



PRESENTS THE SCIENCE OF CLEANING SAFELY WITH NANOTECHNOLOGY ENHANCED, ECO-FRIENDLY SYNTHETIC CLEANING PRODUCTS

The **EcoSeal** difference: we use nanotechnology in our eco-friendly cleaners to improve the surface-active ingredients (Surfactants) at the sub-micron level with safer natural minerals, and eliminate harsher, dangerous traditional caustic chemicals. Nano surfactants drive cleaning agents deeper in soil for a more complete deep cleaning. This helps eliminate VOCs, residue build-up and improves safety profiles. Once a surface is properly cleaned, then sealed with **EcoSeal Finest, Fortify, Wonder Walk** or one of our other specialty sealers, cleaning usually requires only a wiping with water and a microfiber cloth, helping to eliminate chemical exposure, save time and improve the environment.

I SOIL

Soil is nothing more than matter in the right or wrong place. Grease in a frying pan is good; grease on a backsplash is bad. Dirt in your garden is good; dirt on your home's carpet is *very* bad.

There are various types of soil:

1. **Inorganic soil:** Matter that was never "alive", and thus contains no carbon.
 - a. Scale and lime deposits, such as water spots.
 - b. Rust, corrosion, and oxidation.
 - c. Minerals and rock formation.

Use **EcoSeal Calci-cure**

2. **Organic soils:** Matter that once "lived" and that does contain carbon.
 - a. Body oils and animal fat.
 - b. Carbohydrates and proteins.
 - c. Mold and yeast.
 - d. Bacteria and animal waste.

Use **EcoSeal Citra-solve, Bio-dissolve** or **Extreme Strip**

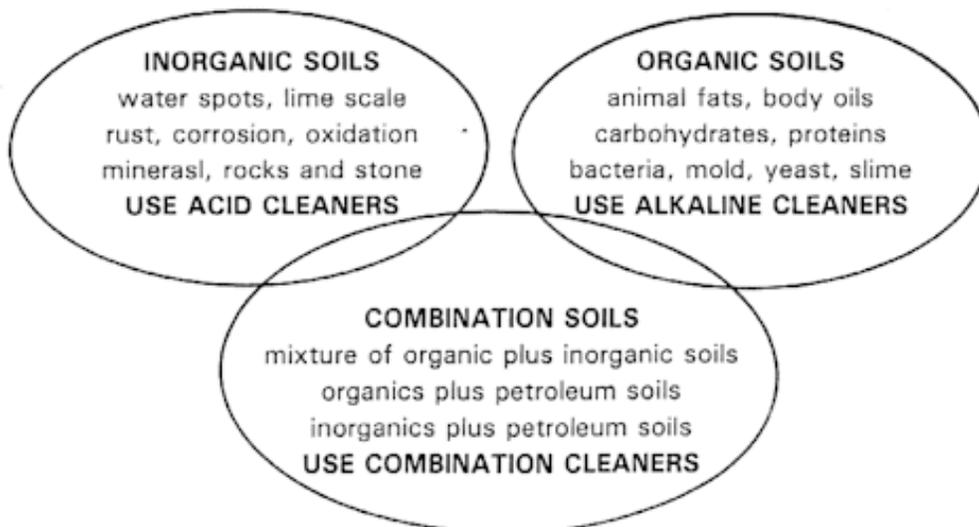
3. **Petrochemical soils:** Motor oils, axle greases, wax, gums and other products made from petroleum. These soils contain no water - in fact they repel water - and thus do not have a pH. They often require another petroleum-based solvent to remove them.

Use **EcoSeal Big Orange**

4. **Odors:** chemical or biological reactions within soils often create offensive odors. Odors such as food residue or urine in tile grout may require enzyme cleaners to address.

Use **EcoSeal Bio-dissolve**

5. **Combination soils:** These are soils that contain an inorganic plus an organic soil and/or a petroleum substance. These soils are difficult to remove because they are hard to identify. Once identified, they usually require a combination type cleaner - alkalines and solvents or acids and solvents.



THE LAW OF MASS CLEANING ACTION

The type of soil usually dictates the type of cleaner that we will use to remove it.

Inorganic soil is cleaned with **acid cleaners**, or more safely with..... **EcoSeal Calci-cure**

Organic soil is cleaned with **alkaline cleaners**, or more safely with..... **EcoSeal Citra-solve**

Petroleum soil is cleaned with **petroleum-based solvents**, or more safely with**EcoSeal Big Orange**

Combination soil is cleaned with **combinations of cleaners**..... **EcoSeal Citra-solve or Bio-dissolve**

ALWAYS neutralize high or low pH cleaners with **EcoSeal Neutral 7**

ALWAYS test cleaners on small, inconspicuous area first.

