



adventech
water quality solution

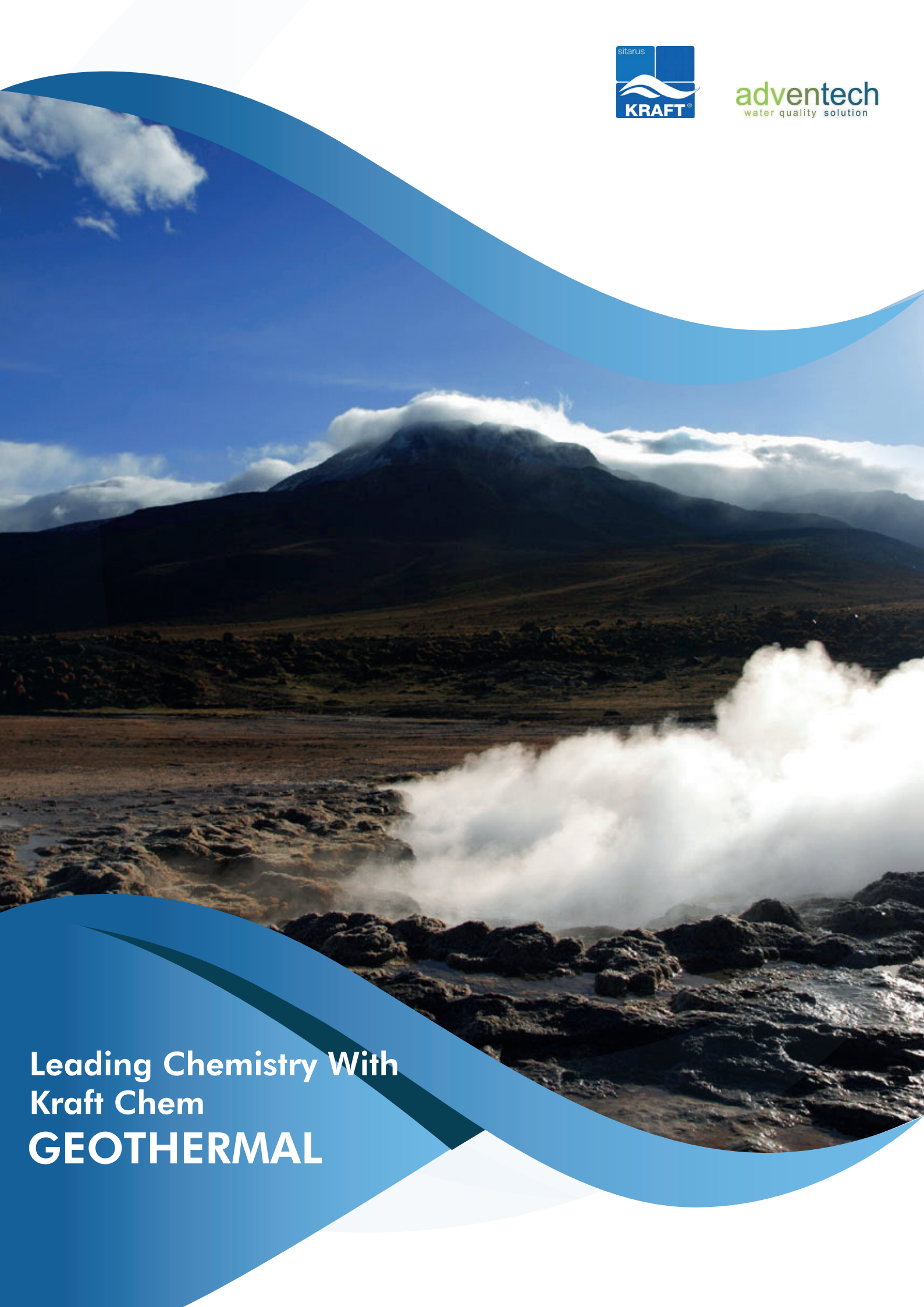
Leading Chemistry With Kraft Chem **GEO THERMAL**



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A landscape photograph of a geothermal area. In the background, a large, dark mountain with a snow-capped peak is partially obscured by white clouds. The middle ground shows a vast, flat, brownish landscape with patches of green vegetation. In the foreground, there are dark, rocky formations with white steam rising from them, indicating a geothermal vent. The sky is a clear, bright blue with some light clouds. The image is framed by large, stylized blue wave-like shapes at the top and bottom.

