



INNOVATIVE
SOLUTION



MIRRICO
GROUP OF COMPANIES

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Our work in the field of innovation is scientific search for the best chemical and technological solutions in the context of efficiency for various industries.

Dear colleagues!

The decrease of oil prices and shifting of the focus of oil companies towards the processing of hydrocarbon crude throw the oil companies into a dilemma of choosing the most appropriate allocation of resources and formation of an investment portfolio. On the one hand, customers are interested in large-scale infrastructure projects aimed at increasing the refinery yield, on the other hand, we find projects to be important, which result in reduction in operating costs and maintenance of oil and gas production at the target level.

Limited financing capacity impose definite conditions on suppliers of the oil companies: the cost of carried technical and chemical solutions is given the same attention as to their efficiency. The need to search for the best combination of price and quality is a challenge for service companies offering own chemical solutions.

We are improving products and technologies of Mirrico portfolio and develop new ones, which impart stability to operational business and open up new horizons for development of the company. Innovations allow us to face the future with confidence creating nowadays what will be in demand tomorrow.

Vasily Solodov,
Innovation Manager of Mirrico Group of Companies



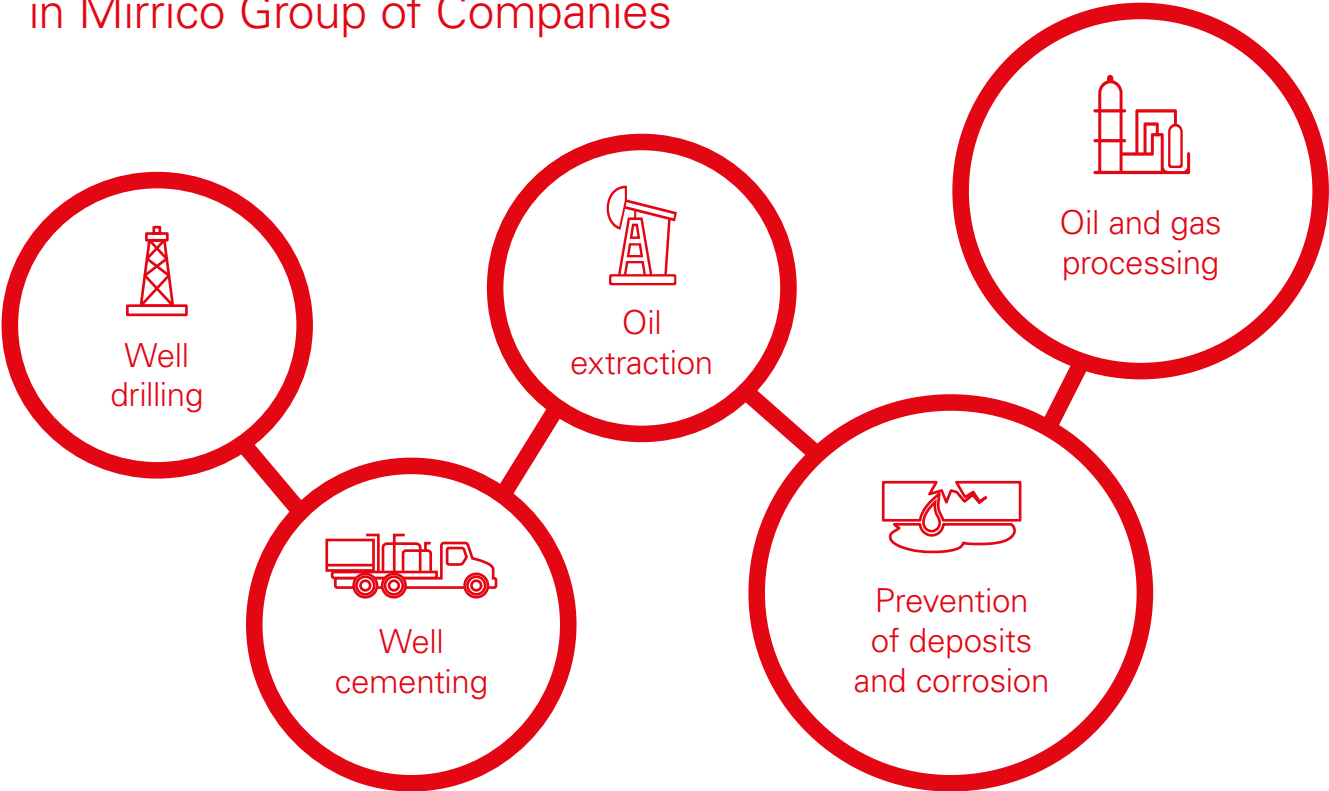
PURPOSES OF INNOVATIVE ACTIVITIES OF MIRRICO GROUP OF COMPANIES

- Assurance of innovative development of the company.
- Enabling Mirrico Group of Companies to become a high-tech company, sci-tech leader among world-class oilfield service companies.
- Compliance with international standards in the field of environmental and industrial safety



Types of innovations realized in Mirrico Group of Companies: product, technological, service and information technology innovations

Promising trends of innovative activities in Mirrico Group of Companies



Structure of innovative activities. Developments and innovations.