ALWAYS pre-wet the surface to be cleaned to break surface tension to make the work of easier, faster and more efficient.

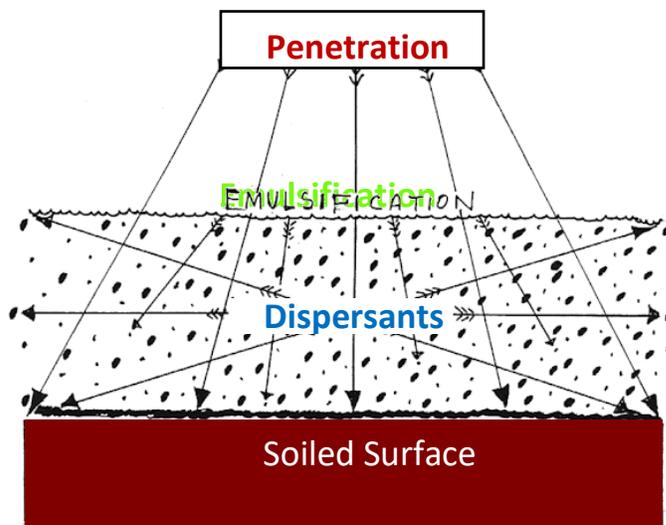
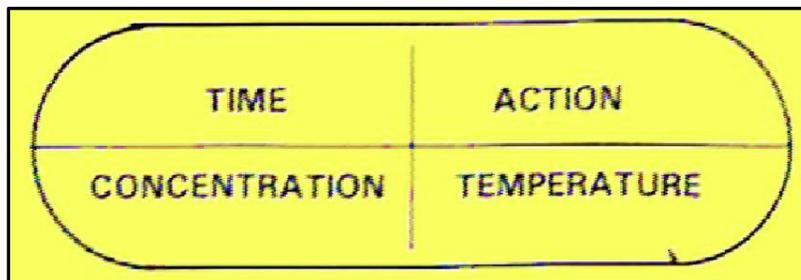
ALWAYS dilute concentrated cleaners as much as possible to still get the job done.

ALWAYS clean vertical surfaces from the top down and keep the whole surface below your work wet to avoid streaking as the cleaner runs down the uncleaned surface below. Clean floors and horizontal surfaces to allow finishing without tracking across cleaned areas. Once an area is cleaned, the cleaning agent should be neutralized with **EcoSeal Neutral 7** prior to any finish regimen of **EcoSeal Finest, EcoSeal Fortify, and EcoSeal Wonder Walk**, or any other finish. **Leaving a cleaned surface un-neutralized and un-rinsed may result in a chemical staining, corrosion or fouling under the finish.**

We have to take the surface into account. For instance, water-based cleaners can damage delicate wood surfaces, so a petroleum based cleaner - containing no water - is appropriate.

We also have to pay attention to the **aggressiveness** of a cleaner. A marble surface would be attacked by a strong (aggressive) acid cleaner. If we need to use an acid cleaner to remove inorganic soil from marble, we must use a very mild (non-aggressive) acid cleaner.

The law of mass cleaning action expresses a relationship between time, action, concentration, and temperature in the process of removing soils. This laws states that if you decrease any one of these factors, we must increase one or more of the remaining factors in order to maintain equal cleaning ability.



II THE pH SCALE

pH is the measurement of the concentration of "hydrogen ions" (shown in chemical notation as H⁺) in relation to the concentration of "hydroxyl ions" (shown in chemical notation as OH⁻). An excess of H⁺ (hydrogen) ions over OH⁻ (hydroxyl) ions makes a solution an *acid (low pH)*. Conversely, an excess of OH⁻ (hydroxyl) ions will make the solution *alkaline (high pH, often referred to as basic)*.

All solutions that are made up of water can be measured for their pH. The pH scale runs numerically from 1 to 14. On this scale, a solution that has a pH from 0 to 6.9 is considered to be an acid. It is acidic because it contains a larger amount of hydrogen ions. **EcoSeal Calci-cure** is a Nano-synthetic with a low (2.5+/-)pH.

A solution that measures from 7.1 up to 14 on the pH scale is considered to be basic (or alkaline) in nature, because it has a larger amount of hydroxyl ions. **EcoSeal Citra-solve** is a Nano-synthetic with a moderately high (10+/-)pH.

