SERUM - GOING BEYOND THE SURFACE

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HĒSION SCIENCES

-BLOCKING EARTH'S BUILD-UP-

www.hesionsciences.com

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TABLE 1: Technical and Chemical Data Table

Serum technical/chemical data		
Density = 0.905 g/L (7.556 lbs. / gal)	Viscosity = 90cP	pH = 6.8-6.9
USDA Biobased Certified (97%)	Biodegradable (nonhazardous)	
ASTM & ASME CERTIFIED	Shelf-Life 12+ months (avoid direct sunlight)	
See Nohesion Serum's Safety Data Sheet (SDS) and Technical Datasheet for more information and data on the Nohesion Serum		

Nohesion Serum's "Life Cycle"

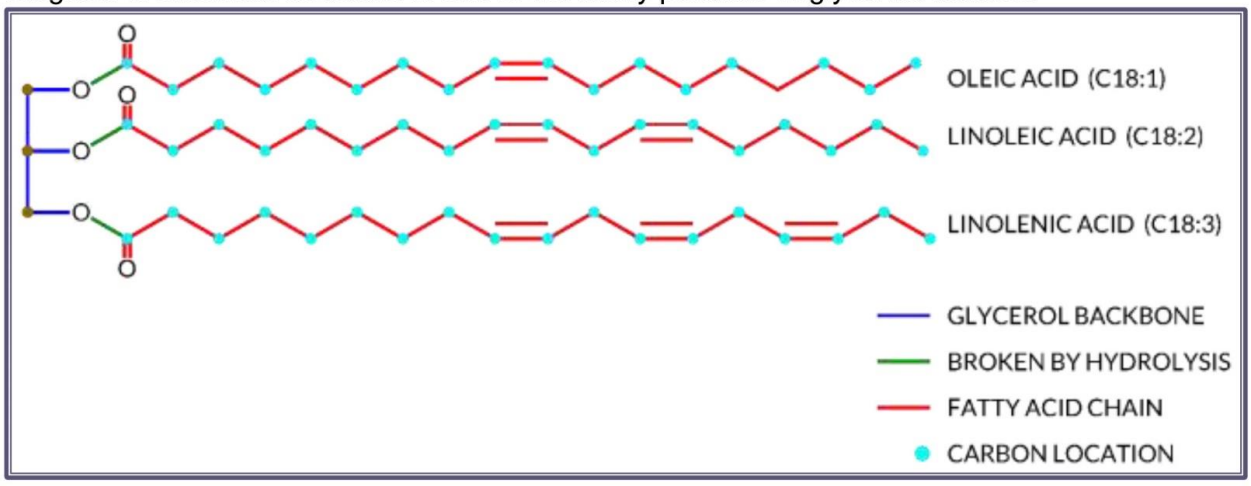
Product Manufacturing Overview and Process Induced Outcome

Nohesion Serum (NS) is produced using a proprietary process designed and built by Hēsion Sciences, Inc. (HS). This process incorporates patented processing equipment with exclusivity rights granted to HS from the original equipment manufacturer (OEM) and inventor. For the purpose of confidentiality, this Patented Equipment shall be referred to as "Nancy". The NS consists of vegetable oil and other minor ingredients. The composition of the Serum is based on very precise weight ratios to achieve maximum performance and effectiveness at an economical price.

Due to the oil's original product manufacturer's guarantee of consistency, they have been selected as the approved manufacturer and supplier for HS' oil in North America. The second main ingredient is supplied by a manufacturer who specializes in manufacturing a wide variety of chemical and other industrial products. Their product is for obtaining the preferred effects and required performance of the NS. The temperature and mixing parameters of each ingredient is precisely controlled by Nancy. The resulting product is a consistent composition. This process also capitulates some additional compounds which are released and/or separated from the larger molecules contained within the oil. The final Product mixture/solution is collectively known as HS' "Nohesion Serum". The additional compounds are not created nor synthesized; however, they are separated or freed from a parent component existing within the oil. These parent compounds are known as Triglycerides.

