Introduction

Water is not usually associated with the production of oil and gas from underground reservoirs and hence its separation is often overlooked and the potential savings resulting from the process unlocked. Few people appreciate the many component costs of water in the oilfield: acquisition, transportation, site storage, conditioning, treatment, flow-back and disposal. Then, of course, there also exists hidden costs. For instance, improperly conditioned water may result in suboptimal fracturing which can reduce oil and gas production. Indeed, water can pose challenges for supply chain management, production modelling and chemical treatment.

Oilfield service companies are constantly called upon to solve many issues during production that require specialty chemicals that provide reliable results. Delays or stoppages mean significant expense, and maintaining smooth operating oilfields is key to success. With a product and service portfolio that covers the life cycle of a well – production and intervention and a robust research and development focus, Metito is well positioned to meet the ever-evolving needs of the oil and gas industry.

Metito commits to providing the most attentive customer service and up to date technology designed to maximise the value of oil and gas assets. With over 30 years experience in providing high performance and innovative chemicals, Metito is now introducing its new line of specialised oilfield chemicals that are focused on common problematic areas within any production system.
Chemical Solutions for Oilfield Production

Quality, Safety & Environment

Metito is determined to ensure that all its products can lead the industry in both their efficiency and environmental classification. The company strives to make certain that all chemicals are developed using environmentally friendly methods and, where possible, are formulated to be fully biodegradable. In order to meet these objectives, Metito has assigned a dedicated QHSE Team and Technical Specialists supervising key areas and processes within the Chemicals Production Division.

Why Metito Oil & Gas?

What makes Metito different, is the level and quality of its field services and formulating expertise. At Metito we believe that there are no off-the-shelf solutions to unique oil and gas field challenges and our solutions are therefore customised and tailor-made for optimum performance.

Our ultimate goal is to help our partner clients reduce costs and increase well productivity through an integrated approach that promotes reliability, profitability and productivity.

“Intellectuals solve problems, geniuses prevent them.”
Albert Einstein

Antifoams

During the production of crude oil and gas, a foamy liquid is encountered which requires regulated control to allow for proper separation of gas and liquids. The formation of foam can cause:

- Pump cavitation
- Fluid carryover in gas flow lines
- Reduced separator efficiency
- Loss of pump efficiency and capacity
- Drop in production capacity
- Presence of surfactants and solid particles in effluents
- Erratically produced fluid flow

Foaming can be caused by such things as pressure drops from the presence of contaminants, and drilling mud, sand or wax, which aid in the stabilisation of gas bubbles/foam. Metito offers a variety of antifoams, under the brand name MetSurf, that bind to the nucleation sites of these contaminants and reduce their ability to generate foam. Pipelines and equipment for both aqueous and oil-based fluids are thus well maintained, keeping the oil and gas production system running at full capacity, improving separator efficiency, increasing pump capacity and efficiency and reducing both noise and vibration. MetSurf antifoams are effective at high temperatures and can be diluted with hydrocarbons such as diesel fuel, crude oil and kerosene thus, effectively treating foaming problems across a broad spectrum of oil and gas industry applications.
Asphaltene Control

Asphaltene Control

Asphaltenes exist as a colloidal suspension stabilised by resin molecules (aromatic ring systems) in the oil. Precipitation of colloidal asphaltenes, the most polar and heaviest component of crude oil, manifests itself in almost all facets of production, transportation and processing of crude oil. Root causes may be:

- Pressure drop
- pH changes
- Shear (turbulent flow)
- Carbon dioxide [CO₂]
- Injected condensate
- Mixing of incompatible crude oils
- Other conditions or materials that break the stability of the asphaltic dispersion

Asphaltene precipitation, deep inside the reservoir, in pipelines or on safety equipment can cause blockages and severe emulsion formation resulting in damage, loss of crude oil recovery, choking off the production thus creating expensive-to-treat processing problems.

