® Paper Floor Mat in vehicle.

Customer Service Advisor Training

• SIMONIZ® UPHOLSTERY SHAMPOO

The procedure for an upholstery shampoo is identical to that of the Carpet Shampoo. The only difference is that because upholstery tends to be more delicate than carpeting, use a longer bristle scrub brush instead of the short bristle scrub brush. Follow Carpet Shampoo procedure.

• TRUNK SHAMPOO

For trunk shampoo, follow Carpet Shampoo procedure.

• SIMONIZ® VINYL TOP DRESSING

1. Spray Simoniz® Vinyl Dressing directly into applicator pad.
2. Dress vinyl top by applying in front to back overlapping motions.
3. Remove excess and buff to desired gloss with clean terry towel.

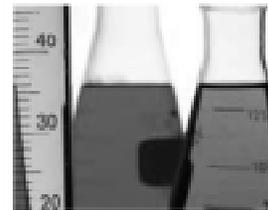
Detail Tip: All vinyl tops should be dressed with a water-based dressing only. Petroleum products could run onto paint and result in staining.

• SIMONIZ® BLACK BODY TRIM AND TIRE REVITALIZER

1. Dress tires by pouring or spraying a small amount of Simoniz® Black Back on a clean terry applicator pad. Make sure rubber and vinyl surface is dry before applying Black Back to tires.
2. Apply a small amount of Black Back to a body towel and work into all other exterior black trim.

VOLUMETRIC ANALYSIS 101

MEASURING COST PER VEHICLE



Determining the product cost per vehicle is a simple one when broken down into the following steps.

1. Determine the product cost per unit (per gallon).
2. Convert the cost per unit to Cost per OUNCES or milliliters.
3. Measure the amount of product used per application per vehicle.
4. Multiply the amount of product used by the cost per ounce or Milliliters.

Measuring Cost per Vehicle -

Single Dilution Process with Positive Injection Pumps or Direct Venturi Draw

1. Determine the cost per unit of the respective product.
Product A has a unit cost of \$5.00 per gallon.
2. Convert the cost per gallon to cost per ounce and or milliliters.
There are 128 ounces in a gallon and 29.574 milliliters in an ounce.
Divide the cost per unit (\$5.00/gallon) by number of ounces (128) in a gallon
 $\$500/128 = .04$ per ounce.
3. Measure the amount of product being used per vehicle.
In order to perform this measurement you will need two graduated cylinders that are large enough to hold product and allow the chemical foot valve to fit down into one cylinder. A 500 milliliter graduated cylinder should meet these requirements.

Dilution Process -

Positive Injection Pump or Venturi Draw

In this process Product A is drawn directly from the stock container and mixed with water on the way to being applied to the vehicle; this is the only time it is diluted with water.

- A. Place the foot valve of the proportioner chemical draw line into the graduated cylinder and then pour the product being measured (Product A) into the cylinder.
- B. Fill the other cylinder to the top line (500ml)
- C. Take notice of where the product levels are at in the cylinder.
- D. Now let a vehicle pass and then take notice of where the product levels are in the cylinder.
- E. Refill the cylinder to the product level before the vehicle passed with the full cylinder.
- F. Subtract the ending level from the starting level to determine the amount of product used.
- G. Assume the product level was at 250 milliliters or 8.45 ounces before the vehicle passed through and it was at 235 milliliters or 7.95 ounces after the vehicle passed.
- H. With simple subtraction (8.45oz - 7.95oz) or (250ml - 235ml) we can easily determine that we used .5oz. or 15ml.

VOLUMETRIC ANALYSIS 101

Convert product use to cost per vehicle

- A. Now that we know the amount of product used (0.5oz.) and product unit cost (.04oz.) we can easily determine the cost of the product used on the vehicle. Multiply the product use 0.5oz. X product cost .04oz. = \$0.02cents.



NOTE: You should always measure product use over several vehicles because of the variance in size in order to determine the average cost per vehicle.

Measuring Cost per Vehicle - Single Dilution Process Using a Proportioner (Hydrominder) Prior To the Pump.

In this proportioning and application process the product is diluted into a holding tank and then pumped out to the vehicle.