Scientific activities	Engineering
Researches	Introduction
Monitoring	Technology transfer
Host platform development	Technical support

ADVANTAGES AND RESOURCES OF INNOVATIVE ACTIVITIES OF MIRRICO GROUP OF COMPANIES



1. Multidimensional partnership of subdivisions of the group of companies:

- Solutions of Mirrico Group of Companies cover 6 industries, 38 markets.

1. Multidimensional partnership of subdivisions of the group of companies:

- Solutions of Mirrico Group of Companies cover 6 industries, 38 markets.

2. Qualified specialists:

- 10% employees of Mirrico Group of Companies are occupied in innovative activities.

3. Own laboratory facilities with analytical equipment and equipment for product synthesis:

- More than 2 000 sq.m are laboratory areas of Mirrico Group of Companies.

4. Availability of scaling phase and own production:

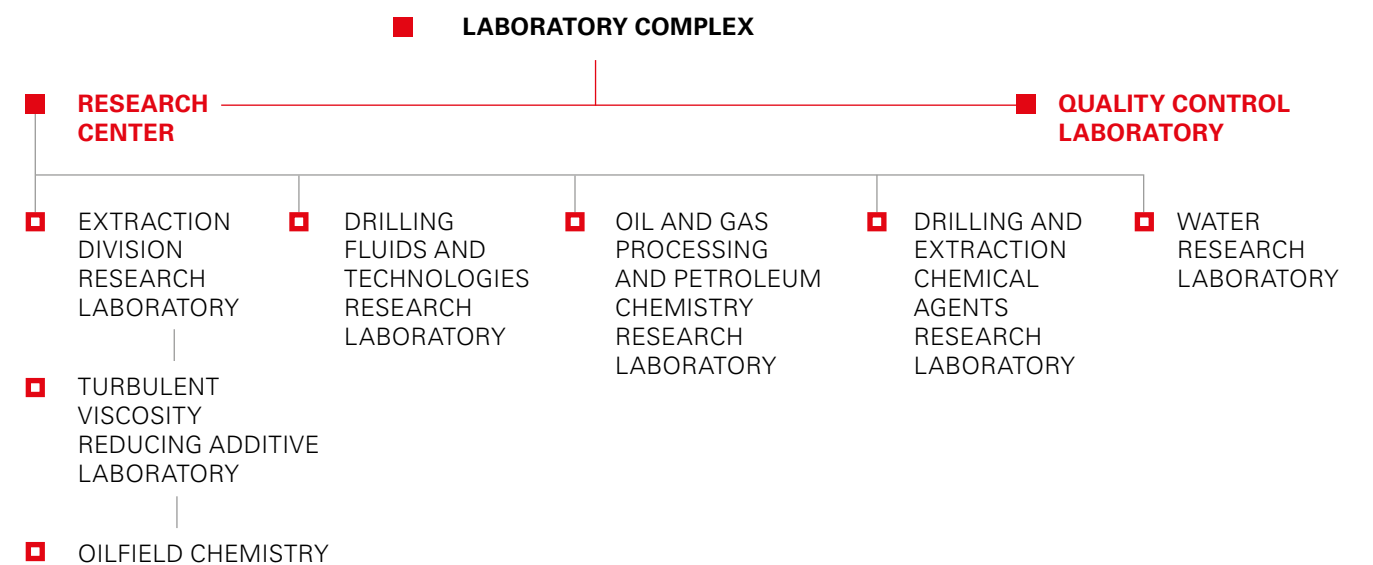
- 50 000 tons a year comprise chemical production (mixing and synthesis).

5. Broad geography of work of Mirrico business units:

- The group of companies perform product supplies and service backup of chemical solutions for industrial markets in the Russian Federation, CIS and Middle East countries.

All of this allows us to develop and introduce new products to the market in short time, and most importantly, to offer truly modern and unique solutions to our customers.

