CLEANING IN THE AGE OF MAGNESIUM AND CALCIUM CHLORIDE

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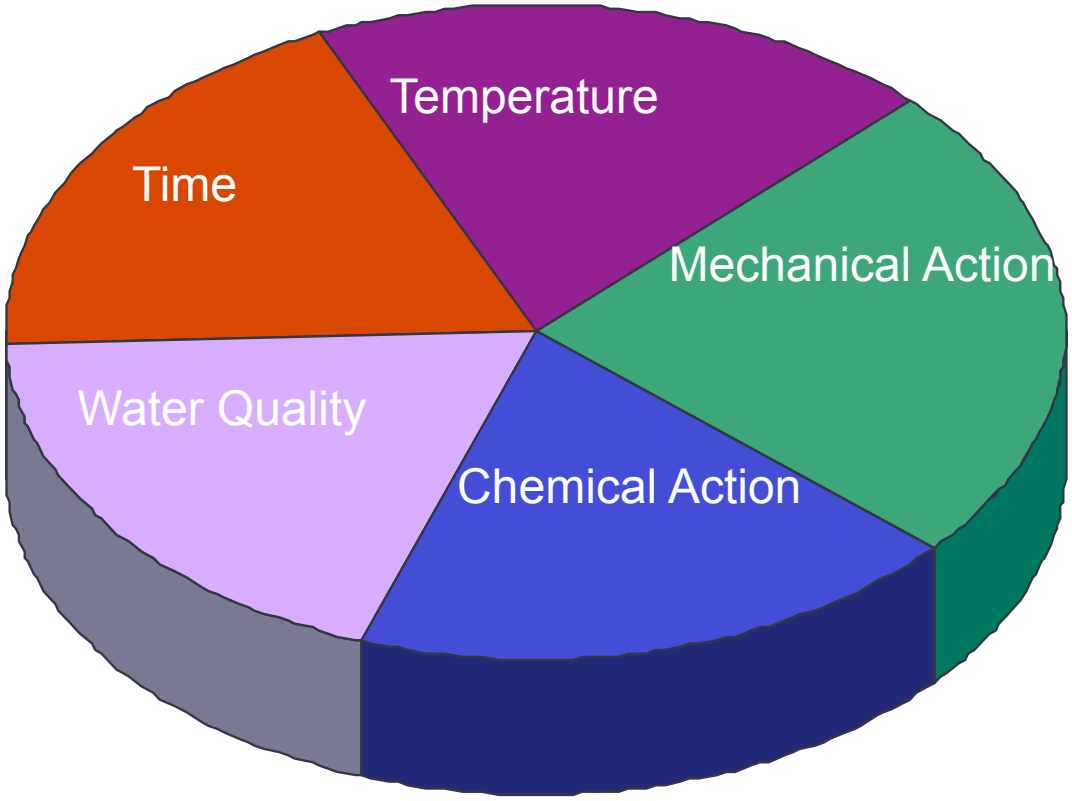
The Corrosive Effects of Magnesium and Calcium Chloride

- Protective coatings are a widely used corrosion control solution and are generally applied at point of manufacturing
- An alternative solution to reducing the effects of corrosion can be the integration of the proper chemistry into a routine cleaning program

Cleaning large vehicles

Photos courtesy of Belanger, Inc.



The five factors of cleaning are like pieces of a pie. A decrease in one of the factors means that another factor(s) will have to be increased to compensate and provide the desired cleaning results.

Time

- in general, **soaking time increases cleaning ability**
- point of diminishing return
- soils and oil may redeposit on surface
- optimum dwell time for:

  presoaks = 30-45 seconds

  bug remover = 1-2 minutes

Temperature

Three Types

- Ambient
- Vehicle
- Chemistry (product & water)

Effects of temperature on cleaning

- Temperature = Activity (atoms get more "excited" when heated)
- Some Limitations
- General Guidelines are 110°- 120°F on vehicle surface

Mechanical Action

- Friction
  - Cloth, brushes, bristles, foam fabric
- Touch-Free
  - Water Pressure (psi)
  - Water Volume & Impingement
  - Speed of Cycle

Chemical Action

- Reduce static charge to release certain soils
- Break down soil physical bonds to the vehicle surface
- Solubilize/disperse road film

Water Quality

- *Water hardness(calcium/magnesium)*
- 10 grains hardness =35% more detergent
- Total Dissolved Solids (TDS)
- pH
- Total Alkalinity
- Metals (Iron, Copper, Manganese)

Do we need to consider a Sixth Factor?

