DOW CORNING

Automotive
Solutions

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Reliable Solutions from Dow Corning for Automotive Appearance

This interactive formulation guide contains formulating tips, formulations and links to online resources for the Automotive Appearance industry. Browse the contents to learn more, or start at the main menu for a complete index.

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Science, Health and Safety information including *Guidance for Aerosol Applications of Silicone-Based Materials* from Silicones Environmental, Health and Safety Council of North America

Auto Polish

1. Introduction

The word "polish" is a non-specific name but may be defined as any product that enhances and protects the painted surface of an automobile by depositing a thin layer or film of material. More specifically, the name polish is assigned to a product with particular properties, as listed below. Polishes may contain many different ingredients and come in various forms that contribute to a range of final product properties. It is essential to choose the correct ingredients and form to satisfy customers' needs for specific applications. The following information should assist in making those choices.

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Silicones are used to improve a number of auto polish properties, including:

- Ease of application
- Polish cleaning ability
- Ease of buffing
- Gloss
- Color intensity
- Durability and detergent resistance
- Water repellency

The best choice of silicone will depend on the relative importance of the properties above. This is because a polish is essentially a compromise of all the properties.

2. Polish types

Polishes can be described in terms of their physical form, carrier system, ability to clean and durability. Physical forms of polishes include pastes, pre-softened pastes (non-flowing emulsions), liquids and gels. There are three types of carrier system:

2.1. Water-free polishes

Where the active ingredients are dissolved in a compatible carrier such as a hydrocarbon solvent.

2.2. Emulsion polishes

Combining two incompatible phases (hydrocarbon solvent + water) by incorporating a surfactant to form a bridge between the two phases.

2.3. Solvent-free polishes

Using pre-emulsified materials with the carrier being water.

The ability of a polish to clean depends on the presence of powders and solvents. Powders clean physically by removing the oxidation layer and smoothing the surface. Solvents clean chemically by dissolving the films and dirt present on the surface. Powder-free polishes, typically referred to as paint conditioners and glazes, are used strictly to provide gloss and protection. They should be applied only to non-oxidized painted surfaces.

A polish may also be described by its level of durability. Durability ranges from temporary (a few weeks) to durable films that remain after numerous detergent washes or months (formerly called "polymer sealants"). To the user, durability is typically judged by a polish's ability to sustain water beading.

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3. Active ingredients

The term "active ingredient," as used here, is defined as that part of the polish left behind in the form of a film on the polished surface after application.

3.1 Silicones

A variety of silicones, including polydimethylsiloxanes, aminofunctional silicones and silicone resins, are used as active ingredients in polish formulations. Silicone emulsifiers, waxes and volatile silicones are also used in polish formulations and will be addressed in other sections.

Polydimethylsiloxane is a nonreactive linear silicone fluid, which is supplied in a number of viscosities. In the auto polish industry the convention is to classify polydimethylsiloxane as either "intermediate" (350-1000 mm^2/s) or "high" (above 1000 mm^2/s) viscosity.

Intermediate-viscosity polydimethylsiloxanes are lower in molecular weight. They provide excellent application ease and rubout, as well as streak resistance. Due to their low surface tension, they can improve polish cleaning abilities by increasing the surface wettability. This enables a more direct contact between the powder and the painted surface. They are very good at spreading and thus provide excellent film continuity. The film provided by intermediate-viscosity polydimethylsiloxanes, especially at 1000 mm^2/s, provides high shine.

High-viscosity polydimethylsiloxanes are much higher in molecular weight. They provide improvements in durability and provide excellent shine characteristics. However, they are more likely to cause streaking. In general, solvent-in-water polishes use 50-1000 mm^2/s polydimethylsiloxane, while water-in-solvent polishes enable higher-viscosity polydimethylsiloxanes to be used. In polish formulations it is advantageous to use a combination of high- and intermediate-viscosity fluids favoring the following broad spectrum:

3	:	1	:	1
350		1000		12,500

This helps to optimize shine and durability in comparison to ease of use and film continuity.

Aminofunctional silicone fluids are also used extensively in polishes in both curable (crosslinking) and noncurable forms. They provide properties similar to the polydimethylsiloxanes, but with enhanced durability and detergent resistance, particularly with the curable forms.

One advantage of aminofunctional silicones is that they contain a polar amine group that provides excellent deposition or surface affinity. This effectively anchors the product to the substrate. In the case of the curable amine silicones, a reactive alkoxy group undergoes a condensation reaction that provides a crosslinked film on the substrate. Aminofunctional silicones are available with different viscosities, which allow optimization of properties for a particular application. They are compatible with other silicone fluids and resins and therefore may be blended to create the desired polish performance. Fatty acids may be combined with aminofunctional silicones to improve the corrosion resistance of a polish film. Stearic or lauric acid is often used for this purpose. These can also crosslink with acid waxes through the amino group.

Silicone resins may also be used in polish formulations. These networked silicones are available either bodied or linear and provide intermediate durability to the polish film. When used in conjunction with polydimethylsiloxanes, they provide improved durability with excellent leveling while maintaining similar ease-of-use, shine and water-repellent characteristics.

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3.2 Waxes

Waxes are commonly found in polish formulations. A wide variety of different waxes are available, including naturally occurring (carnauba), synthetic (silicone wax, polyethylene) and refined (paraffin) waxes. If properly selected, a wax may reduce smear, improve film continuity (or uniformity), provide durability and promote stability by acting as a thickener.

Most waxes may be described as either soft or hard wax. Hard waxes, such as carnauba and polypropylene, tend to have higher melting points. They provide a harder film finish and promote good gloss, color intensity and durability. However, they are often more difficult to apply and buff out.

Softer waxes, such as paraffin and beeswax, tend to be better at lubricating, providing better application in terms of rubout ease and improved spreading. However, soft waxes provide less shine to the system. In most formulations, it is best to blend a hard wax with a soft wax to optimize their benefits in the formulation.

A recent innovation has been the introduction of silicone waxes into auto polishes. These provide a different combination of properties to that of the traditional waxes. While having a low melting point, they can provide a film with increased detergent resistance and weathering abilities, especially when combined with functionalized silicones. They provide a dry film that improves the resistance to dirt pickup, while retaining the application ease, spreading characteristics and shine associated with softer waxes.

3.3 Solvents

Solvents are another component of most polish systems and can have an impact on the overall formulation performance. The purpose of the solvent in a polish is to carry the active ingredients; to “wet” the surface so a uniform film is produced; and to clean the surface. In choosing a solvent, drying rates, combustibility, compatibility with the surface and compatibility with the packaging must be considered.

It is important to optimize the solvent choice to provide appropriate drying time for the specific application and actives in the formulation. Too little or too much drying time for a specific formulation may lead to poor performance by leaving streaks or a discontinuous film finish. Aliphatic hydrocarbons with Kauri-Butanol values of less than 32 are recommended for polishes. Examples of these include de-aromatized and isoparrafinic solvents. Solvents that contain aromatic substances are not recommended for use in these products because they may damage the surface and may raise flammability, health and environmental issues.

Volatile silicones are an alternative to these traditional solvents. Volatile silicones provide some unique application properties such as better spreading and lubrication properties due to their lower surface tension, and improved compatibility with silicones. Different evaporation rates can be achieved by blending. This allows even deposition of other ingredients, while their cleaning ability for various deposits is comparable to traditional solvents. It has been shown that volatile silicones do not contribute to tropospheric ozone formation. Therefore, volatile silicones are not classified as VOCs in the USA.

3.4 Powders

Powders or polishing agents provide physical surface preparation and cleaning, and aid leveling of the deposited film. The ability of a powder to clean and smooth out surface imperfections depends on the particle size, its shape and hardness. The larger and less uniform the powder particle the greater the cleaning ability to remove the oxidized paint layer. Milder powders are composed of more uniform, smaller particles, which polish more and clean less, giving greater gloss. These are better suited to surfaces with little or no oxidation. For cars less than one year old, it may not be necessary to include powders in the formulation. Most powders contain kaolin clays, diatomaceous earths and hydrated aluminas such as *Sillitin*®, *Kaopolite*®, *Diafil*® and *Alcan*® grades.

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3.5 Emulsifiers

A polish emulsion may be described by either its emulsion system or its ionic character.

An oil-in-water (o/w) emulsion is a system in which the water is the external or continuous phase and the oil is in the form of suspended droplets. These can give a better shine than the other emulsion type, are less flammable and may be considered safer for skin contact.

Water-in-oil (w/o) polishes are popular due to easier processing in some cases and better cleaning properties. Here the oil is the continuous phase, with the water suspended as droplets. Emulsifiers for this type of system have a hydrophilic/hydrophobic balance favoring the oil phase, e.g., silicone emulsifiers. For best results, the water and oil phases are blended separately, and then the water phase is slowly added to the oil phase using a mixer that provides high shear. With some formulations it is possible to blend the phases in a certain order in one vessel.

Silicone emulsifiers represent a unique material for use in water-in-oil polish formulations. These lipophilic materials produce very stable, shear-thickened emulsions. In addition, they are thixotropic, providing excellent application ease. The inherent lubricating nature of the silicone improves rubout. As emulsifiers they can provide better shine than their organic counterparts due to compatibility with active residual material in the polish film.

Emulsions defined by their ionic character are either anionic, nonionic or cationic. An anionic emulsion particle shows a net negative charge typical of the formulations, based on the saponification of a fatty acid such as oleic acid and an alkali. Nonionic emulsions show no net charge and are typical of the emulsions, based on alcohol ethoxylates. Cationic emulsion particles have a net positive charge similar to the alkyl quaternary compounds, giving good wetting and substantivity properties as well as synergy with silicones.

The key to making stable polishes is using the right level of emulsifier, correct HLB value and chemical type for the system – with the ingredients added in the proper order. Oleic acid and a volatile amine can be used together because this combination leaves no residual surfactant on the surface and therefore avoids re-emulsification. Substituting a higher-molecular-weight fatty acid, such as stearic, for the oleic can increase the emulsion viscosity and improve stability.

3.6 Thickeners

A variety of thickeners are commonly used in polish formulations to provide better stability and improved consistency. For maximum efficiency, the external phase should be thickened with no more thickener used than necessary.

In a water-in-oil system, a solvent-based thickener such as bentonite clay can be used. This will increase the viscosity and improve the product consistency as well as reduce the phase separation. The presence of aminofunctional silicones provides a richer, thicker end product with this emulsion type.

With oil-in-water formulations, the aqueous phase may be thickened with natural gums, cellulose gums or acrylic acid polymers. Magnesium aluminium silicates provide minimum thickening, but tend to reduce powder settlement. This is of particular benefit in spray-and-wipe formulations where lower viscosity is desired.

3.7 Biocides

Microbes can spoil polishes, causing breakdown of the product as indicated by a color change or offensive odor. Microbes can also affect the packaging of the polish by distorting the container. Microbial testing must be undertaken to verify whether the product needs protecting.

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3.8 Miscellaneous

Other additives may be added to the polish as desired. For example, coloring agents can be added to shade the polish, while fragrances give an attractive smell. Both are typically incorporated at 0.1-0.2% by weight (higher levels of fragrance can affect stability). In other situations the coloring agent (pigment or dye) is added in larger amounts to create "colored polishes." Other resins, such as acrylic and polyurethane, can be incorporated at low levels to increase the immediate water resistance (not repellency). However, compatibility needs to be determined.

4. Formulation tips

4.1 Stability problems

4.1.1 Oil-in-water polishes

Many different stability problems occur in oil-in-water polishes, but the most common ones can be remedied fairly easily. One such problem occurs when the emulsifying system is the reaction product of a reactive amine source with a fatty acid. If there is interference with this reaction, there will be insufficient surfactant to emulsify the internal phase. It is advisable to combine the reactants in the same phase (usually the oil phase) and allow them to pre-react before adding reactive ingredients such as aminofunctional silicones or neutralizing agents. Problems also occur when the amine content of silicones or other ingredients is too great as this tends to favor water-in-oil emulsions and can actually prevent oil-in-water polishes from forming properly.

If the emulsion forms, but is prone to settling or breaking, thickening the emulsion will often enhance the stability. This may be accomplished by thickening the external phase with gums or acrylic acid polymers.

4.1.2 Water-in-oil polishes

Probably the most common type of instability in water-in-oil polishes is "oiling out" of the phases. This condition occurs because of the natural tendency of the less dense solvents to collect at the top of the polish, but can normally be redispersed by agitation such as shaking. To eliminate this tendency, the emulsion can be made extra thick to reduce the mobility of the phases. Alternatively, steps can be taken to make the phases more compatible, for example by adding a hydrophilic co-surfactant.

Also, applying more shear will reduce the particle size of the emulsion and thicken the polish. It is possible however to overshear the polish and make the particles too small, consuming the surfactant and contributing to instability. When using silicone emulsifiers, adding 0.5-1.0 of a water-soluble electrolyte, such as sodium citrate, in the water phase can substantially enhance stability.

4.2 Performance issues

4.2.1 Streaking problems

Streaking is generally defined as marks or imperfections in the polish film that are immovable, or hard to move, with simple rubbing. In extreme cases streaking appears as harder swirl marks where the polish was originally applied. Generally there are two main causes for streaking:

- The film-forming ingredients cannot level and spread well.
- The film-forming ingredients interfere with each other.

The first cause is usually manifested by insufficient drying time, improper solvent choice or improper application conditions. Allowing too little or too much drying time can have negative effects on the polish film. It is important to choose appropriate solvents as well as the proper phase ratios (water phase versus oil phase) to provide a drying time that allows the polish active ingredients to wet out to a thin, uniform film.

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Polishes that dry too quickly tend to leave a film that varies in thickness over the surface. This creates a film with poor gloss properties because the actives do not have time to wet out prior to solvent evaporation. This is especially the case for higher-viscosity and reactive silicones.

Polishes that are left to dry for too long may also yield a non-uniform film with poor gloss and color enhancement. This is because after the solvent has evaporated, the remaining actives cannot be buffed to a smooth finish – especially if the materials have begun to crosslink and anchor to the surface. Environmental conditions (primarily temperature and humidity) affect the required drying times; on warm surfaces the solvent evaporates too quickly for reactive polymers to wet out. It is important to consider these factors when choosing the solvent or solvent blend for your formulation. In most cases a polydimethylsiloxane will be more flexible than a reactive polymer, and can accommodate a variety of drying times. If these measures do not eliminate the problem, then a wetting agent should be tried at low dosage levels, typically 0.1-0.3%. Silicone polyethers are effective wetting agents used in small quantities; they reduce the tendency to re-emulsify, and avoid incompatibility problems.

The second cause of streaking (i.e., the film-forming ingredients interfering with each other) can be more difficult to resolve. An approach would be to eliminate each ingredient in turn to determine the source of the interference. Sometimes the final film may be compatible, but in getting to that film, there may be stages where ingredients interfere with each other and cause streaking. In this case, choosing coalescing solvents that help solubilize all of the active ingredients can help.

Finally, it must be said that streaking is not an easy problem to solve, so plenty of persistence is required.

4.2.2 Smearing

Smearing is the tendency of a polish film to be too mobile. This can contribute to a more hazy appearance, and show fingerprints or an oily look. Smearing is usually caused by overdeposition of higher-viscosity active ingredients. One solution is to reduce the level of high-viscosity ingredients such as silicones and other materials, or change the ratio of low- and high-viscosity actives. The choice and level of powders can play a significant part in the amount of material left behind on the surface. This can be optimized by trying to incrementally increase or decrease powder and active levels, but this too is a bit of a balancing act and requires perseverance. Every ingredient added or subtracted in a formulation can affect the final properties and physical form of a polish.

4.2.3 Gloss and color

These properties are a function of several factors of a formulation as well as the conditions and surface where it is applied. Gloss can be measured by reflectance properties and clarity of image, while color is assessed from such factors as hue, lightness and saturation.

“Clarity of image” is how well the finish shows details of the reflected image. A common way to assess clarity is to hold a ruler or printed page perpendicular to the surface of the paint and observe the reflected markings and letters on the paint. This is usually affected by how smooth the surface is. A film-former that is smeary can cause unevenness in the image and can distort the image. However, a film-former that is too rigid, or one that dried too quickly, can cause a spotty or mottled deposition, also resulting in distortion. Clarity can be improved by blending different film-formers; by choosing slower- or faster-drying solvents; or by using a very fine grade of powder to polish the surface to a smooth finish.

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Color intensity is often referred to as “jetting” or “wet look” and is influenced by the type of film-former used. Thicker films (e.g., higher-viscosity silicones) will usually help the jetting but this can be carried too far and result in smearing. Hard waxes have the same benefits and problems as high-viscosity silicones but have the disadvantage of being difficult to buff. In some instances, where a high level of reactive silicones or hard waxes is used, it is possible for some of the powder residues to be trapped in the film and left on the surface. This reduces the wet look.

4.2.4 Durability versus ease of use

Waxes were the first reasonably durable polish components and were applied from solvent over the surface, then buffed to a smooth appearance. The harder the wax the better the durability but the harder it was to buff. Polydimethylsiloxanes were introduced to help lubricate waxes and allowed easier buffing, but these compromised durability. The solution was curable silicones, which allow easy application, spreading and buffing. They then cure in place and become more durable.

The curable silicones used in automotive polishes are normally aminofunctional ones. The requirement is to apply as much as needed for good durability while retaining good gloss and ease of use. Low-viscosity aminofunctional silicones are more reactive and more durable, but do not provide significant levels of gloss or lubricity. By blending with higher-viscosity aminofunctional silicones or polydimethylsiloxanes, the best balance of durability and ease of use can be achieved.

The typical ratio of reactive amino-silicones used in traditional polishes is 4 to 6 parts high viscosity to 1 part lower viscosity. This balance can be adjusted to affect ease of application, buffing, gloss and durability. Small, incremental changes are best, because altering one property can affect another.

5. Notes on formulations shown

5.1. Unless stated, all quantities are in percentage parts by weight.

5.2. All formulations are for illustrative purposes only and have been subjected to limited stability tests. You should perform your own stability and performance tests.

5.3. While Dow Corning endeavors to provide-up-to-date information on all the toxicological aspects of its products, it cannot provide such information on other ingredients mentioned in the formulations. As the formulations themselves have not been subjected to safety tests, formulators must satisfy themselves that their final products are safe and compliant with current legislation.

5.4. Note that these are representative formulations only and are not commercialized products. Information and data contained in the formulations are based on information Dow Corning believes to be reliable, but Dow Corning does not warrant merchantability, fitness for use, performance or efficacy. It is the formulator’s obligation to test any application and to conclude satisfactory performance and safety tests before commercialization. Suggestions of uses should not be taken as inducements to infringe any particular patent.

5.5. Please note that certain aminofunctional siloxanes can display acute toxicity via aerosol inhalational exposure. Safety data sheets should be referred to before handling and formulating with these products.

5.6. Soft water should be used for all formulations.

5.7. Biocides have not been shown but all formulations should be subjected to microbial testing. Coloring agents and fragrances may also be included at low addition levels.

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The developed polishes presented by Dow Corning have been formulated to satisfy one of the requirements in the table below:

	Condition of painted surface		
	New	**Good**	**Slightly Weathered**
Abrasive	0-5%	5-12%	10-15%
Durable	Wax Conditioner	Poly Sealant Liquid	Poly Sealant Paste
Semi-durable	Hard Wax	"Polish"	–
Temporary	Instant	–	–

6. Tire care and protectants

Tire dressings, also known as tire renovators, and protectants, also known as vinyl dressings, have the purpose of enhancing the appearance of rubber and plastic surfaces. These products can be water- or solvent-based. Protectants are typically water-based products. Silicone emulsions made of polydimethylsiloxane fluids can be combined to achieve desired gloss levels. It is recommended to start with emulsions made of intermediate-viscosity fluids and use emulsions made of high-viscosity fluids to improve depth of gloss. Aminofunctional silicone emulsions can be incorporated to impart durability to these products. Notice that some aminofunctional silicone emulsions have cationic surfactants. Choose nonionic or cationic emulsions when combining with these emulsions.

The recommended silicone actives content for tire dressings and protectants formulations is 15-25%.

Silicone polyethers such as XIAMETER® OFX-5211 Superwetting Agent can be utilized to enhance wetting properties for these products. The recommendation is to use 0.1-0.3% depending on how difficult to wet the surface is.

Elastomer emulsions and dispersions, silicone polyethers and silicone waxes can help to create innovative look and feel finishes such as soft or dry feel. These types of silicones can help to formulate non-oily-feel products.

Solvent-based tire dressings can be formulated following the recommended ratios found in section 3.1 (Silicones). The same principles found in polishes on how to achieve different levels of gloss apply to tire dressings.