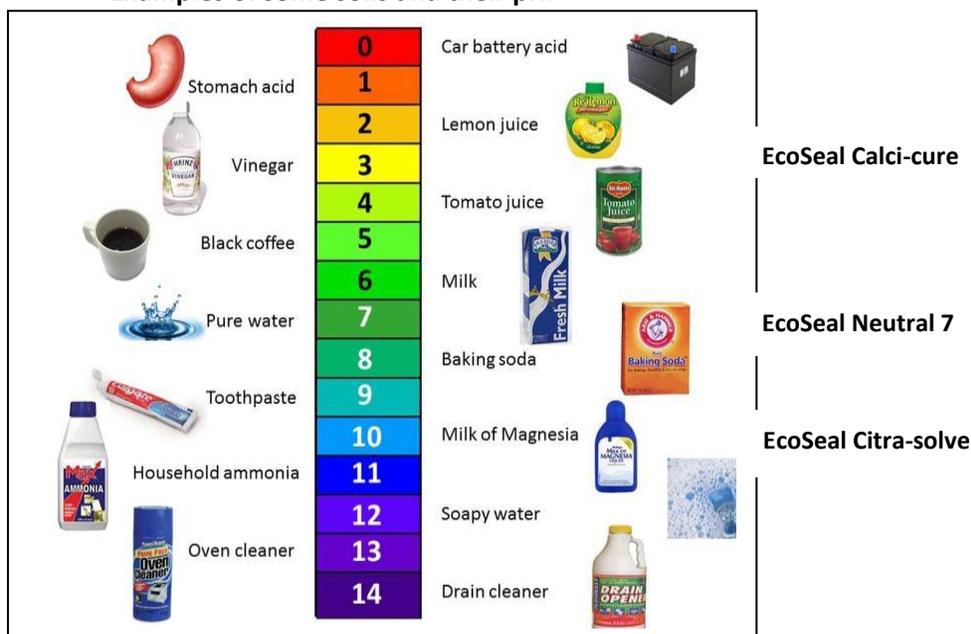
A pH of 7.0 is neutral because it contains equal amounts of hydrogen (H⁺) and hydroxyl (OH⁻) ions. Pure, unpolluted rainwater or distilled water is neutral, because it has a pH of 7.0.

EcoSeal Neutral 7 is a neutral mild cleaner for daily maintenance

Non-aqueous liquids or solutions (solvents such as gasoline, mineral spirits, and chlorinated safety solvents) have neither hydrogen or hydroxyl ions. They do not have a pH. pH is a characteristic of *water solutions* only.

EcoSeal Big Orange is a Nano-enhanced, more eco-friendly solvent for petroleum-based soils.

Examples of some soils and their pH:



III CLEANING AGENTS

Cleaning agents usually contain some combination of ingredients to help them do their job: *remove unwanted soils!* The following ingredients all have a specific job to do in a cleaner formula:

1. Solvent
2. Surfactants: detergents or soap
3. Penetrating and wetting agents
4. Chelators
5. Saponifiers
6. Builders

EcoSeal uses nanotechnology to minimize or replace harsh chemicals in these 6 ingredients.

Cleaners may be formulated to do a specific job. Sometimes a cleaner will not contain many of these ingredients; other times it will contain almost all of them.

A good cleaning solution *must* be complex, because it has a lot to do. "Cleaning" (or "soil removal") is a series of events where the soil is wetted, loosened, broken up, suspended, dissolved, dispersed, and prevented from re-depositing. Here are the different ingredients that may go into a cleaner, keeping an eye on the specific job each ingredient will do.

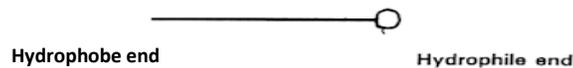
1. Solvent

All cleaners require some sort of liquid solvent. This solvent not only "dissolves" the soil, but also provides a medium in which soil can be suspended and carried away from the surface. Water is the oldest, least expensive and most widely used cleaning solvent known to man. Over time, water will clean or remove just about every type of soil, be it organic, inorganic, petroleum or combination.

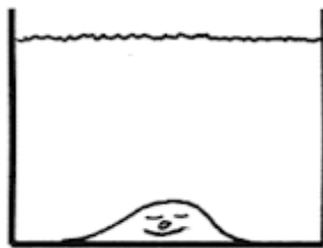
Other solvents may also be used, including petroleum distillates (such as mineral spirits) and chlorinated solvents (such as methylene chloride). These are especially effective on petroleum type soils, or where water could damage the item being cleaned - such as on a wood surface.