To combat this problem, Metito developed an innovative range of oil-soluble asphaltene control products under the brand name MetClear. These pioneering products can assist in:

- Inhibition of asphaltene agglomeration and precipitation
- Solubilisation of asphaltene colloids into the oil phase
- Significant reduction in asphaltene fouling in pipelines, downhole tubulars and surface processing system
- Improved dehydration through the removal of asphaltene interface pads
- Increased flow assurance

Biocides

Biocides

In the oil and gas industry, the development and operation of an oilfield goes through several distinct phases, all of which can be affected by unwanted microbial growth. Microbial contamination can occur during drilling of the well, preparing the well for production (stimulation), construction of the facilities and in production itself. Uncontrolled microbial growth such as: slime forming sessile bacteria, downhole colonisation and contamination with Sulphate Reducing Bacteria (SRBs) can cause many operational and technical problems. These include; blocking the producing wells and reducing the injectivity of water and disposal wells. When the acid gas level builds over time, it can also cause enhanced corrosion which in turn increases the production costs and presents serious health and safety concerns.

SRB bacteria are able to survive in high salinity, high pressure, and high temperature environment, where the pH level is moderate. Once bacterial colonies are established, it is practically impossible to disinfect a reservoir. The only true method to control the downhole environment is to ensure topside adequate biocide usage. As a result they require the implementation of various treatment philosophies and biocide usage patterns.

Metito’s biocide range, MetOcide, has a full range of complementary products for the water and oilfield industry which are formulated to sterilise water used in different situations and help prevent asset integrity issues such as Microbial Induced Corrosion (MIC), biomass accumulation, oil carryover and polymer degradation. The comprehensive programmes prevent a wide range of problems; corrosion, steel pitting, cracking, scaling, plugging and help to either eradicate, prevent or control microbial growth and prevent the build-up of biofilms.

MetOcide Benefits:

- Control system fouling from iron sulphide
- Protect formations from externally induced bacterial contaminations which can sour oil and gas production
- Control hydrogen sulphide accumulation in production equipment and vessels, that can potentially lead to failures, system downtime, high operating expenses, reduced hydrocarbon production and safety concerns due to H₂S gas accumulation
Corrosion Inhibitors

Corrosion occurs where water and gas are present and can lead to production challenges such as; increased iron and manganese levels in fluids, increased iron carbonate and sulphide deposition in pipelines, giving rise to costly environmental cleanup.

Corrosion also leads to:
A- Deterioration of equipment due to wall loss and increased solids in the produced water
B- Reduced production rates due to pressure drops and blocked downhole system

Corrosion inhibition is an important part of maintaining as high a level of asset integrity as possible. Metito offers a variety of corrosion inhibitors, under the brand name MetGuard, that can be used to tackle oilfield corrosion. MetGuard chemicals provide protection and maintain pipeline integrity.

The MetGuard series is designed to combat a wide variety of corrosion problems in oil and gas production. They are effective under sweet corrosion (CO2 induced), sour corrosion (Hydrogen Sulphide induced). MetGuard corrosion inhibitors are designed for a variety of applications including reinjection wells, gas plants, refineries, transportation lines, and barges. These inhibitors reduce costs and extend the working life of capital assets such as process equipment, pipelines and storage tanks. MetGuard protect the internal metal surfaces by forming a thin layer film which protects the internal walls from corrosion.

MetGuard comes in 3 different phases:
1- Oil Soluble
2- Oil Soluble/Water dispersible
3- Water dispersible

All products are custom designed on site and verified at our R&D laboratories to optimise your process protection.

Drag Reducers

• Crude Oil Drag Reducing Agent
• Water Drag Reducing Agent

Drag is defined as the frictional pressure loss that occurs over the length of a pipe during fluid flow. High pressure losses can be experienced in turbulent flow which can lead to lower pump capacity and flow rates.

Metito is a leading provider of Drag Reducing Additives, MetDrag, to improve pipeline flow in both onshore and offshore pipeline applications. MetDrag reduces drag in petroleum pipelines giving optimum throughput capacity and energy efficiency. It can also improve the flow properties of crude oil under low temperature, reduce the viscosity and pour point of crude oil. The products can also increase transmission and reduce pressure loss in the pipelines.

