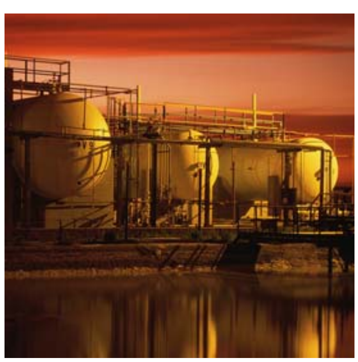
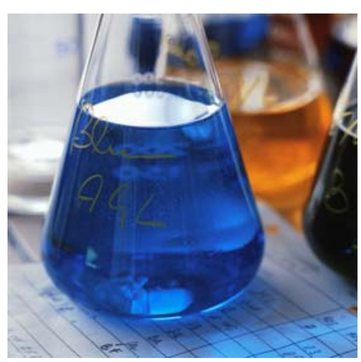
Chemlogic
INNOVATION SOLUTIONS

Wholesale Specialty Chemical Products, Descriptions, and Uses

- Oil and Gas Industry
- Drilling & Completion
- Pipeline Gathering & Transportation



- Refinery/Process
- Industrial Water Treating
- Precision Cleaning Applications

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Introduction

Chemlogic produces chemicals used in oil and gas production, gathering, transportation, and refining. Leading edge technology is used to research, develop and produce such chemicals. All stages of production comply with the strictest standards with regards to Quality Control and the Protection of the Environment.

Chemlogic also provides technical and consulting services in the areas of petroleum chemistry and petroleum engineering.

Products Lines:

- Atmospheric Corrosion Inhibitors
- Corrosion Inhibitors for Gas Pipelines
- Corrosion Inhibitors for Oil Pipelines
- Corrosion Inhibitors for Water Pipelines and Systems
- Defoaming Agents & Antifoam Additives
- Degreasers for Crude Oil Tanks & Cleaning Projects
- Dispersants for Oil Spills on the Sea, Lakes, Rivers, etc.
- Flow Improvers
- Oxygen Scavengers
- Paraffin and Asphaltene Inhibitors
- Paraffin and Asphaltene Solvents
- Passivation Agents
- Scale Inhibitors
- Scale Removers
- Biodegradable Solvents
- Surfactants
- Pipeline Cleaners

Additives for Drilling & Completion:

- Lubricants for Drilling & Cement Drill-outs
- Lubricating Beads for Helical Bends in Horizontal Wells
- Polymers for Friction Reduction
- Corrosion inhibitors packer fluids
- Mutual solvents
- Oxygen scavengers
- Surfactants

Atmospheric corrosion inhibitors:

Chemlogic's line of atmospheric corrosion inhibitors is comprehensive. There are products especially developed for long-term protection in aggressive conditions (e.g. in the presence of H2S), for marine and humid atmospheres and for rural environments.

Corrosion inhibitors for gas pipelines, oil pipelines and water pipelines:

Chemlogic's corrosion inhibitors are designed for the protection of different types of pipelines working under several dissimilar circumstances. Products especially designed for pipelines transporting high BS&W crudes, oil contaminated with corrosive gases (e.g. CO_2, H_2S and O_2), water soluble products, oil dispersible products, and chemicals especially designed for pipelines that are used alternatively with oil and water (sea water or produced water)

Defoaming agents & Antifoam Additives:

Chemlogic's line of defoaming agents comprises silicone and non-silicone based products. Their uses range from drilling fluids to refinery processes. Please contact us for full information on our defoaming agents.

Degreasers for crude oil tanks and cleaning projects:

Chemlogic's heavy-duty degreasers find no competitors when the job is extreme. Chemlogic also offers a complete line of degreasers for applications like the cleaning of platform decks, oily equipment

Dispersants for oil spills on the sea, lakes, rivers, etc.:

Chemlogic line of chemicals was especially designed for the protection of the environment during exploration, production, transporting and refining activities includes an oil-water emulsifier. It finely divides an oil spill into millions of microscopic droplets that are easily biodegraded by the naturally occurring bacteria and evaporation. A spill that has successfully been treated with Chemlogic's materials does not adhere to animals like birds, fish and penguins.