HS' oil is considered to be 100% fatty oils or fatty acids (FAs), but the primary molecular structures are a composition and combination of numerous Triglyceride isomers. Diagram 1 is an example of just one isomer within the many various Triglyceride molecules present in the oil. One thing common to all triglyceride isomers is the Glycerol Backbone or Fragment which is shown in blue. The red lines represent different long chained FAs, mainly an 18 Carbon chain molecule (FAs can only have an even number of Carbon atoms). This FA molecule has a Carbonyl Carbon on the FA chain and is bonded to one (1) of the three (3) Oxygens on the Glycerol Backbone, hence a "Triglyceride" molecule. The Triglyceride molecules can have two (2) or even three (3) of the same kind of FAs bonded to a single glycerol backbone. They can even have a different order of connectivity as shown in Diagram 1 below. The green line represents the bond broken when the Triglyceride molecule goes through hydrolysis.

Diagram 1: Chemical Structure of one of the many possible Triglyceride isomers



The information shown in Table 1 provides the percentages of the general FA categories present in the oil per the supplier's specifications. The supplier measures the FA Methyl Esters after inducing Esterification of the Triglycerides. The Product Specification data in Table 1 is the measured maximum amounts of impurities or small amounts of unremoved compounds still present after the initial oil refining process. The Nutritional Data allows us to understand which FAs are more likely to be freed through hydrolysis, statistically due to abundance. However, for the application of the NS, all the distinct FAs perform equally well.

Table 1: Product Description: 860080 Crude Degummed Soybean Oil

PRODUCT SPECIFICATION	**NUTRITIONAL INFORMATION**
% FFA AS OLEIC .75 MAX MOISTURE AND IMPURITIES .30 MAX FLASH POINT; ° F MIN 250.0 MIN PHOSPHORUS (PPM) 200.0 MAX	CALORIES 900 FAT TOTAL (GRAMS) 100 SATURATES 15.0% cis-MONOUNSATURATES 22.0% cis-POLYUNSATURATES 62.0% TRANS FATTY ACIDS <1.0%
TYPICAL ANALYSIS	**INGREDIENT STATEMENT**
UNSAP'BL MATTER; % MAX 1.50	vegetable oil

Since the majority of the oil composition is Triglycerides, many different FAs chains (ranging from C16-C20, but mainly C18) are present in the form of numerous isomers of the triglycerides. Diagram 2 depicts a simplified way to think about the Triglyceride's molecular structure. This also allows us to account for the different FAs attached to the Glycerol Backbone, making up the Triglyceride molecules. Diagram 3 is a generic Fatty Acid structure and focuses on the Carboxylate group where the Hydroxide (OH^-) ion is acquired from the hydrolysis of the Triglyceride molecules.

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Diagram 2:
Simplified Triglyceride Structure

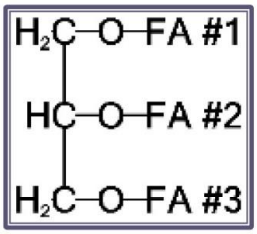
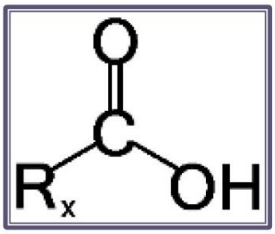