Infrastructure of Innovative Activities of Mirrico Group of Companies is as follows:



A photograph of several Erlenmeyer flasks and test tubes in a laboratory setting. The flasks contain liquids of various colors: red, orange, yellow, and blue. The background is blurred, showing laboratory equipment and bright lighting.

INNOVATIVE SOLUTIONS OF MIRRICO GROUP OF COMPANIES

- **DRILLING INNOVATIONS**
- **CEMENTING INNOVATIONS**
- **OIL EXTRACTION INNOVATIONS**
- **INNOVATIONS STRUGGLING AGAINST
DEPOSITS, CORROSION**
- **INNOVATIONS IN OIL AND GAS
PROCESSING AND PETROLEUM
CHEMISTRY**
- **INNOVATIONS FOR PROVISION
OF THE QUALITY OF WATER AND COAL
BENEFICATION**

DRILLING INNOVATIONS



BIOLUB GREEN biodegradable lubricant for drilling

Description: a composition based on vegetable oil and derivatives of fatty acids

Application: for treatment of water-based drilling fluids for the purpose of reduction of a downhole frictional force, prevention of sticking in case of drilling of a vertical, directional wells. It has stuffing resistant effect.

Recommended consumption: in the process of working solution BIOLUB GREEN chemical agent with a concentration of 0,3–3% (3–30 kg/m³) is added to the drilling fluid in case of primary treatment and the same with a concentration of 0,1–0,5% (1–5 kg/m³) is added in case of second treatment.

Peculiarities:

- It is composed of natural, environmentally friendly raw materials.
- Stable at temperatures up to 160 °C and pH values up to 10.
- Effective in fresh and mineralized drilling fluids. It does not deteriorate rheology, filtration and other properties of the drilling fluid.
- Compatible with all chemical agents used for treatment of drilling fluids.

Lubricant for complicated conditions BIOLUB EPL

Description: lubricant based on natural and modified compounds.

Application: for drilling mud treatment to decrease downhole friction forces. Application of Biolub EPL is particularly recommended in boreholes of complex shape with long horizontal section. It is effective not only in fresh but also in brine drilling muds (including those fully saturated).

Recommended consumption: recommended concentration of the chemical is 1–10 kg/m³. Optimal concentration is 0,3%.

Peculiarities:

- Molecules of Biolub EPL active base are positively charged. Due to this, the chemical shows increased adsorption property in relation to tool metal, including high temperatures cases.
- Featured by strong anti-stuck effect even at low concentrations (from 0,3%).
- Shows corrosion inhibitor properties.
- Extends the service life of drilling pumps and drill bits.

ARMO-BLOCK

Description: hardening compound, the setting time of the compound can be regulated in a broad range of time.

Application: loss circulation control technologies for losses of any severity. Optimum range of reservoir temperatures for application is 10–50 °C.

Recommended consumption: 5 to 10 m³ per operation according to hole size and well design.

Peculiarities:

- The technology complements QUICK-STONE™ in the temperature range from 10 to 50 °C in regard of loss circulation control.

- The finished compound is a fluid liquid. When the ARMO-BLOCK™ hardens, an exothermic reaction occurs (a large amount of heat is released), that accelerates the time required to achieve the strength of the compound.
- Other factors (such as hydrostatic pressure) do not affect the strength development time. ARMO-BLOCK™ shows a linear profile of the viscosity change up to the setting point of the compound at which the profile starts to show a viscosity change exponentially. It is possible to proceed drilling out the compound after 3–5 hours (depending on the reservoir temperature) from the moment of completion of the injection of the compound.

OSNO-PLUG polymer cross-linked composition

Description: the composition is movable, flowing liquid before cross-linking. After cross-linking it is an elastic gel, which has good adhesion to metal and rock.

Application: in oil extracting industry in drilling processes and well workover, in technologies of drilling fluid lost circulation control, in a wide range of lost circulation scales.

Recommended consumption: the cementing solution is prepared by diluting of OSNO-PLUG BS gelling agent with a concentration of 5–15 kg/m³ in fresh or saline water using standard tank farm. Then OSNO-PLUG CL chemical agent with a concentration of 5–15 kg/m³ is added

to the resulting viscous solution, then the viscoelastic solution is injected into the wellbore lost-circulation zone. Chemical agent concentration depends on the nature of lost-circulation.

Peculiarities:

- Adjustment of system thickening time (from 30 minutes to 6 hours by change of system components' concentrations).
- Possibility to add colmatation additives.
- Ability of the system adjustment in a wide range of temperatures (20–95 °C).
- Ability to adjust viscosity of base working solution.