Neutralizers:

Chemlogic's neutralizers are widely used in clean up jobs of lines plugged with scale, after the acidizing job. Other applications include the neutralization of lakes, rivers, etc., that have been contaminated with acid substances.

Oxygen scavengers:

Chemlogic offers a complete line of oxygen scavengers in different types of packing. Our oxygen scavengers are stabilized so they do not react with the oxygen in the air, thus maintaining their active material content even after the original packing has been opened.

Paraffin and asphaltene inhibitors and solvents:

Chemlogic has developed a complete line of chemicals to combat paraffin and asphaltene problems in the industry. It comprises solvents, especially designed for the removal of paraffin and asphaltene deposits and special products, technically called *crystal modifiers* that chemically react with the paraffin crystal, changing its structure into a new one that will not precipitate under the same circumstances.

Passivation agents:

Widely used in industrial chemical clean ups, Chemlogic's passivation agents have been developed with state-of-the-art technology. The function of these special chemicals is to build a passivation layer on the metallic surface that has been treated by acidification. The passivation step usually follows the neutralizing phase of the acidification.

Scale inhibitors and removers:

Chemlogic's scale products are manufactured with carefully selected organic and inorganic raw materials. A distinct product should be selected for each specific case.

Special solvents:

Chemlogic manufactures and commercializes an extensive line of special solvents. Their uses go beyond the petroleum industry. Some of them are specifically designed to remove paraffin from plugged wells; some are especially active against rust and oxidation.

Surfactants:

Chemlogic's line of surfactants is wide. It ranges from active chemicals used as detergents to demulsifiers used as emulsion breakers in oil treatments. They are carefully made of special blends of oxyalkylated resins, polymers, wetting agents and other specific quality raw materials.



Antifoam Chemicals

Foam is defined as a coarse dispersion of gas in a liquid. It is created either by condensation or dispersion of a gas in a liquid medium. A pure liquid does not foam. Therefore, foam occurs when surface active contaminants, foaming agents or foam stabilizers are present.

There are two ways to define the phases of foam:

1. The gas is in the form of separate particles with no continuity, so it is called the “discontinuous phase.” The liquid, which surrounds the bubbles, is called the “continuous phase.”
2. The gas dispersed in the liquid may be referred to as the “disperse” or: internal” phase. The liquid is then referred to as the “external” phase.

For foaming to occur, three building blocks are needed:

1. Liquid (oil, water, or organic chemicals)
2. A gas (air)
3. A contaminant (iron sulfide, sand, silt, asphaltenes, etc.)

Foam wastes money! Foam reduces the capacity of treating equipment and can make the goal of achieving oil difficult attain. Uncontrolled foam can lead to production tank overflow which translate into lost revenues and extra expenditures for clean-up operations. By maintaining control over foam, dehydration will function more efficiently. Production losses are reduced and the volume of product transported to refineries is increased.

The use of chemical antifoams is the most popular method for foam control. Among small producers, Chemlogic's antifoam products may be batched into the production tank. On large producing leases, continuous injection of antifoam at the proper rate will keep foam under control.

Chemlogic antifoam chemicals when added to the foaming system, will orient at the surface and break the film that stabilizes the foam. The unusually low surface tension of antifoams produces high surface activity and great spreading power resulting in unique performance by these materials in many applications. To be effective, Chemlogic's antifoam must meet the following criteria.

1. The solubility of the foam control products in a foaming medium must be low. If the chemicals are soluble, the following tendency of the fluid may increase.
2. The antifoam must be readily dispersible in the foaming system. By being highly dispersible, the antifoam will be more effective in controlling the foaming problem.
3. The antifoam must not react with the foaming liquid. The antifoam must have the ability of the surface orientation to ensure total distribution into the gas-liquid interface where it can do its job of breaking liquid membranes which entrap gas.

The persistence or continued activity of antifoam depends on one or more of the following factors:

1. Percent Solids – Some components which make up an antifoam product have a tendency to adhere to the solids in the system. This results in a loss of activity because the antifoam does not remain at the liquid surface where it functions best. The more solids present in a system, the greater and quicker the activity loss becomes.
2. Digestion – Most Chemlogic antifoams are partially biodegradable; therefore, in water systems with bacteria, a loss of activity will be seen over a period of time due to microbial action.
3. Evaporation – In very hot systems, antifoams with volatile components may lose some activity as these components evaporate.
4. Reactivity/solubility – The antifoam may decrease when components of the antifoam react with system contaminants.