1. From the preceding example we have determined the unit cost of Product A to be \$5.00 per gallon and we have converted that to a cost of .04 per ounce.
2. Measure the amount of product being used per vehicle.
 - A. Drawing product up through the proportioner fill the reservoir up as much as possible with diluted product and shut off the water feed to the proportioner.
 - B. Mark the level on the reservoir where the mixed solution has risen to.
 - C. Place the foot valve of the proportioner chemical draw line into the graduated cylinder and pour Product A into the cylinder.
 - D. Take note of where the product levels are in the cylinder. Allow several vehicles to receive the product application so that the level of the solution in the tank will drop (be careful not to deprive the pump of liquid.)
 - E. Take note of exactly how many vehicles were washed.
 - F. Now turn the proportioner back on and fill the reservoir tank back up exactly to where the high level mark was made.
 - G. Now take note of the volume of product remaining in the graduated cylinder.
 - H. Refill the cylinder to the product level before the vehicle passed with the full cylinder.
 - I. Subtract the ending level from the starting level to determine the amount of product used.
 - J. Assume we drew 3 ounces of product from the graduated cylinder and washed 4 vehicles in this test. We simply divide the amount of product used by the number of vehicles washed to determine the use per vehicle. 3oz. divided by 4 vehicles = .75oz. per vehicle.
3. Convert product use to cost per vehicle.
 - A. Now that we know the amount of product used per vehicle (.75oz.) and the product unit cost (.04oz.) we can easily determine the cost of the product used per vehicle.
 - B. Multiply the product use .75oz. x product cost .04oz. = .03 cents per vehicle.

VOLUMETRIC ANALYSIS 101



For Double Dilution Process:

In this proportioning and application process the product is diluted into a holding tank and then diluted again before it goes out to the vehicle.

1. From the preceding examples we have determined the unit cost of Product A to be \$5.00 per gallon and we have converted that to a cost of .04 per ounce.
2. Measure the amount of product being used per vehicle.

Follow the same procedure as the Single Dilution Process Where a Proportioner is used prior to the Pump. You may have to refill the graduated cylinder several times in order to produce enough drops in the solution in the reservoir to measure.

Make sure to note the total number of vehicles washed and the total amount of product used. Assume we draw 12 ounces of product from the graduated cylinder and we washed 8 vehicles in this test. We simply divide the amount of product used by the number of vehicles washed to determine the use per vehicle (12oz. divided by 8 vehicles = 1.5oz. Per vehicle.

Convert Product Use to Cost Per Vehicle:

Now that we know the amount of product used per vehicle (1.5oz.) and the product unit cost (.04oz.) we can easily determine the cost of the product used per vehicle. Multiply the product use 1.5oz. Product cost .04 oz. = .06 per vehicle.



SAFETY FIRST:

Always take the necessary safety precautions when working with any chemicals. Safety Glasses, chemical resistant gloves and proper clothing should always be worn.

ACKNOWLEDGMENTS:

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COST PER VEHICLE QUICK CALCULATOR