QUICK-STONE lost circulation control technology

Description: an organo-mineral compound composed of finely dispersed powders. The system in original condition has water viscosity, marked by controlled quick development of strength and a composition for its creation can fully dissolve in hydrochloric acid, contrary to standard cement mortars, which are not pumped through the bit due to the absence of the above properties. This compound can be injected through the bottom hole assembly.

Application: for solving problems of producing formation damage in the process of drilling, for disastrous lost circulation control, isolation of the zone of water and gas show, temporary well killing, setting of a sidetracking plug instead of packer setting, for incompetent rock consolidation.

Recommended consumption: recommended compound pumping volume makes 5–10 m³.

Peculiarities:

- The system is easily drilled out after hardening.
- Mixed with water in the field environment
- and pumped without special equipment.
- Injection can be performed through the bit with minimal jet nozzle through the bore hole assembly, MWD, CT.
- The system has a low viscosity profile solidifying in 180 seconds.
- It has a controlled strength gain and an adjustable «linear profile» of setting.

CAVE-BLOCK lost circulation control technology

Description: an organo-mineral composition with particle dimension making up to 500 micron, density ranges from 1,03 to 1,10 g/cm³ due to hange of the mixture composition, moreover, it may be used in drilling fluid systems based on brines (density is up 1,5 g/cm³).

Application: in lost circulation control technology for pumping to the lost circulation zone in the form of a visco-elastic composition, where a tight plug is formed, which prevents lost circulation.

Recommended consumption: recommended pumping volume makes 20–40 m³.

Peculiarities:

- The composition does not depend on the formation temperature.
- CAVE-BLOCK chemical agents remaining in the hole, are easily cleaned at the cleaning systems of the drilling sites.



ALGYPO fluid system for drilling of unstable rock zones

Description: system of drilling fluids with different density.

Application: in case of construction of boreholes, composed of clay and argillaceous sediments and carbonate rocks with inclusions of gypsum and anhydrites, without complications in the form of landslides, avalanches and accidents.

Peculiarities:

- Has a unique composition, which allows to inhibit effectively hole walls, composed of unstable rock.
- Universality as compared to other drilling systems, allowing to perform in like effective manner drilling operations in various sections without using a different type of the fluid.

CEMENTING INNOVATIONS



Mixed additive for cement slurry SAPSAN KUPER

Description: ready-to-use powder mixture of different additives in one package.

Application: for accelerating setting time and start of strength gaining.

Recommended consumption: 50 kg of Sapsan Kuper per 1 ton of cement.

Peculiarities:

- Shorter setting time (time for pumped cement slurry with addition of Sapsan Kuper at 10 °C is 2 hours 40 minutes compared to CaCl₂ (at 10 °C, it is 10 hours 30 minutes); start of strength gain at 10 °C (6 hours 30 minutes) compared to CaCl₂ at 10 °C (14 hours)).
- Easy application of mixture in field conditions: the mixture contains all necessary additives for cement preparation with specified density. The mixture is added into dry cement as well as into grouting fluid before mixing with cement.
- The mixture provides for pumped state of the cement slurry even at density of 1,95 g/cm³ due to plasticizer content in the mixture.

Mixed additive for cement slurry ATREN RECADE

Description: powder mixture of additives.

Application: to give cement stone self-healing properties and to block fluid penetration into the cement stone. It contains additives that react upon contact with bottom-hole fluids (water, oil).

Recommended consumption: 2,5 to 5% of dry cement weight. Delivery point and optimum dose are determined by laboratory and/or pilot industrial tests for every specific use case.

Peculiarities:

- Increases the lifetime of cement stone by 30–50%
- Applicable within a wide range of temperatures (5 to 120 °C).
- Easily soluble.
- Increases the water-proof properties of cement stone.
- Due to easy dilation, it increases the strength properties of cement stone and its adhesion to metal even in light grouts.
- Increases the strength properties of cement rock and its adhesion to metal even in light grouts.

ATREN SPACER O cleaning spacer

Description: a mixed product based on different surfactants in the hydrocarbon solvent.

Application: applied in oil industry for removal of a filter cake from hole walls, which is formed by hydrocarbon based drilling fluids. The product conditions a wellbore for effective cementing of casing pipes. An effective product in case of use in wells drilled with use of hydrocarbon based drilling fluids.

Recommended consumption: recommended dosage per 1 m³ of liquid mud:

- ATREN SPACER O — 10–20%;
- Hydrocarbon solvent — 30–40%;
- Water — 50%.