Diagram 3:
Generic FA structure focused on the Carbonyl group

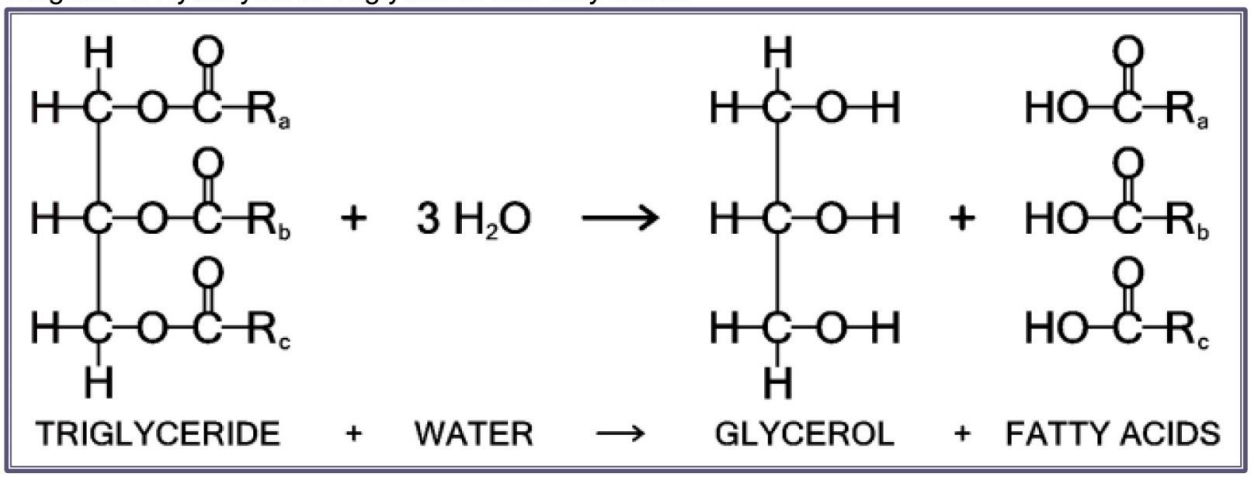


The proprietary manufacturing process used to produce NS allows some of the FAs to break free from the Triglyceride molecules. This happens through Hydrolysis where a Hydroxyl group (OH^-) bonds to the FA Carbonyl group; moreover, the Glyceride backbone bonds the oxygens to a Hydronium (H^+) ion thus creating Glycerol. The trace amounts of water contained in the oil along with the other ingredients in the manufacturing process, provides the source of H^+ ions and OH^- ions required for hydrolysis. The hydrolysis of the Triglycerides in the oil is kinetically favored, but thermodynamically driven. Due to the trace amounts of water (0.3% from the OPM), atmospheric humidity, hydrolysis will occur over time at ambient temperatures; however, when the oil is heated and processed through HS' proprietary process, hydrolysis occurs at an accelerated rate.

Hydrolysis is accelerated/influenced by the thermal energy created by thermal and mechanical actions through two (2) different methods, organic chemical reactions and mechanochemical physically influenced forces. Hydrolysis of the oil increases the Freed Fatty Acids (FFA) concentration; however, the extent of Hydrolysis is controlled by the amount of H_2O present in the process and by how much H_2O is absorbed through ambient humidity conditions.

In summary, the influenced outcome of processing/manufacturing the NS causes the FA's to be freed up, allowing them to play their necessary role in preventing concrete buildup. Diagram 4 below shows an overview of the Hydrolysis chemical reaction on the Triglyceride molecule. These freed up FAs promote the primary mechanism of how the Nohesion Serum works/functions.

Diagram 4: Hydrolysis of Triglyceride with only water.



Description of the Product Performance Mechanism (how/why it works)

The Nohesion Serum performs in ultimately two (2) ways, a primary mechanism and a secondary/ancillary mechanism. The increased FAs chemically react with Ca^{2+} ions to create a Ca/FA salt, which precipitates out of solution. "Equation 1" represents this chemical reaction:

Equation 1: Fatty Acid reaction with Ca^{2+} ions (Stoichiometrically balanced)

$$2Fatty\ Acid + Ca(OH)_2 \rightarrow Ca(Fatty\ Acid)_2 + 2H_2O$$

Ca^{2+} ions are abundantly available in a wet concrete slurry and in cured/curing cement. As shown in Equation 1, the reaction yields a CA/FA salt. This salt inhibits $Ca(OH)_2$ crystals from forming at the surface between the NS and the substrate. Calcium hydroxide is a primary product created when Portland Cement is mixed with water. The Calcium Hydroxide crystalline structure is a key component to the strength of cured cement. The Ca/FA Salt is practically insoluble in water. The minor amount of the Salt's solubility is because the Ca^{2+} ions are sourced from the aqueous phase (the water/cement slurry); however, the Salt prefers an Organic phase environment/solvent. This primary mechanism of salt formation inhibits $Ca(OH)_2$ crystals from forming on surfaces because a Ca^{2+} ion is pulled away from the $Ca(OH)_2$. By separating the calcium ion from the calcium hydroxide crystals in the cement slurry, the Calcium Hydroxide crystalline structure/matrix is destabilized. This separation also forms a type of soap scum layer coating on the substrate's surface. Due to the concrete mixing action, this soap scum film will slowly be scrubbed away over time.