MetDrag Benefits:
• Reduced turbulence and drag inside pipelines
• Increased flow rate and throughput
• Increased pumping efficiency
• Reduced and stabilised operating pressures
• Effectiveness at higher salt concentrations
• Increased pipeline throughput
• Increased flow capacity
• Reduced pipeline operating pressure
• Reduced pump power demands and consumption costs
• Prevents pipeline shutdown due to pumps' maintenance
• Decreased transportation time

MetDrag can provide energy efficient and cost-effective solutions to all the flow challenges. The drag reduction technology we employ is equally effective whether the liquid product flowing through the pipeline is crude or refined oil or water.
Emulsion Breakers

Emulsions are caused when oil and water are forced to mix in the presence of an emulsion stabilising surfactant. Emulsifying agents are inherent in produced oil and gas condensate, as well as many chemical treatments, such as film forming corrosion inhibitors. These emulsion stabilising surfactants collect at the boundary or interface between the oil and water and make a strong, resilient film that resists breaking. This film prevents the dispersed droplets from coalescing into larger droplets and falling out of the mixture. Emulsion breaking is hence considered one of the most complex and situational aspects of oilfield chemistry.

To facilitate the economical removal of water from crude oil, Metito offers demulsifiers for both water-in-oil (Forward) and oil-in-water (Reverse) emulsions. The MetBreak series covers a wide range of chemistries, including polyols, resins, epoxides, polyamines and specially designed molecules.

When formulated, these products are capable of treating a wide range of emulsions under the most demanding field conditions including short residence times, high turbulence, high solid loadings, low temperature and high water content. Benefits obtained by our customers through incorporating MetBreak demulsifiers into their treatment regimes include:

- Well defined oil and water interface
- Greatly improved vessel efficiency
- Less “slop oil” reprocessing and disposal
- Better process control and throughput
- Reduced overall treatment costs
- Increased yield of production
- Reduced fuel consumption

MetBreak products are developed using accurate field-testing methods and field trials, to ensure an optimised performance for each application.

H₂S Scavengers

Hydrogen sulphide (H₂S) occurs naturally in Crude oil and gas wells, in addition, it is generated in reservoirs as a result of bacterial sulphate reduction by (Sulphate Reducing Bacteria - SRB’s) in process systems. Once established, it can potentially be carried in Hydrocarbon streams resulting in severe corrosion in pipelines, and pumps, Iron Sulphide accumulations and leaks in flow and gathering lines, creating high failure rates in production. Metito developed effective H₂S scavengers for different applications that meet any Sulphur challenges within any production system. This products line is marketed under the brand name MetSul.

MetSul series provides superior corrosion protection against H₂S as well as removal of volatile mercaptans. They react to form layers that inhibits corrosion, eliminating the need for additional corrosion-control products. MetSul removes H₂S odours and their effects and, unlike biological or caustic processes, it changes the H₂S molecule without precipitating harmful solids or simply moving the problem to downstream locations.

MetSul Benefits:

- Fewer required injection points and lower dosage rates
- Reduced need for acid washing and replacement of media in wet scrubbers
- H₂S is converted instantly to a non-hazardous salt in water that is easily disposed of
- No special storage or handling precautions are needed
- The reaction products can be easily removed from the process systems
- Maintains asset integrity and reduces the need for new equipment
- The reaction is instant and irreversible and has no effect on oil, gas or fuel quality

If you encounter hydrogen sulphide in your system, Metito can perform laboratory tests to determine H₂S levels and customise a chemical solution to fit your production needs.
**Hydrate Inhibitors**

The ongoing development of offshore marginal oil and gas fields increases the risks of facing operational difficulties caused by the presence of gas hydrates. Hydrates are crystal/ice-like formations that can grow, leading to serious blockage in production lines and safety problems. Hydrate plugs can be a serious problem to any production system and can shutdown an operation and threaten pipeline integrity. These gas hydrates can form quite rapidly where water and light Hydrocarbons are present at relatively low temperatures and high pressures. Once formed, they produce plugs that can completely block a flow line, shutting down production. Hydrate plugs are very difficult and dangerous to remediate.