Peculiarities:

- Effective conditioning of a wellbore for effective casing cementing.
- Active cleaning of a filter cake, formed by the hydrocarbon based drilling fluid.



ATREN EXPAND expanding agent for cement mortars

Description: a mixture based on finely dispersed metals with modifying additives.

Application: applied in oil extracting industry, in technological processes of well casing for improvement of lining the hole quality and bond quality on the border "rock-cement stone" and "cement stone — casing pipe" due to internal pressure in the cement mortar.

Recommended consumption: ATREN EXPAND is added to dry cement mixture subject to concentration up to 0,2% (depending on application conditions) with regard to the weight of dry cement.

Peculiarities:

- Controlled response initiation time by means of a special manufacturing technology — capsule.
- Used to control gas migration by creating pressure inside the slurry that compensates the reduction in hydrostatic pressure during cement hardening.
- It has a strong effect that accelerates thickening of the cement slurry.



Magnesia cements

Description: magnesia cement formulations specially selected according to well conditions.

Application: applied subject to any extended salt sublayers along the wellbore, if there is a requirement for high strength characteristics at low formation temperatures in the well, in perennially frozen rock zones, for cementing of gas well.

Peculiarities:

- Operating density of formulations, demonstrating maximal physical-chemical results should be 1,6 g/cm³. Low density allows to depressurize a hydrostatic column during injection and after it. These formulations can be used for cementing of incompetent rock prone to fracturing.
- Density can be adjusted in the range from 1,2 to 2,15 g/cm³, the relevant sedimentation stable formulations with high strength characteristics are selected.

- Densification time can be adjusted with accuracy of a minute, this property is especially useful for cementing of gas wells or wells with abnormally high formation pressures. In such a case gas does not have time to do a tubule in the cement body, that allows to avoid costly repairs to eliminate behind-the-casing flows of the well in future.
- Formulations of magnesia cements of Mirrico Group of Companies do not lose their properties during curing in salt sublayers, a good bond to the salt sublayer is also achieved. Normal cements do not guarantee a qualitative bond in these conditions.

OIL EXTRACTION INNOVATIONS. BOTTOMHOLE TREATMENT CHEMICALS



Water solution ATREN B-SOLV

Description: water solution of high-performance chelating agents mixture, which creates stable soluble complex compounds with barium ions.

Application: for barium (barium sulfate) deposit removal, recovery and increase of porosity and permeability properties of bottom-hole area of oil and gas wells, as well as for cleaning of downhole pumping and technological equipment from barium sulfate deposits.

Recommended consumption: to estimate dissolving capacity of barium sulfate deposits. The recommended dissolving capacity of 5% Atren B-Solv solution relatively (BaSO_4) is 60%, relatively calcium carbonate is 94%, relatively their mixture is 88%.

Peculiarities:

- It is thermally stable. It preserves its efficiency at temperatures up to 150 °C;
- In most cases, it does not require using of additional corrosion inhibitors: it does not have corrosiveness in relation to metals and alloys used;
- In addition to barium sulfate deposits, Atren B-Solv affects insoluble compounds of strontium and calcium (carbonates, sulfates).

SEURVEY ORM oil viscosity modifying agent

Description: a composition of surfactants and a nonionic polymer.

Application: applied to increase gas recovery factor. The action of the agent is based on interaction of surfactants with oil and formation of low viscosity dispersions. Polymeric components form thin films on oil-water phase boundary and prevent coalescence by stabilizing oil-in-water emulsion.

Recommended consumption: regular pumping of SEURVEY ORM oil viscosity modifying agent together with well steam treatment. Recommended concentration for application makes 0,5–2%.

Peculiarities:

- The product comes in two forms:
- SEURVEY ORM 1 is a liquid form of the product and SEURVEY ORM 2 is a granular form of the product.
- Reduces viscosity of high-viscosity oil (from 500 to 1000%) at a temperature of 20 °C.
- Resistant to shear loads and to heat up to 200 °C.
- Ensures separation of water-oil emulsion in 16 hours of production seasoning.
- Can be freshened after destruction of emulsion and newly used in the process of high-viscosity oil treatment.
- Active ingredients of the product are compatible with the most of used corrosion inhibitors, demulsification agents and other agents.

DESANDOL 711 agent for limitation of mechanical impurity carry-over

Description: a complex agent for limitation of mechanical impurity carry-over and water saturation of extracted fluids.

Application: applied to reduce a quantity of mechanical impurity in extracted fluids.