Leading Chemistry With
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GEO THERMAL

GeoThermal Energy

Geothermal energy is considered to be a most sustainable energy source owing to its limited burning of fuels and minimal emission of carbon dioxide and other greenhouse gases. Geothermal energy is a thermal energy, which comes from reservoirs of steam and hot water beneath the surface of the Earth. It plays an important role in the transition from fossil fuels to more sustainable fuels as a clean renewable resource. Diminishing use of coal, oil and gas makes possible to reduce the emissions of greenhouse gases into the atmosphere and, consequently, help fight against global warming and environmental pollution. Geothermal energy is one of the most efficient and environmentally friendly types of renewable energy to generate electricity, and it is also used for a variety of industrial and domestic applications, such as heating, refrigerating, drying (industrial and farm products), biogas processes, biofuels production, water desalination, soft drink carbonation, farming, irrigation, pasteurization, soil sterilization, aquaculture, snow melting and de-icing, bathing. The geothermal power market is mainly driven by the factors including an efficient and sustainable energy source and growing adoption of renewable energy. The limited burning of fuels and minimal emission of carbon dioxide and other greenhouse gases favour the adoption of geothermal energy..

Chemical Services

Kraft 's same range of chemical solutions combine specialty chemical products and services for maximum performance and efficiency from your operations. We know the key to your success is our commitment to provide unparalleled technical expertise and superior local service through cost-effective application of customized specialty chemicals for the life of the well.

Industry-Leading Chemical Solutions for Optimum Production

Following expert evaluation of each application, Kraft works with you to develop site-specific products and formulations for customized solutions that ensure production systems operate at full potential.

Solutions to Mitigate Risk and Protect Pipeline Integrity

Our Midstream Solutions Group works in conjunction with operations to service your pipeline assets, and proactively control and prevent pipeline failures using chemical inhibition programs that minimize internal corrosion.

Solutions to Maximize Deepwater Operations

Kraft offers a same of specialty chemicals to enhance performance and safety in deepwater systems. Our expertise means we can customize platform-specific chemical products and formulations for a particular system or producing condition.

Local Service, Global Laboratory Support

Our fully equipped mobile Technical Service Response Units provide in-field laboratories for conducting surveys, analyses, and systems evaluations at field locations anywhere in the world. Backed by an extensive global lab database, Kraft experts can conduct comprehensive testing analysis on a global scale to meet your challenges with expertise and knowledge from around the world.

What Damage Does Scale Cause?

The effect these scales have on a well depends largely on their location and the amount deposited in the system. Scales can restrict and completely choke production in the tubing, in the flowlines, at the sandface, or in the perforations. Scales can deposit in fractures and formations that are distant from the wellbore.

How Scale Inhibitors Control Scale Formation?

Chemical scale inhibitors control the deposition of scale by either interacting with the microscopic scale surface and altering the crystal structure as it is forming or by sequestering the ions (calcium and barium) that precipitate as scale.

Chelation: One method of scale control chelates (sequesters) the ion that is causing scale, which requires one part inhibitor for each part potential scale. Because this one-to-one ratio can become expensive, chelation is not usually recommended.

Threshold Inhibition: The recommended scale control technique involves the process of threshold inhibition. This process occurs as follows

- ◆ The binding site of the scale inhibitor molecule is attracted to the charges on the small scale crystal.
- ◆ Because the inhibitor is attached to the scale crystal, the crystal grows no larger.
- ◆ Eventually the crystal redissolves and releases the inhibitor to repeat the process.

The practical result is that the presence of as few as 1 to 30 mg/L of inhibitor is enough to maintain 100 times its weight of potential scale in solution. This level of efficiency makes scale inhibition a very economical method of scale prevention.

The nature of the binding site and the chemical identity of the scale determine the effectiveness of a threshold inhibitor. Because the three most common scales are chemically different from one another, scale inhibitors vary in effectiveness, depending on which type of scale is present. For example, a very small quantity of inhibitor might prevent CaCO_3 scale, but the same amount of that inhibitor might be ineffective against CaSO_4 scale.

Corrosion Inhibitor: Increasing the dosage of inhibitor can then prevent problems with CaSO_4 precipitation. The specific conditions determine inhibitor choice. Always test inhibitors under the existing conditions. To provide the most economical treatment for a problem, consider a variety of chemical scale inhibitors. After you have identified the scale and determined the well conditions, select the best inhibitor to prevent and control the problem.