Asphaltene & Paraffin Inhibitors

Paraffin and asphaltenes are commonly-occurring components of crude oils, which have the potential to seriously interfere with production and in many cases, shut it down entirely. Asphaltenes are large aromatic agglomerates composed primarily of heterocyclic rings. Held in solution in crude oil by naturally occurring petroleum resins that adhere to the outer surface of the asphaltene agglomerate, they will precipitate and deposit in your production system in locations where pressure drops allow the resins to desorb. Paraffins are saturated hydrocarbon waxes that will precipitate and deposit in areas where your production system's temperature falls below the solubility temperature of the paraffins, known as the Wax Appearance Temperature (WAT). Like asphaltenes, paraffins can block a production system and completely stop production.

In locations where paraffins or asphaltenes have already deposited in a system, remedial treatment is necessary for their removal. Chemlogic's product line of paraffin and asphaltene dispersants and solvents offer the capability to remove these deposits and restore a production system to its designed capacity. Chemlogic solvents remove paraffin and asphaltene deposits when used in batch treatments by simply dissolving the deposits, while Chemlogic dispersants contain oil soluble surfactants that break up the paraffin or asphaltene deposit and disperse it in the oil.

While Chemlogic's products can be used in continuous injection applications to control deposition of waxes and asphaltenes, the normal procedure is to remove existing deposits through batch treatment. The volume of chemical and frequency of treatment required for batch treatments will depend primarily on the severity of the problem. Once existing paraffin and asphaltene deposits are removed, continuous injection treatment provides a cost-effective approach to maintaining a system with no production-inhibiting deposits.

Corrosion Inhibitors

The production of gas and oil is often accompanied by water, either from the formation, from condensation, or from water injected as lift assist. Acid gases, such as hydrogen sulfide (H_2S) and carbon dioxide (CO_2) are often present in produced fluids, and oxygen is sometimes a contaminant in the water used for injection. These acid gases increase the corrosivity of the waters to steel, and can significantly impact the safe operating life of production tubulars and equipment, production vessels, and transportation systems.

The presence or absence of multiple phases (gas, water, and oil or condensate) in the same system can complicate the problem of controlling corrosion. The flow regime or pattern of fluids in a tubing string, vessel, or pipeline can have a significant impact on corrosivity. If a well or pipeline experiences "slug" or intermittent flow, highly corrosive conditions may exist in the area of the pipe in slug flow.

Pipelines can experience top-of-line corrosion when conditions promote the rapid condensation of water in a cooler section of the line, causing a film of water to form at the top of the line. This water at the top of the pipe becomes saturated with acid gases and corrodes the pipe. A further complication is a change in conditions, such as flow rate, temperature, and pressure over the life of a well, production or processing system, or pipeline, which can result in changing corrosivity or even a change in the potential corrosion mechanisms.

The control of corrosion in the oilfield can be a complex problem, requiring detailed analysis and a thorough understanding of the range of conditions expected during the life of the system prior to the development of a corrosion management plan. Chemlogic's Corrosion product line consists of a number of corrosion inhibitor formulations - some have been developed to address specific corrosion problems and others have been formulated to have wide applicability. Corrosion products are proven performers with a solid history of "raising the bar" in providing cost-effective corrosion protection in all oilfield operations. Chemlogic's corrosion inhibitors are effective in the severe environments found in cutting-edge production systems. Applications include controlling corrosion in all types of oilfield operations, including oil and gas production, processing, and transportation systems.

Chemlogic corrosion inhibitors are added to a system to help slow down or even stop a chemical reaction. It is therefore, is a substance, which, when added to a corrosive environment effectively decreases the corrosion rate of metals within it.

Chemlogic corrosion inhibitors function using one of three main fundamental mechanisms:

1. Adsorption as a thin protective molecular film on the surface of the metal.
2. Formation of a bulky precipitate which coats the metal.
3. Changing the environment characteristics by the formation of bulky protective precipitates or removing aggressive constituents from the environment. One commonly used classification relates to whether the inhibitors are inorganic or organic.