Recommended consumption: 4–10%, an optimal concentration is established according to results of pilot tests.

Peculiarities:

- Increases formation permeability to oil.
- Ensures stabilization of producing formation in semiconsolidated sandy reservoirs.
- Reduces water cut of recoverable oil.
- Reduces operating costs due to increase of runlife of the equipment, especially electric centrifugal pump unit.





Technology of enhanced oil recovery using water diverting thermotropic gelling agents ATREN THERMOSOL (lt and ht brands)

Description: dry powder based on synthetical substances.

Application: for recovery factor increase using water diverting thermotropic gelling agents in terrigenous and carbonate reservoirs with low reservoir sweep by flooding due to untimely entries of flood water in production wells via the most permeable zones.

Recommended consumption: concentration for injection is 10 to 20% Atren Thermosol depending on reservoir geology.

Peculiarities:

- Possibility of well treatment at low ambient temperatures (up to -35°C).
- Solid commodity form facilitates easy handling during wellsite operations.
- The chemical is non-toxic, causes no impact on environment and oil commercial properties.



Mutual solvent DEWAXOL VR

Description: a blend based on surfactants, dispersion agents in an alcoholic solvent.

Application: in the processes of bottom-hole formation area preparation for cleaning pores and filtration channels from formation water and oil, removing osmotic water and oil film from the surface of the formation rocks.

Recommended consumption: repeating addition of mutual solvent (volume depends on a well) before and between injection of different fluids (IC, solvent, well-killing fluids, etc.) into a well, which may be incompatible.

Peculiarities:

- Wide range of solubility both in oil and water phases.
- Compatible with highly mineralized formation waters.
- Lower price for the same level of quality comparable to highly expensive foreign analogs.

INNOVATIONS IN OIL RECOVERY. CHEMICAL AGENTS FOR WATER SHUTOFF

Atren WSO product for selective water shutoff

Description: partially hydrated high-molecular polymer, dispersed in the organic solvent.

Application: applied in reduction-oxidation potential and cement squeeze technologies for selective isolation of water-saturated parts of the formation. A chemical agent is pumped into the formation where it forms gel upon interaction with produced water in the pore space. This leads to reduction of water mobility in water- and oil-saturated sublayers.

Recommended consumption: a chemical agent is mixed with diesel fuel in the ratio of 1:1 at the multiple well platform. 2–3 m³ of working solution per a meter of production range. Dilution of concentrated ATREN WSO with diesel fuel/liquid water-free hydrocarbons fuel in the ratio of 1:1 is acceptable in the field conditions.

Peculiarities:

- Workability of preparation. Additional means are not required to prepare a working composition working composition.
- Does not have negative impact on oil-saturated part of the productive formation.
- The obtained cross-linked system is destructed with a 12% solution of HCl in the volume of 20% from the volume of destructed gel.

MC-ROCK technology

Description: mixture of nonorganic powders of the size of grain from 3 to 5 micron, which are added gradually into the industrial water with creation of a solution with prescribed properties, which, in its turn, turns into a high-force material.

Application: for liquidation of behind-the-casing flows, liquidation of leaks in the production casing, of migration to the upper formations, installation of insulation bridges in oil and gas wells.

Recommended consumption: 3–5 m³.

Peculiarities:

- Penetrating power of MC-ROCK technology compositions is many times higher than the one of usual cements; maximum value of components grain, being a part of this technology, is from 3 to 5 micron.
- High strength properties of formulations. Standard compression strength for any formulation of MC-ROCK technology of MIRRICO Group of Companies is from 30 to 50 MPa and flexing strength is from 10 to 15 MPa, after 24 hour exposure time.
- Possibility to regulate flowability and rheology.
- Linear extension of the rock of the composition is from 5 to 10%, which has a positive impact on the quality and service durability of the repaired well site.

INNOVATIONS IN OIL RECOVERY. CHEMICAL AGENTS FOR FRACTURING



Product for guar-free liquids of formation fracturing VES-FRAC

Description: a gelling agent on water base for formation fracturing liquids. Absence of polymer in the composition implies different mechanism of formation of a structured gel. When VES-FRAC is dissolved, spherical micelles are formed in the water (micelle formation is a typical process for surface-active materials), solution rheology remains unchanged, viscosity does not increase. After an activator is added, the structure of spherical micelles turns into vermiciform micelles, which stands for instant formation of a visco-elastic gel.

Application: applied as a gelling agent on water base for formation fracturing liquids. Non-polymer nature of the chemical agent may form a visco-elastic gel.