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Table I: Application Selector Guide

Target Application ▶ / Benefit ▼	Wash and Rinse Aid	Exterior Wax, Conditioner and Sealant	Exterior Trim Protectant	Upholstery Care	Interior Trim Renovator	Leather Conditioner	Glass Care	Vinyl Protectant	Tire Care
Water-Based									
Gloss	*Dow Corning* Toray FZ-4658 XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-1171 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1015 Emulsion XIAMETER® MEM-1865 Emulsion XIAMETER® MEM-1473 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1015 Emulsion XIAMETER® MEM-1865 Emulsion XIAMETER® MEM-0039 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-1473 Emulsion XIAMETER® MEM-1015 Emulsion XIAMETER® MEM-1171 Emulsion XIAMETER® MEM-0039 Emulsion XIAMETER® MEM-0346 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-1473 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1015 Emulsion XIAMETER® MEM-0039 Emulsion	XIAMETER® OFX-0193 Fluid	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0039 Emulsion XIAMETER® MEM-1171 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1015 Emulsion XIAMETER® MEM-1716 Emulsion
Durability	XIAMETER® MEM-8035 Emulsion *Dow Corning* Toray FZ-4658	XIAMETER® MEM-8035 Emulsion *Dow Corning* Toray BY 22-749 SR Emulsion	XIAMETER® MEM-8035 Emulsion *Dow Corning®* HV 495 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1101 Emulsion		XIAMETER® MEM-8035 Emulsion *Dow Corning®* HV 495 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1171 Emulsion	*Dow Corning®* HV 495 Emulsion		XIAMETER® MEM-8035 Emulsion	XIAMETER® MEM-8035 Emulsion *Dow Corning* Toray BY 22-729 EX Emulsion *Dow Corning®* HV 495 Emulsion XIAMETER® MEM-1101 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1716 Emulsion
Ease of Use	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion		XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion		XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion
Water Beading	*Dow Corning* Toray FZ-4658 XIAMETER® MEM-8035 Emulsion XIAMETER® MEM-0062 Emulsion PS	*Dow Corning* Toray BY 22-749 SR Emulsion	XIAMETER® MEM-8035 Emulsion			XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0062 Emulsion PS			XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1101 Emulsion XIAMETER® MEM-8035 Emulsion XIAMETER® MEM-1716 Emulsion
Leveling	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-1473 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0039 Emulsion XIAMETER® MEM-1473 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0039 Emulsion XIAMETER® MEM-1473 Emulsion		XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-1473 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1171 Emulsion XIAMETER® MEM-8035 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0039 Emulsion XIAMETER® MEM-1473 Emulsion	XIAMETER® OFX-0193 Fluid		XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-1473 Emulsion
Paintability		XIAMETER® MEM-5009 Emulsion *Dow Corning®* 2418 Release Emulsion	XIAMETER® MEM-5009 Emulsion *Dow Corning®* 2418 Release Emulsion		*Dow Corning®* 2418 Release Emulsion			XIAMETER® MEM-5009 Emulsion *Dow Corning®* 2418 Release Emulsion	

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Table I: Application Selector Guide (continued)

	Target Application ▶ / Benefit ▼	Wash and Rinse Aid	Exterior Wax, Conditioner and Sealant	Exterior Trim Protectant	Upholstery Care	Interior Trim Renovator	Leather Conditioner	Glass Care	Vinyl Protectant	Tire Care
Water-Based	**Wetting**	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-8035 Emulsion XIAMETER® MEM-0062 Emulsion PS				XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-8035 Emulsion XIAMETER® MEM-1171 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0062 Emulsion PS	XIAMETER® OFX-5211 Superwetting Agent XIAMETER® OFX-0193 Fluid	XIAMETER® MEM-1716 Emulsion	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-1101 Emulsion XIAMETER® MEM-8035 Emulsion XIAMETER® MEM-1716 Emulsion XIAMETER® MEM-1171 Emulsion
	Slip	XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion XIAMETER® MEM-8035 Emulsion XIAMETER® MEM-0062 Emulsion PS	XIAMETER® MEM-1716 Emulsion XIAMETER® MEM-1865 Emulsion	XIAMETER® MEM-1865 Emulsion XIAMETER® MEM-1101 Emulsion XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion		XIAMETER® MEM-8035 Emulsion XIAMETER® MEM-1171 Emulsion XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion	XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion		XIAMETER® MEM-1716 Emulsion	XIAMETER® MEM-1716 Emulsion XIAMETER® MEM-8035 Emulsion XIAMETER® MEM-1171 Emulsion XIAMETER® MEM-1101 Emulsion XIAMETER® MEM-0062 Emulsion PS XIAMETER® MEM-0349 Emulsion XIAMETER® MEM-0346 Emulsion
	Color Enhancement	MEM-0062 Emulsion PS	*Dow Corning*® HV 495 Emulsion XIAMETER® MEM-1865 Emulsion XIAMETER® MEM-1101 Emulsion	*Dow Corning*® HV 495 Emulsion XIAMETER® MEM-1865 Emulsion XIAMETER® MEM-1101 Emulsion		*Dow Corning*® HV 495 Emulsion XIAMETER® MEM-1865 Emulsion XIAMETER® MEM-1101 Emulsion	*Dow Corning*® HV 495 Emulsion XIAMETER® MEM-1865 Emulsion XIAMETER® MEM-1101 Emulsion			XIAMETER® MEM-1101 Emulsion *Dow Corning*® HV 495 Emulsion

Table I: Application Selector Guide (continued)

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	Target Application ▶ / Benefit ▼	Wash and Rinse Aid	Exterior Wax, Conditioner and Sealant	Exterior Trim Protectant	Upholstery Care	Interior Trim Renovator	Leather Conditioner	Glass Care	Vinyl Protectant	Tire Care
Solvent-Based	**Gloss**		XIAMETER® PMX-200 Silicone Fluid (350-1,000 cSt) XIAMETER® OFX-0531 Fluid *Dow Corning*® 3527 Release Agent *Dow Corning*® 2-1912 Fluid *Dow Corning*® 2-5088 Wax	XIAMETER® PMX-200 Silicone Fluid (350-1,000 cSt) XIAMETER® OFX-0531 Fluid *Dow Corning*® 3527 Release Agent *Dow Corning*® 2-1912 Fluid		XIAMETER® PMX-200 Silicone Fluid (350-1,000 cSt)	XIAMETER® PMX-200 Silicone Fluid (350-1,000 cSt) *Dow Corning*® 2-5088 Wax		XIAMETER® PMX-200 Silicone Fluid (350-1,000 cSt)	XIAMETER® PMX-200 Silicone Fluid (350-1,000 cSt)
	Durability	XIAMETER® OFX-8630 Fluid	XIAMETER® OFX-0536 Fluid XIAMETER® OFX-0531 Fluid *Dow Corning*® 3527 Release Agent *Dow Corning*® 2-1912 Fluid *Dow Corning*® 593 Fluid *Dow Corning*® 2-5088 Wax XIAMETER® OFX-8630 Fluid	*Dow Corning*® 3527 Release Agent *Dow Corning*® 593 Fluid *Dow Corning*® 2-1912 Fluid			*Dow Corning*® 2-5088 Wax			XIAMETER® PMX-200 Silicone Fluid (12,500-60,000 cSt) XIAMETER® OFX-8630 Fluid *Dow Corning*® 3527 Release Agent *Dow Corning*® 593 Fluid *Dow Corning*® 2-1912 Fluid
	Ease of Use		XIAMETER® PMX-200 Silicone Fluid (50-1,000 cSt) XIAMETER® OFX-0531 Fluid	XIAMETER® PMX-200 Silicone Fluid (50-1,000 cSt) XIAMETER® OFX-0531 Fluid		XIAMETER® PMX-200 Silicone Fluid (50-1,000 cSt)	XIAMETER® PMX-200 Silicone Fluid (50-1,000 cSt)		XIAMETER® PMX-200 Silicone Fluid (50-1,000 cSt)	XIAMETER® PMX-200 Silicone Fluid (50-1,000 cSt)
	Water Beading	XIAMETER® PMX-0245 Fluid XIAMETER® PMX-200 Silicone Fluid XIAMETER® OFX-8630 Fluid	*Dow Corning*® 3527 Release Agent *Dow Corning*® 2-1912 Fluid *Dow Corning*® 2-5088 Wax XIAMETER® PMX-200 Silicone Fluid	*Dow Corning*® 593 Fluid XIAMETER® OFX-0531 Fluid *Dow Corning*® 2-5088 Wax XIAMETER® PMX-200 Silicone Fluid	XIAMETER® FBL-0563 Formulated Blend	*Dow Corning*® 593 Fluid *Dow Corning*® 2-1912 Fluid *Dow Corning*® 3527 Release Agent XIAMETER® PMX-200 Silicone Fluid	*Dow Corning*® 2-5088 Wax	*Dow Corning*® 3527 Release Agent	XIAMETER® PMX-200 Silicone Fluid	*Dow Corning*® 2-1912 Fluid *Dow Corning*® 593 Fluid *Dow Corning*® 3527 Release Agent XIAMETER® PMX-200 Silicone Fluid
	Leveling	XIAMETER® PMX-0245 Fluid	XIAMETER® PMX-200 Silicone Fluid *Dow Corning*® 593 Fluid	XIAMETER® PMX-200 Silicone Fluid		XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid		XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-0244 Fluid XIAMETER® PMX-0245 Fluid *Dow Corning*® OS-2 Silicone Cleaner and Surface Prep Solvent
	Paintability		*Dow Corning*® 2-5088 Wax XIAMETER® OFX-0203 Fluid XIAMETER® OFX-0230 Fluid	XIAMETER® OFX-0203 Fluid XIAMETER® OFX-0230 Fluid		XIAMETER® OFX-0203 Fluid XIAMETER® OFX-0230 Fluid	*Dow Corning*® 2-5088 Wax		XIAMETER® OFX-0203 Fluid XIAMETER® OFX-0230 Fluid *Dow Corning*® 2-5088 Wax	XIAMETER® OFX-0230 Fluid XIAMETER® OFX-0203 Fluid
	Dry Finish		*Dow Corning*® 2-5088 Wax				*Dow Corning*® 2-5088 Wax			
	Wetting	XIAMETER® PMX-0245 Fluid	XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid		XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-0244 Fluid XIAMETER® PMX-0245 Fluid XIAMETER® PMX-0345 Fluid *Dow Corning*® OS-2 Silicone Cleaner and Surface Prep Solvent XIAMETER® PMX-200 Silicone Fluid
	Slip		XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid	XIAMETER® PMX-200 Silicone Fluid		XIAMETER® PMX-200 Silicone Fluid	
	Color Enhancement		XIAMETER® PMX-200 Silicone Fluid (10,000-60,000 cSt)	XIAMETER® PMX-200 Silicone Fluid (10,000-60,000 cSt)		XIAMETER® PMX-200 Silicone Fluid (10,000-60,000 cSt)	XIAMETER® PMX-200 Silicone Fluid (10,000-60,000 cSt)			XIAMETER® PMX-200 Silicone Fluid (10,000-60,000 cSt)

Table II: Solvent-Based Product Comparison

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Description	Currently Available in These Geographic Areas	Product	Functions, Benefits and Recommendations	Comparison Ratings[1] Shine	Durability	Ease of Use	Wetting	Slip	Viscosity, cSt[2]	% Actives	Notes
Volatile Silicone	Global	XIAMETER® PMX-200 Silicone Fluid, 0.65 cs	Volatile, low-viscosity fluids designed for use as carriers, high-performance/non-VOC[3] solvents and cleaning aids in a wide range of automotive polish formulations; effective wetting properties deliver actives to the automotive surface; slip, water repellency and gloss characteristics are present for a limited time; replace mineral seal oil in rinse aids; effective microemulsions can be achieved when combined with silicone surfactants.			•••••	•••••		0.65	100	Volatile carrier; CARB[4] compliant
	Global	*Dow Corning*® OS-2 Silicone Cleaner and Surface Prep Solvent					••••		0.78	100	
	Global	XIAMETER® PMX-1184 Fluid							1.6	100	Not tested for comparison ratings
	Global	XIAMETER® PMX-0244 Fluid							2.5	100	Volatile carrier; CARB[4] compliant; not tested for comparison ratings
	Global	XIAMETER® PMX-0245 Fluid				•••••	•••••		4.0	100	Volatile carrier; CARB[4] compliant
	Global	XIAMETER® PMX-0345 Fluid				•••••	•••••		5.0	100	Volatile carrier; CARB[4] compliant
Silicone Fluid	Global	XIAMETER® PMX-200 Silicone Fluid	High-viscosity fluids provide excellent depth of gloss and improvements in durability and water resistance; useful in solvent-based formulations; blend of intermediate- and high-viscosity fluids recommended to achieve a good balance in gloss, application ease and rub-out; a 3:1:1 ratio of 350, 1,000 and 12,500 cSt products optimizes shine and durability; products are available in emulsion form.	••••	••	••••	••••	•••••	50 - 1,000	100	
				••••	••••	••	•	••••	10,000 - 60,000	100	
Amino Functional Silicone	Global	XIAMETER® OFX-0531 Fluid	Offering enhanced durability, detergent resistance and corrosion resistance; offered in crosslinkable (curable) and non-crosslinkable versions; curable products produce a continuous film; non-crosslinkable products offer excellent stability and shelf life; deposit and adhere strongly to automobile finishes, chrome and aluminum surfaces.	•••••	•••	•••	••	•	160	50	
	Global	XIAMETER® OFX-0536 Fluid		••	•••••	•••	•	••	40	100	
	Global	XIAMETER® OFX-8630 Fluid		•	••••	•••	••	••	500	100	
Alkylaryl Functional Fluid	Global	XIAMETER® OFX-0203 Fluid	Have properties similar to intermediate-viscosity fluids, but with alkyl functionality; serve as actives for leather conditioners; provide preferred technologies to formulate products for body shop use.	•••	•••	•••	•••	•	1,200	100	
	Global	XIAMETER® OFX-0230 Fluid							1,125 - 1,645	100	Not tested for comparison ratings
Silicone Wax	Global	*Dow Corning*® 2-5088 Wax	Serves as active for leather conditioners; provides preferred technologies to formulate products for body shop use; serves as an ingredient for hard waxes, paintable polishes, wax conditioners, polishes and polymer sealants.	••••	••••	••		•	-	100	Melt at 70°C prior to use
Emulsifier Wetting Agent	Global	XIAMETER® OFX-0190 Fluid	Cleaning and wetting properties; lubricity in glass cleaners; ability to be used in water-in-oil and water-in-silicone emulsions makes them unique to formulate non-VOC products; XIAMETER® OFX-0190 Fluid, XIAMETER® OFX-0193 Fluid and XIAMETER® OFX-3667 Fluid are suited for co-surfactants; XIAMETER® OFX-0193 Fluid for anti-fog applications; *Dow Corning*® 3225C Formulation Aid for water-in-silicone emulsions; *Dow Corning*® 5200 Formulation Aid for water-in-oil emulsions.						2,000	100	Not tested for comparison ratings
	Global	XIAMETER® OFX-0193 Fluid		•		•••••	•••••	•	400	100	
	Global	*Dow Corning*® 3225C Formulation Aid		•	•	•••	•••	•	700	100	
	Global	XIAMETER® OFX-3667 Fluid							200 - 500	100	Not tested for comparison ratings
	Global	*Dow Corning*® 5200 Formulation Aid		••••	•	••	••	•	2,500	100	
Silicone Resin	Global	*Dow Corning*® 593 Fluid		••	••	••••	••••	•••	700	100	
	Global	XIAMETER® FBL-0563 Formulated Blend							7	42	Air-drying, air-curing; imparts a high degree of water repellency on natural and synthetic fabrics; not tested for comparison ratings
	Global	*Dow Corning*® 2-1912 Fluid	Long-lasting water durability and repellency that protects automotive surfaces; preferred when enhanced water beading is desired; some can be reacted with catalyst agents to formulate fabric water repellents.	••••	••	••••	••••	•••	700	100	
	Global	*Dow Corning*® 3527 Release Agent		•••	•••	•••	•••	••	2,000	100	

[1] Comparison Ratings (••••• = Best; • = Moderate). Note: Ratings are a preliminary guideline only. See product data sheets for detailed information. All tested products have been tested at 5% actives on automotive panels using a suitable solvent.

[2] The above information is not intended for use in preparing product specifications. Contact Dow Corning before writing specifications.

[3] VOC = Volatile Organic Compounds, according to the U.S. Clean Air Act. Contact Dow Corning for product compliance in your area.

[4] California Air Resources Board.

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Table III: Water-Based Product Comparison

Description	Currently Available in These Geographic Areas	Product	Functions, Benefits and Recommendations	Comparison Ratings[1]					Viscosity, cSt (‡polymer viscosity for the emulsion products)	% Actives	Emulsifier Type	Free of APEO Surfactants	Compliant with European Detergent Regulations EC 648/2004	Notes
				Shine	Durability	Ease of Use	Wetting	Slip						
Silicone Fluid Emulsion	Americas, Asia	XIAMETER® MEM-0349 Emulsion	Preferred for water-based formulations, these emulsions and microemulsions offer significant advantages when formulating flexibility is desirable; good compatibility; good surface abrasion characteristics; good gloss, minimum smear; for use in automotive polishes and rubber/vinyl protectant formulations, cleaning properties; provide proven performance, reliable quality and speed to market; the small particle size of the microemulsion products offers better penetration, improved wetting out, more consistent coatings.	••••	•••	••••	•••	••	350‡	60	Nonionic	Yes	Yes	
	Americas, Asia	XIAMETER® MEM-0039 Emulsion		••	••	•••	••	•	350‡	35	Nonionic	Yes	Yes	
	Americas	XIAMETER® MEM-1171 Emulsion		••••	••	••••	•••	•••	approximately 550‡	50	Nonionic			Low-odor
	Americas	XIAMETER® MEM-0062 Emulsion PS		••	•••	•••	•••	••	1,000‡	60	Slightly cationic	Yes		Emulsifiers are readily biodegradable
	Americas	XIAMETER® MEM-1101 Emulsion		•••	••	•••	•••	•••	125,000‡	60	Anionic	Yes		
	Europe	XIAMETER® MEM-0346 Emulsion		••••	•••	••••	•••	••	350‡	60	Nonionic	Yes	Yes	
	Europe	XIAMETER® MEM-1473 Emulsion		••••	•••	•••	•••	•	400	50	Nonionic	Yes	Yes	
	Global	XIAMETER® MEM-0347G Emulsion		•••	••	••••	•••	•	OH functional	60	Nonionic	Yes	Yes	
	Europe	XIAMETER® MEM-1015 Emulsion		••••	•••	••••	•••	•••	1,000‡	60	Slightly anionic	Yes	Yes	
	Global	*Dow Corning*® HV 495 Emulsion		••••	••••	•	•••	••	100,000‡	35	Anionic	Yes	Yes	
Silicone Fluid Microemulsion	Global	XIAMETER® MEM-1716 Emulsion		•••	••	••	••	••••	10,000‡	30	Cationic	Yes	Yes	Clear translucent
	Global	XIAMETER® MEM-1865 Emulsion		••	•••	••	••	••••	12,500‡	25	Anionic/ nonionic	Yes	Yes	Translucent
Amino Functional Silicone Emulsion	Global	XIAMETER® MEM-8035 Emulsion	Provide outstanding bonding and adhesion properties to automotive finishes, allowing repeated washings and adverse weather conditions.	•••	••••	••	•	••••	-	35	Cationic	Yes	Yes	
Alkylaryl Functional Silicone Emulsion	Global	XIAMETER® MEM-5009 Emulsion	Have properties similar to intermediate-viscosity fluids, but with alkyl functionality; serve as actives for leather conditioners; provide preferred technologies to formulate products for body shop use.	••	••	•••	•••	••	-	50	Nonionic	Yes		Emulsifiers are readily biodegradable
	Europe	*Dow Corning*® 2418 Release Emulsion		•••	•••	•••	•••	•	-	50	Nonionic	Yes	No	
Amino Emulsion	Japan	*Dow Corning*® BY 22-729 EX Emulsion	Provides durability to tire treatment products.	••	••••	•	•	•••		20	Nonionic	Yes		
Resin Emulsion	Japan	*Dow Corning*® BY 22-749	Provides durable water repellency to liquid car polish products, tire treatment products.	•••	••••	••••	•••	••		70	Nonionic	Yes		
Amino Micro-emulsion	Japan	*Dow Corning*® FZ-4658	Provides durable water repellency to shampoo for automated car washes; the small particle size prevents blockage in the pipes of the washing mechanism.	•••	••••	••••	•••	•••		15	Nonionic	Yes	Yes	Translucent gray

[1] Comparison Ratings (••••• = Best, • = Moderate). Note: Ratings are a preliminary guideline only. See product data sheets for detailed information. All tested products have been tested at 5% actives on automotive panels using a suitable solvent.

Reformulate Your Tire and Vinyl Dressings with Products from Dow Corning and Avoid Costly Fines.

Dow Corning C.A.R.B.-Compliant Solutions for Automotive Surfaces

AV09029

Failure to comply with the California Air Resources Board's (C.A.R.B.'s) volatile organic compound (VOC) limits could cost you up to $50,000 per day in fines.

The good news is that Dow Corning can help you easily reformulate your products to meet C.A.R.B. requirements.

A Challenging Task

Effective January 1, 2003, non-aerosol automotive rubber and vinyl protectants sold in the state of California required a maximum VOC limit of 3 percent. (To learn more about how C.A.R.B. regulations impact your business, read our Tip Sheet on California regulations for auto appearance products.)

Today's consumers enjoy beautifying their vehicles and making them look like new. And they rely on your vinyl and tire dressings to help them do just that. We understand how difficult it can be to reformulate solvent-based dressings that comply with environmental regulations without sacrificing the performance your customers have come to expect.

Reliable Solutions

Dow Corning can offer you reliable solutions that deliver both high performance and C.A.R.B. compliance.

There are many ways to reformulate, including cost-inviting water-based formulas and VOC-exempt solvent alternatives. However, many of these solutions come with trade-offs. The decision to switch from your current solvent to slow-drying isoparaffin solvents, for example, could short-change your product (and your customers) in critical performance benefits.

… continued

Dow Corning offers solutions that can help you

- Control your wetting properties and drying time
- Enhance color for that new-car showroom look
- Modify shine and durability
- Make your product easier to apply

We have prepared sample formulations to show you how easy it is to formulate a VOC-exempt Fast Dry tire dressing using XIAMETER® PMX-1077 Fluid. Compare the outstanding results Dow Corning delivers (Figure 1) to the results obtained using an isoparaffin-based formula (Figure 2).

Or, if a water-based formula is an option for you, try the XIAMETER® MEM-0349 Emulsion multi-surface dressing formulation with vertical clinging properties (Figure 3).

Compare the Alternatives

The drying-time chart (Figure 4) lets you compare the performance of Dow Corning's volatile siloxanes vs. common organic-based solvents. As you can see, an organic-based VOC-exempt solvent may not meet your formulation requirements. Dow Corning's VOC-exempt fluids, on the other hand, can give you the flexibility you need to formulate compliant products that live up to your customers' expectations.

