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ChloroLuxus™ FAQ

What is ChloroLuxus™?

ChloroLuxus™ comes from a family of products known as PetroLuxus™ and were developed over past fifteen years of study and trial. The products are proprietary in nature and were developed to liberate hydrocarbons from a variety of materials and media. All PetroLuxus™ products share basic and inherent characteristics to act with hydrocarbons on a molecular level and cause them to lose their attraction to water, metals, minerals, and other particulate matter.

ChloroLuxus™ is a chloride reducing solution engineered to reduce the high salt content in Mayan or other high chloride count crude oil streams. High salt content crude oil is economically penalized in the spot crude oil markets. This is due to the severe problems that arise in the refining process. The corrosive nature of salt fouls, deteriorates metals and plugs equipment contaminating the refining process.

According to past news releases by the technologies predecessor company, the ChloroLuxus™ technology was used to reduce chloride content in PEMEX's (Petroleos Mexicanos) Mayan crude oil fields. The ChloroLuxus™ technology is a salt reducing solution that is an environmentally friendly blended compound designed to reduce chlorides in Crude Oil streams. ChloroLuxus™ breaks the interfacial tension in heavy crudes allowing the entrained chlorides in a crude oil to move out of the heavy crude oil stream via the entrained and suspended water which is shed into a water phase. Additionally, ChloroLuxus™ has shown to increase API Gravity, reduce basic sediment and water also known as BS&W, reduce H₂S and de-gas entrained gases.

PEMEX produces approximately 600,000 BBLs of Mayan crude oil a day that is heavily laden with chlorides. PEMEX developed a mechanical system to reduce the high chloride content. Due to the maturing of the oil field and increased salt water intrusion, PEMEX is no longer able to achieve the target of 50 PTB (Pounds per Thousand Barrels) or less using its system. With the use of ChloroLuxus™, we were able to achieve chloride levels of 12 & 13 PTB. This is a significant reduction to PEMEX's target of 50 PTB.

ChloroLuxus™ is a highly concentrated product with an elevated pH. When introduced into a well formation, ChloroLuxus™ will interact with H₂S that is present to cause the H₂S to breakdown into water and sodium sulphide, also caustic, thus dramatically reducing corrosion. Further, in the presence of acids, the high pH of ChloroLuxus™ will act as a buffering agent to raise the relative pH and reduce corrosion. This action combined with the presence of silicon in ChloroLuxus™ will deposit a protective coating on the surface of metal components. Added benefits to application of ChloroLuxus™ include friction reduction and promotion of separation for lower BS&W.

(Appendix A: ChloroLuxus™ WC Product Data Sheet)



Is ChloroLuxus™ WC Environmentally-Friendly?

Yes, ChloroLuxus™ WC is an inorganic compound and thus contains no organic compounds, toxic metals, or their salts. The environmental fate of ChloroLuxus™ WC is silica, the same material as found in beach sand. The chemistries of ChloroLuxus™ WC pose no threat of persistence in the environment, no bio-accumulation, nor toxicity when used at the recommended concentrations.

Why does it work on hydrocarbons?

When in contact with oil / hydrocarbons it acts as a surfactant, by reducing surface tension, and breaks the bond of oil to other materials. Several inherent characteristics allow ChloroLuxus™ to break the bond of oil to mineral surfaces. ChloroLuxus™ is designed to disperse and penetrate, to disrupt the weak hydrogen bond of oil to mineral surfaces to which it is attached, and then to displace the oil from pores and other spaces. Once the bond is broken between oil and other materials, ChloroLuxus™ enhances the natural tendency of the oil to be hydrophobic and colloidal, thus promoting efficient separation. Unlike common surfactants, ChloroLuxus™ is derived from inorganic materials and will not form an emulsion.

Can ChloroLuxus™ WC be used in Potable Water?

Yes, ChloroLuxus™ WC is NSF/ANSI Standard 60 certified. NSF/ANSI (American National Standards Institute) Standard 60: Drinking Water Treatment Chemicals – Health Effects by governmental agencies that regulate drinking water supplies. Developed by a team of scientists, industry experts and key industry stakeholders, NSF/ANSI Standard 60 sets health effects criteria from many water treatment chemicals including:

- Corrosion and scale inhibitors
- Coagulants and flocculants
- Disinfection and oxidation chemical
- pH adjustment, softening, precipitation and sequestering chemicals
- Well Drilling aids
- All other specialty chemicals used in drinking water treatments

For additional information on NSF/ANSI Standard 60, please visit: <http://www.nsf.org/services/by-industry/water-wastewater/water-treatment-chemicals/nsf-ansi-standard-60/>

(NSF/ANSI Standard 60: Certificate # **CO142260-01**) (Note: this is currently being updated)



Is ChloroLuxus™ WC harmful to humans?