Recommended consumption: process of preparation of a working solution consists in adding of VES-FRAC chemical agent in concentration of 3–5% into the fresh water and mixing it till full dissolution. Formation of a visco-elastic gel is achieved at the expense of activation upon adding of a 1–3% activator.

Peculiarities:

- Dissolved excellently and activated upon adding of salt.
- Gel is destroyed upon contact to formation fluids.
- Is applied in the wide range of temperatures.
- Has excellent proppant carrying capacity.
- Gel instantly recovers upon load removal.
- Absence of colmatation of the pore space.

INNOVATIONS STRUGGLING AGAINST DEPOSITS AND CORROSION



SCIMOL WS-2772 corrosion inhibitor of prolonged action

Description: a chemical agent based on high-molecular surface-active materials with intense adsorption properties and substantivity to the metal surface and on low-molecular surface-active components capable to form the system of secondary interaction after formation of a protective film on the metal surface.

Application: applied for anticorrosive treatment of structural metals of oil-field equipment and pipelines of the systems of gathering and transport of water cut oil with stratified and churn flow of liquid, for the systems of waste water disposal and reservoir pressure maintenance.

Recommended consumption: 10–20 g/m³.

Peculiarities:

- Inhibitor components in the result of many molecular interactions have high substantivity to the metal surface, at the expense of which they adsorb on it forming a stable polymer film, which shields the surface from the aggressive environment. At the expense of polymer structure of the film, its elevated adhesion to metals and improved protective characteristics are achieved.
- A low dosage is required compared to the known chemical agents for achievement of high protective effect; high after-effect.
- Formation of a more solid film on the metal surface.
- Protects excellently against carbon dioxide and hydrogen-sulfide corrosion.
- Possesses high sorption activity towards metal surfaces.



Corrosion inhibitor for gas environments

Description: a balanced composition based on polyamines and surfactants in a solvent.

Application: for protection of the oil and gas production equipment and pipelines of the gas production and transportation systems, as well as gas treatment units against carbon dioxide and/or hydrogen sulfide corrosion.

Recommended consumption: 20 to 300 g/m³ of condensed phase volume. The optimum dose is determined based on the results of pilot industrial tests.

Peculiarities:

- Shows high absorption capacity with regard to metal surfaces and a long-lasting aftereffect.
- Provides reliable protection of the equipment in environments containing corrosive gases.

MR series rheology modifier

Description: products have a comprehensive effect; they are made in different kinds depending on application. They represent compositions of non-ionogenic surface-active compounds in the organic solvent. MR-1088 is a suspension of active components in the organic carrier.

Application: applied in oil extraction with the purpose to change properties of the pumpable liquid, reduction of power consumption and increase of technological equipment durability; application of them provides improvement of rheological properties of the pumpable liquid; inhibition of precipitation of wax components of oil; improvement of pumping quality of the pipelines; demulsifying properties.

Recommended consumption: 30–500 g/m³ depending on the conditions.

Peculiarities:

- MR series rheology modifiers are chemical agents having a comprehensive effect. Mechanism of their action is based on formation of defects on the surface of growing wax crystals, which influence there further growth, and on flattening of a turbulent flow at the expense of creation of a “smooth pipeline” effect.
- Availability of modified block copolymers of alkylene oxides allows to destroy trolly oil.
- High efficiency in case of low dosage, complexity of actions.

DESCUM-4, P polymer scale inhibitor

Description: a uniform high-efficiency scale inhibitor, compatible with well-killing fluids and oil field waters. It represents a complex composition based on organic complexing agents with phosphonic groups and organic carbonic polyacids.

Application: applied for effective prevention of precipitation of salts which have different chemical composition at all stages of oil recovery, transportation and treatment for protection of wells, down hole and surface oilfield equipment under conditions of high mineralization of produced water. Main application is for prevention of carbonates and calcium sulphate deposits on the surface and down hole oilfield equipment in the media with different mineralization degree.

Recommended consumption: 10–50 g/m³, dosage is determined to a large degree with the content of sediment forming cations in the produced water, filling with dissolved gases and specific conditions of oil extraction. Optimal dosage is established according to the results of pilot testing.

Peculiarities:

- Compatible with well-killing fluids, this fact allows to use these chemical agents with killing under pressure method and upon well killing.
- Effective under conditions of high mineralization of produced water and does not have any negative impact on construction materials of the oilfield equipment.