Keep your business moving forward. Save money, time, and trouble with Dow Corning Service Solutions.

Need to know if your product or proposed formulation will stand up to a C.A.R.B. inspection?

Dow Corning Analytical Services has the capability to analyze for water content, ammonium content, prohibited compounds, ketones, and alcohols to help you determine if you are meeting the C.A.R.B. guidelines for volatile content. There is a fee for these services, but they can save you money, time, and trouble by helping you avoid violations and costly fines.

Copies of our California regulations Tip Sheet and C.A.R.B.-compliant prototype formulations are available from your Dow Corning representative.

For more information about Dow Corning's Service Solutions, please visit **dowcorning.com**

AV05804

Figure 1
Tire treated with Tire Dressing Formula TP-750 (XIAMETER® PMX-1077 Fluid), Form No. 26-1613

AV05805

Figure 2
Tire treated with Tire Dressing Formula TP-770 (isoparaffin), Form No. 26-1615

AV05803

Figure 3
Tire treated with Water-Based Tire Dressing Formula IP-580 (XIAMETER® MEM-0349 Emulsion), Form No. 26-1616

… continued

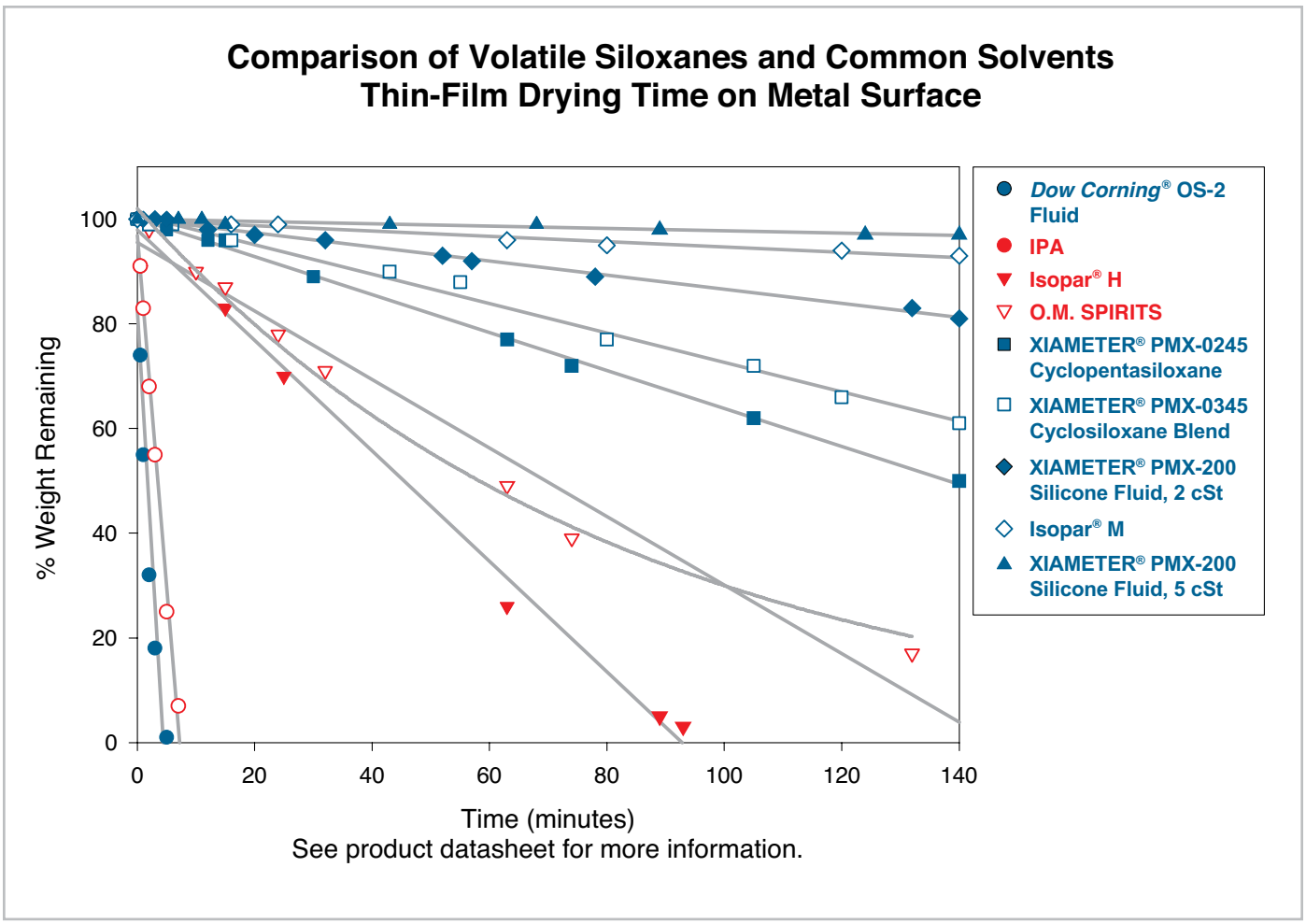

Figure 4: Drying-Time Chart
VOC-exempt solvents are shown in blue.

Reliable Solutions from Dow Corning

Tip Sheet for California Regulations for Auto Appearance Products

The California Air Resources Board (C.A.R.B.) has a Consumer Products Compliance Program that implements regulations and ensures compliance for the amount of volatile organic compounds (VOCs) in consumer products.

WHO is impacted by these regulations?

Companies that manufacture, distribute and/or sell consumer products for both retail sales and institutional sales in the state of California.

Because both retail sales and institutional use are included in these regulations, it is important to know the difference between these categories.

In **retail** sale the end formula is purchased for personal use by a *consumer* at a retail store, such as a gas station, retail chain or auto specialty store. Whereas with **institutional** use the end formula is purchased by a *company* such as a car dealership, body shop, rental car agency or car wash and the user is an employee of that company.

WHAT auto products are affected and WHEN do the regulations become effective?

The table below is a partial list from the Consumer Products Program.

WHERE can I find more information about these regulations?

Visit **www.arb.ca.gov/** for more information on the Consumer Products Program of the California Air Resources Board (C.A.R.B.).

WHY are some solvents classified as "VOC-exempt"?

There are two ways a solvent can be classified as "VOC-exempt" for the California Consumer Products Program. First, if a solvent is a low vapor pressure or high boiling point compound, it is considered exempt. These solvents are called "LVP-VOC" compounds and are dramatically slower to dry than traditional solvents used in auto appearance products (such as odorless mineral spirits). Second, there is a small family of fast-drying solvents that have been exempted by the California Consumer Products Program. Dow Corning volatile methyl siloxanes are recognized as being non-ozone-depleting; they are exempt from U.S. EPA VOC regulations and are also exempt by the California Consumer Products Program.

… continued

Product Category	Effective Date	VOC Standard (Maximum)
Automotive Rubbing or Polishing Compounds	1/1/2005	17%
Automotive Wax/Polish/Sealant/Glaze		
Instant detailers	1/1/2001	3%
Hard paste wax	1/1/2005	45%
All other forms	1/1/2005	15%
Brake Cleaners	12/31/2010	10%
Bug and Tar Remover	1/1/2002	40%
Engine Degreasers		
Aerosols	12/31/2010	10%
Non-aerosols	12/31/2004	5%
Fabric Protectants		
Aerosols	1/1/1997	60%
Non-aerosols	12/31/2010	1%
Rubber and Vinyl Protectant		
Aerosols	1/1/2005	10%
Non-aerosols	1/1/2003	3%

ARE OTHER STATES adopting these or similar standards?

YES, various states in the country are or have already adopted these standards. Consult the specific state regulations on air quality or air resources of your concern. Below, we offer links to assist you.

New York:

www.dec.ny.gov/regs/2492.html
www.dec.ny.gov/regs/4201.html

New Jersey:

Subchapter 24: Prevention of Air Pollution from Consumer Products and ***Subchapter 16: Control and Prohibition of Air Pollution by Volatile Organic Compounds***

www.state.nj.us/dep/aqm/rules.html#27

Pennsylvania:

www.dep.state.pa.us/dep/deputate/airwaste/aq/regs/regs.htm
www.pacode.com/secure/data/025/chapter130/s130.211.html

Virginia

9VAC5-40-7270. Standard for volatile organic compounds

http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+9VAC5-40-7270

Delaware

Regulation No. 1141: Limiting Emissions of Volatile Organic Compounds from Consumer and Commercial Products

http://regulations.delaware.gov/AdminCode/title7/1000/1100/1141.shtml

District of Columbia

Chapter 7 – Volatile Organic Compounds

http://ddoe.dc.gov/ddoe/frames.asp?doc=/ddoe/lib/ddoe/information2/air.reg.leg/chapter7revised.pdf

Maine

Bureau of Air Quality

Chapter 152: Control of Emissions of Volatile Organic Compounds from Consumer Products

www.maine.gov/dep/air/regulations/docs/CHAP152%20Consumer%20Products%202007.pdf

Chapter 159: Control of Volatile Organic Compounds from Adhesives and Sealants

www.maine.gov/dep/air/regulations/recentlyadopted.htm

Maryland

Code of Maryland Regulations 26.11.32 Control of Emissions of Volatile Organic Compounds from Consumer Products

www.mde.state.md.us/ResearchCenter/laws_regs/procreg_26_11_32_033007.asp
www.mde.state.md.us/ResearchCenter/laws_regs/index.asp

HOW can auto appearance products be formulated to meet these requirements?

Look at the following examples:

- Clear (solvent-based) rubber and vinyl protectants can be modified to include VOC-exempt solvents.
- The type of rubber and vinyl protectant formula can change to a white water-based emulsion.
- Liquid polishes or hard pastes (water-in-solvent emulsions) can be modified to include a mixture of a VOC-exempt solvent and a traditional solvent (such as odorless mineral spirits).

Dow Corning supplies VOC-exempt volatile methyl siloxanes with a variety of drying times to meet your needs for solvent-based formulas or for water-in-solvent emulsions (liquid polishes or hard pastes). A few of our products include XIAMETER® PMX-0245 Cyclopentasiloxane, XIAMETER® PMX-0345 Cyclosiloxane Blend and *Dow Corning*® OS-2 Silicone Cleaning Solvent. See your Dow Corning representative for a comparison of volatile methyl siloxanes from Dow Corning versus other common solvents with which you may already be familiar.

Dow Corning also supplies a variety of silicon-based actives in emulsion form for direct formulation into your water-based formulas. See Dow Corning's prototype formulations for a variety of choices and ideas for protectants for rubber, vinyl, and tire surfaces.

Contact your local distributor or Dow Corning directly for formulation ideas and product recommendations that match your interests.

Reliable Solutions from Dow Corning

Auto Care Raw Material Explanations

Raw Material	Function	Supplier
Acetic acid	An acid used to solubilize aminofunctional silicones.	Various
Acrylic thickener	A polyacrylic acid polymer thickener used to increase viscosity and give stability (e.g., Carbopol® ETD 2001).	The Lubrizol Corporation lubrizol.com
Alcan® SF7	An aluminum trihydroxide powder with a very fine particle size used to give extremely gentle polishing action. The function is to remove light oxidization and minor surface blemishes from paintwork. The powder also aids in leveling of the polish film during buffing and helps promote high shine.	Alcan Chemicals alcan.com
Amadol® 511	Water-in-oil emulsifier.	Akzo Nobel akzonobel.com
Bentone® 38	Rheological additive used to modify viscosity.	Elementis Specialties elementis-specialties.com
Bio-soft® NI-7	Alcohol ethoxylate. A biodegradable surfactant used to replace Makon 10, a nonylphenylethoxylate.	Stepan Co. stepan.com
Brij™ LT4	A non-ionic emulsifier with the chemical name ethoxy (4) synthetic C12-C13 alcohols.	Croda Inc. croda.com
Brij™ O10	A non-ionic surfactant with the chemical name alcohol ethoxylate, based on tridecanol and used for detergency.	Croda Inc. croda.com
Cabosil® EH-5	Fumed silica used as a thickener for organic solvents.	Cabot Corporation cabot-corp.com
Carnauba wax	An organic wax used to give a hard film with good shine.	Various
Cellulose thickener	Hydroxyethyl cellulose thickener used to increase viscosity and stabilize the formulation.	Ashland Inc. ashland.com
Crodamet® T8	A non-ionic emulsifier with the chemical name ethoxy (8) tallow amine.	Croda Inc. croda.com
Crodasinic® LS35	An emulsifier with the chemical name sodium lauroyl sarcosine.	Croda Inc. croda.com
Dimethylamino ethanol	Reacts with oleic acid to form a salt, which acts as an emulsifier.	Various
Dow Corning® HV 495 Emulsion	A polymer, non-ionic emulsion of 60,000 cSt dimethyl fluid (OH terminated) that offers excellent color improvement and good durability to auto polish and vinyl/ tire protectants.	Dow Corning Corporation dowcorning.com

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Raw Material	Function	Supplier
Dow Corning® 593 Fluid	A silicone resin in dimethyl fluid that provides very good leveling properties to auto polishes.	Dow Corning Corporation dowcorning.com
Dow Corning® 2-1912 Fluid	A silicone resin in dimethyl fluid that imparts shine, durability and ease of use to auto polishes and tire/vinyl protectants.	Dow Corning Corporation dowcorning.com
Dow Corning® 2200 Antifoam Emulsion	A silicone antifoam used to slowly collapse generated foam.	Dow Corning Corporation dowcorning.com
Dow Corning® 3225C Formulation Aid	A silicone polyether used as an emulsifier.	Dow Corning Corporation dowcorning.com
Dow Corning® 3527 Release Agent	A silicone resin in dimethyl fluid that imparts shine, durability and ease of use to auto polishes and tire/vinyl protectants.	Dow Corning Corporation dowcorning.com
Dow Corning® 5200 Formulation Aid	A silicone polyether used as an emulsifier.	Dow Corning Corporation dowcorning.com
Dowanol® DPM	A solvent to remove road film, with the chemical name dipropylene glycol methyl ether.	The Dow Chemical Company dow.com
Dowanol® DPnB	A coalescing agent with the chemical name dipropylene glycol n-butyl ether.	The Dow Chemical Company dow.com
Dowanol® PM	A fast-evaporating solvent to remove road film, with the chemical name propylene glycol methyl ether.	The Dow Chemical Company dow.com
Dowanol® PnB	A coalescing agent with the chemical name propylene glycol n-butyl ether.	The Dow Chemical Company dow.com
Empicol® ESB 70	An anionic surfactant with the chemical name sodium lauryl ethoxy sulphate. Used for detergency and quick foaming.	Rhodia Inc. rhodia.com
Empilan® 2502	A non-ionic surfactant with the chemical name coconut diethanolamide. Used to increase viscosity and improve foam generation.	Rhodia Inc. rhodia.com
Exxsol™ D40 (Low aromatic solvent 160/190°C)	A medium-evaporating solvent, used as a carrier for actives (silicones). This solvent also has cleaning properties and can remove tar, etc.	ExxonMobil Chemical exxonmobilchemical.com
Exxsol™ D80 (Low aromatic solvent 200/250°C)	A slow-evaporating solvent, used as a carrier for actives (wax and silicones). This solvent also has cleaning properties for tar, etc.	ExxonMobil Chemical exxonmobilchemical.com
Heptane	A fast-evaporating aliphatic solvent used as a carrier for silicone actives.	Various
Isopropanol	A fast-evaporating solvent used for its cleaning and anti-freeze properties.	Various
Kaopolite® SF Kaopolite® AB Kaopolite® 1152	Anhydrous aluminum silicate powders used for removing oxidized paintwork and very minor surface blemishes. Also aid in leveling of the polish film during buffing.	Kaopolite Inc +1 888 567 6548 Distributed in selected locations by Univar, Inc.

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Raw Material	Function	Supplier
Kathon LX	A preservative agent.	Rohm & Haas rohmhaas.com
Lanolin Oil	An oil to help restore and maintain the suppleness of leather.	Various
Makon TD-12	A non-ionic surfactant, tridecyl alcohol ethoxylate, POE-12.	Stepan Co. stepan.com
Ninol 49-CE	A coconut DEA.	Stepan Co. stepan.com
Norpar™ 6	A very fast-evaporating aliphatic solvent, used as a carrier for actives (silicones).	ExxonMobil Chemical exxonmobilchemical.com
Oleic acid	An acid that reacts with dimethylamino ethanol to form a salt that acts as an emulsifier.	Various
Paraffin wax	A softer organic wax that gives less durability and shine than carnauba; however, it is easily buffable.	Various
PEG 6000	High-molecular-weight polymer of ethylene oxide, used as an emulsifier in waxes and polishes.	Hallstar hallstar.com
Pine oil	A wetting and cleaning agent.	Various
Polawax® GP200	A blend of fatty acids with non-ionic surfactants that functions as an emulsifier. Forms oil/water emulsions, which can convert to water/oil on application.	Croda Inc. croda.com
Polyethylene wax	An organic wax that gives hardness and durability to films. Also has solvent-binding ability.	Various
Propylene glycol	A slow-evaporating water-miscible solvent that assists to deposit a uniform film, anti-freeze property.	Various
Rhodapex® ESB 70	An anionic surfactant with the chemical name sodium lauryl ethoxy sulphate. Used for detergency and quick foaming.	Rhodia Inc. rhodia.com
Rust inhibitor	Sodium benzoate or similar to eliminate rusting of aerosol can.	Various
Sillikolloid P87	Quartz and kaolinite filler.	Hoffmann Mineral hoffmann-mineral.com
Sillitin Z86	Quartz and kaolinite filler.	Hoffmann Mineral hoffmann-mineral.com
Span™ 80	A non-ionic emulsifier with the chemical name sorbitan trioleate.	Croda Inc. croda.com
Span™ 120 (formerly Crill® 6)	A non-ionic emulsifier with the chemical name sorbitan monoisostearate.	Croda Inc. croda.com
Syncrowax® AWI	A hard wax (blend of C18-C36 acids), used for protection.	Croda Inc. croda.com

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Raw Material	Function	Supplier
Syncrowax® ERL	An ethylene glycol ester of C18-C36 fatty acids that can be buffed to a high gloss.	Croda Inc. croda.com
Tomamine® Amphoteric L	Cocoamidopropyl betaine. An amphoteric surfactant used for detergency and foam generation.	Air Products, Inc. airproducts.com/industries/industrial-institutional-cleaning.aspx
Tomamine® AO-728	An amine oxide-type amphoteric surfactant used as a foam booster/foam stabilizer.	Air Products, Inc. airproducts.com/industries/industrial-institutional-cleaning.aspx
Tomamine® Emulsifier Four	An emulsifier with the chemical name cationic dialkyl quaternary ammonium chloride, used to aid water repellency.	Air Products, Inc. airproducts.com/industries/industrial-institutional-cleaning.aspx
Tomamine® Q-17-2	A cationic surfactant with the chemical name isotridecylcyloxypropyl dihydroxyethyl methyl ammonium chloride that is used to enhance detergency performance.	Air Products, Inc. airproducts.com/industries/industrial-institutional-cleaning.aspx
Triethanolamine	Used as part of emulsifier system/ thickener system.	Various
Tween® 80	A non-ionic emulsifier with the chemical name polyoxyethylene (20) sorbitan monooleate.	Croda Inc. croda.com
Veegum® Pro	Gum thickener (amine-modified hydrated magnesium aluminum silicate).	R.T. Vanderbilt rtvanderbilt.com
Wax emulsion Michem® Lube 155	A 25% active blend of soft/hard wax, with a particle size such that a non-level film is created that scatters light, causing the sheen effect.	Michelman Inc. michem.com
Wax Emulsion 7619	Carnauba/beeswax blend to aid gloss and water repellency.	Marlin Chemicals marlinchemicals.co.uk
XIAMETER® MEM-0039 Emulsion	A non-ionic emulsion of intermediate-viscosity dimethyl fluid that improves the leveling and ease of use of auto polish formulations. Also imparts gloss to both polishes and tire/vinyl protectants.	Dow Corning Corporation dowcorning.com
XIAMETER® MEM-0062 Emulsion PS	A cationic silicone emulsion (55% active silicone) of 1,000 cSt dimethyl fluid. The emulsion promotes gloss and improves wet-out characteristics of vinyl and tire dressings.	Dow Corning Corporation dowcorning.com
XIAMETER® MEM-0346 Emulsion	A non-ionic emulsion of intermediate-viscosity dimethyl fluid that improves the leveling and ease of use of auto polish formulations. Also imparts gloss to both polishes and tire/vinyl protectants.	Dow Corning Corporation dowcorning.com
XIAMETER® MEM-0349 Emulsion	A non-ionic emulsion of intermediate-viscosity dimethyl fluid that improves the leveling and ease of use of auto polish formulations. Also imparts gloss to both polishes and tire/vinyl protectants.	Dow Corning Corporation dowcorning.com