OZ.	\$0.03	\$0.04	\$0.05	\$0.06	\$0.07	\$0.08	\$0.09	\$0.10	\$0.11	\$0.12	\$0.13	\$0.14	\$0.15	\$0.16	\$0.17	\$0.18	\$0.19
0.1	\$0.003	\$0.004	\$0.005	\$0.006	\$0.007	\$0.008	\$0.009	\$0.010	\$0.011	\$0.012	\$0.013	\$0.014	\$0.015	\$0.016	\$0.017	\$0.018	\$0.019
0.2	\$0.006	\$0.008	\$0.010	\$0.012	\$0.014	\$0.016	\$0.018	\$0.020	\$0.022	\$0.024	\$0.026	\$0.028	\$0.030	\$0.032	\$0.034	\$0.036	\$0.038
0.3	\$0.009	\$0.012	\$0.015	\$0.018	\$0.021	\$0.024	\$0.027	\$0.030	\$0.033	\$0.036	\$0.039	\$0.042	\$0.045	\$0.048	\$0.051	\$0.054	\$0.057
0.4	\$0.012	\$0.016	\$0.020	\$0.024	\$0.028	\$0.032	\$0.036	\$0.040	\$0.044	\$0.048	\$0.052	\$0.056	\$0.060	\$0.064	\$0.068	\$0.072	\$0.076
0.5	\$0.015	\$0.020	\$0.025	\$0.030	\$0.035	\$0.040	\$0.045	\$0.050	\$0.055	\$0.060	\$0.065	\$0.070	\$0.075	\$0.080	\$0.085	\$0.090	\$0.095
0.6	\$0.018	\$0.024	\$0.030	\$0.036	\$0.042	\$0.048	\$0.054	\$0.060	\$0.066	\$0.072	\$0.078	\$0.084	\$0.090	\$0.096	\$0.102	\$0.108	\$0.114
0.7	\$0.021	\$0.028	\$0.035	\$0.042	\$0.049	\$0.056	\$0.063	\$0.070	\$0.077	\$0.084	\$0.091	\$0.098	\$0.105	\$0.112	\$0.119	\$0.126	\$0.133
0.8	\$0.024	\$0.032	\$0.040	\$0.048	\$0.056	\$0.064	\$0.072	\$0.080	\$0.088	\$0.096	\$0.104	\$0.112	\$0.120	\$0.128	\$0.136	\$0.144	\$0.152
0.9	\$0.027	\$0.036	\$0.045	\$0.054	\$0.063	\$0.072	\$0.081	\$0.090	\$0.099	\$0.108	\$0.117	\$0.126	\$0.135	\$0.144	\$0.153	\$0.162	\$0.171
1	\$0.030	\$0.040	\$0.050	\$0.060	\$0.070	\$0.080	\$0.090	\$0.100	\$0.110	\$0.120	\$0.130	\$0.140	\$0.150	\$0.160	\$0.170	\$0.180	\$0.190
1.1	\$0.033	\$0.044	\$0.055	\$0.066	\$0.077	\$0.088	\$0.099	\$0.110	\$0.121	\$0.132	\$0.143	\$0.154	\$0.165	\$0.176	\$0.187	\$0.198	\$0.209
1.2	\$0.036	\$0.048	\$0.060	\$0.072	\$0.084	\$0.096	\$0.108	\$0.120	\$0.132	\$0.144	\$0.156	\$0.168	\$0.180	\$0.192	\$0.204	\$0.216	\$0.228
1.3	\$0.039	\$0.052	\$0.065	\$0.078	\$0.091	\$0.104	\$0.117	\$0.130	\$0.143	\$0.156	\$0.169	\$0.182	\$0.195	\$0.208	\$0.221	\$0.234	\$0.247
1.4	\$0.042	\$0.056	\$0.070	\$0.084	\$0.098	\$0.112	\$0.126	\$0.140	\$0.154	\$0.168	\$0.182	\$0.196	\$0.210	\$0.224	\$0.238	\$0.252	\$0.266
1.5	\$0.045	\$0.060	\$0.075	\$0.090	\$0.105	\$0.120	\$0.135	\$0.150	\$0.165	\$0.180	\$0.195	\$0.210	\$0.225	\$0.240	\$0.255	\$0.270	\$0.285
1.6	\$0.048	\$0.064	\$0.080	\$0.096	\$0.112	\$0.128	\$0.144	\$0.160	\$0.176	\$0.192	\$0.208	\$0.224	\$0.240	\$0.256	\$0.272	\$0.288	\$0.304
1.7	\$0.051	\$0.068	\$0.085	\$0.102	\$0.119	\$0.136	\$0.153	\$0.170	\$0.187	\$0.204	\$0.221	\$0.238	\$0.255	\$0.272	\$0.289	\$0.306	\$0.323
1.8	\$0.054	\$0.072	\$0.090	\$0.108	\$0.126	\$0.144	\$0.162	\$0.180	\$0.198	\$0.216	\$0.234	\$0.252	\$0.270	\$0.288	\$0.306	\$0.324	\$0.342
1.9	\$0.057	\$0.076	\$0.095	\$0.114	\$0.133	\$0.152	\$0.171	\$0.190	\$0.209	\$0.228	\$0.240	\$0.268	\$0.285	\$0.304	\$0.323	\$0.342	\$0.361
2	\$0.060	\$0.080	\$0.100	\$0.120	\$0.140	\$0.160	\$0.180	\$0.200	\$0.220	\$0.240	\$0.260	\$0.280	\$0.300	\$0.320	\$0.340	\$0.360	\$0.380

POWDERS

Cost per ounce = Cost per pound divided by 16

LIQUIDS

Cost per ounce = Cost per gallon divided by 128



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