2. Surfactants: detergents or soaps

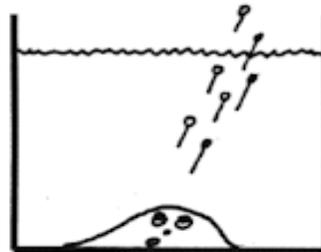
The word *surfactant* is short for "surface active agent". Surfactants work at the boundary layer (the *interface*) between the soil and the solvent. Each surfactant molecule has two chemical groups; one that is attracted to water (the *hydrophile*) and one that is attracted to soil (the *hydrophobe*).



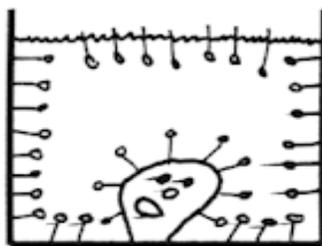
In a cleaning solution, the hydrophobic end of the surfactant molecule orients toward the soil. Many surfactant molecules will attack the soil, breaking it up into small pieces and completely surrounding it. The hydrophilic ends of the surfactant molecules project into the solvent, causing the soil to be broken up, removed from the surfaces, lifted and suspended into the cleaning solution.



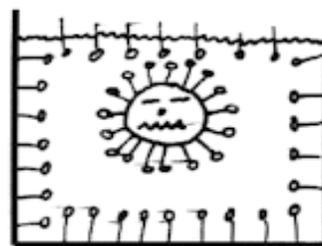
Oily soil. Oily soil



Detergent attack on soil.



Orientation of hydrophilic and hydrophobic ends



Soil is surrounded, lifted suspended and dispersed

Soaps have the same structures and work in the same way. The only real difference between soap and detergent is that soap is made from natural materials, animal fat and sodium hydroxide (*caustic lye*)

3. Penetrating and wetting agents

Modern technology can produce many different types of surfactants by changing the chemical composition of the hydrophobic and hydrophilic ends of the molecule. By changing the chemical composition, we can create surfactants that have greater or lesser abilities in different areas:

- a. Detergency: the ability to break the bond between soil and the surface.
- b. Penetrating and wetting: allows water to surround soil particles that would otherwise repel the water.
- c. Foaming: creation of bubbles that lift dirt from the surface.
- d. Emulsifying: the ability to break up greasy petroleum soils into small droplets that can be dispersed thoroughly.
- e. Solubilizing: dissolving a soil so that it is no longer a solid soil particle.
- f. Dispersing: spreading the minute soil particles throughout the solution - to prevent them from sticking to a mop, bucket or back onto the cleaned surface.

4. Chelating agents

Chelating agents "tie up" the hardness in water. Dissolved minerals in water cause the hardness and hinder the cleaning ability of a cleaning solution. Rain is pure and soft, but it quickly dissolves minerals (mainly calcium, magnesium, iron and silica) as it soaks into the ground and travels through rivers or lakes. As the water becomes loaded with dissolved minerals, it becomes hard.

5. Saponifiers

Saponifiers are strongly alkaline chemicals that convert animal fats and oils into natural soaps. This is the very same chemical reaction that is used to make real, natural soaps, and the conversion of fats to soap is called *saponification*. Once the fats and oils are converted to soap, they are soluble in water and can be washed away.

6. Builders

Builders give the cleaning solution "reserve strength" to enable it to withstand heavy soil loads. Various phosphate, carbonate, silicate and citrate salts are used as builders in modern cleaning solutions.

EcoSeal's Nano polymers and Nano metal oxides augment or replace many of these components to provide for safer, faster, more complete cleaning; plus reduce VOCs, chemical exposure, residue build-up and improve safety profiles of your cleaning regimen.

Where more severe cleaning conditions: such as very old, hardened soils, penetrated petroleum staining on concrete or deeply ground in dirty floor wax, more aggressive cleaners may be required like EcoSeal Extreme Strip or EcoSeal Heavy Duty Concrete Cleaner. Always follow label directions.

Once a surface is properly cleaned, then sealed with **EcoSeal Finest**, **EcoSeal Fortify**, **Wonder Walk** (for floors), or one of our other specialty sealers for masonry or other surfaces, cleaning usually requires only a wiping with water and a microfiber cloth, helping to eliminate chemical exposure, save time, money and improve the environment.

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