The following section describes the various types of scale inhibitor.

Scale Inhibitors

Numerous chemical additives are effective at preventing scale precipitation. Several inhibition products are presented in this section according to their chemical category:

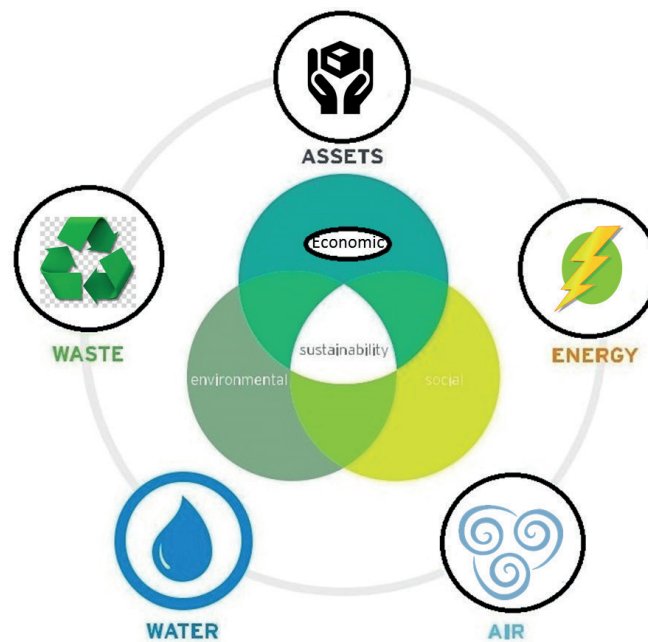
- ◆ Polyphosphates and phosphate esters
- ◆ Slowly soluble polyphosphates
- ◆ Phosphonates
- ◆ Polyacrylic acid and other carboxylic acid-containing polymers

Polyphosphates (Condensed Phosphate) and Phosphate Esters

Polyphosphates are the original scale inhibitors. Polyphosphates are simply long chains of phosphate units

Our Goal :

Kraft Water partners with geothermal energy producers worldwide to develop reliable, cost-effective and safe solutions. Our ultimate goal is to deliver a measurable economic advantage and exponential return on investment.



Assets: Maximize plant availability ,well flow and performance and the life of cooling tower .Minimize unscheduled shutdown. Maximize the life of flash/binary plant and Wells Productio. Reduce maintenance cost bu minimizing corrosion scaling and fouling.

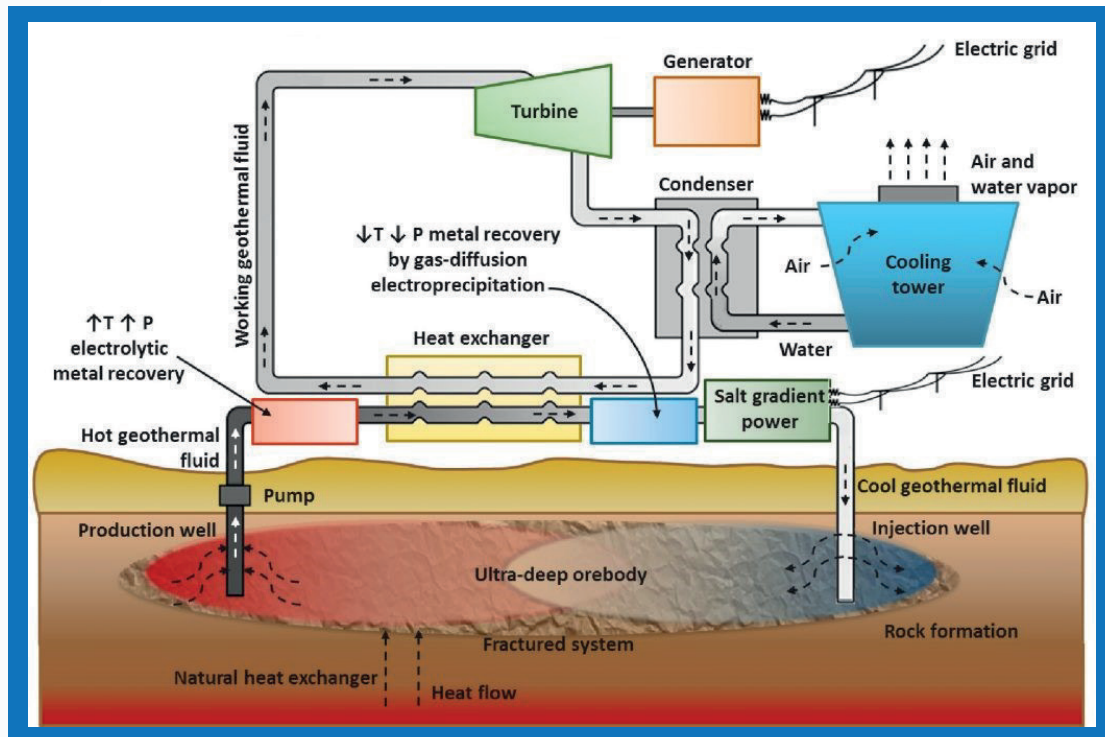
Water: Limit blowdown loss by maximizing cool-ing tower cycles of concentration.