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Raw Material	Function	Supplier
XIAMETER® MEM-8035 Emulsion	A cationic aminosilicone emulsion that provides shine and protection when formulated into polishes and vinyl/tire protectants.	Dow Corning Corporation dowcorning.com
XIAMETER® OFX-0193 Fluid	A silicone polyether surfactant that acts as a wetting and foam-boosting agent. This polyether also has moderate cleaning properties and acts as a surface tension depressant, wetting agent, emulsifier and foam builder.	Dow Corning Corporation dowcorning.com
XIAMETER® OFX-0203 Fluid	An alkylaryl polysiloxane fluid that imparts gloss and ease of use to polish formulations. This fluid also offers the benefit of paintability.	Dow Corning Corporation dowcorning.com
XIAMETER® OFX-0531 Fluid	An aminofunctional silicone fluid that provides good gloss in polish formulations. This fluid works in conjunction with XIAMETER® OFX-0536 Fluid to plasticize it.	Dow Corning Corporation dowcorning.com
XIAMETER® OFX-0536 Fluid	An aminofunctional silicone fluid that gives excellent durability and protection properties. This fluid works in conjunction with XIAMETER® OFX-0531 Fluid.	Dow Corning Corporation dowcorning.com
XIAMETER® OFX-3667 Fluid	A silicone polyether emulsifier.	Dow Corning Corporation dowcorning.com
XIAMETER® PMX-0245 Cyclopentasiloxane XIAMETER® PMX-0246 Cyclohexasiloxane	A volatile cyclic siloxane fluid that promotes water removal when used in rinse aid formulations. Also can be used as a VOC-exempt solvent in protectant formulations.	Dow Corning Corporation dowcorning.com
XIAMETER® PMX-200 Silicone Fluid, 350 cSt	A low-viscosity dimethyl fluid that promotes leveling of auto polishes, provides gloss and improves ease of use.	Dow Corning Corporation dowcorning.com
XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	An intermediate-viscosity dimethyl fluid that gives high gloss, aids rubout and improves ease of use when incorporated into polish formulations.	Dow Corning Corporation dowcorning.com
XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt	An intermediate-viscosity dimethyl fluid that enhances color and shine when formulated into auto polishes. Also provides protection against minor scratches.	Dow Corning Corporation dowcorning.com
XIAMETER® PMX-200 Silicone Fluid, 60,000 cSt	A high-viscosity dimethyl fluid that gives excellent color enhancement and protection properties when formulated into automotive polishes.	Dow Corning Corporation dowcorning.com
XIAMETER® RSN-9118 Resin	A silicone resin in a volatile fluid that provides durability and shine when formulated into auto polishes and tire/vinyl protectants.	Dow Corning Corporation dowcorning.com

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Auto Care Supplier List

(1) Dow Corning Corporation
dowcorning.com/autocare

(2) Noveon, Inc.
lubrizol.com

(3) Air Products and Chemicals, Inc.
airproducts.com

(4) Rio Tinto Alcan
riotintoalcan.com

(5) Cabot Corporation
cabot-corp.com

(6) Ashland Inc.
ashland.com

(7) Croda Inc.
croda.com

(8) The Dow Chemical Company
dow.com

(9) Rhodia Inc.
rhodia.com

(10) ExxonMobil Chemical Company
exxonmobilchemical.com

(11) Michelman Inc.
michem.com

(12) Kaopolite Inc.
Tel: +1 888 567 6548

Prototype Formulation for Automotive Wax

Emulsion Hard Wax

Formulation reference: PW-310

AV09029

Description

This formulation features a blend of silicones to promote shine and waterbeading. Also, this product contains a much lower solvent level than traditional hard-wax formulations.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Low aromatic solvent 160/190°C	20.0	Odorless Mineral Spirits
2. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	1.1	Dow Corning Corp.
3. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	0.7	Dow Corning Corp.
4. *Syncrowax*® AWI	1.5	Croda Ltd.
5. *Dow Corning*® 2-5088 Wax	1.5	Dow Corning Corp.
6. *Span*™ 120	1.4	Croda Ltd.
7. *Polawax*® GP200	0.9	Croda Ltd.
8. Triethanolamine	0.9	
9. 50% sodium citrate in water	2.0	
Phase B		
10. Water	72.0	

Procedure

1) Mix phase A ingredients in the main vessel using low-speed stirring while heating to 70°C.
2) In an auxiliary vessel heat phase B ingredient to 70°C and then add to phase A with high-shear mixing.
3) Stir slowly while cooling.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve color: Incorporate XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt, at 0.4%.
- To improve durability: Incorporate XIAMETER® RSN-9118 Resin or *Dow Corning*® 2-8630 Polymer at 1.0%.

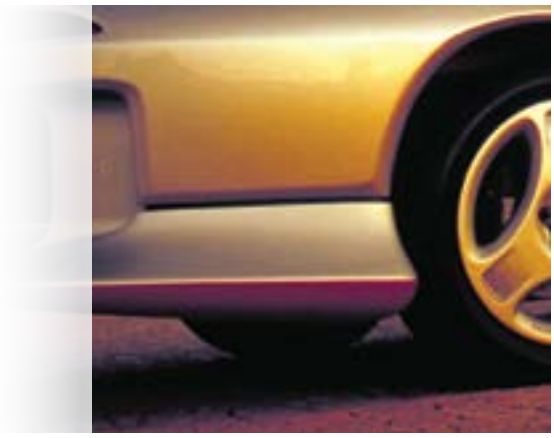
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Automotive Wax

Hard Wax

Formulation reference: PW-320



AV09029

Description

This is a traditional product for the preservation of new and good-condition paintwork. The formulation provides shine and ease of use due to its thin consistency.

Ingredient	Weight %	Trade Name/Supplier
1. Low aromatic solvent 160/190°C	85.7	Odorless mineral spirits
2. Low aromatic solvent 200/250°C	10.0	Low odor base solvent or #460 solvent
3. Carnauba wax	0.5	
4. *Dow Corning*® 2-5088 Wax	1.0	Dow Corning Corp.
5. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	0.5	Dow Corning Corp.
6. XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt	0.3	Dow Corning Corp.
7. *Dow Corning*® 593 Fluid	1.0	Dow Corning Corp.
8. XIAMETER® RSN-9118 Resin	1.0	Dow Corning Corp.

Procedure

1) Add ingredients 1-4 to the vessel and heat to 85°C with low-speed stirring until the waxes have dissolved.

2) Start cooling and add ingredients 5-8 with continuous stirring.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve gloss: Incorporate 0.5-1.0% XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt.
- To improve ease of use: Increase level of XIAMETER PMX-200 Silicone Fluid, 350 cSt, to 1.0%.
- To improve durability: Increase levels of XIAMETER RSN-9118 Resin and *Dow Corning* 2-5088 Wax to 2.0% or incorporate XIAMETER® OFX-0536 Fluid at 1.0%.
- If a single silicone resin is desired, choose either *Dow Corning* 593 Fluid or XIAMETER RSN-9118 Resin. Look for the product that provides the best leveling and durability.

Learn more on product finder

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Automotive Wax

Wax Conditioner

Formulation reference: PW-390

AV09029

Description

This formulation produces a traditional high-wax-content polish, typically used by classic car owners. This polish is suitable for cleaned paintwork, but also can be used on wood dashboards and chrome bumpers. The silicone wax contributes to durability of the product, with the silicone resin aiding leveling characteristics.

Ingredient	Weight %	Trade Name/Supplier
1. Low aromatic solvent 160/190°C	52.5	Odorless mineral spirits
2. Low aromatic solvent 200/250°C	18.6	Low-odor base solvent or #460 solvent
3. Carnauba wax	6.4	
4. Paraffin wax	12.5	
5. *Dow Corning*® 2-5088 Wax	4.9	Dow Corning Corp.
6. *Rocsol*® C wax	2.0	Croda Ltd.
7. Polyethylene wax AC 629	1.7	Allied Corp. Int.
8. *Dow Corning*® 593 Fluid	1.4	Dow Corning Corp.

Procedure

1) Add all products to a vessel and heat to 110°C with slow-speed stirring. Mix until uniform.

2) Cool to filling temperature.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve gloss: Incorporate XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt, instead of *Dow Corning* 593 Fluid.
- To improve ease of use: Incorporate 1-3.0% XIAMETER® PMX-200 Silicone Fluid, 350 cSt, or increase level of *Dow Corning* 593 Fluid.
- To improve color intensity: Incorporate 0.5-1.0% XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt.
- To improve durability: Increase level of *Dow Corning* 2-5088 Wax, reducing the level of the paraffin wax by the same amount, or incorporate XIAMETER® OFX-0536 Fluid or XIAMETER® RSN-9118 Resin as a replacement for *Dow Corning* 593 Fluid.

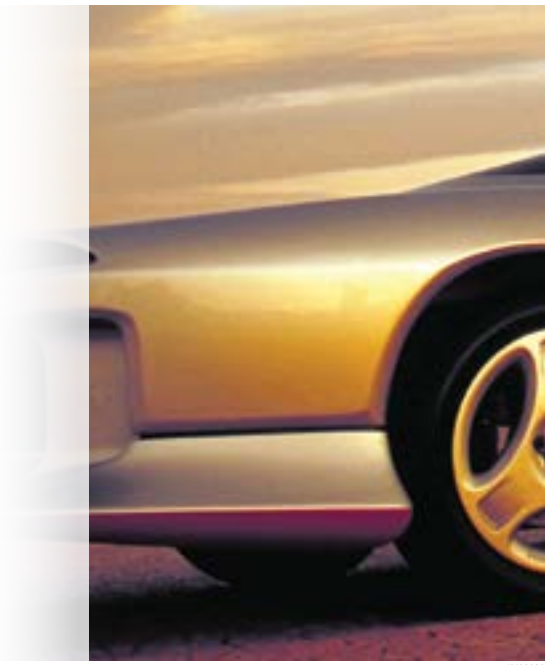
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Low-VOC Polish

Low-VOC Polish

Formulation reference: PW-400



AV09029

Learn more on product finder

Description

This polish is a detergent-resistant cleaner designed for automotive surfaces. The product exhibits little phase separation and provides easy rub-out, excellent gloss, very good durability and resistance to detergent washings.

Solvent was replaced with a VOC-exempt silicone solvent, XIAMETER® PMX-0245 Cyclopentasiloxane, to target a VOC level of 14% for this formula as defined by California A.R.B.

This formula passes five cycles of freeze/thaw stability testing.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. DI water	59.0	
2. *Kaopolite*® XDA	6.6	Kaopolite, Inc.
3. *Kaopolite*® 1152	3.4	Kaopolite, Inc.
4. *Amadol*® (Witcamide) WE	1.0	Akzo Nobel
5. Kerosene/mineral spirits	3.5	
6. XIAMETER® PMX-0245 Cyclopentasiloxane (VOC-exempt)	11	Dow Corning Corp.
7. Sodium chloride	1.0	
Phase B		
8. Kerosene/mineral spirits	7.24	
9. *Bentone*® 38 Thickener	0.6	Rheox, Inc.
Phase C		
10. XIAMETER® OFX-0531 Fluid	5.5	Dow Corning Corp.
11. XIAMETER® OFX-0536 Fluid	1.0	Dow Corning Corp.
12. Isopropanol	.15	

Procedure

1) Load phase A ingredients in the order shown into a vessel and mix well.
2) Mix phase B ingredients in a separate container.
3) Add phase B to the production vessel and mix well.
4) Add phase C ingredients to the production vessel and mix well.

Typical Properties/Additional Information

- After phase A mixing, the material forms a thick paste emulsion.
- After phase B mixing, the material is a similar thick paste emulsion.
- After phase C mixing, the alcohols activate *Bentone* 38 Thickener. Polish continues to thicken over several days.

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- Ensure high-flow (turnover) mixing exists to prevent the abrasive from settling at the vessel bottom. If agitation is stopped on the mixing vessel during phase A or phase B, *Kaopolite* XDA Abrasive will settle to the bottom.

Observe precautions for handling XIAMETER® products as indicated on the safety data sheets.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Car Polish

Paintable Polish

Formulation reference: PP-930

AV09029

Description

This paintable polish is specifically formulated for use in garages and body shops where polydimethylsiloxanes could give rise to recoatability problems.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Low aromatic solvent 160/190°C	30.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
2. Paraffin wax	0.5	Suter & Co Ltd.
3. *Dow Corning*® 2-5088 Wax	3.0	Dow Corning Corp.
4. *Span*™ 80	0.4	Croda Inc.
5. *Dow Corning*® 203 Fluid	0.5	Dow Corning Corp.
Phase B		
6. Water	50.6	
7. *Sillitin*® Z.86	5.0	Hoffmann Minerals
8. *Alcan*® SF7	7.0	Alcan Chemicals
9. *Tween*® 80	1.1	Croda Inc.
Phase C		
10. Cellulose thickener	0.9	Ashland Inc.

Procedure

1) Heat ingredients 1–3 to 70°C in an auxiliary vessel to dissolve the wax with low-speed stirring.
2) Add ingredients 4 and 5.
3) In the main vessel, mix phase B ingredients while heating to 70°C.
4) Add phase A to phase B with high shear, then start to cool.
5) Add phase C ingredient under low shear.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve ease of use: Increase *Dow Corning* 203 Fluid to 1.0%.
- To improve durability: Increase *Dow Corning* 2-5088 Wax to 4.0%.
- *Alcan* SF7 can be replaced by other aluminum trihydroxides such as Almatis *Hydral*® 710.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Car Polish

Spray-and-Wipe Polish

Formulation reference: PW-306

AV09029

Description

This is a no-wax spray-and-wipe polish formulation designed to provide good gloss to an automotive surface. The product has good application ease and rub-out with limited durability.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. XIAMETER® MEM-0349 Emulsion or XIAMETER® MEM-0346 Emulsion	6.00	Dow Corning Corp.
Phase B		
2. Water	90.00	
3. *Veegum*® Pro	0.80	R.T. Vanderbilt Co.
4. *Kaopolite*® AB	0.20	Kaopolite, Inc.
Phase C		
5. *Kaopolite*® SF	3.00	Kaopolite, Inc.

Procedure

1) Blend phase B ingredients (thickening water first) until uniform.

2) Add phase A ingredients and mix until uniform.

3) Add phase C ingredient and mix lightly until uniform.

Typical Properties/Additional Information

- To improve durability: Add XIAMETER® MEM-8035 Emulsion at 2-3%.
- Other gum thickeners may be used.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Car Polish

Instant

Formulation reference: PW-330

AV09029

Description

The blend of fluids in this formulation yields high gloss in an easy-to-use product form.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Low aromatic solvent 160/190°C	25.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
2. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	1.4	Dow Corning Corp.
3. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	1.0	Dow Corning Corp.
4. *Dow Corning*® 5200 Formulation Aid	2.0	Dow Corning Corp.
Phase B		
5. Water	57.6	
6. *Sillikolloid*® P.87	8.5	Hoffmann Minerals
7. Wax Emulsion 7619[1]	2.5	Marlin Chemicals
8. 50% sodium citrate in water	2.0	

[1]Wax Emulsion – 35% active blend of soft/hard waxes

Procedure

1) Blend phase A ingredients in the main vessel under low shear.
2) In the auxiliary vessel, add phase B ingredients in the order listed. Mix with low shear.
3) Add phase B to phase A very slowly under high shear until the emulsion begins to form. The remainder of phase B can then be added at a faster rate.
4) When addition is complete, mix with high shear.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve color: Incorporate XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt at 0.4%.
- To improve durability: Incorporate *Dow Corning*® 3527 Release Agent.
  or XIAMETER® OFX-0531 Fluid at 1.0% and reduce the level of the XIAMETER® PMX-200 Silicone Fluids by 0.5%.
- The low aromatic solvent can be partially replaced with XIAMETER® PMX-0245 Cyclosiloxane to comply with California Air Resources Board regulations.

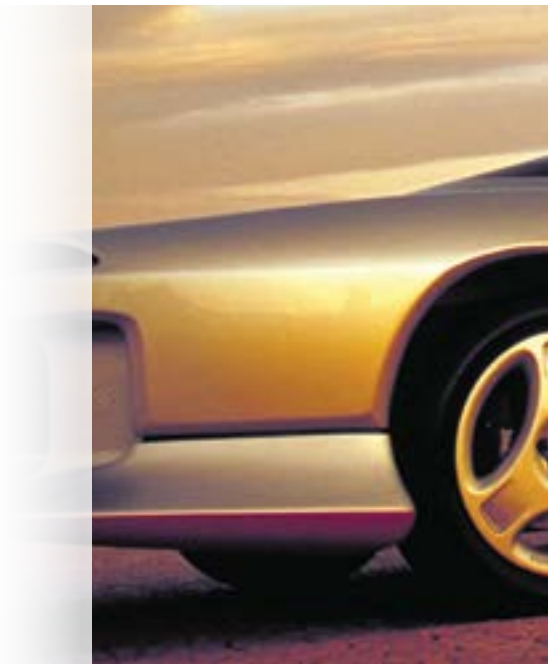
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Car Polish

Low-Solvent Liquid Polish

Formulation reference: PW-340



AV09029

Description

This low-solvent liquid polish uses a blend of silicone fluids to achieve shine and ease of use. The silicone resin helps to improve water repellency.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Low aromatic solvent 200/250°C	9.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
2. *Dow Corning*® 2-5088 Wax	1.5	Dow Corning Corp.
3. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	1.5	Dow Corning Corp.
4. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	0.5	Dow Corning Corp.
5. XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt	0.5	Dow Corning Corp.
6. *Dow Corning*® 593 Fluid	1.5	Dow Corning Corp.
7. *Span*™ 80	0.3	Croda Inc.
Phase B		
8. Water	71.3	
9. *Kaopolite*® SF	11.6	Kaopolite, Inc.
10. *Tween*® 80	0.9	Croda Inc.
11. Acrylic thickener	0.2	Lubrizol/Noveon
Phase C		
12. Triethanolamine	0.2	

Procedure

1) Mix phase A ingredients with heat to 70°C in an auxiliary vessel using low shear.
2) Mix phase B ingredients in the main vessel at 70°C with low shear.
3) Add phase A to phase B under high shear and cool.
4) Add phase C ingredient with low shear.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve durability: Replace *Dow Corning* 593 Fluid with XIAMETER® RSN-9118 Resin at 2.0% or XIAMETER® OFX-8630 Fluid at 1.0%.

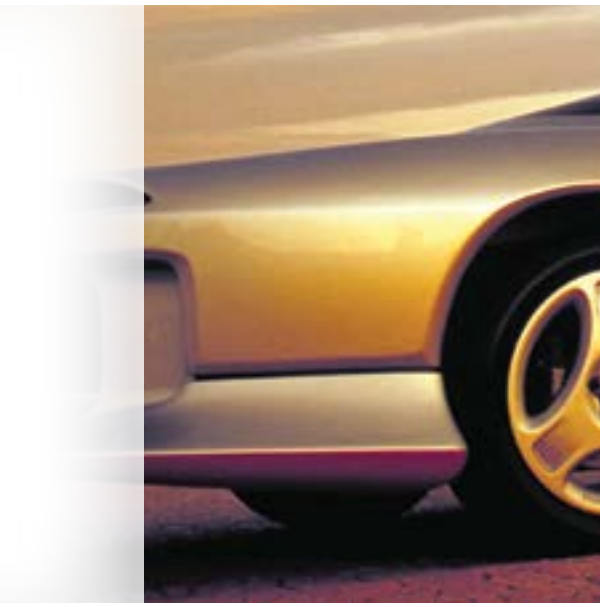
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Car Polish

Polish

Formulation reference: PW-350



AV09029

Description

The combination of silicone fluids and a silicone resin gives an easy-to-use polish product that resists weathering. This product also features excellent gloss and color.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Low aromatic solvent 160/190°C	14.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
2. Low aromatic solvent 200/250°C	10.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
3. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	1.2	Dow Corning Corp.
4. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	0.6	Dow Corning Corp.
5. *Dow Corning*® 3527 Release Agent	1.6	Dow Corning Corp.
6. *Dow Corning*® 2-5088 Wax	1.5	Dow Corning Corp.
Phase B		
7. Water	57.0	
8. *Alcan*® SF7	12.4	Alcan Chemicals
9. *Crodamet*® T8	1.3	Croda Ltd.
10. Cellulose thickener	0.9	Ashland Inc.

Procedure

1) Heat phase A ingredients to 70°C in an auxiliary vessel using low shear.
2) Add ingredients 7–9 to the main vessel, heating to 70°C with low shear.
3) Slowly add ingredient 10 and stir until dispersed.
4) Add phase A and phase B with high shear.
5) Cool to ambient temperature.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve gloss: Increase XIAMETER PMX-200 Silicone Fluid, 1,000 cSt, to 1.0%.
- To improve color: Incorporate XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt, at 0.5%.
- To improve durability: Incorporate XIAMETER® RSN-9118 Resin at 2.0% instead of *Dow Corning*® 3527 Release Agent.
- *Alcan* SF7 can be replaced by other aluminum trihydroxides such as Almatis *Hydral*® 710.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulations for Shampoo

Standard Shampoo

Formulation reference: CW-101

AV09029

Description

The silicone surfactant provides wetting effects, while the amino-functional silicone can deposit onto the surface to enhance the polish film for gloss/water repellency.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Sodium lauryl ethoxy sulfate	10.0	Rhodapex ESB 70 FEA/ Rhodia Inc.
2. Soft water	78.7	
Phase B		
3. Makon TD12	5.5	Stepan Co.
4. Coconut diethanolamide	3.5	Ninol 49-CE/Stepan Co.
5. XIAMETER® MEM-8035 Emulsion	1.5	Dow Corning Corp.
6. XIAMETER® OFX-0193 Fluid	0.3	Dow Corning Corp.
Phase C		
7. Hydroxyethyl cellulose thickener	0.5	Ashland Inc.

Procedure

1) Dissolve ingredient 1 in ingredient 2. Add phase B ingredients with low-speed mixing until fully dispersed.
2) Sprinkle in the phase C ingredient and mix until completely dissolved, approximately 60 minutes.
3) Pour down and package appropriately.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve gloss and color, add *Dow Corning*® HV 495 Emulsion at 1.0%.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Shampoo

Protective Shampoo

Formulation reference: CW-102

AV09029

Description

This formulation produces a product that is an intermediate between a standard shampoo and a polish that enhances gloss and provides a longer-lasting protective silicone film. The product can be applied the same as normal shampoo, or it can be poured directly onto a water-soaked sponge and wiped over a surface.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Water	60.0	
2. *Bio-soft*® N1-7	1.0	Stepan Co.
3. XIAMETER® MEM-8035 Emulsion	2.5	Dow Corning Corp.
Phase B		
4. Low aromatic solvent 160/190°C	30.0	Exxsol D40/Exxon Chemicals Ltd.
5. Carnauba wax	1.5	
6. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	1.0	Dow Corning Corp.
7. Pine oil	1.0	
Phase C		
8. Hydroxyethyl cellulose thickener	0.8	Ashland Inc.