Metito offers a wide range of gas hydrate inhibitors marketed under the brand name MetHyd which includes:

**A- Low Dosage Hydrate Inhibitors (LDHI)**
LDHI is divided into 2 main categories; Kinetic Hydrate Inhibitors (KHIs) and Anti-Agglomerants (AAs).

A.1- **Kinetic Hydrate Inhibitors (KHIs)**
Kinetic Hydrate inhibitors (KHIs) affect the induction time and slow down the formation of hydrates. They work by binding to the surface of the hydrate, opposing the formation and growth of crystalline hydrate nuclei. The goal is to suppress hydrate formation for longer than the residence time of the water in the hydrate formation region. KHIs tend to be low molecular weight polymers, usually a polyethylene (or polyvinyl) backbone chain with attached polar groups (typically amides with carbon numbers of 5–7).

A.2- **Anti-Agglomerants Inhibitors (AAIs)**
Instead of preventing growth based on thermodynamics, these inhibitors rely on delaying nucleation, slowing growth and preventing hydrate agglomeration to prevent hydrate plugs.

B- **Thermodynamic Hydrate Inhibitors (THIs)**
Thermodynamic inhibitors are compounds which lower the hydrate formation temperature when mixed with water. These chemical additives disrupt hydrogen bonding in water and the freezing point of water is lowered (or depressed) and ice is no longer stable at 0°C. Based on the additive chosen (which include salts, glycols, and alcohols), Metito can vary the amount of freezing point depression achieved.

**Oxygen Scavengers**

Most oxygen corrosion in oilfield metallurgy is caused by the addition of fluids from the surface that have been exposed to air for any length of time. When large quantities of fluids are injected ‘downhole’, such as in fracturing operations, saltwater disposal wells, formation squeezes or waterflood operations, oxygen can be introduced in significant quantities. ‘Downhole’ oxygen can cause such symptoms as dark produced water, reddish or brown solids in produced water, excessive turbidity of produced water or flaky black or reddish deposits on metal surfaces.

Metito offers a wide variety of oxygen scavengers marketed under the brand name MetScav, including bisulphites and sulphites, to help with oxygen mitigation in your oilfield applications.

MetScav oxygen scavengers chemically react with oxygen present in the source water, removing the integrity risks it poses, and eliminating its potential to react with other ions present in the system. If oxygen levels exceed a certain threshold, these specialty chemicals can be combined with oxygen corrosion inhibitors to further protect the pipeline and keep your oil and gas production running at optimum corrosion levels.

**MetScav Benefits:**
- Reduction of oxygen content in oilfield fluids injected ‘downhole’
- Minimised oxygen induced corrosion and pitting
- Minimised iron oxide deposition and scaling
- Reduced consumption of oxygen corrosion inhibitors
Pour Point Depressants

The pour point of a fuel or oil is the lowest temperature at which it will pour when cooled under defined conditions. In general, the pour point is indicative of the amount of wax in oil. Lower temperatures can cause wax present in crude oil to agglomerate trapping a substantial amount of oil, inhibiting oil flow and hindering lubrication, impacting production, storage, transportation and usage.

Although most of the wax is removed during base oil refining, some wax is desirable for achieving the right viscosity. So Pour Point Depressants (PPDs) are added, allowing mineral oils to function efficiently at low temperatures, while keeping the viscosity benefits of the wax at higher temperatures.

Metito offers a broad line of PPDs, unsurpassed in excellence, scientifically crafted for diverse applications marketed under the brand name MetPour. The MetPour range of chemicals is designed to prevent wax crystals in lubricants from agglomerating or fusing together at reduced ambient temperatures thus providing an efficient oil function at lower temperatures and superior viscosity levels at higher temperatures. Metito’s novel range of depressants can significantly lower the temperature at which the oil can smoothly flow, enhancing oilfield operations under cooler conditions and improving overall costs.