The primary mechanism of salt formation is supported by a secondary mechanism, separation in the Liquid-Liquid Phase. This additional separation occurs between the hydrophobic oil and the aqueous hydrophilic cement slurry. As an organic, the applied NS coating is fundamentally

nonpolar. The properties of the remaining Triglycerides not undergoing hydrolyses in the oil, create a nonpolar repulsion effect on the polar aqueous phased Concrete slurry. To improve the Serum's ability or effectiveness in preventing build-up, the secondary ingredient of the NS improves both the primary and secondary mechanisms. The secondary is a surfactant; this surfactant improves the NS' effectiveness by allowing the Serum to diffuse into the microscopic peaks and valleys of the metal or solid surface to which the NS is being applied. This unique surfactant allows this diffusion by reducing the NS' surface tension. When a substance with a reduced surface tenson comes into contact with water or a wet surface, this substance will uniformly spread out or disperse in all directions. One direction is down, the Nohesion Serum diffuses deep into the exposed microscopic pores/spaces/cracks on the metal surface. This ancillary benefit improves the NS' ability to anchor to the entire exposed surface. The polar end of the surfactant has a negative dipole moment, this dipole moment is attracted to the positively (+) ionically charged metal surface. Through miscibility characteristics, the very nonpolar end of the surfactant will interact with the nonpolar primary NS ingredient, the oil. Once allowed to slightly dry, a uniform and consistent thin film, or sheen, of Serum will be evenly spread across the entire surface. After four (4) to five (5) loads of concrete, the abrasive nature of the aggregate and solids in the concrete slurry will wear/scrub away this sheen of Serum. To maintain a bond-free surface, reapplication of the Nohesion Serum is to occur once per day.

Application Procedure Specifics and Suggested or Required Application Equipment

The ability to uniformly apply Nohesion Serum to the inside of a concrete truck drum is uniquely specific and requires Hēsion Science's Serum automated applicator. This automated applicator is known as the "Stinger". The Stinger is a United States patented machine and is designed specifically to perform two separate actions with one machine. The first action is to power rinse/wash the internal surfaces of a concrete truck drum. The second action is to apply the NS. The Stinger enters from above at the drum's ingredient hopper and transitions to the opposite end of a drum without removing or modifying any existing standard concrete truck equipment. Regardless of the number of loads hauled per day, the Serum is intended to be applied at the end of each working day.

The following is an overview of the steps required to implement a Hēsion Sciences concrete truck preventative maintenance program with NS and the Stinger. The following applies to brand new concrete truck drums and concrete trucks placed into service right after the mechanical or chemical removal of build-up (aka, chipping). Concrete trucks with internal drum surface build-up in excess of 0.5 inches thick, will not experience the full effect of the Nohesion Serum.

Stinger Serum Application Process Steps:

1. Concrete truck drivers utilize the Stingers "On-the-Ball" display to back up and properly position the truck to the Stinger.
2. The driver places the mixing drum into the discharge rotation direction.
3. The driver increases the drum rotational speed to its maximum allowable setting.
4. The driver accesses the rear of the Stinger and depresses the "END OF DAY" start button.
5. The Stinger automatically extends the application wand, aka the tail, into the drum. The Tail is programmed to take 30 seconds to transverse the length of the concrete truck drum.
6. As the Tail enters the aperture of the drum, two forward facing nozzles are activated and 100 gallons per minute of water (50 gallons per minute per nozzle) at over 100 PSIG are directed towards the drum surface and towards the front side of the internal ribbons.
7. As the Tail continues to extend into the drum and reaches a point where little to no water can be directed outside of the drum, two aft facing nozzles are activated and 100 gallons per minutes of water (50 gallons per minute per nozzle) at over 100 PSIG are directed towards the drum surface and towards the back side of the internal ribbons.
8. After reaching full extension, the Tail is automatically retracted. The Tail will take 30 seconds to transverse the length of the concrete truck drum.
9. As the tail approaches the aperture of drum, the aft facing nozzles are turned off, and as the tail exits the drum, the forward-facing nozzles are turned off.
10. Once the tail has returned to its starting position (or home position), the tail will pause the process for 25 seconds. This waiting time allows water to be removed from the drum. After 25 seconds, the Stinger will begin extending its tail into the drum. Again, once the Tail pierces the drum's aperture, the Tail will take 30 seconds to transverse the length of the concrete truck drum.
11. As the Tail enters the drum, an atomizing nozzle combines low pressure Serum and low pressure compressed air to disburse a controlled fog/cloud of Serum inside the drum. The average droplet