Procedure

1) Put phase A ingredients into the main vessel. Heat to 70°C with low-shear mixing.
2) In a separate vessel, load ingredients 4 and 5. Heat to 70°C, then add ingredients 6 and 7 while mixing at low shear.
3) Add phase B to phase A with high shear. Start cooling to room temperature.
4) Add the phase C ingredient slowly and mix until dissolved, approximately 45 minutes.

Learn more on product finder

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve color, incorporate XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt, at 0.5%.
- To improve gloss, substitute XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt, for XIAMETER PMX-200 Silicone Fluid, 350 cSt.
- To improve durability, reduce the level of XIAMETER PMX-200 Silicone Fluid, 350 cSt, to 0.6% and the emulsifier level to 0.8%.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Shampoo

Protective Shampoo

Formulation reference: CW-120

AV09029

Description

This formulation produces a product that is an intermediate between a standard shampoo and a polish that enhances gloss and provides a longer-lasting protective silicone film. The product can be applied the same as normal shampoos, or it can be poured directly onto a water-soaked sponge and wiped over a surface.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Water	60.0	
2. *Crodamet*® T8	1.0	Croda Ltd
Phase B		
3. Low aromatic solvent 160/190°C	30.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
4. *Dow Corning*® 2-5088 Wax	1.5	Dow Corning Corp.
5. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	1.0	Dow Corning Corp.
6. Pine oil	1.0	
7. XIAMETER® OFX-8630 Fluid	2.5	Dow Corning Corp.
Phase C		
8. Cellulose thickener	0.8	Ashland Inc.

Procedure

1) Add ingredient 2 to ingredient 1 with low-speed stirring in the main vessel, heating to 70°C.
2) In phase B, add ingredients 3 and 4 to an auxiliary vessel, heat to 70°C, and add ingredients 5–7 with low-speed stirring.
3) Add phase B to phase A with high shear. Start cooling.
4) Add the phase C ingredient slowly and mix until dissolved.

Typical Properties/Additional Information

Suggestion for adjusting the formulation:

- To improve color: Incorporate XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt, at 0.5%.
- To improve gloss: Substitute XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt, for XIAMETER PMX-200 Silicone Fluid, 350 cSt.
- To improve durability: Reduce the level of XIAMETER PMX-200 Silicone Fluid, 350 cSt, to 0.6% and the emulsifier level to 0.8%.

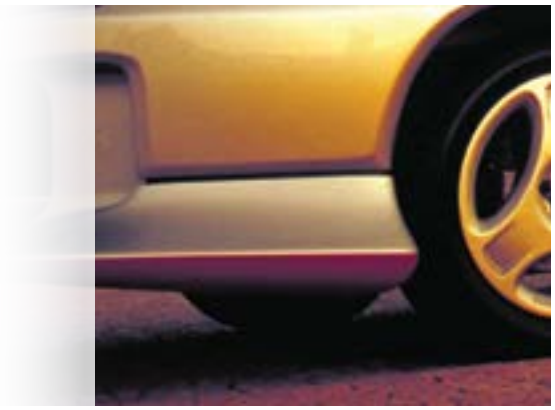
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Dry Washer

Dry Washer

Formulation reference: CW-140



AV09029

Description

This formulation exhibits the dual function of cleaning and adding shine to automotive metallic surfaces. XIAMETER® MEM-0039 Emulsion provides gloss and XIAMETER® OFS-6124 Silane ensures an excellent adherence factor, making it more resistant and shiny and providing surface cleaning with no water.

Ingredient	Weight %	Trade Name/Supplier
1. Water	90.2	
2. Xanthan gum	0.5	*Keltrol*® F/CP Kelco
3. XIAMETER® MEM-0039 Emulsion	3.0	Dow Corning Corp.
4. Ethanol	3.0	
5. Sodium ricinoleate @ 35%	2.0	
6. XIAMETER® OFS-6124 Silane	1.0	Dow Corning Corp.
7. Aluminum silicate 500 #	0.2	
8. Glutaraldehyde	0.1	

Procedure

1) Add ingredient 2 to ingredient 1 in the main vessel.

2) When completely dispersed, add ingredient 3 and stir for 10 minutes.

3) Add ingredients 4 and 5 and stir for 10 minutes.

4) Add ingredient 6 and stir for 10 minutes.

5) Add ingredient 7 and stir for 10 minutes.

6) Add ingredient 8 and stir for 10 minutes.

Typical Properties/Additional Information

Directions: Apply the final product with a soft cloth or cotton wool over dust or grime with circular movements, one small area at a time. Remove the product with a dry and clean cloth.

Do not apply this product over sand-covered surfaces.

The ethanol helps to clean the surface and ensures the compatibility of XIAMETER OFS-6124 Silane in the formulation. The ethanol may be replaced by isopropanol.

The final formulation will have a pH between 8.0–9.5 because of the presence of the sodium ricinoleate. The xanthan gum helps to stabilize the formulation.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Shampoo

Shampoo for Use in Professional Detailing
Formulation reference: CW-150

AV09029

Description

This is an automotive shampoo that stands out among similar products because XIAMETER® OFS-6124 Silane, in addition to providing excellent grime and grease removal, imparts shine and adheres to metal surfaces.

Ingredient	Weight %	Trade Name/Supplier
1. Water	88.4	
2. Hydroxyethyl cellulose	0.4	*Cellosize*® QP 100 M H/ Union Carbide
3. Sulfonic acid	5.0	
4. Sodium hydroxide @ 50%	0.6	
5. Triethanolamine	0.5	
6. Cocamide DEA	1.0	
7. Dioctyl succinate @ 70%	2.0	
8. Isopropanol	1.0	
9. XIAMETER® OFS-6124 Silane	1.0	Dow Corning Corp.
10. Glutaraldehyde	0.1	
pH at 10% dilution: 6.5–7.5		

Procedure

1) Add ingredient 2 to ingredient 1 in the main vessel and stir until the solution is transparent and viscous.
2) Add ingredient 3 and stir for 10 minutes.
3) Slowly add ingredient 4 and stir for 10 minutes.
4) Add ingredients 5 and 6 and stir for 20 minutes.
5) Check the pH. It should be between 6.5 and 7.5. Use ingredient 3 or 4 to correct the pH, if necessary.
6) Add ingredient 7 and stir for 10 minutes.
7) Add ingredients 8 and 9 and stir for 15 minutes.
8) Add ingredient 10 and stir for 10 minutes more.

Learn more on product finder

Typical Properties/Additional Information

Directions: In a shaded area, apply a 10% dilution of the final product on a cold metallic surface with a soft sponge. The resulting foam should be left for 2 minutes and then removed with water. Dry the vehicle with a soft towel.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Drying Agent

Final Rinse Formula for Automatic Car Wash (Concentrate)
Formulation reference: RA-210

Description

This formulation can be used for the final rinse cycle for automatic car wash systems. The silicone ingredient provides water sheeting and quicker runoff. A dilute solution is sprayed on the vehicle after cleaning, with blowers aiding removal of water droplets.

The concentrate product is diluted with water 50:1 at the car wash facility. The product/water mixture is diluted further 6:1 to 10:1 while spraying through the car wash machinery.

AV09029

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. XIAMETER® PMX-0245 Cyclopentasiloxane	10	Dow Corning Corp.
2. *Dowanol*® DPNP	10	The Dow Chemical Co.
3. XIAMETER® OFX-3667 Fluid	10	Dow Corning Corp.
4. *Tomamine*® Emulsifier Four[1]	20	Air Products, Inc.
Phase B		
5. Water	50	

[1]Contact Air Products, Inc., (www.airproducts.com) to obtain information on this product.

Procedure

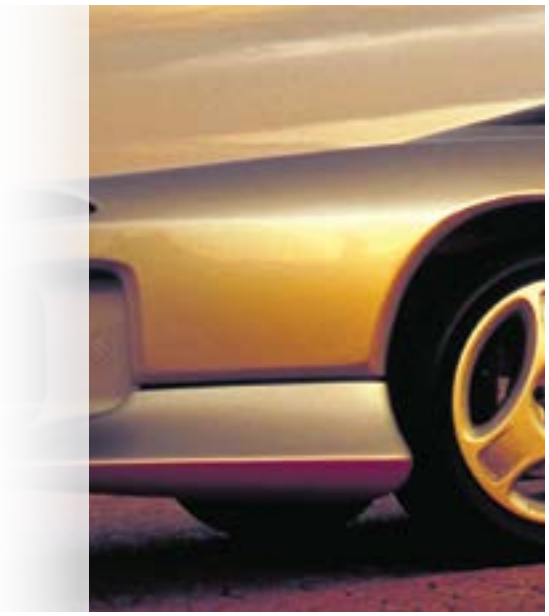
Add phase A ingredients in the order shown under low-shear mixing. Add water under low shear. The final mixture should be transparent.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Durable Polish

Automotive Cream Wax – Durable Polish
Formulation reference: PW-301



AV09029

Description

This automotive cream wax was created and balanced with XIAMETER® brand silicone fluids, resulting in a high-gloss and easy-to-apply product. The XIAMETER® silicone fluids leave a soft film on a metallic surface. XIAMETER® OFX-0531 Fluid adds long-lasting protection to the wax film. This wax is appropriate for consumers and professionals.

Ingredient	Weight %	Trade Name/Supplier
1. Water	62	
2. Xanthan gum	0.3	
3. Stearic acid	2	
4. Polyethylene glycol stearate PEG 6000	1	*Cutina*® DSP 6B/Cognis
5. Sodium hydroxide @ 50%	0.4	
6. Kerosene	15	
7. Citric fragrance	0.2	D-Limonene
8. Carnauba wax emulsion @ 50%	4	
9. XIAMETER® PMX-200 Silicone Fluid, 100 cs	4	Dow Corning Corp.
10. XIAMETER® PMX-200 Silicone Fluid, 1,000 cs	2	Dow Corning Corp.
11. XIAMETER® OFX-0531 Fluid	1	Dow Corning Corp.
12. Silicon dioxide 300#[1]	8	
13. Glutaraldehyde	0.1	The Dow Chemical Co.

[1]The silicon dioxide can be replaced with aluminum silicate 350# or 500# for better cleaning properties.

Procedure

1) Place ingredient 1 in a vessel.
2) Add ingredient 2 to the main vessel at room temperature and stir until uniform.
3) Add ingredients 3 and 4 and heat to 65°C to reach the melting point.
4) Add ingredient 5 under agitation and cool to 35°C.
5) Add ingredient 6 and stir for 10 minutes.
6) Add ingredients 7–12 under agitation in the listed order one at a time until uniform.
7) Add ingredient 13 and stir for 10 minutes more.

Learn more on product finder

Typical Properties/Additional Information

- The fragrance provides a pleasant citric odor.
- For good results, apply the product in circles. Do one section at a time. When haze appears, buff with a soft and clean cloth or cotton.
- If paste-like consistency is required, the xanthan gum can be replaced with acrylic polymer *Carbopol*® 941 from Lubrizol (Noveon division).

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

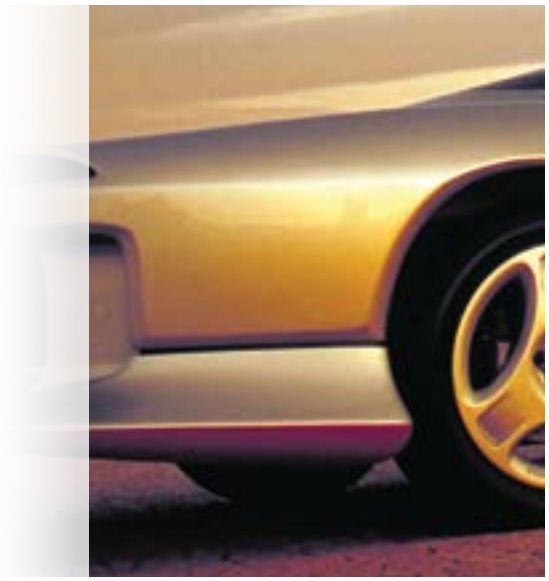
Prototype Formulation for Automotive Wax

Automotive Cream Wax

Formulation reference: PW-303

Description

This automotive cream wax was created and balanced with XIAMETER® brand silicone fluids, resulting in a high-gloss and easy-to-apply product. In addition, this product exhibits cleaning and high wetting properties, leaving a soft film on the metallic surface. XIAMETER® OFX-0531 Fluid adds long-lasting protection to the wax film. This wax is appropriate for consumers and professionals.



AV09029

Ingredient	Weight %	Trade Name/Supplier
1. Water	62	
2. Xanthan gum	0.3	
3. Stearic acid	2	
4. Hallstar PEG 6000 DS	1	Hallstar
5. Sodium hydroxide @ 50%	0.4	
6. Kerosene	15	
7. Fragrance	0.2	
8. Carnauba wax emulsion @ 35%	4	
9. XIAMETER® PMX-200 Silicone Fluid, 100 cSt	4	Dow Corning Corp.
10. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	2	Dow Corning Corp.
11. XIAMETER® OFX-0531 Fluid	1	Dow Corning Corp.
12. *Kaopolite*® 1152	8	Kaopolite, Inc
13. *Kathon*™ LX	0.1	Rohm & Haas Co.

Procedure

1) Place ingredient 1 in a vessel.
2) Add ingredient 2 to the main vessel at room temperature and stir until uniform.
3) Add ingredients 3 and 4 and heat to 65°C to reach the melting point.
4) Add ingredient 5 under agitation and cool to 35°C.
5) Add ingredient 6 and stir for 10 minutes.
6) Add ingredients 7–12 under agitation in the listed order one at a time until uniform.
7) Add ingredient 13 and stir for 10 minutes more.

Learn more on product finder

Typical Properties/Additional Information

- For good results, apply the product in circles. Do one section at a time. When haze appears, buff with a soft and clean cloth or cotton.
- If paste-like consistency is required, the xanthan gum can be replaced with acrylic polymer *Carbopol*® 941 from Lubrizol (Noveon division).

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

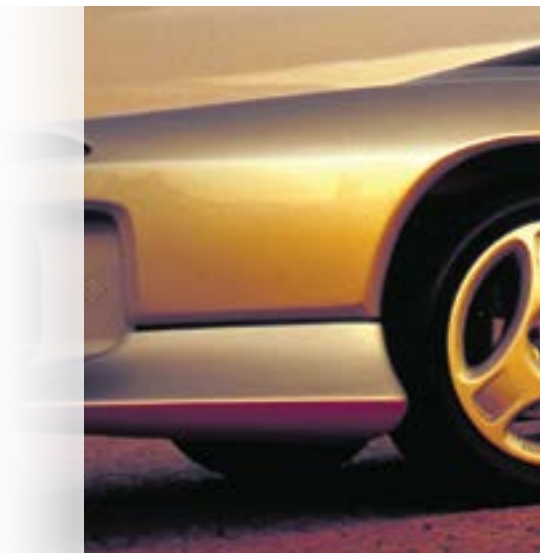
Prototype Formulation for Durable Polish

High-Gloss Automotive Cream Wax for Professional Detailing

Formulation reference: PW-304

Description

This automotive cream wax was created and balanced with XIAMETER® brand silicone fluids resulting in a high-gloss, durable, and easy-to-apply wax. In addition, this product exhibits cleaning and high-wetting properties leaving a soft film on a metallic surface. XIAMETER® OFX-0531 Fluid adds long-lasting protection to the wax film. *Dow Corning*® 3037 Intermediate is a phenyl resin that provides outstanding and persistent shine. This formula is appropriate for professionals.



AV09029

Ingredient	Weight %	Trade Name/Supplier
1. Water	62.2	
2. Xanthan gum	0.3	*Keltrol*® F/CP Kelco
3. Stearic acid	2	
4. Hallstar PEG 6000 DS	1	Hallstar
5. Sodium hydroxide @ 50%	0.4	
6. Kerosene	15	
7. Carnauba wax emulsion @ 35%	4	
8. XIAMETER® PMX-200 Silicone Fluid, 100 cSt	4	Dow Corning Corp.
9. *Dow Corning*® 3037 Intermediate	2	Dow Corning Corp.
10. XIAMETER® OFX-0531 Fluid	1	Dow Corning Corp.
11. *Kaopolite*® 1152	8	Kaopolite, Inc.
12. *Kathon*™ LX	0.1	Rohm & Haas Co.

Procedure

1) Place ingredient 1 in a vessel.
2) Add ingredient 2 to the vessel at room temperature and stir until uniform.
3) Add ingredients 3 and 4 and heat to 65°C to reach the melting point.
4) Add ingredient 5 under agitation and cool to 35°C.
5) Add ingredient 6 and stir for 10 minutes.
6) Add ingredients 7–11 under agitation in the listed order one at a time until uniform.
7) Add ingredient 12 and stir for 10 minutes more.

Learn more on product finder

Typical Properties/Additional Information

- For good results, apply the product in circles. Do one section at a time. When haze appears, buff with a soft and clean cloth or cotton.
- If paste-like consistency is required, the xanthan gum can be replaced with acrylic polymer *Carbopol*® 941 from Lubrizol (Noveon division).

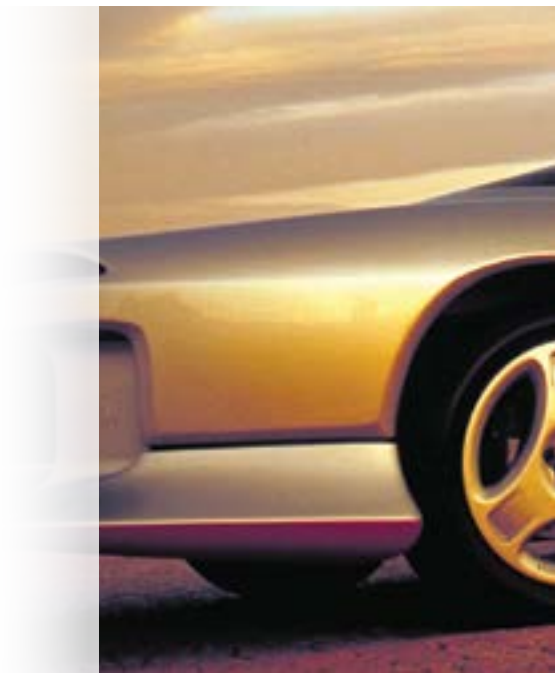
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Durable Polish

Automotive Cream Wax for Professional Detailing
Formulation reference: PW-305

Description

This colored, automotive cream wax was created and balanced with XIAMETER® brand silicone fluids resulting in a high-gloss, durable, and easy-to-apply wax. In addition, this product exhibits cleaning and high-wetting properties, leaving a soft film on the metallic surface. XIAMETER® OFX-0531 Fluid adds long-lasting protection to the wax film. XIAMETER® OFS-6124 Silane is added to fix the pigment on the metallic surface. This wax is appropriate for professionals.



AV09029

Ingredient	Weight %	Trade Name/Supplier
1. Water	62	
2. Xanthan gum	0.3	*Keltrol*® F/CP Kelco
3. Stearic acid	2	
4. Hallstar PEG 6000 DS	1	Hallstar
5. Sodium hydroxide @ 50%	0.4	
6. Kerosene	15	
7. Carnauba wax emulsion @ 35%	4	
8. XIAMETER® PMX-200 Silicone Fluid, 100 cSt	4	Dow Corning Corp.
9. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	2	Dow Corning Corp.
10. XIAMETER® OFX-0531 Fluid	1	Dow Corning Corp.
11. XIAMETER® OFS-6124 Silane	1	Dow Corning Corp.
12. *Kaopolite*® 1152	5.5	Kaopolite, Inc.
13. Pigment	0.1	
14. Titanium dioxide	1.6	
15. *Kathon*™ LX	0.1	Rohm & Haas Co.

Learn more on product finder

Procedure

1) Place ingredient 1 in a vessel.
2) Add ingredient 2 to the main vessel at room temperature and stir until uniform.
3) Add ingredients 3 and 4 and heat to 65°C to reach the melting point.
4) Add ingredient 5 under agitation and cool to 35°C.
5) Add ingredient 6 and stir for 10 minutes.
6) Add ingredients 7–11 under agitation in the listed order one at a time until uniform.
7) Add ingredients 12–14 under agitation until uniform.
8) Add ingredient 15 and stir for 10 minutes.

Typical Properties/Additional Information

This formulation was developed with the purpose to cover scratches on metallic surfaces.

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- For good results, apply the product in circles. Do one section at a time. When haze appears, buff with a soft and clean cloth or cotton.
- If paste-like consistency is required, the xanthan gum can be replaced with acrylic polymer *Carbopol*® 941 from Lubrizol (Noveon division).

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Durable Polish

Durable, High-Gloss Paste Polish

Formulation reference: PW-307

AV09029

Description

This formulation is for a detergent-resistant cleaner paste polish, designed for automotive surfaces. This formulation provides a product with improved application ease and rub-out, as well as excellent gloss, due to the use of a silicone emulsifier. The product also exhibits very good durability and resistance to multiple detergent washings.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Odorless mineral spirits	9.5	
2. *Dow Corning*® 3225C Formulation Aid	7.5	Dow Corning Corp.
Phase B		
3. XIAMETER® OFX-0536 Fluid	1.0	Dow Corning Corp.
4. XIAMETER® OFX-0531 Fluid	6.0	Dow Corning Corp.
Phase C		
5. Water	58.0	
6. *Kaopolite*® SF	15.0	Kaopolite, Inc.
Phase D		
7. *Tween*® 20	1.0	Croda Inc.
Phase E		
8. 50% solution of sodium citrate in water	2.0	

Procedure

1) Place phases A and B into a mixing vessel. Start agitation. Mix until uniform.
2) Separately blend phase C and add it to the top of the vessel with turbulent mixing.
3) Add phases D and E.
4) Upon complete addition, begin high-speed mixing with a shear blade.
5) Continue shearing the product until the desired consistency is achieved. Package.