Air Quality: H₂S abatement (non-condensable gases & condensate)

Increased Energy Saving: Optimize performance of cooling tower through sulfur deposit inhibition and microbial control. Maximize mWh output by limiting scale formation in production wells, process equip-ment, and injection wells

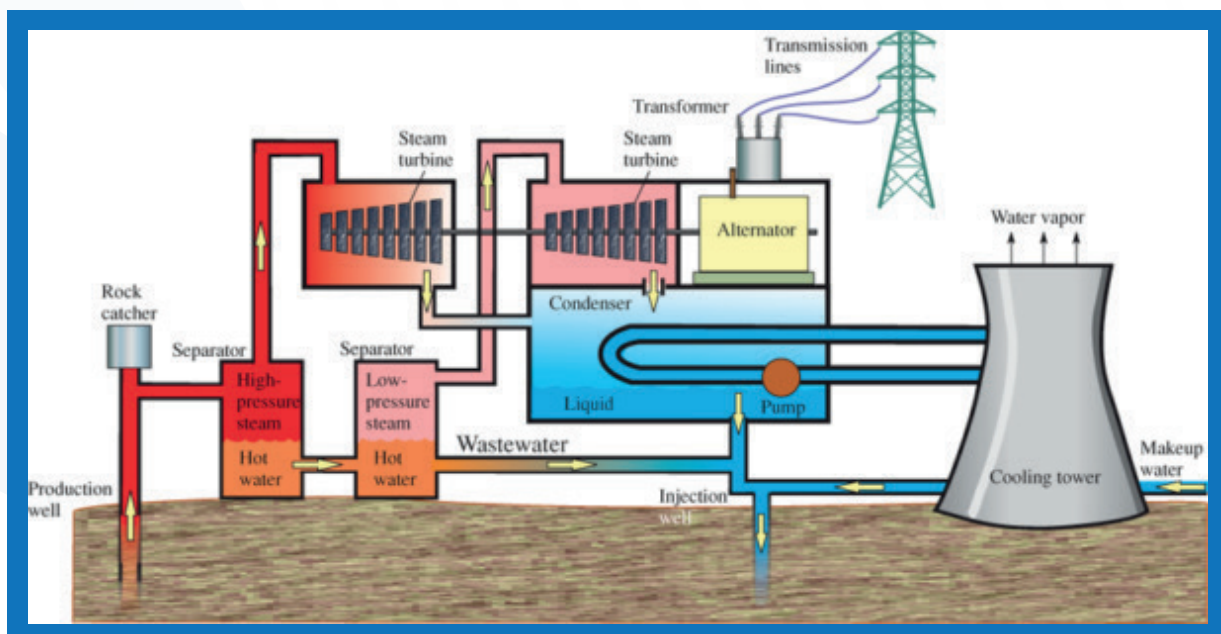
Complete solutions to your challenges

A-Binary Cycle GeoThermal Power Plant :



Geothermal power plants operate with heated fluid extracted from underground reservoirs; the chemistry of these geothermal fluids can present significant challenges for the reliable and efficient operation of power plants. The issues experienced in each plant can vary, as the fluid chemistry changes from reservoir to reservoir and the plant designs are customised based on early reservoir data to make best use of the available resource.