Emulsion Breakers

The most important objective of any oil production facility is the separation of water and other foreign materials from the produced crude. The breaking of these “crude oil and water emulsions” constitutes one of the more challenging problems in today’s oil producing industry.

Oil leaving the producing facility has to meet a low water content specification. Too high a level of produced water in the exported oil would severely reduce pumping and other transport capacity. Even a small percentage of emulsified water in crude oil increases the cost of pumping due to the larger volume and the higher viscosity of the oil. In addition, the high salinity of the water would cause corrosion and scaling in downstream operations. It is therefore necessary to remove the water and associated salts from the crude oil.

Production of immiscible oil and water through well head chokes and valves, along with the simultaneous action of shear and pressure reduction, often produce stable water-in-oil mixtures. The relative stability of these mixtures depends upon many factors such as water cut, the nature of salts present, the viscosity of the oil, and in particular the indigenous surfactants present in the oil.

Some of the water does not mix with the oil to give a stable mixture. This “free water” readily separates from the oil. More often, the conditions of production are such that a stable mixture is formed. Such a mixture is called an emulsion and must be specially treated before separation can occur.

An emulsion is a mixture of two immiscible liquids, one of which is dispersed as droplets in the other. The liquid in an emulsion that is broken into droplets is known as the dispersed or internal phase, whereas the liquid surrounding the droplets is called the continuous or external phase. Emulsions formed in oil producing operations are predominantly water-in-oil.

Under proper conditions, emulsions are resolved quickly and effectively by chemicals synthesized to have demulsifying properties. To break an emulsion chemically, the chemical must be carried to the interface of the emulsified water and the surrounding oil. In this action, it is believed that the chemical powers the interfacial tension of the oil and water, allowing the dispersed particles to coalesce into larger drops which then separate from the oil.

The success of treating with Chemlogic emulsion breakers depends on:

- An adequate quantity of the most effective chemical.
- Sufficient agitation to cause thorough mixing of the chemical with the emulsion.
- Where necessary, the addition of heat to facilitate breaking of the emulsion. “Cold treating” may be possible if ambient temperature is above the paraffin cloud point, or if working with a frozen or icy emulsion, the emulsion is first melted. Cold treating usually requires considerably more demulsifier than treating with heat. There is usually an economically effective ratio of chemical to heat, as well as a practical one.
- Proper handling and separation of the gas before settling.
- Sufficient time to permit settling of the released water.

Scale Inhibitors

Scale deposition is a complex crystallization process. Most natural waters contain considerable quantities of dissolved minerals or impurities, which are present as ions. Combinations of some of these ions form compounds that have low solubility in water. When the water's limited capacity to dissolve these compounds is exceeded (supersaturated), and then these compounds can precipitate as solids.

For crystallization of a compound from water to occur, three conditions must be fulfilled simultaneously.

These are:

- Supersaturation
- Nucleation
- Adequate contact time for crystal growth

Chemlogic scale inhibitors can work in one or more of three ways:

1. By interfering with the nucleation process

A nucleation type inhibitor diffuses in the bulk liquid to reach the ion clusters either in the liquid or on a solid substrate. The inhibitor ions are of a sufficiently large size to be able to disrupt the scaling ion clusters and prevent their further growth to the critical size where crystallites would form. If the formation of crystallites can be prevented then scaling will not occur. A good nucleation inhibitor ion needs to be of a critical size but still be able to diffuse in the water at an acceptable rate.

2. By interfering with crystal growth

   Crystal growth occurs on active sites that occupy a small percentage of the crystal surfaces. A good crystal growth inhibitor has a strong affinity for such active sites and is able to diffuse over the surface to other active sites as they form. This type of inhibitor has to be sufficiently small to be able to do this, but sufficiently large in order not to be absorbed into the growing crystals. If the inhibitor is absorbed into the crystal it can be considered advantageous in that the resulting scale may be soft, friable and easily removed.

3. By modifying crystal surfaces

   Molecules that are neither nucleation nor crystal growth modifiers are able to absorb strongly to crystal surfaces and prevent attachment of crystals. This action is analogous to the action of dispersants on organic deposits.