size within this fog/cloud is approximately 40 microns. 0.5 Liters of Serum will be uniformly disbursed throughout the inside of the drum during this 30 second process.

12. After reaching full extension, the Tail will automatically retract. The Tail will take 30 seconds to transverse the length of the concrete truck drum and during this motion, it will uniformly dispense another 0.5 Liter of Serum.
13. After the tail returns home, the On-the-Ball system will inform the driver about the completed process. The driver will reduce the drum's rotational speed to a desired slow speed, then pull away from the Stinger. Ideally, the drum should continue rotating for at least 15 minutes after the Serum has been applied to deliver a uniform coating across all internal surfaces.
14. The Drive then parks the truck for the night. After 8 to 12 hours, the Serum will have dispersed into all exposed surfaces and dried.

The Stinger's concrete truck application process, excluding the recommended drying time mentioned in Step 14 takes approximately 3 minutes and 30 seconds.

The Stinger quickly and efficiently cleans out and coats the internal surfaces of a concrete truck drum. The Serum will come into contact w/ the residual washout water when it's fogged into the drum, or at the very least, the internal wetted surfaces of the drum. As the Serum contacts the water, the Serum spreads out due to its reduced surface tension and allows the nonpolar - polar repulsion phenomena to occur. As the H_2O slips down from the top of the drum, it leaves the Serum behind. The top of the drum will dry faster than the bottom of the drum when the drums rotation is stopped. This has no effect the Serum's performance.

The Nohesion Serum works perfectly for other Concrete tools and equipment. The application steps for these devices or components are:

1. Remove excess residue and buildup with a direct stream of water from a garden hose or equivalent. Use mechanical force to remove any large clumps of concrete.
2. At the end of the work day, after the final cleaning, and with the cleaned surfaces still wet, but free of any standing water, apply Serum onto all surface of the container, mixer, tool, truck bed and/or concrete forms.
3. When applying Serum, a thin sheen/film is sufficient, wipe or brush away any excess Serum. A fogger/aerosolizing type of sprayer, dispensing an average droplet size of 40 microns or less, is suggested for efficient NS application and to maximize product usage.
4. For best results, allow the Serum to dry for approximately eight (8) to 12 hours while the tools/form is positioned vertically. A vertical position will allow excess water to run off the bottom of the tool/form. This will result in a uniform thin film/sheen to setup on the surface.
5. If absolutely necessary, Serum can be applied to dry tools/forms and dry equipment just before performing concrete work; however, for best results. Serum should be allowed to dry.

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Definitions

Carbonyl – a double bonded Carbon to an Oxygen (C=O) found in Aldehydes, Ketones, and Carboxylic Acids.

Carboxylate Group – a functional group containing a hydroxy unit attached to a Carbonyl carbon.

Esterification – a reaction with alcohols in the presence of catalytic amounts of a strong inorganic acid, such as HCl or H_2SO_4, to give an ester and water.

Hydrolysis – Occurs with water. A transformation in which a substrate undergoes substitution by solvent molecules, is called solvolysis. When water is the solvent, the term hydrolysis is applied.

Triglyceride – Triesters of 1,2,3-propanetriol (glycerol) with long-chained carboxylic acids constituting fats and oils.