B- Flash Plant (double) GeoThermal Power plant



Products for Geothermal Plants:

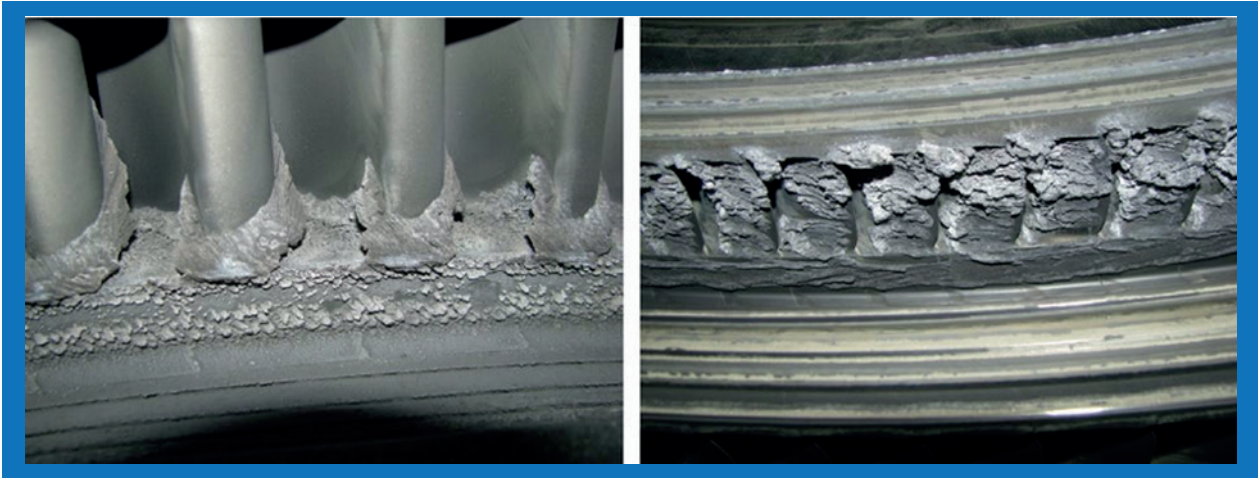
- ◆ Silica dispersants
- ◆ Scale Inhibitors
- ◆ Acid Inhibitors
- ◆ Corrosion Inhibitors



Silica Dispersant:

Silica is a ubiquitous component of geothermal fluids and must be removed or reduced in concentration to allow other components to be removed. Most hydrothermal systems equilibrate with quartz (SiO_2) causing the fluids to have silica concentrations that reflect the temperature of the reservoir - the hotter the reservoir, the higher the silica concentration of the fluid.

The solubility of SiO_2 decreases with a decrease in temperature, with pressure changes having very little effect. SiO_2 can be precipitated into open spaces such as fractures or pores in the rock in regions where the subsurface temperature changes abruptly and at the subsurface where hot springs discharge. Calcite (calcium carbonate) has a retrograde solubility, i.e., it is more soluble at low temperatures than at high temperatures.



Silica-deposits-on-a-geothermal-steam-turbine-deposition-on-rotating-blades

Geothermal power plants can be quite complex and the utilisation of geothermal power is not without problems. Unlike conventional oil or gas-fired power plants where the working fluid is simply clean water, the working fluid of geothermal power plants is geothermal fluid which has a complex chemical composition varying from area to area. The fluid is basically water containing a lot of dissolved minerals and dissolved gases. Complex processes and reactions take place as the fluid depressurises.

Silica while in the form of silicic acid can form hard glassy scales and also combine with various metals to form various silicates that can also cause scaling. There exist various methods to control silica scaling so it doesn't cause too many problems for heat exchangers and surface piping in geothermal power plants. This usually involves keeping the water from becoming oversaturated with respect to amorphous silica by carefully controlling the temperature and the pressure of the water. Once the water becomes oversaturated with respect to amorphous silica as it cools further, silica scaling occurs rapidly and in large quantities. This type of scaling is especially problematic for injection wells.

Product Range

Specific inhibitors with dispersive capacity for high pressure and temperature over than 180°C geothermal waters (organic phosphate and dispersants)

Scale inhibitors showing high performance even at low dosages which are designed for wells with reservoir temperatures higher than 180°C and high levels of hardness, silicate, sulfate, even at low dosages especially serving at geothermal power plants are within this product range.