ChloroLuxus™ WC is shipped in its concentrated form. It has a very high pH – 12.5+. Although the pH is high, it is highly buffered in its concentrated form, though if it is spilled on skin it will not harm. But follow the safety handling instructions as specified in the MSDS.

(Appendix C: ChloroLuxus™ WC Material Safety Data Sheet)

How is ChloroLuxus™ WC designed to perform?

ChloroLuxus™ WC was designed as a multipurpose treatment formulation for treating hydrocarbons and water. The advantages of ChloroLuxus™ WC are the many distinct advantages over other water treatment formulation such as chlorine. These advantages include:

- Anti-Microbial
- Anti-Corrosion properties
- Heavy Metal Containment
- H2S Mitigation
- Odor elimination
- Drilling Mud Mobilization
- Produces no toxic byproducts
- Safe to handle
- Does not produce toxic gases

How many different chemicals does it replace?

Depending on the operation and the current chemicals be used, ChloroLuxus™ WC and replace between 4-8 different chemicals. This cost benefit makes ChloroLuxus™ WC an exceptional value proposition and greatly mitigates the potential of human error while mixing chemicals.

How does it work in down hole environments?

Many variables exist in oil formations, including, mineral composition, temperature, pressure, oil type and quality, water type, and the presence of many compounds that affect the ability to produce oil. ChloroLuxus™ is designed to work within a wide array of variables encountered in oil formations. Its basic functions are to release oil, enhance flow characteristics, reduce corrosion,



disperse paraffin and asphaltene, and provide protection to metal production components. ChloroLuxus™ performs these functions in most environments and formation types.

Where can ChloroLuxus™ WC be applied?

ChloroLuxus™ WC can be applied to hydrocarbons on the mixed with soil, down-hole in oil and gas wells, used to mitigate H₂S and in both potable and non-potable water systems. These include municipal water wells, irrigation water wells, piping systems, storage tanks, etc.

Is ChloroLuxus™ WC a biocide?

NO! Biocides work on the mechanism of poisoning bacteria. Biocides such as chlorine work by poisoning the bacteria, although some stronger bacteria species have a survival mechanism whereby they move back into their protein protective shell. This allows the bacteria to survive the poisoning.

Environmentally-friendly ChloroLuxus™ WC works on the mechanism of destabilizing the homeostasis - The ability or tendency of an organism or a cell to maintain internal equilibrium by adjusting its physiological processes. ChloroLuxus™ WC chemistry disrupts the bacteria's ability thrive through a "coating" mechanism with coats the bacteria and/or the food source for the bacteria. This mechanism does not allow the bacteria to survive or thrive.

(Appendix D1 & D2: Sangre de Cristo Laboratory Results – Please review Lab notes)

Is ChloroLuxus™ a surfactant?

No. It has surfactant like qualities in that it readily reduces surface tension that allows oil to release from other materials. The mechanism involved is disruption to weak hydrogen bonding of oil to surfaces. ChloroLuxus™ is derived from inorganic materials; surfactants are typically made from organic materials which possess entirely different chemical properties.

How is ChloroLuxus™ WC a corrosion inhibitor?

Yes, When ChloroLuxus™ WC comes into contact with metal surfaces a polymer layer of silicon and oxygen are deposited. The polymer creates in effect, a barrier that prevents the metal surface from interacting with the chemistry of the water stream. It is resistant to acids, alkali and organic compounds.

Water well components: pumps, casing, tubulars, screens, etc., pipelines and storage tanks receive the above mentioned coating barrier which extends the life of the components and equipment.

(Appendix F: Corrosion Inhibitor Photos)



What effect does ChloroLuxus™ WC have on heavy metals?

The chemistry of ChloroLuxus™ WC is such that it will covalently bond with most polyvalent metal ions in water and ultimately render the metal cations insoluble in water which allows them to settle out or be filtered out. The toxicity is significantly reduced when in an insoluble state. Some of the metals that can be re-acted out of the water stream are: arsenic, cadmium, iron, mercury, and many other transitional metals. The efficiency of the metal conversions will depend on several factors. Among these factors are pH, species of the metal ions, concentration (metal ions, ChloroLuxus™ WC or both).