Learn more on product finder

Typical Properties/Additional Information

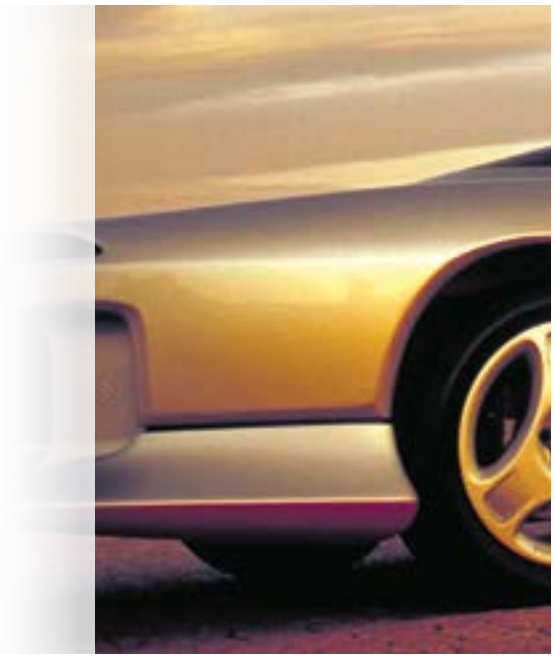
1) The order of addition is critical. Ensure the water phase is added to the top of the oil phase under turbulent mixing followed by shearing. Variations to this procedure may yield a thin, unstable product because the emulsion may not invert to a water-in-oil form.
2) The use of a high-shear homogenizer may improve product consistency and stability.
3) Many alternative solvents to mineral spirits are acceptable.
4) A reduced level of the polishing agent (*Kaopolite*® SF) may be desirable for use on clearcoat finishes and may improve application ease and rub-out.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulations for Durable Polish

Detergent-Resistant Cleaner Paste Polish

Formulation reference: PW-308



AV09029

Learn more on product finder

Description

This formulation is for a detergent-resistant cleaner paste polish designed for automotive surfaces. This formulation provides exceptional application ease and rub-out, as well as excellent gloss, due to the use of a silicone emulsifier with the resin/dimethyl fluid blend. The use of volatile silicones improves wet-out as well as the application ease of the material. The presence of the amine-functional material and the resin/dimethyl fluid blend provides excellent durability and resistance to multiple detergent washings.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. XIAMETER® PMX-0345 Cyclosiloxane Blend	12.5	Dow Corning Corp.
2. *Dow Corning*® 3225C Formulation Aid	7.5	Dow Corning Corp.
Phase B		
3. *Dow Corning*® 2-1912 Fluid	3.0	Dow Corning Corp.
4. XIAMETER® OFX-0536 Fluid	1.0	Dow Corning Corp.
Phase C		
5. Water	58.0	
6. *Kaopolite*® SF	15.0	Kaopolite, Inc.
Phase D		
7. *Tween*® 20	1.0	Croda Inc.
Phase E		
8. 50% solution of sodium citrate in water	2.0	

Procedure

1) Place phases A and B into a mixing vessel. Start agitation. Mix until uniform.
2) Separately blend phase C and add it to the top of the vessel with turbulent mixing.
3) Add phases D and E.
4) Upon complete addition, begin high-shear mixing.
5) Continue high-shear mixing until the desired consistency is achieved. Package.

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Typical Properties/Additional Information

1) The order of addition is critical. Ensure the water phase is added to the top of the oil phase prior to high-shear mixing or emulsion may not invert, yielding a low-viscosity, unstable final product.
2) The homogenization step may increase product viscosity and improve consistency and stability.
3) An alternative solvent may be considered.
4) A reduced level of the polishing agent (*Kaopolite*® SF) may be desirable for clear coat finishes and may improve application ease and rub-out.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Exterior Trim Protection

Exterior Plastic/Rubber Enhancers – Liquid
Formulation reference: EP-403

AV09029

Description

The combination of an amino-functional silicone fluid and a high-viscosity silicone fluid gives a durable film to restore faded bumpers and other trim. Reducing the thickener level enables the product to be packaged in a spray dispenser.

Ingredient	Weight %	Trade Name/Supplier
1. Water	83.3	
2. XIAMETER® MEM-8035 Emulsion	5.7	Dow Corning Corp.
3. *Dow Corning*® HV 495 Emulsion	10.0	Dow Corning Corp.
4. Cellulose thickener	1.0	Ashland Inc.

Procedure

1) Add ingredients 1–3 in the order listed to an appropriate vessel, while mixing at low speed.
2) Slowly add ingredient 4 to the vessel. Mix for 30 minutes, or until the product is completely dissolved and no lumps are present.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

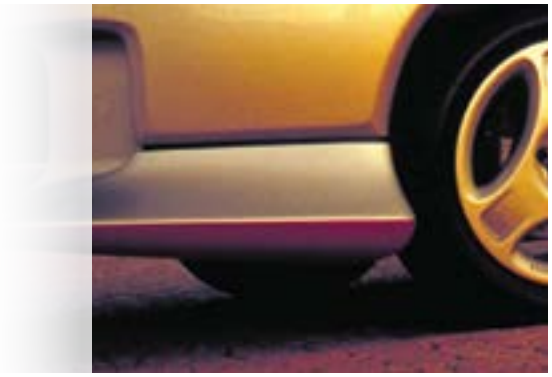
- To improve leveling, add XIAMETER® MEM-0062 Emulsion PS or XIAMETER® MEM-0349 Emulsion or XIAMETER® MEM-0346 Emulsion.
- To improve wetting, add 0.5% of XIAMETER® OFX-5211 Superwetting Agent or XIAMETER® OFX-0309 Fluid.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Exterior Trim Protection

Exterior Plastic/Rubber Enhancers – Sheen Finish
Formulation reference: EP-404



AV09029

Description

This product provides a matte, leather-like appearance to exterior surfaces. Incorporation of a wax emulsion will promote uneven reflection of light, giving a perceived lower gloss finish. An emulsion of a lower-viscosity polydimethylsiloxane base polymer will give less color intensity.

Ingredient	Weight %	Trade Name/Supplier
1. Water	80.4	
2. XIAMETER® MEM-8035 Emulsion	5.0	Dow Corning Corp.
3. XIAMETER® MEM-0062 Emulsion PS	8.0	Dow Corning Corp.
4. Wax emulsion	6.0	*Michelman*® Lube 155/ Michelman Inc.
5. Acrylic thickener:	0.4	
6. Triethanolamine	0.2	

Procedure

1) Add ingredients 1–4 into an appropriate vessel. Mix at low speed.

2) Slowly add ingredients 5 and 6. Mix until product is homogeneous.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To lower the color intensity: Substitute XIAMETER® MEM-0349 Emulsion or XIAMETER® MEM-0346 Emulsion for XIAMETER MEM-0062 Emulsion PS.
- To give a lower gloss finish: Partially replace XIAMETER MEM-0062 Emulsion PS with wax emulsion.
- To improve durability: Increase the level of XIAMETER MEM-8035 Emulsion and decrease the level of XIAMETER MEM-0062 Emulsion PS.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Exterior Trim Protection

Exterior Plastic/Rubber Enhancers – Aerosol Product
Formulation reference: EP-410

AV09029

Description

Blending a silicone fluid with a silicone resin shows excellent gloss/color with durability. Spray application makes for a very quick process.

Ingredient	Weight %	Trade Name/Supplier
1. Low aromatic solvent 160/190°C	10.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
2. Heptane	62.5	Exxon Chemicals Ltd. Shell Chemicals Ltd.
3. XIAMETER® PMX-200 Silicone Fluid, 60,000 cSt	10.0	Dow Corning Corp.
4. XIAMETER® RSN-9118 Resin	2.5	Dow Corning Corp.
5. Isopar G	15.0	Exxon Chemicals Ltd.

Procedure

Mix the ingredients listed with low-speed stirring.

Typical Properties/Additional Information

Approximately 70% by weight of this formulation would be used in an aerosol with the remaining 30% serving as propellant.

- To improve durability, increase the level of XIAMETER RSN-9118 Resin.
- Replace XIAMETER RSN-9118 Resin with *Dow Corning*® 2-1912 Fluid.

Please read *Guidance for Aerosol Applications of Silicone-Based Materials* from the Silicones Environmental, Health and Safety Council of North America (SEHSC) at sehsc.com/science.asp.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Exterior Trim Protection

Exterior Plastic/Rubber Enhancers – Gel
Formulation reference: EP-420

AV09029

Description

The thick gel consistency of this formulation enables accurate application to trim areas only. The silicone fluid gives excellent gloss and color, while the amino-functional silicone fluid provides durability.

Ingredient	Weight %	Trade Name/Supplier
1. Low aromatic solvent 160/190°C	83.3	Exxon Chemicals Ltd. Shell Chemicals Ltd.
2. *Cabosil*® EH-5	8.7	Cabot Corp.
3. XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt	6.0	Dow Corning Corp.
4. XIAMETER® OFX-0536 Fluid	2.0	Dow Corning Corp.

Procedure

Mix the ingredients in the order listed above with low-shear stirring.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

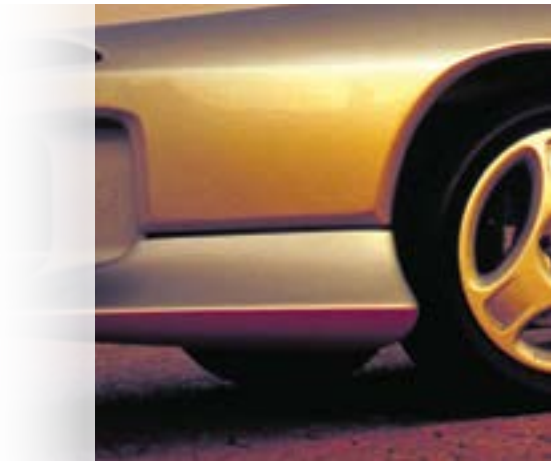
- To increase the color intensity, substitute XIAMETER® PMX-200 Silicone Fluid, 60,000 cSt, for XIAMETER PMX-200 Silicone Fluid, 12,500 cSt.
- To improve durability, increase the level of XIAMETER OFX-0536 Fluid and/or incorporate XIAMETER® RSN-9118 Resin.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Exterior Trim Protection

Premium Protectant Lotion (Low Odor)
Formulation reference: IP-590



AV09029

XIAMETER MEM-1171 Emulsion is a 50% polydimethylsiloxane emulsion with nonionic surfactants.

Learn more on product finder

Description

This formula is a water-based protectant lotion that is California A.R.B. compliant. XIAMETER® MEM-1171 Emulsion provides high gloss to interior dashboards, plastic, rubber, interior leather and tire surfaces and is low odor when applied to surfaces. An easy-to-disperse thickener that maintains low odor was selected to create this lotion.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. DI or soft water	45	
2. *Carbopol*® EZ-2	.70	Lubrizol/Noveon
Phase B		
3. Preservative	q.s.	The Dow Chemical Co. or Rohm & Haas Co.
4. XIAMETER® MEM-1171 Emulsion	30	Dow Corning Corp.
Separate Phase C (Premix) Target pH = 8.0–9.0		
5. DI water	24	
6. 20% sodium hydroxide solution	q.s.[1]	

[1]Start with 0.010%

Procedure

Use a mixer with multiple impellers to give high turnover flow at sides and bottom of container.

1) Use enough phase A water to reach the effective mixing zone of the vessel.
2) Add *Carbopol* EZ-2 thickener and disperse under moderate shear (minimum 20 minutes).
3) Add phase B ingredients and mix under moderate shear (minimum 20 minutes). A large increase in thickness will occur.
4) Put phase C DI water in a separate container for the phase C premix.
5) Add 20% sodium hydroxide solution to achieve a pH of 8.0–9.0 for phase C as measured by a digital pH meter.
6) Add phase C to the formula and continue mixing (minimum of 20 minutes). Lotion will thin during this step.

Typical Properties/Additional Information

DI water or softened water is recommended for this formula. Adjust the amount of 20% sodium hydroxide solution to achieve the target pH. The amount of thickener can be adjusted to modify the formula from a thin lotion to a thick gel if desired.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Glass Cleaner

Glass Care – Screenwash

Formulation reference: GL-802

AV09038

Description

This silicone surfactant enables rapid coverage of the windscreen promoting contact between road traffic film and the solution.

Ingredient	Weight %	Trade Name/Supplier
1. Water	68.5	
2. *Crodasinic® LS35*	0.5	Croda, Inc.
3. *Dowanol®* DPM	2.0	The Dow Chemical Co.
4. *Dowanol®* PM	3.0	The Dow Chemical Co.
5. Propylene glycol	5.0	
6. XIAMETER® OFX-0193 Fluid	1.0	Dow Corning Corp.
7. Isopropanol	20.0	

Procedure

Mix the ingredients in the order listed with low-speed stirring.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- The level of XIAMETER OFX-0193 Fluid should be adjusted depending on the dilution ratio recommended for the product to optimize wetting.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Glass Cleaner

Glass Care – Cleaner

Formulation reference: GL-810

AV09038

Description

This is a cleaning product for removing grease and dirt from windows. The silicone surfactant aids spreadability and also provides temporary anti-mist properties without smearing.

Ingredient	Weight %	Trade Name/Supplier
1. Water	84.7	
2. *Dowanol*® DPM	5	The Dow Chemical Co.
3. XIAMETER® OFX-0193 Fluid	0.3	Dow Corning Corp.
4. Isopropanol	10	

Procedure

Mix the ingredients in the order listed with low-speed stirring.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- At higher levels of incorporation, XIAMETER OFX-0193 Fluid can provide an anti-mist property.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulations for Glass Cleaners

Glass Cleaner with Ammonia and Citric Glass Cleaner

Formulation reference: GL-840

AV09038

Description

These automotive glass cleaners are easy to wipe off because of the lubricity provided by XIAMETER® OFX-0193 Fluid.

Ingredient	Weight %		Trade Name/Supplier
	A	B	
1. Water	66.2	66.3	
2. Isopropanol	10	10	
3. Ethanol	20	20	
4. Propylene glycol n-butyl ether	3	3	*Dowanol*® PnB/ The Dow Chemical Co.
5. XIAMETER® OFX-0193 Fluid	0.5	0.5	Dow Corning Corp.
6. Ammonia	0.3	–	
7. D-Lemonene	–	0.2	

Procedure

Mix the ingredients in the order listed with low-speed stirring.

Typical Properties/Additional Information

- The ammonia in formulation **A** acts as a degreaser and the D-Lemonene in formulation **B** adds a pleasant citric odor.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Glass Cleaner

Anti-Fog Glass Cleaner

Formulation reference: GL-860

AV09038

Description

This is a glass cleaner formulation that is excellent for cleaning automobile windshields, household windows, refrigerators, stovetops and kitchen counter surfaces. It removes grease and dirt and is easy to wipe off because of the lubricity provided by the silicone fluid. This formulation also provides anti-fog properties.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. XIAMETER® OFX-0193 Fluid	0.5	Dow Corning Corp.
2. XIAMETER® OFX-5211 Superwetting Agent	1.0	Dow Corning Corp.
3. *Dowanol*® PnB	4.0	The Dow Chemical Co.
4. Isopropanol	10	
Phase B		
5. Deionized water	84.5	

Procedure

1) Mix phase A ingredients until uniform.

2) Add this solution to phase B.

Typical Properties/Additional Information

- The grease-removing power of this product may be slightly improved by adding a small amount of organic surfactant.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Interior Protection

Cockpit Enhancers – Aerosol Product

Formulation reference: IP-501

AV08305

Description

This formulation provides an easy-to-apply product featuring silicones that give good gloss/color and that help mask light scratches.

Ingredient	Weight %	Trade Name/Supplier
1. Low aromatic solvent 160/190°C	10.0	Exxon D40/Exxon Chemical Co.
2. Heptane	68.0	
3. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	3.5	Dow Corning Corp.
4. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	3.5	Dow Corning Corp.
5. Isopar G	15.0	Exxon Chemical Co.

Procedure

Mix the ingredients in the order listed with-low speed stirring. Approximately 70% by weight of this formulation would be used in an aerosol with the remaining 30% being propellant.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To increase the gloss/color: Increase ratio of XIAMETER PMX-200 Silicone Fluid, 1,000 cSt, to XIAMETER PMX-200 Silicone Fluid, 350 cSt; or incorporate 2% XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt.
- To provide a drier film: Incorporate 3% *Dow Corning*® 2-1912 Fluid or XIAMETER® RSN-9118 Resin and reduce level of other silicones by 1% each.

Please read *Guidance for Aerosol Applications of Silicone-Based Materials* from the Silicones Environmental, Health and Safety Council of North America (SEHSC) at sehsc.com/science.asp.

Learn more on product finder

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Interior Protection

Cockpit Enhancers – Liquid

Formulation reference: IP-502

AV08305

Description

This product is an emulsion form of a solventless product formulated to provide shine to interior surfaces.

Ingredient	Weight %	Trade Name/Supplier
1. Water	85.0	
2. XIAMETER® MEM-0349 Emulsion or XIAMETER® MEM-0346 Emulsion	7.0	Dow Corning Corp.
3. XIAMETER® MEM-0062 Emulsion PS	7.0	Dow Corning Corp.
4. Hydroxyethyl cellulose thickener	1.0	Ashland Inc.

Procedure

1) Put ingredients 1–3 into an appropriate vessel and mix at low speed.
2) Slowly add ingredient 4 while mixing at low speed. Continue to mix for 30 minutes, or until all thickener is dissolved and the product is homogeneous.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To increase the gloss/color: Incorporate 2% *Dow Corning*® HV 495 Emulsion and reduce the level of other silicones by 1% each.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Interior Protection

Cockpit Enhancers – Sheen Finish
Formulation reference: IP-503

AV08305

Description

Lowering the silicone level and using a wax emulsion of larger particle size promotes uneven light reflection, giving a perceived lower gloss finish (as a new look) with reduced glare.

Ingredient	Weight %	Trade Name/Supplier
1. Water	87.3	
2. Carbomer	0.5	Carbopol Ultrez/Lubrizol
3. XIAMETER® MEM-0349 Emulsion or XIAMETER® MEM-0346 Emulsion	6.0	Dow Corning Corp.
4. Wax emulsion	5.0	*Michem*® Lube 155/ Michelman Inc.
5. Triethanolamine	1.0	Ashland Inc.
6. Preservative	0.2	

Procedure

1) Put ingredient 1 into the main vessel. Sift in ingredient 2. Mix for 20 minutes at low speed.
2) Add ingredients 3 and 4 to the main vessel. Mix 10 minutes.
3) Add ingredients 5 and 6 to the main vessel. Mix 30 minutes. Pour down and package.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To give a more sheen or matte finish: Increase ratio of wax emulsion to XIAMETER MEM-0349 Emulsion or XIAMETER MEM-0346 Emulsion.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Interior Protection

Leather Care

Formulation reference: IP-540

AV08983

Description

This gel product uses a combination of materials to keep leather supple by replacing lost natural oils. The silicone wax helps to protect the leather, while the silicone fluid aids during application.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. *Dow Corning*® 2-5088 Wax	2.0	Dow Corning Corp.
2. *Syncrowax*® ERL	2.0	Croda Ltd.
3. *Syncrowax*® AWI	2.0	Croda Ltd.
4. Lanolin	2.0	Croda Ltd.
5. *Brij*™ LT4	2.5	Croda Ltd.
6. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	1.0	Dow Corning Corp.
7. Pine Oil	1.0	
8. Triethanolamine	0.5	
Phase B		
9. Water	37.0	
Phase C		
10. Acrylic thickener (2%) solution	15.0	Lubrizol
11. Water	30.0	
12. Isopropanol	5.0	

Procedure

1) Mix phase A ingredients in the main vessel and heat to 70°C.
2) Heat phase B ingredient to 70°C and add to phase A under high shear.
3) Prepare a solution of acrylic thickener and water, and add this to the main vessel.
4) Add isopropanol and mix for 5 minutes under high shear, then use low-speed mixer.

Typical Properties/Additional Information

This is a Croda-derived formulation.

Suggestions for adjusting the formulation:

- To increase the gloss/color: Replace XIAMETER PMX-200 Silicone Fluid, 350 cSt, with XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt.
- To reduce the gloss: Replace XIAMETER PMX-200 Silicone Fluid, 350 cSt, with XIAMETER® PMX-200 Silicone Fluid, 100 cSt.
- To improve water repellency: Replace XIAMETER PMX-200 Silicone Fluid, 350 cSt, with XIAMETER® RSN-9118 Resin.
- To achieve a drier film: Replace XIAMETER PMX-200 Silicone Fluid, 350 cSt, with *Dow Corning*® 593 Fluid or *Dow Corning*® 3527 Release Agent or XIAMETER RSN-9118 Resin.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Interior Protection

Vinyl Protectant

Formulation reference: IP-550

AV08983

Description

This formulation is a vinyl surface protectant that may be used on various soft surfaces such as vinyl, leather, rubber, and plastics to impart gloss.

Ingredient	Weight %	Trade Name/Supplier
1. Water	79.1	
2. Hydroxyethyl cellulose	0.8	*Cellosize*® QP4400H/ The Dow Chemical Co.
3. XIAMETER® MEM-0039 Emulsion	20	Dow Corning Corp.
4. *Kathon*™ LX	0.1	Rohm & Haas Co.

Procedure

1) Add ingredient 2 to ingredient 1 and stir to achieve a transparent solution.
2) Add ingredient 3 and stir for 10 minutes.
3) Add ingredient 4 and stir for 10 minutes more.

Typical Properties/Additional Information

Directions: The final product can be applied by spray or with a damp cloth. This product should not be applied on floors or on vehicle controls.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Interior Protection

Creamy Vinyl Surface Protectant

Formulation reference: IP-560

AV08983

Description

This is a creamy vinyl and leather cleaner and protectant. It provides excellent gloss and easy application.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. *Dow Corning*® 3225C Formulation Aid	7.5	Dow Corning Corp.
2. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	5.0	Dow Corning Corp.
3. XIAMETER® PMX-0245 Cyclopentasiloxane	12.5	Dow Corning Corp.
Phase B		
4. Water	73.9	
5. *Tween*® 20	1.0	Croda Inc.
6. Sodium chloride	0.1	

Procedure

1) Blend phases A and B separately.