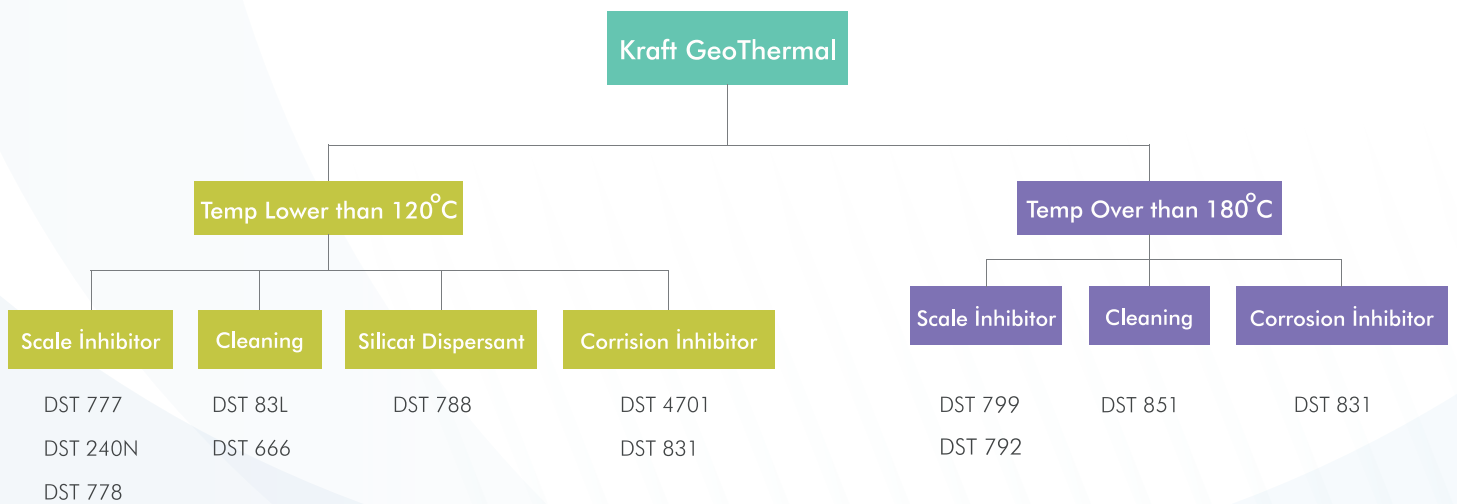
Scale inhibitors which are designed for wells supplying thermal hotels and central heating systems with reservoir temperatures below than 120°C and with different levels of hardness are within this product range

Upp Stream - Well Stimulation Products

Acid inhibitors, acid inhibitor intensifiers, friction reducers and similar products which are used during acidizing of production and re-injection wells are designed according to metal alloy, acid type and other chemical additives are included in this mather.

Cleaning Product (Usable On-line Or Off-Line)

Product range includes products for well acidizing and for online/offline cleaning of calcium, magnesium, silicate, sulfate, antimony and similar substances which are formed inside vaporizers/preheaters for various reasons at geothermal power plants.



Kraft Geothermal Product	Temp Lower than 180 oC	Temp Over Then 180 OC	On- line	Compatibility	Scaling	Dispersant	Durability	Dosage
Adventech DST 777 Scale Inhibitor	yes	no		high	high	high	medium	medium
Adventech DST 778 Scale Inhibitor	yes	no		high	medium	high	high	low
Adventech DST 799 Scale Inhibitor	yes	yes		medium	high	high	medium	medium
Adventech DST 792 Scale Inhibitor	yes	yes		high	high	high	medium	low
Adventech DST 788 Silicat Dispersant	yes	yes		high	high	high	high	medium
Adventech DST 83L Acid Cleaning DST 851	yes	yes	yes	high			high	Very low
Adventech DST 666 Acid Cleaning	yes	no	yes	medium			high	low
Adventech DST 831 Corrosion Control Agent	yes	yes		low	high	high	high	very low
Adventech DST 887 Control Agent	yes		yes	high	high	high	high	low

Solutions:

- ◆ Complete range of scale and corrosion inhibition chemistries
- ◆ Complete survey of your system and working conditions
- ◆ Laboratory support for water and deposit analysis
- ◆ Laboratory simulation and product screening

Benefits:

- ◆ Prevent loss of power generation
- ◆ Minimize the number of unscheduled shutdowns
- ◆ Minimize acidizing and/or reaming of production well
- ◆ Reduce maintenance cost.



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Comprehensive Service

Complete survey of your system and working conditions. Laboratory support for water and deposit analysis. Close follow up from our engineers from the start up of the treatment until stable operating conditions are obtained Regular on-site analysis and treatment control.

Our products stand for high quality: Kraft Technologies has been successfully certificated by the DQS GmbH fulfilling the standards of DIN EN 9001:2000 and DIN EN 14001:2018 as well as OHSAS 18001:9000