"Desaltification"

Detergent Components

- Acids
- Alkalis
- Surfactants
- Conditioners
- Solvents

Functions of Acidic Detergents Low pH or pH<7

- Water hardness compatible
- Cleans and brightens chrome and glass
- Excellent for most inorganic soils
- Buffers the next step
- Excellent rinsing properties
- Aids in drying

Functions of Alkaline Detergents High pH or pH>7

- **Effective against particulate and oily soils**
- Reacts with hard water ions(Ca/Mg)
- Detergency
- Saponification
- Break down organic soils

Functions of Surfactants

- **Solubilization and emulsification of soil**
- **Enhance rinsing**
- Wetting of surfaces
- Penetration of soil
- Displacement of soil
- Foam or defoam
- Antimicrobial – limited

Functions of Conditioners

- **Prevent calcium and magnesium salts from precipitating and/or adhering to surfaces.**
- Chelate
  - **"Claw" for metal ions** like Mg or Ca
- Crystal modifier
  - Functions like a chelate
  - **Prevents metal ion precipitation or scale formation** at extremely low dilutions

So back to the typical washing of a large vehicle…generally a neutral detergent and/or an alkaline detergent is used.

Why is it not effective today against magnesium and calcium chloride?

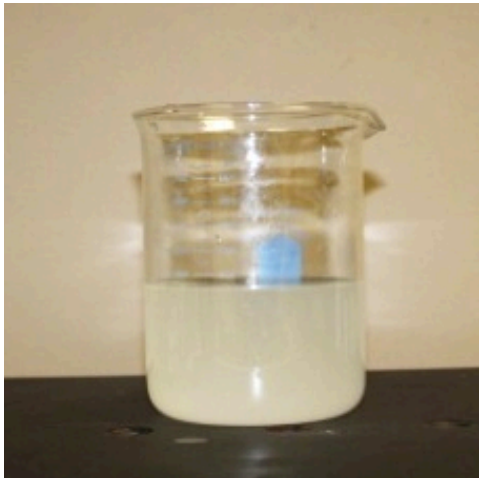
The Neutral Detergent

Photo courtesy of Belanger, Inc.

- Neutral Foam Shampoo
- Similar to Pot and Pan Dish Soap
- Used in friction washes
- Provides lubricity and detergency

Incompatibility

Neutral Detergent and Chlorides



- Incompatible with Magnesium or Calcium Chloride.
- May create very small particulate in the brushes and cloth of the wash *resulting in abrasion to surface of vehicle*

The Alkaline Detergent

Photo courtesy of Belanger, Inc.

Alkaline Detergents (pH >7 or High pH)

- Saponification
- Effective against particulate and oily soils
- Required for touchless washing