2) Add phase B to the top of phase A with turbulent mixing.

3) Once the addition is complete, shear mix to the desired consistency.

Typical Properties/Additional Information

1) Durability may be improved with the addition of XIAMETER® OFX-0531 Fluid in phase A.

2) *Witcamide*® 511 may be used as an alternative emulsifier.

3) Other electrolytes may be substituted for sodium chloride.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Interior Protection

Fabric Water Repellent

Formulation reference: IP-570

AV03983

Description

This formulation is an excellent water repellent treatment for items such as automotive upholstery and carpet. It may also be used to treat rainwear, snowsuits, mittens, footwear and upholstery materials.

Ingredient	Weight %	Trade Name/Supplier
1. XIAMETER® FBL-0563 Formulated Blend	5.0	Dow Corning Corp.
2. *ISOPAR*® G Solvent	95.0	Exxon Corp.

Procedure

1) Blend water repellent with solvent.

Typical Properties/Additional Information

- This product could also serve as a concentrate for an aerosol and be used at a level of 80% with 20% propellant.
- Solvents should be free of moisture to ensure maximum shelf life.
- Alternative solvents, such as aliphatic hydrocarbons, may be used.

Please read *Guidance for Aerosol Applications of Silicone-Based Materials* from the Silicones Environmental, Health and Safety Council of North America (SEHSC) at sehsc.com/science.asp.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Interior Protection

Multi-Surface
Medium Shine Dressing
Formulation reference: IP-580

AV08305

XIAMETER MEM-0349 Emulsion and MEM-0346 Emulsion are 60% polydimethyl-siloxane emulsions with nonionic surfactants.

Learn more on product finder

Description

This formulation is a water-based protectant that is California A.R.B. compliant. The formula provides gloss to interior dashboards, plastic, rubber, interior leather, and tire surfaces. The thickener provides vertical cling when the formula is sprayed.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Water	30-40	
2. XIAMETER® MEM-0349 Emulsion or XIAMETER® MEM-0346 Emulsion	34	Dow Corning Corp.
3. Acrylic thickener:		
Alcogum® L-12 or	1.5	Alco Chemical
Acusol® 820	1.0	Rohm & Haas Co.
4. Preservative	q.s.	The Dow Chemical Co. or Rohm & Haas Co.
Phase B		
5. Additional water to total 63% water	33-23	
6. Triethanolamine	1.4	Various

Procedure

Use a mixer that gives adequate turnover flow at the sides of the bottom of the container.

1) Load enough water to reach the effective mixing zone of the container.
2) Add the remaining phase A ingredients and mix until uniformly dispersed (minimum 20 minutes).
3) Premix phase B ingredients and then add to phase A.
4) Mix until thickener is fully activated (minimum 20 minutes).
5) Check the formula pH and verify it is in the correct range.

Additional Information to Optimize Formula

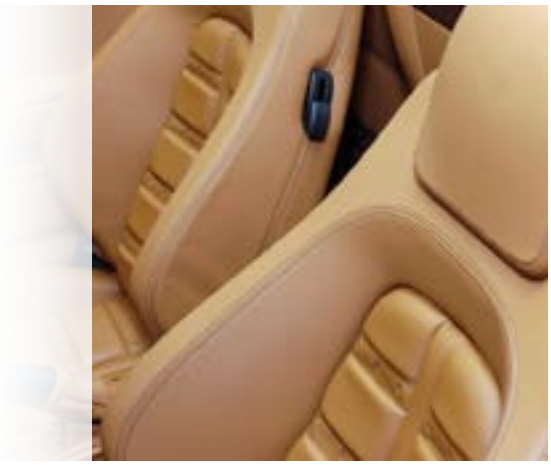
First, adjust the targeted amount of triethanolamine to obtain a final pH of 8.0–9.5 to correctly activate the thickener. This compensates for variations in the source water pH. If desired, adjust the level of acrylic thickener to modify the formula viscosity for best performance with your spray bottle.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Interior Protection

Premium Protectant Lotion (Low Odor)

Formulation reference: IP-590



AV08983

XIAMETER MEM-1171 Emulsion is a 50% polydimethylsiloxane emulsion with nonionic surfactants.

Learn more on product finder

Description

This formulation is a water-based protectant lotion that is California A.R.B. compliant. XIAMETER® MEM-1171 Emulsion provides high gloss to interior dashboards, plastic, rubber, interior leather and tire surfaces and is low odor when applied to surfaces. An easy-to-disperse thickener that maintains low odor was selected to create this lotion.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. DI or soft water	45	
2. *Carbopol*® EZ-2	.70	Lubrizol (Noveon division)
Phase B		
3. Preservative	q.s.	The Dow Chemical Co. or Rohm & Haas Co.
4. XIAMETER® MEM-1171 Emulsion	30	Dow Corning Corp.
Separate Phase C (Premix) Target pH = 8.0–9.0		
5. DI water	24	
6. 20% sodium hydroxide solution	q.s.[1]	

[1]Start with 0.010%.

Procedure

Use a mixer with multiple impellers to give high turnover flow at the sides and bottom of the container.

1) Load enough water to reach the effective mixing zone of the container.
2) Add *Carbopol* EZ-2 thickener and disperse under moderate shear (minimum 20 minutes).
3) Add phase B ingredients and mix under moderate shear (minimum 20 minutes). A large increase in thickness will occur.
4) In a separate container, load DI water for the phase C premix.
5) Add 20% sodium hydroxide solution to achieve a pH of 8.0–9.0 for phase C as measured by a digital pH meter.
6) Add phase C to formula and continue mixing (minimum of 20 minutes). Lotion will thin during this step.

Additional Information to Optimize Formula

DI water or softened water is recommended for this formula. Adjust the amount of 20% sodium hydroxide solution to achieve the target pH. The amount of thickener can be adjusted to modify the formula from a thin lotion to a thick gel if desired.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

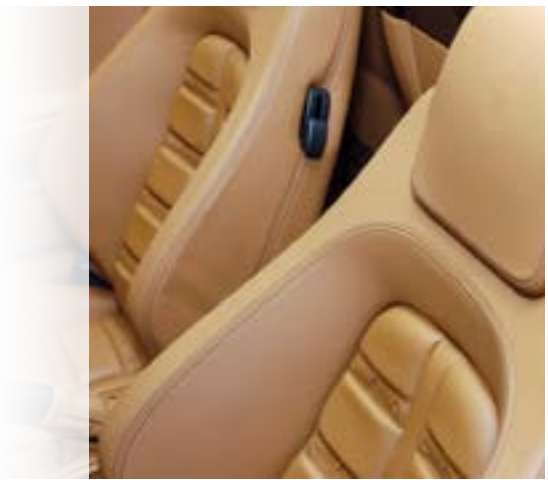
Prototype Formulation for Leather Conditioner

Leather Conditioner Lotion

Formulation reference: IP-600

Description

This creamy lotion for conditioning leather provides a high shine during initial application, then slowly transforms to a medium shine that feels dry. *Dow Corning*® 2-5088 Wax thickens the formula and provides a dry protective film to the leather. *Dow Corning*® 5200 Formulation Aid is an excellent emulsifier for economical formulas with a high water content where the oil phase is the continuous phase of the emulsion. The formula VOC content is less than 0.5 wt % and contains natural lanolin oil for conditioning.



AV08983

Ingredient	Weight %	Trade Name/Supplier
Water Phase		
1. DI water	72.0	
2. Sodium chloride	1.0	
Oil Phase		
3. *Isopar*™ M (isoparaffin) (VOC-exempt)	17.0	Exxon Chemicals Ltd. or equivalent
4. XIAMETER® PMX-0245 Cyclopentasiloxane	2.0	Dow Corning Corp.
5. Lanolin oil	2.0	Various
6. White mineral oil	1.0	Various
7. *Dow Corning*® 5200 Formulation Aid (emulsifier)	3.0	Dow Corning Corp.
8. *Dow Corning*® 2-5088 Wax	2.0	Dow Corning Corp.

Procedure

1) In a separate container suitable for heating, add all oil phase ingredients in the order shown.
2) Heat the oil phase slowly to 72°C in a closed container to melt the wax (for example, in a large oven).
3) Load hot DI water at 60°C into the mixing vessel.
4) Add sodium chloride and dissolve.
5) Ensure the mixing vessel equipment and water phase are between 60–65°C.
6) Add the hot oil phase (72°C) to the mixing vessel and mix.
7) Allow the formula to begin cooling under moderate shear.
8) When the liquid cools below 55°C, the material will change to an "oil out" emulsion and will thicken dramatically.
9) Continue to mix until the formula has cooled below 40°C.

Learn more on product finder

Typical Properties/Additional Information

Sodium chloride is a freeze-thaw stabilizer.

XIAMETER PMX-0245 Cyclopentasiloxane promotes good spreading of all actives.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Sheen Finish Cockpit Enhancer

Cockpit Enhancers – Sheen Finish
Formulation reference: IP-610

AV08305

Description

This cockpit enhancer uses a silicone emulsion at low dosage. It incorporates a wax emulsion with large particle size, which gives uneven light reflection. The result is a perceived lower gloss finish. This is important for light reflection control on treated surfaces, e.g., dashboards, that can distract the driver from the road.

Ingredient	Weight %	Trade Name/Supplier
1. Water	88	
2. XIAMETER® MEM-1473 Emulsion	6	Dow Corning Corp.
3. Microspersion 250	5	Kromachem Ltd.
4. Cellulose thickener	1	The Dow Chemical Co.

Procedure

Mix the ingredients in the order listed at low stirring speed.

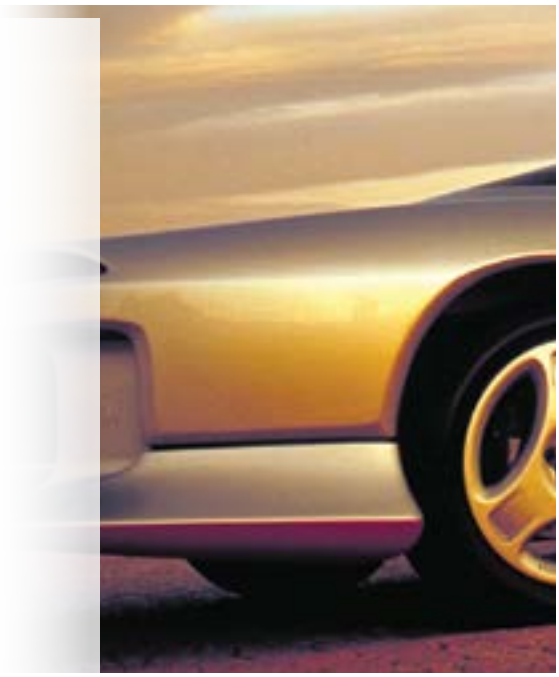
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Polymer Sealant

Polymer Sealant Liquid

Formulation reference: PW-360



AV09029

Description

This polymer sealant liquid polish features an amino-functional silicone that gives long-lasting protection with good color and gloss. Full protection is developed 24 hours after application of the polish.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Low aromatic solvent 160/190°C	10.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
2. Low aromatic solvent 200/250°C	12.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
3. Oleic acid	1.4	
4. Dimethylamino ethanol	1.3	
Phase B		
5. XIAMETER® OFX-0536 Fluid	2.0	Dow Corning Corp.
6. XIAMETER® OFX-0531 Fluid	3.0	Dow Corning Corp.
Phase C		
7. Water	55.1	
8. Cellulose thickener	0.8	Ashland Inc.
9. *Kaopolite*® SF	10.0	Kaopolite, Inc.
10. Dimethylamino ethanol	0.1	
Phase D		
11. Wax emulsion	4.3	

Procedure

1) Mix phase A ingredients until uniform using low shear in an auxiliary vessel.
2) Add phase B ingredients to phase A with low shear.
3) Add phase C ingredients to the main vessel with low-speed stirring until fully dispersed.
4) Add the contents of the auxiliary vessel to the main vessel under high shear.
5) Add phase D ingredient to the main vessel with low-speed stirring.

Learn more on product finder

Typical Properties/Additional Information

A method used to improve the corrosion resistance of a polish is to react XIAMETER OFX-0536 Fluid with lauric acid. In the example above, the XIAMETER OFX-0536 Fluid and lauric acid only would be added to the solvents (ratio 0.3 acid to 1.0 XIAMETER OFX-0536 Fluid) and this heated to 45°C for 5 minutes. Components 3 and 4 would then be added and the polish completed as before.

Suggestions for adjusting the formulation:

- To improve gloss: Incorporate 0.5–1.0% XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt.

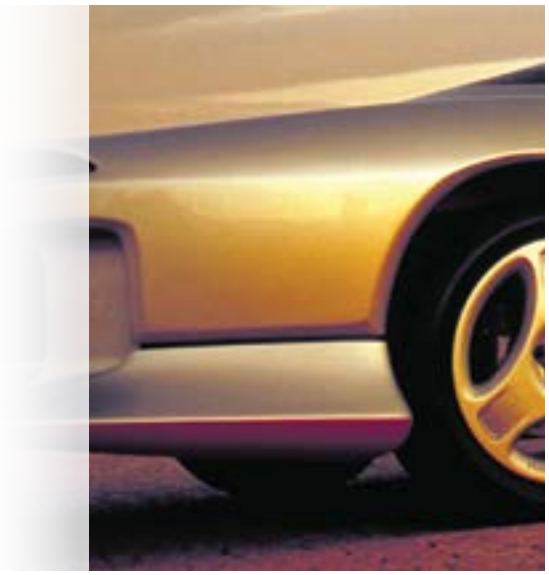
… continued

- To improve ease of use/leveling: Incorporate 0.5–1.0% XIAMETER® PMX-200 Silicone Fluid, 350 cSt, or *Dow Corning*® 593 Fluid.
- To improve color intensity: Incorporate 0.2–0.5% XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt.
- To improve gloss, ease of use and color: Incorporate XIAMETER PMX-200 Silicone Fluid, 350 cSt; XIAMETER PMX-200 Silicone Fluid, 1,000 cSt; XIAMETER PMX-200 Silicone Fluid, 12,500 cSt in a ratio of 3:1:1 at 1% total level.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Polymer Sealant

Pre-Softened Polymer Sealant Paste
Formulation reference: PW-370



AV09029

Description

This product is formulated to give good detergent resistance by incorporation of amino-functional silicones and wax. The silicone fluid aids application characteristics.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Low aromatic solvent 160/190°C	10.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
2. Low aromatic solvent 200/250°C	12.0	Exxon Chemicals Ltd. Shell Chemicals Ltd.
3. *Dow Corning*® 2-5088 Wax	3.0	Dow Corning Corp.
4. XIAMETER® OFX-0536 Fluid	2.0	Dow Corning Corp.
5. XIAMETER® OFX-0531 Fluid	3.0	Dow Corning Corp.
6. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	0.8	Dow Corning Corp.
Phase B		
7. Water	54.5	
8. *Alcan*® SF7	8.0	Alcan Chemicals
9. *Diafil*® 830	4.2	Microfine Minerals Ltd.
10. *Crodamet*® T8	1.5	Croda Ltd.
11. Cellulose Thickener	1.0	Ashland Inc.

Procedure

1) Place ingredients 1–3 into an auxiliary vessel and heat to 45°C with low-shear mixing. Maintain the temperature at 40-45°C and add ingredients 4–6 with low shear.
2) In the main vessel, add ingredients 8 and 9 to ingredient 7 with low shear until dispersed while heating to 50°C.
3) Add ingredients 10 and 11 under low shear.
4) Add phase A and phase B under high shear.
5) Cool to filling temperature.

Typical Properties/Additional Information

Learn more on product finder

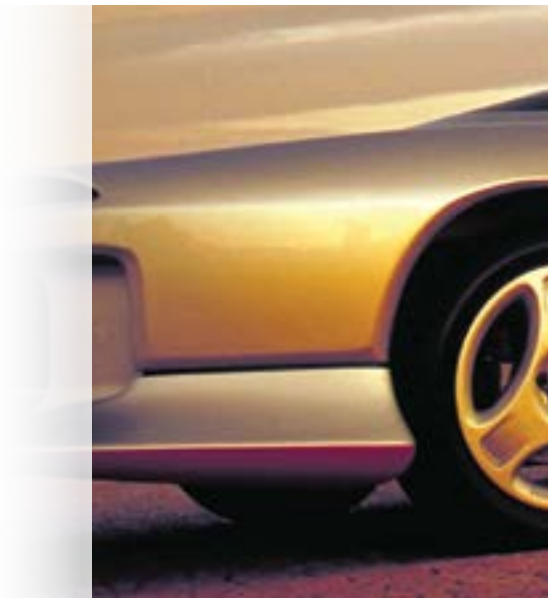
Suggestions for adjusting the formulation:

- To improve gloss: Incorporate 0.5–1.0% XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt.
- To improve ease of use: Increase level of XIAMETER PMX-200 Silicone Fluid, 350 cSt, to 1.5%.
- To improve color intensity: Incorporate 0.2–0.5% XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt.
- To improve gloss, ease of use, and color: Incorporate XIAMETER PMX-200 Silicone Fluid, 350 cSt; XIAMETER PMX-200 Silicone Fluid, 1,000 cSt; and XIAMETER PMX-200 Silicone Fluid, 12,500 cSt in a ratio of 3:1:1 at 1% total level.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Polymer Sealant

Pre-Softened Polymer Sealant Paste
Formulation reference: PW-375



AV09029

Description

This formulation gives good detergent resistance by incorporation of amino-functional silicones and wax, while the fluid aids application characteristics.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Low aromatic solvent 160/190°C	10.0	Exxsol D40/Exxon Chemical Co.
2. Low aromatic solvent 200/250°C	12.0	Exxsol D80/Exxon Chemical Co.
3. Carnauba wax	3.0	
4. XIAMETER® OFX-0536 Fluid	2.0	Dow Corning Corp.
5. XIAMETER® OFX-0531 Fluid	3.0	Dow Corning Corp.
6. XIAMETER® PMX-200 Silicone Fluid, 350 cSt	0.8	Dow Corning Corp.
Phase B		
7. Water	54.5	
8. *Alcan*® SF7	8.0	Alcan Inc.
9. Celite Super Floss	4.2	Celite Corp.
10. *Bio-soft*® N1-7	1.5	Stepan Co.
11. Hydroxyethyl cellulose thickener	1.0	Ashland Inc.

Procedure

1) Place ingredients 1–3 into an appropriate vessel and heat to 45°C with low-shear mixing. Maintain the temperature at 40–45°C and add ingredients 4–6.
2) In the main vessel, add ingredients 7–9 and mix with low shear until dispersed while heating to 50°C.
3) Add ingredients 10 and 11 under low shear. Mix until all ingredients are dispersed, approximately 45 minutes.
4) Add phase A to phase B under high shear. Cool to filling temperature.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve gloss, incorporate 0.5–1.0% XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt.
- To improve ease of use, increase level of XIAMETER® PMX-200 Silicone Fluid, 350 cSt, to 1.5%.
- To improve color intensity, incorporate 0.2–0.5% XIAMETER® PMX-200 Silicone Fluid, 12,500 cSt.
- To improve gloss, ease of use and color, incorporate XIAMETER PMX-200 Silicone Fluid, 350 cSt; XIAMETER PMX-200 Silicone Fluid, 1,000 cSt; and XIAMETER PMX-200 Silicone Fluid, 12,500 cSt in a ratio of 3:1:1 at 1% total level.

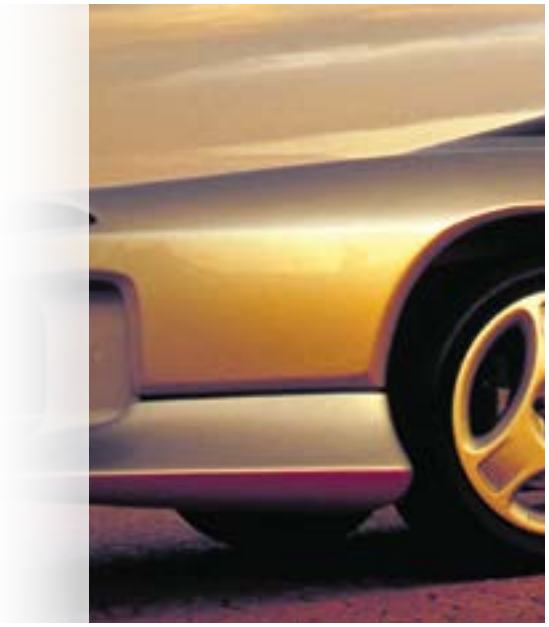
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Scratch Concealer

Scratch Concealer

Formulation reference: SC-100



AV09029

Learn more on product finder

Description

Dow Corning® 3527 Release Agent is easy to apply and provides a durable, smooth, glossy coating that penetrates imperfections.

Hydral® 710 Abrasive works well with polish formulas with a high water content. Both *Kaopolite*® 1152 and *Hydral* 710 Abrasives are relatively mild and prevent additional scratches to auto clear coats.

Isopar™ M is an organic isoparaffin solvent that is VOC-exempt, very slow to dry and aids with film formation of active ingredients in the formula.

This formula passes five cycles of freeze/thaw stability testing.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. DI water	68.45	
2. Alcoa *Hydral*® 710 Abrasive	3.0	Alcoa Inc.
3. *Kaopolite*® 1152 Abrasive	5.0	Kaopolite, Inc.
4. *Amadol*® (Witcamide) WE	2.0	Akzo Nobel
5. Sodium chloride salt	1.0	
6. Stoddard solvent	10.50	Chemcentral or Ashland
Phase B		
7. *Isopar*™ M (isoparaffin)	1.00	Exxon Chemicals Ltd.
8. Stoddard solvent	3.0	Chemcentral or Ashland
9. *Bentone*® 38	0.7	Rheox, Inc.
Phase C		
10. *Dow Corning*® 3527 Release Agent	5.0	Dow Corning Corp.
11. Isopropanol	0.35	

Procedure

1) Load phase A ingredients in the order shown into a vessel and mix well.
2) Mix phase B ingredients in a separate container.
3) Add phase B to the production vessel and mix well.
4) Add phase C ingredients to the production vessel in the order shown and mix well.