Chemlogic's scale inhibitors prevent scale deposits in well tubulars and field flow lines to help maximize production volume and reduce downtime.

In most applications, low dosage rates of concentrated Chemlogic formulations effectively treat the scaling problem. In severe scaling conditions, particularly with $BaSO_4$, dose rates can be easily increased as required by formulation activity and inhibitor-to-scale specificity.

Water Clarifiers

Chemlogic water quality enhancement products solve many oilfield water quality problems for economical compliance with environmental obligations and regulations.

Modern oilfield operations must address many environmental and operational considerations for produced water, waterflood and subsurface disposal:

Produced water. The quality of produced water discharged overboard from offshore production systems is subject to stringent governmental regulations, as well as corporate philosophies. In U.S. waters and other offshore areas, residual oil and grease levels as low as 29 ppm (monthly average) are stipulated.

Waterflood and subsurface disposal. High quality water enhances reservoir life, helps maintain injectivity and reduces disposal costs for waterflooding operations and subsurface water disposal.

Chemlogic water clarification products can be divided into two groups. The division is based on whether the chemical is a water based solution or a two phased suspension called latex. Solution polymers have low to moderately high molecular weights, while latex polymers are extremely high molecular weight vinyl polymers.

Chemlogic solution polymers may be a mixture of salts, solvents, and water soluble active ingredients. The active material is often an organic polyamine, but a metallic salt may be used alone. Most water clarification products are solution polymers. These products are easy to make and are easy to use in the field.

- Metal salts are excellent choices for neutralizing zeta potential. Metallic ions with a multiple positive charge are the most efficient. Zinc chloride and aluminum chloride are the most common examples.

- Like metallic salts, polyamines help neutralize zeta potential and speed up the coagulation process. The significant advantages of polyamines are the abundance of positively charged amine sites plus the surfactant and polymer bridging qualities that can be built into the polymer. Polymers with high charge density can be used as alternatives to metals. In filtration applications, highly charged polyamines easily attach themselves to the filter media and still have enough cationic charge potential to help remove oil and solids from the water. Higher molecular weight solution polymers have the ability to help as flocculants through polymer bridging. In all of the polyamines there is a degree of surfactancy not found in metal salts which helps reduce surface tension and increases solids wetting.

- Reverse emulsion breakers are polyamines proven especially useful for resolving oil-in-water emulsion. These products incorporate surface tension reducing properties into the polyamine chemistry and are often blended with metallic salts that speed coagulation.

Chemlogic latex polymers are comprised of three categories; oil external, inverted, and water external.

- **Oil external latex polymers** are made from water soluble monomers, suspended as small droplets within a surrounding organic liquid. Droplet formation is done before polymerization. This permits much larger polymers to be formed within the individual droplets without the problem of long polymer chains forming very thick or solid products. Thus, for polyamines that become more efficient as their molecular weight increases, a latex version of the chemistry is often chosen. Oil external latex polymers can be either anionic or cationic and have molecular weights in the millions. When oil external latex is used, the polymer must be inverted to release the various charged molecules. Inversion is accomplished through the use of surfactants, which disperse the organic liquid and release the water droplets containing the desired chemical. This inversion process requires time and agitation and is sometimes a problem for oilfield applications. However, the added efficiencies obtained with the latex products often make up for the extra effort.

- In some applications **inverted latex polymers** are extremely efficient and only very low dosages are needed. Often one quart of chemical can be too much. In order to make these low dosage rates practical from the application standpoint, the latex is actually diluted with water to make a less concentrated product. Of course the polymer inverts in the presence of water and although the product concentration is low, the viscosity is often high. The high viscosity is due to the very high molecular weight of the polymer. Both anionic and cationic latex products can be pre-inverted.

- **Water external latex polymers** offer an alternative way to make high molecular weight polymers. Water instead of oil is used as the external or continuous phase of the latex process. Water external latex products depend on the use of surfactants to isolate the droplets. When the polymerization process is complete, the surfactants continue to stabilize the droplets and prevent the droplets from coalescing. This technology is less common than external latexes. However, these polymers are easy to pump and disperse quickly in produced water and are often preferred for field applications.