Insoluble salts forming

Alkaline Detergent and Chlorides

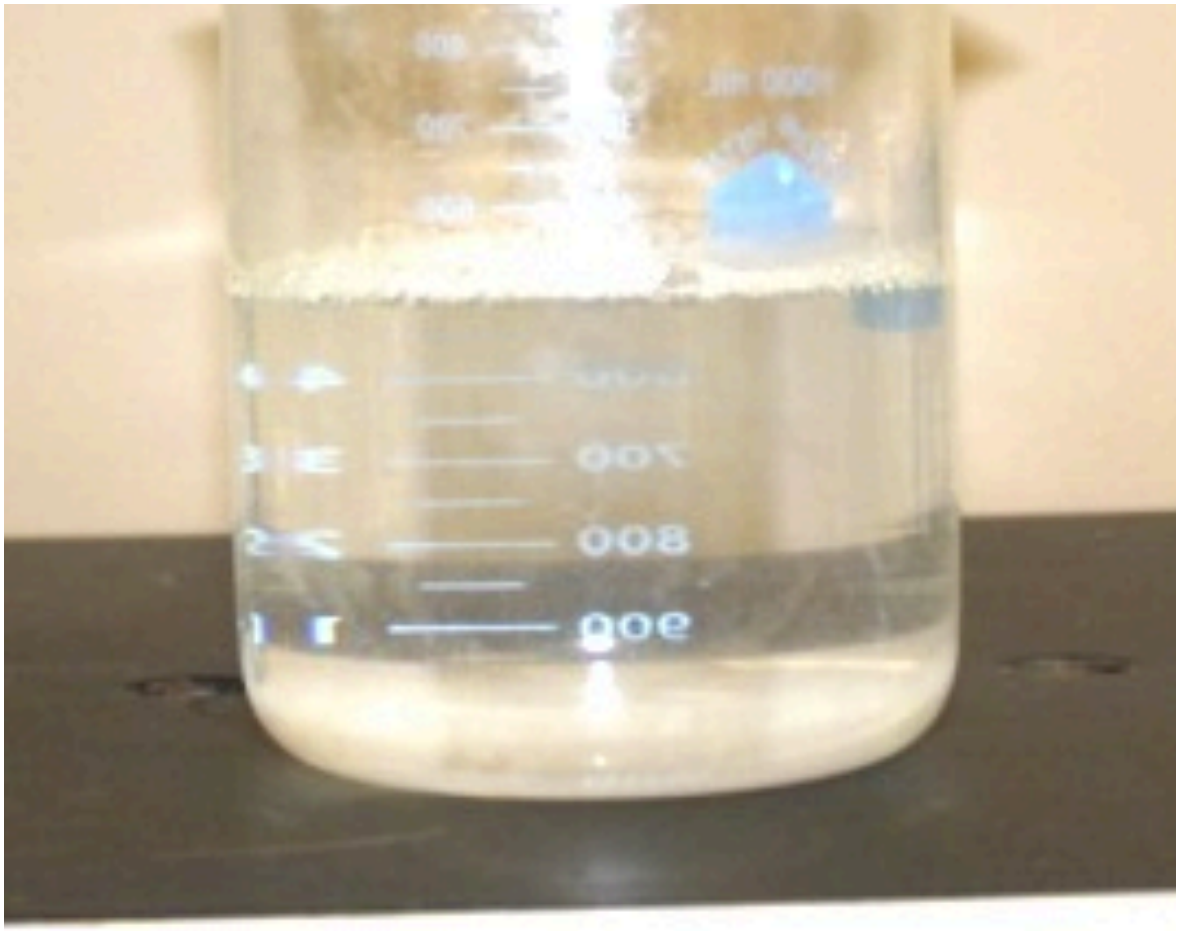


- Shocks the magnesium and calcium chlorides out of solution similar to how a water treatment facility reduces water hardness
- Creates insoluble magnesium or calcium salts that are more difficult to remove from vehicle

The alternative solution – Low PH detergent

- Discovered as part of the touchless car wash two step cleaning process.
- Total “desaltification” of metal and painted surfaces
- Can be used as a one step detergent in a friction wash or as step 1 in a two step touchless wash

Solubilizing



Low PH Detergent and Chlorides

- Solubilizing both calcium and magnesium chloride to aid removal and prevent subsequent corrosion

An additional benefit?

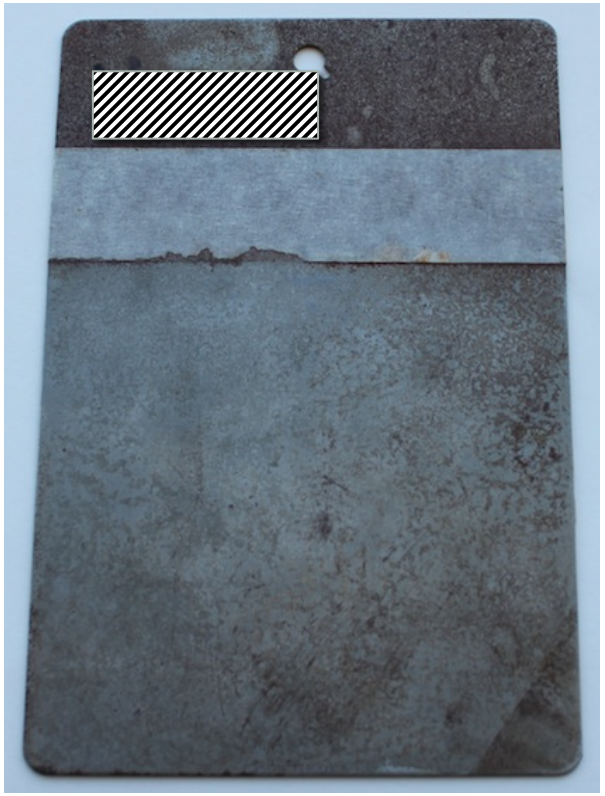
- Surfaces cleaned using the Low pH approach have been very resistant to subsequent corrosion
- Un-rinsed Low pH detergent on bare metal provided additional protection
- Tests reveal that the correct Low pH detergent applies a conversion coating to the metal

Conversion Coating

A conversion coating is the result of the reaction between a metal surface with another chemical that provides a greater protection against foreign corrosive substances than that provided for by the metal itself.

an example of conversion coating

- Plate treated with low pH detergent



- Reverse side of plate – no treatment

The Benefit?

The conversion coating effect can provide additional protection to bare metal surfaces on vehicles.

Getting the Detergent to the Right Place

Photo courtesy of Belanger, Inc.

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Detergents with the right chemistry can work for you – but only if the detergent is applied where it counts

Conclusion

- Detergents with the right chemistry when used properly can reduce the corrosive effects of magnesium chloride and calcium chloride and provide additional short term protection to bare metal
- Detergents with the wrong chemistry can make it more difficult to remove magnesium/calcium chlorides and contribute to further damage
- In order to be effective, detergents need to be applied to the undercarriage of the vehicle

Questions?

- Today's powerpoint presentation and handout will be available for download on www.ver-techlabs.com

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