How does ChloroLuxus™ WC affect drilling mud?

Drilling muds are an essential component in the construction and development of water wells. Unfortunately, drilling mud is pushed back into the formation during the drilling process. Although the well completion process is designed to remove as much drilling mud as possible, large quantities of drilling mud remain in the well. The remaining drilling mud in the well restricts and inhibits fluid entry into the well bore.

Field reports indicate that water wells that have been treated with ChloroLuxus™ WC are showing significant mobilization of drilling muds that were left in the well bore and formation thus removing obstructions to fluid entry into the well bore.

Does ChloroLuxus™ affect H₂S?

ChloroLuxus™ can reduce the corrosive effects of H₂S by breaking the bond of Hydrogen and Sulphur into water and sodium sulphide that is carried out of the well during production.

What effect does ChloroLuxus™ have on paraffin?

ChloroLuxus™ works with solvents like oil, diesel fuel, xylene and others to break down paraffin buildup. ChloroLuxus™ enhances the solvent by suspending and dispersing the paraffin, once broken down, so that it can be carried out of the well with the produced oil. Contact of ChloroLuxus™ with metal surfaces leaves a protective e layer that further resists formation and buildup of paraffin on tubular and equipment.



What effect does ChloroLuxus™ have on asphaltenes?

Asphaltenes are heavy hydrocarbon compounds that tend to mass together and create restriction. ChloroLuxus™ reacts with asphaltenes much the same as with paraffin. The asphaltene is broken down into small particles that will suspend and be carried with oil flow.

What is ChloroLuxus™ WC-100 and how does it work around the wellbore?

ChloroLuxus™ WC-100 is a well clean up product. It embodies the basic characteristics of all ChloroLuxus™ products to release oil. However, ChloroLuxus™ WC-100 is designed to target cleanup of the production string and near wellbore matrix of the formation. Many wells are plagued with production and mechanical issues resulting from fouling and corrosion. ChloroLuxus™ WC-100 is designed to penetrate pore spaces, displace oil, open pore channels and increase permeability that have been compromised from years of production. Further, production tubing and equipment can become fouled from many corrosive materials that compromise performance and increase cost. ChloroLuxus™ WC-100 effectively cleans corrosion and provides a protective layer to equipment that reduces fouling.

How is ChloroLuxus™ WC-100 applied?

ChloroLuxus™ WC-100 can be applied with water as a down hole treatment. It can be applied with hot oil, diesel fuel, xylene or other petroleum based solvents for paraffin and asphaltene treatment. For maintenance of a well, the product can be applied as a drip treatment. ChloroLuxus™ WC-100 can also be used as biocide to treat produced water.

What does ChloroLuxus™ WC react with down-hole well bore perforations?

Perforations that are fouled from corrosion build up or paraffin and asphaltene will benefit from treatment by cleaning and opening the perforations.

Will ChloroLuxus™ WC-100 harm my equipment?

No. in fact, ChloroLuxus™ will improve metal production components by cleaning and leaving a layer of protection to reduce further problems.



How much ChloroLuxus™ WC is required per well?

See Appendix J for application procedure. But on average a domestic water well will require 5 gallons of ChloroLuxus™ WC and a larger municipal well will require between 30-40 gallons of ChloroLuxus™ WC per well.

What should I expect when the well is turned back on?

After the well has been treated and agitated, bring the well back on line. As the water is pumped from the reservoir, the water will dark to black. This is due to the dead bacteria that resided at the bottom of the well and the gravel pack. It could also have a foul odor. This will clear up as the water is pumped off.

How long does an ChloroLuxus™ WC treatment last?

This has not been firmly established yet. For example one of the earliest wells treated with ChloroLuxus™ brand product was for the US Department of the Interior's Bureau of Reclamation in Colorado. On average the life of a well there is 12-18 months due to the high concentration of bacteria. This well was treated in the summer of 2011 and is still pumping with minimal reduction in water production.

How is ChloroLuxus™ WC shipped?

ChloroLuxus™ WC is shipped in various size containers.

275 gallon IBC Totes (Actual 250 gallons)

55 gallon drum (Actual 50 gallons)

5 gallon pail

Are any hazardous placards required for transport?

ChloroLuxus™ WC is an environmentally-friendly product that is certified to NSF/ANSI Standard 60 – Chemicals used for the treatment of potable water. It is non-toxic, non-flammable and non-hazardous. There are no DOT restriction in the United States thus no Hazardous placards are required for transport.