Paraffin Control

Paraffin, associated with the production of crude oil, can cause several production problems. Paraffin skin damage can either be naturally occurring or manmade due to repeated hot oil treatments. Naturally occurring paraffin occurs due to the formation temperature is lower than the cloud point of the fluids produced. When the temperature of the produced fluids falls below the wax appearance temperature of wax present in the oil. The crystals that solidify increase fluid viscosity and can form deposits on pipeline walls and settle in vessels. Once accumulated in vessels, they form at tank bottoms and pads at fluid interfaces.

If unchecked, this wax deposition can rapidly produce plugs that can choke oil production tubing or pipelines, increase pumping pressure, slow down or stop production. Paraffin created by hot oil/water treatments can cause damage due to heavier ends being pushed ‘downhole’ and into the formation. Both types of damage reduce the effective permeability at/or near the formation face, reduce the internal diameter of tubulars and pipelines, restrict or block valves, impede other production equipment to reduce capacity, and in the worst case stop production.

Metito offers paraffin treatments under the brand name MetPar, that are focused on maintaining pipeline integrity and keeping production systems flowing at optimal levels and can be customised to meet your production challenges and delivery, including the use or combination of:

- Wax inhibitors; which alter the wax crystal structure and prevent them from forming a deposit
- Dispersants; which keep the wax solids suspended in produced fluids and prevent it from settling in vessels and interfaces
- Solvents; which dissolve deposits that have formed prior to a chemical application

MetPar Benefits:
- Reduced or prevented ‘downhole’ paraffin deposition and formation
- Increased production through the removal of paraffin blockages
- Improved plant operating efficiency
- Reduction of pour point for paraffinic hydrocarbons
- Improved separator efficiency
Scale formation can reduce the production efficiency of wells and shorten the life of equipment both ‘downhole’ and on the surface. Produced water contains dissolved mineral ions, including: Calcium, Barium, Strontium, Carbonates and Sulphates. When these ions reach a point of super saturation because of a sudden drop in pressure or changes in temperature, a co-mingling of incompatible waters or a change in pH or water chemistry, the mineral salts become less soluble and precipitate as thick scale. The scale adheres to pipe walls, ‘downhole’ pumps, surface flow-lines and the internals of surface equipment thereby reducing production, jamming critical isolation or safety valves, and causing well instrument lines to plug.

To solve the toughest scale problems in oil and gas, Metito developed an innovative, proprietary technology, that effectively controls scale formation, significantly improving production efficiency and extending the equipment life cycle. This technology is designed to work in the varied and challenging ‘downhole’ water conditions encountered in today’s environments.

**MetSafe** series is customised to prevent mineral deposition while also removing deposits which have already formed. Relying on years of water treatment expertise, Metito works with you to analyse the water chemistry in your production and injection systems for scaling tendencies and examine any deposits that may have already formed to identify the scale type. From there, we develop a specific scale control program and chemical application that best fits the production needs, helping you to optimise the production and reduce the cost of operations associated with scale cleanup, removal and disposal.

**MetSafe Benefits:**
- Reduced downtime for mechanical, acid or chemical cleanout
- Increased lifetime of well and well equipment by minimising deposits that can cause excessive wear
- Maintained flow capacity of various flow-lines associated with surface equipment
- Polymer type scale inhibitor traceable with a simple field test

MetSafe chemicals are formulated to biodegrade quickly, reducing the potential for chemical accumulation.

Demulsification and separation of the hydrocarbon phase during primary separation of produced fluids does not usually leave an aqueous phase sufficiently free of hydrocarbons to meet the discharge limits required for water disposal. It can lead to the presence of oil and solids in produced water that can be dispersed throughout the water phase, resulting in a “milky” appearance, off specification oil and grease, solids in discharge or disposal water and can also create the build-up of an emulsion pad in the separator vessel. If this occurs, the amount of impurities above the industry regulations must be reduced before any discharge, disposal or water reuse is allowed.