Typical Properties/Additional Information

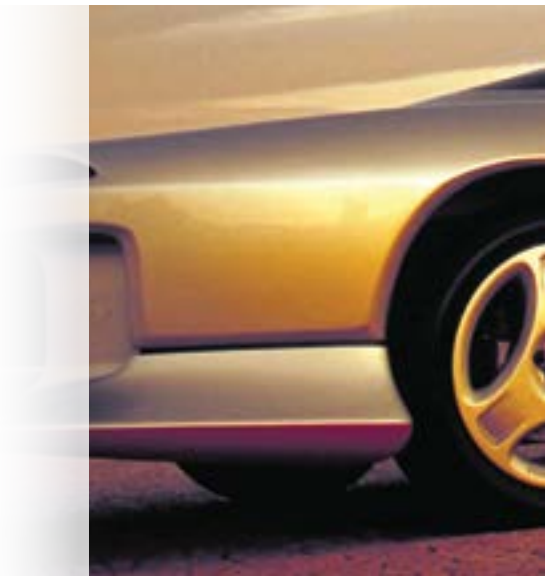
- Formulas with a water content greater than 75% are problematic (poor emulsification and do not thicken to a paste) and are not recommended with this combination of abrasives and emulsifier.

Observe precautions for handling XIAMETER® products as indicated on the safety data sheets.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Solvent-Free Polish

Solvent-Free Polish
Formulation reference: PW-385



AV09029

Description

This formulation incorporates a range of silicone emulsions of fluid/amino/wax to provide properties that were achievable historically with solvent-based technologies.

Ingredient	Weight %	Trade Name/Supplier
1. Water	25.0	
2. *Bio-soft*® N1-7	0.5	Stepan Co.
3. XIAMETER® PMX-0246 Cyclohexasiloxane	5.0	Dow Corning Corp.
4. Water	52.1	
5. XIAMETER® MEM-0349 Emulsion or XIAMETER® MEM-0346 Emulsion	1.0	Dow Corning Corp.
6. XIAMETER® MEM-8035 Emulsion	1.6	Dow Corning Corp.
7. Wax emulsion	4.5	*Michem*® Lube 155/ Michelman Inc.
8. Hydroxyethyl Cellulose Thickener	0.8	Ashland Inc.
9. Celite Super Floss	7.5	Celite Corporation
10. *Alcan*® SF7	3.5	Alcan Inc.

Procedure

1) Mix ingredients 1–4 in an appropriate vessel under high shear.
2) Add ingredients 5–7 to the vessel with high shear.
3) Slowly add ingredient 8 while mixing. Continue to mix for 30 minutes, or until the thickener is dissolved and the product is uniform.
4) Add ingredients 9 and 10 to the above, continuing to mix for an additional 10 minutes.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve gloss, incorporate XIAMETER® MEM-0062 Emulsion PS at 0.5%; reduce XIAMETER MEM-0349 Emulsion or XIAMETER MEM-0346 Emulsion to 0.5%.
- To improve durability, increase XIAMETER MEM-8035 Emulsion to 2.0% and the wax emulsion to 5.1%.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Tire Care

Multi-Surface
Medium Shine Dressing
Formulation reference: IP-580

AV09029

XIAMETER MEM-0349 Emulsion and MEM-0346 Emulsion are 60% polydimethyl-siloxane emulsions with nonionic surfactants.

Learn more on product finder

Description

This formula is a water-based protectant that is California A.R.B. compliant. The formula provides gloss to interior dashboard, plastic, rubber, interior leather, and tire surfaces. The thickener provides vertical cling when the formula is sprayed.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. Water	30-40	
2. XIAMETER® MEM-0349 Emulsion or XIAMETER® MEM-0346 Emulsion	34	Dow Corning Corp.
3. Acrylic thickener:		
Alcogum® L-12 or	1.5	Alco Chemical
Acusol® 820	1.0	Rohm & Haas Co.
4. Preservative	q.s.	The Dow Chemical Co. or Rohm & Haas Co.
Phase B		
5. Additional water to total 63% water	33-23	
6. Triethanolamine	1.4	Various

Procedure

Use a mixer that gives adequate turnover flow at the sides of the bottom of the container.

1) Use enough phase A water to reach the effective mixing zone of the container.
2) Add rest of the phase A ingredients and mix until uniformly dispersed (minimum 20 minutes).
3) Premix the phase B ingredients and then add to phase A.
4) Mix until thickener is fully activated (minimum 20 minutes).
5) Check the formula pH to verify it is in the correct range.

Additional Information to Optimize Formula

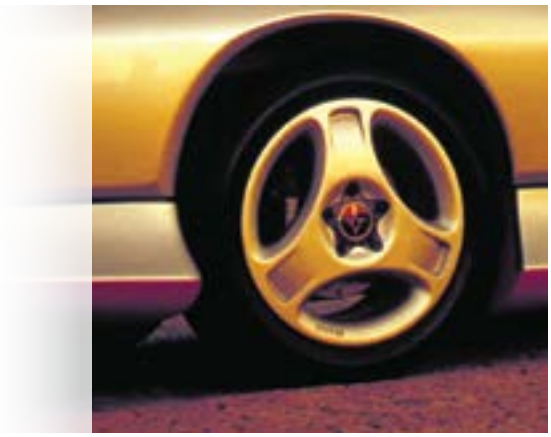
First, adjust the targeted amount of triethanolamine to obtain a final pH of 8.0–9.5 to correctly activate the thickener. This compensates for variation in source water pH. If desired, adjust the level of acrylic thickener to modify the formula viscosity for the best performance with your spray bottle.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Tire Care

Tire Enhancer Foam Spray

Formulation reference: TP-701



AV09029

Description

This formulation gives a "new" rather than painted appearance to the tire. The high-viscosity fluid emulsion increases gloss, while the amino-functional silicone promotes durability.

Ingredient	Weight %	Trade Name/Supplier
1. Water	68.15	
2. Polyoxyethylene (20) sorbitan monooleate	0.7	*Tween*® 80/Croda Ltd.
3. Sorbitan trioleate	0.5	*Span*™ 80/Croda Ltd.
4. Propylene glycol	2.0	
5. *Dow Corning*® HV 495 Emulsion	20.0	Dow Corning Corp.
6. XIAMETER® MEM-8035 Emulsion	8.3	Dow Corning Corp.
7. Rust inhibitor	0.2	Sodium benzoate
8. XIAMETER® AFE-2210 Antifoam Emulsion	0.15	Dow Corning Corp.

Procedure

Mix the ingredients in the order listed with low-speed stirring.

Approximately 85% by weight of this formulation will be used in an aerosol fitted with a foaming valve, with the remaining 15% used in propellant.

Typical Properties/Additional Information

Suggestions for adjusting the formulation:

- To improve durability, increase ratio of XIAMETER MEM-8035 Emulsion to *Dow Corning* HV 495 Emulsion.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Tire Care

Solvent-Based Liquid Tire Surface Protectant

Formulation reference: TP-720

AV09029

Description

This tire dressing protectant is designed to impart high gloss to the surfaces of tires.

Ingredient	Weight %	Trade Name/Supplier
1. Odorless mineral spirits	85	
2. XIAMETER® PMX-200 Silicone Fluid, 10,000 cSt	15	Dow Corning Corp.

Procedure

1) Blend ingredients until uniform. Ensure adequate mixing at the bottom of the blending container.

Typical Properties/Additional Information

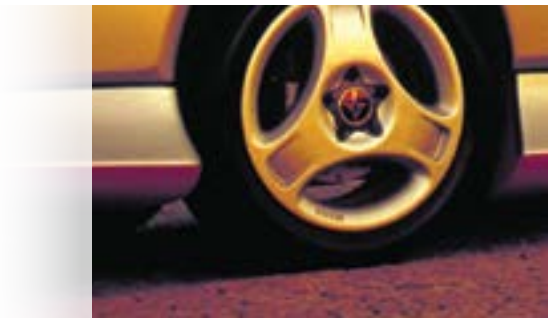
- Solvent choice may vary with specific application needs and desired drying time.
- Additional durability and gloss can be achieved by raising amount of XIAMETER PMX-200 Silicone Fluid, 10,000 cSt. Suggested range in formulation is 10–20 wt %.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Water-Based Tire Dressing

Tire Dressing with XIAMETER® MEM-1171 Emulsion
(Lot Number 16788-73)
Formulation reference: TP-730



AV09029

Description

This formulation is based on XIAMETER® MEM-1171 Emulsion, which is a low-odor, high-solids emulsion. XIAMETER® MEM-1101 Emulsion adds shine, while XIAMETER® MEM-8035 Emulsion increases durability.

Ingredient	Weight %	Trade Name/Supplier
1. XIAMETER® MEM-1171 Emulsion	32.0	Dow Corning Corp.
2. XIAMETER® MEM-1101 Emulsion	4.0	Dow Corning Corp.
3. XIAMETER® MEM-8035 Emulsion	3.5	Dow Corning Corp.
4. Water	60.5	
5. *Kathon*™ LX	0.05	Rohm & Haas Co.

Procedure

Mix ingredients in the order listed with low stirring and add them slowly.

Typical Properties/Additional Information

- To improve gloss: Add more XIAMETER MEM-1101 Emulsion.
- Explore different levels of gloss by using XIAMETER® MEM-1664 Emulsion with XIAMETER MEM-1101 Emulsion.

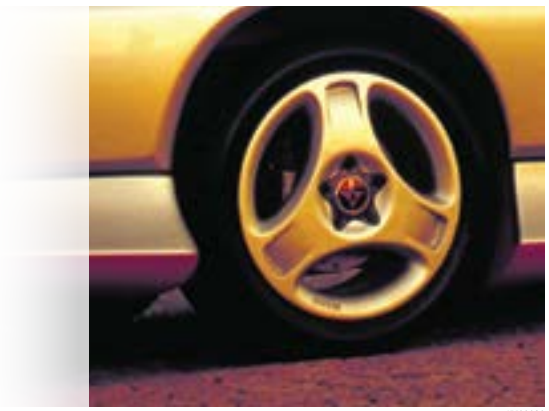
See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Tire Care

Cream Tire Dressing with XIAMETER® MEM-1171 Emulsion

(Lot Number 16788-75)
Formulation reference: TP-740



AV09029

Description

This formulation produces a thick cream tire dressing based on XIAMETER® MEM-1171 Emulsion. XIAMETER MEM-1171 Emulsion is low odor and high solids. XIAMETER® MEM-1101 Emulsion adds shine, while XIAMETER® MEM-8035 Emulsion improves durability.

Ingredient	Weight %	Trade Name/Supplier
1. Water	58.85	
2. Carbomer	0.60	Carbopol Ultrez 10/ Lubrizol
3. XIAMETER® MEM-1171 Emulsion	32.0	Dow Corning Corp.
4. XIAMETER® MEM-1101 Emulsion	4.0	Dow Corning Corp.
5. XIAMETER® MEM-8035 Emulsion	3.5	Dow Corning Corp.
6. Triethanolamine	1.1	
7. *Kathon*™ LX	0.05	Rohm & Haas Co.

Procedure

1) Put the water into the main vessel and begin mixing at low speed. Slowly add the carbomer and mix under high shear until all powder has been wetted, approximately 30 minutes. Add the carbomer slowly to avoid the formation of lumps.
2) When all of the carbomer has been hydrated, add XIAMETER MEM-1171 Emulsion, XIAMETER MEM-1101 Emulsion and XIAMETER MEM-8035 Emulsion to the main vessel while mixing.
3) Add the triethanolamine and preservative. Stir for another 30 minutes.
4) Pour down and package.

Typical Properties/Additional Information

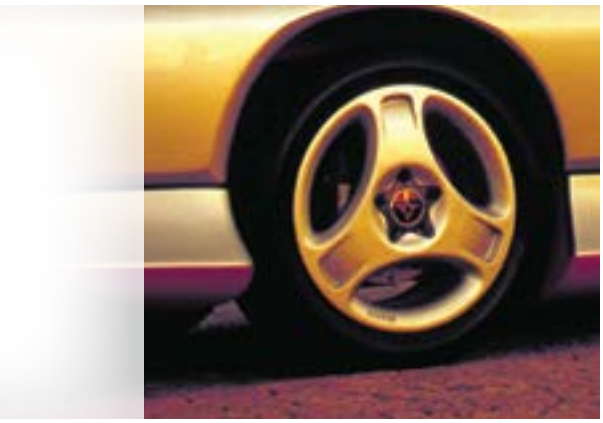
- To improve gloss, increase the amount of XIAMETER MEM-1101 Emulsion.
- Explore different levels of gloss using *Dow Corning*® HV 495 Emulsion with XIAMETER MEM-1101 Emulsion.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

Prototype Formulation for Tire Care

Fast Dry Premium Shine Tire Dressing
Formulation reference: TP-750



AV09029

XIAMETER PMX-1077 Fluid is:

- VOC-exempt
- Non-allergenic
- Low in toxicity
- Safe on plastics; non-corrosive to metals

Learn more on product finder

Description

This formulation is a "spray and walk away" tire dressing that dries extremely fast and is California A.R.B compliant. The formulation provides premium shine and premium darkening/color enhancement of tires. Treated tires have a glossy, dark "car show" appearance.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. XIAMETER® PMX-1077 Fluid	50	Dow Corning Corp.
2. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	10	Dow Corning Corp.
3. XIAMETER® PMX-200 Silicone Fluid, 10,000 cSt	20	Dow Corning Corp.
Phase B		
4. VOC-exempt aliphatic hydrocarbon solvent (isoparaffin)	20	CPChem *Soltrol*® 220 or *Exxon*® Isopar M

Procedure

Add the phase A ingredients in the order shown into a mixing vessel suitable for handling flammable liquids and vapors. Use a mixing impeller with adequate turnover flow at the bottom of the container. Rinse the load lines and any additional containers with the phase B ingredient while adding it to the mixing vessel.

Typical Properties/Additional Information

XIAMETER PMX-1077 Fluid is flammable. Review the Dow Corning Safety Data Sheet and use appropriate cautions during use. The above formulation is flammable (flash point = 27ºF). Follow the appropriate labeling and shipping of packages containing this formula.

Including the isoparaffin solvent prevents the formula from drying before the gloss agents cover the tire uniformly and also lowers the formula cost.

Formulation Performance Review

Results

- Uniform appearance while drying
- Amount of slippery residue on the ground is four times less than with formulation TP-770
- Reduced streaks/drips at the tire bottom while drying
- High level of color enhancement and gloss compared to TP-770

… continued

15 minutes after application

30 minutes after application

Dried appearance

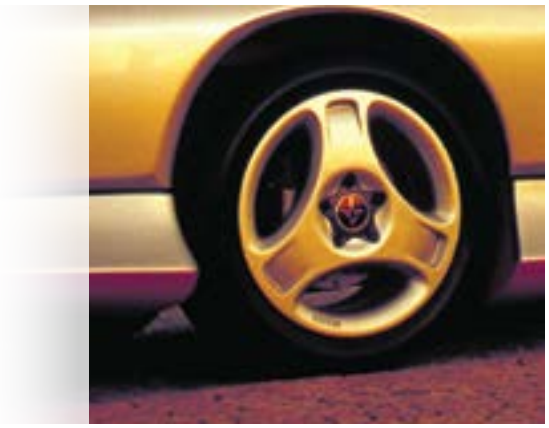
AV05804

Formula was sprayed on the tire surface with no wiping.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Tire Care

Spray & Walk Away Tire Dressing
Formulation reference: TP-760



AV09029

XIAMETER PMX-0245 Cyclopentasiloxane is:

- VOC-exempt
- Low in toxicity
- Safe on most plastics or metals

Learn more on product finder

Description

This formulation is a "spray and walk away" tire dressing that is California A.R.B. compliant. XIAMETER® PMX-0245 Cyclopentasiloxane improves the spreading of gloss agents so no wiping is needed. The formulation gives premium shine and premium darkening/color enhancement of tires. Treated tires have a glossy, dark "car show" appearance.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. XIAMETER PMX-0245 Cyclopentasiloxane	37	Dow Corning Corp.
2. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	5	Dow Corning Corp.
3. XIAMETER® PMX-200 Silicone Fluid, 10,000 cSt	20	Dow Corning Corp.
Phase B		
4. VOC-exempt aliphatic hydrocarbon solvent (isoparaffin)	38	CPChem *Soltrol*® 220 or *Exxon*® Isopar M

Procedure

Add the phase A ingredients in the order shown into a mixing vessel. Use a mixing impeller with adequate turnover flow at the bottom of the container. Rinse the load lines and any additional containers with the phase B ingredient while adding it to the mixing vessel.

Typical Properties/Additional Information

If the amount of XIAMETER PMX-0245 Cyclopentasiloxane is significantly reduced, then wiping the formula after spraying will be necessary.

Increasing the ratio of XIAMETER PMX-0245 Cyclopentasiloxane to isoparaffin solvent in the formula will continue to improve the spreading properties.

… continued

Formulation Performance Review

Results

- Uniform appearance while drying
- Amount of slippery residue on the ground is two times less than with formulation TP-770
- Reduced streaks/drips at the tire bottom while drying
- High level of color enhancement and gloss compared to TP-770

15 minutes after application

30 minutes after application

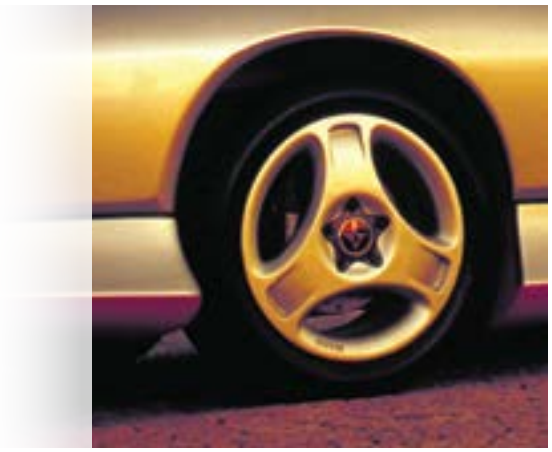
Dried appearance

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Tire Care

Spray & Wipe Low-Cost Tire Dressing

Formulation reference: TP-770



AV09029

Description

This formulation is a "spray and wipe" tire dressing that is California A.R.B. compliant and low in cost. Wiping after application to the tires is necessary to improve the uniformity of shine and to prevent residue on the floor. The blend of XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt, and 10,000 cSt gives high shine.

Ingredient	Weight %	Trade Name/Supplier
Phase A		
1. VOC-exempt aliphatic hydrocarbon solvent (isoparaffin)	70	CPChem *Soltrol*® 220 or *Exxon*® Isopar M
2. XIAMETER® PMX-200 Silicone Fluid, 1,000 cSt	5	Dow Corning Corp.
3. XIAMETER® PMX-200 Silicone Fluid, 10,000 cSt	20	Dow Corning Corp.
Phase B		
4. VOC-exempt aliphatic hydrocarbon solvent (isoparaffin)	5	CPChem *Soltrol*® 220 or *Exxon*® Isopar M

Procedure

Place the phase A ingredients in the order shown into a mixing vessel. Use a mixing impeller with adequate turnover flow at the bottom of the container. Rinse the load lines and any additional containers with the phase B ingredient while adding it to the mixing vessel.

Typical Properties/Additional Information

The VOC-exempt isoparaffin solvent is very slow to dry compared to *Dow Corning*® brand volatile methylsiloxane fluids. Wipe the tire after treatment to avoid dripping and residue on the floor.

Formulation Performance Review

Results

- Streaky appearance while drying
- Streaks and drips at the tire bottom while drying
- Low level of color enhancement and gloss compared to TP-750 or TP-760

Learn more on product finder

Formula was sprayed on the tire surface with no wiping.

Untreated tire

15 minutes after application

30 minutes after application

Dried appearance

AV05805

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Prototype Formulation for Tire Care

Water-Based Tire Shine

Formulation reference: TP-780

AV09029

Description

This formulation is a water-based tire shine.

Ingredient	Weight %	Trade Name/Supplier
1. Water	67.95	
2. Tween® 80	0.70	Croda Inc.
3. *Span*™ 80	0.50	Croda Inc.
4. Propylene glycol	4.00	
5. XIAMETER® MEM-0062 Emulsion PS	18.00	Dow Corning Corp.
6. XIAMETER® MEM-8035 Emulsion	1.00	Dow Corning Corp.
7. Sodium benzoate	0.20	
8. XIAMETER® AFE-2210 Antifoam Emulsion	0.15	Dow Corning Corp.
9. *Dow Corning*® HV 495 Emulsion	7.00	Dow Corning Corp.
10. XIAMETER® OFX-0309 Fluid	0.50	Dow Corning Corp.

Procedure

Mix the ingredients in the order listed with low-speed stirring.

See Auto Care Raw Material Supplier Reference Sheet for the role of the raw material and supplier information.

Learn more on product finder

For More Information

Visit the Dow Corning Automotive Appearance Chemicals website, **dowcorning.com/autocare**, to learn more about silicone-based innovations for automotive appearance products from Dow Corning.

Contact Information

dowcorning.com/ContactUs

www.xiameter.com

Two Brands to Serve You

In addition to the *Dow Corning*® brand specialty materials and services showcased in this document, Dow Corning Corporation offers thousands of standard silicone products under its XIAMETER® brand, backed by the same quality and supply you've come to expect from Dow Corning. Visit **www.xiameter.com** to learn more about additional silicone options available from the XIAMETER brand.

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