Metito’s line of water clarifiers, **MetDeoil**, are specifically developed to focus on the removal of such impurities, including complex hydrocarbons from an oil/water dispersion, reverse emulsion breakers to destabilise oil-in-water, as well as coagulants, flocculants, flotation aids and filter aids. Each chemical application is specifically made to fit particular emulsifiers, dispersants, process units, and conditions in the field.

**MetDeoil Benefits:**
- Improved control of separation vessels
- Meet discharge requirements for produced water
- Improved injectivity of produced water
- Recovers more sellable oil from produced fluids
- Leaves clear water with minimal suspended oil or solids

To determine which water clarifier is best suited for an application, Metito’s chemical specialists can perform an extensive on-site evaluation of the system, including jar testing with fresh produced fluids and a customised water clarifying treatment best suited for your production.
Metito has extensive experience in developing innovative programmes and products to mitigate ‘downhole’ and pipeline corrosion, scale, asphaltene, paraffin’s and Microbial Induced Corrosion (MIC) problems. We specifically focus on pipeline, process and production facility issues relating to gas, oil and water problems with the intention of clearly defining the problem, developing new products and programmes, and monitoring the results to ensure that these programmes are efficient and cost-effective. We leverage our knowledge, experience and creativity to solve our customers’ toughest challenges and deliver valuable solutions first time, every time.

At Metito we carry out on-site analysis then fully re-evaluate at our laboratory to ensure that the product we recommend is the best possible fit. Once a product has been prepared we offer on-site technical assistance for the product dosage rates and application points. This on-site technical service will continue to ensure that the product is the best solution as the oilfield changes over the years. We take great pride in offering green, environmentally sustainable chemical solutions as all our products are produced using environmentally friendly methods and, where possible, are formulated to be fully biodegradable.

At Metito we don’t just offer chemicals but commit to offering world-class, intelligent solutions, technologies, and services that continue to inspire and lead the industry.

Customer satisfaction is our top priority. It starts from the day we receive an enquiry and lasts throughout our partnerships. Our philosophy and commitment to the highest possible customer satisfaction is formalised in our Metito Customer Excellence standards.

**Managing Contacts**
Metito believes that communication is key to the success of any long term partnership. Our documented management of your business includes an overview of your operation with focus on your business drivers, goals and priorities.

**Engineering Survey**
Delivering what you need starts with a full understanding of your site, systems and processes. Safety is at the forefront of all we do. We capture all this in our Engineering Survey. It is important to have knowledge of our impact on your critical processes, past and current challenges, the treatment regimes and equipment/chemistries utilised. We focus on evaluating cost impact of current regimes so that we can identify clear, quantifiable benefits of using Metito programmes. Our Technical Support Engineers and Industry/Product Specialists review engineering surveys with our Sales Engineers to ensure we select the most appropriate and cost-effective treatment to ensure maximum plant efficiency.

**Timetable for Service**
We are a completely dedicated and service orientated organisation. Our commitment to develop a service plan which covers all the expected routine system assurance testing and inspections. In addition, we commit to planned reviews of operational results, agreed Key Performance Indicators, value-added projects and constant review of Safety and Environmental performance.

**Information Reports**
The work we do is all captured in comprehensive service reports covering all test data, recommendations for improvement (including safety) and that summarise the value in terms of what we provide.

**Technical Manual**
We ensure that the documentation on site supports all that we do with the customer. Our Technical Manual covers; Metito contact information, ordering information, safety information, Metito and Customer responsibilities, overview of Metito programme and products, Engineering Survey information, required test procedures, control limits and troubleshooting guide, MSDS and Product Bulletins.

**Overall Review**
We commit to reviewing our performance with our customers at least once a year so that we cover - QHSE, review of System Assurance, programme KPIs, Value Added Projects, programme financials, future project priorities and goals, and discuss satisfaction survey feedback and training requirements.