Granulated corrosion inhibitors, scaling

Description: a biodegradable polymer matrix, which contains molecules of an active substance. Uniform carryover of the chemical agent is provided by gradual dissolution of an active substance in the liquid flow.

Application: applied for protection of the oilfield equipment against corrosion and salt deposits, besides they may apply by means of placement into a dib hole (a part of a well bore lower than the production facility and up to holdup depth), and in bore-holes, and also under the electrical centrifugal pump, if possible. Very vital for distant wells if anytime access to them is complicated.

Peculiarities:

- Potential joint use of different chemical agents: corrosion inhibitors, demulsification agents, scale inhibitors etc.
- Uniform and regulated carryover of a chemical agent.
- When dosing equipment is not available and filing and control of such equipment is not required.
- Minimum expenses upon well treatment.
- High ecological compatibility.



MARTin technology of robot-assisted cleaning of a vertical steel tank from oil slimes

Description: MARTin installation consists of three units, each of them may be equipped with different equipment depending on the customer's requirements and conditions. A basic model of installation includes:
Unit of withdrawal and cleaning, which consists of a withdrawal pump and a robot-assisted device for erosion of deposits with water under high pressure.
Unit of cleaning and processing, which contains a set of equipment for gradual cleaning of oil slime which is formed from solid particles and separation of an oil fraction.
Unit of emptying, which contains a platform for transport access for removal of cake (separated solid particles), and capacities for oil intake. The water received is used again for erosion and cleaning. Basic equipment of MARTin installation consists of two containers installed on the chassis.

Application: applied for cleaning of reservoirs with return of oil products contained in the deposits.

Peculiarities:

- Reservoirs are not cleaned by people, but by robot-assisted devices equipped with video surveillance system, lighting system, pumping device and washing agent feed device. The robot is equipped with its own shaft and the operator serves its distantly with the help of control and observation center.
- Cleaned deposits are separated and oil part is returned to the customer.
- High speed and quality of cleaning of reservoirs and capacities.
- Manual cleaning is not available.

INNOVATIONS IN OIL AND GAS PROCESSING AND PETROLEUM CHEMISTRY



DEWAXOL 3001-A polymerization inhibitor for alkali purification

Description: a specially chosen mixture of amines in water-alcohol solvent.

Application: applied for prevention of undesirable polymerization of unsatisfied compounds and aldehyde condensation on the alkali cleaning units of pyrolysis products.

Recommended consumption: from 0,1 to 0,6 ppm per 1 ppm of acetaldehyde in pyrolysis gas.

Peculiarities:

- Reduces formation of yellow oil and foam in caustic wash tower.
- Increases under-stream period of the units of alkali cleaning.
- Does not violate a technological process.
- Possesses high effectiveness of inhibition.
- Compatible with DEOXOL 1001 oxygen absorbent.
- Hazard class shall not be lower than 3d hazard class 3.

Oxygen absorbent for alkali cleaning DEOXOL 1001

Description: amine composition in water solution.

Application: for absorption of free oxygen, as well as for prevention of equipment corrosion and inhibiting olefin polymerization in the system.

Recommended consumption: up to 230 ppm depending on flow composition.

Peculiarities:

- Absorbs free oxygen.
- Decreases equipment corrosion.
- Non-toxic product.
- Inhibits polymerization processes.
- Compatible with polymerization inhibitor Dewaxol 3001-A.



Polymerization inhibitors for gas separation DEWAXOL 3002, 3002 (k803), 3002E, 3102, INFLOW 3002E, 3102E

Description: compositions of heterocyclic compounds.

Application: applied for prevention of thermal polymerization in the processes of separation of ethylene, propylene, isoprene, butadiene and other unsatisfied compounds.

Recommended consumption: 20–500 ppm, optimal dosage for each specific case is determined depending on the wellstream composition and operating temperature.

Peculiarities:

- Reduce formation of undesirable polymers.
- Increase under-stream period of the installations.
- Low doses are effective.

Polymerization inhibitors for compression DEWAXOL 3003E

Description: a mixture of derivative heterocyclic compounds and aroma compounds in the hydrocarbon solvent.

Application: applied for prevention of compression of pyrolysis gas and contact gases containing unsaturated compounds by polymerization products of compressor equipment.

Recommended consumption: 1–50 ppm, optimal dosage for each specific case is determined depending on the wellstream composition and operating temperature on the compressor discharge.

Peculiarities:

- Increase of distance run between overhauls of the compressor equipment.
- High effectiveness of inhibition.
- Compatibility with other polymerization inhibitors.



Polymerization inhibitors for styrole production DEWAXOL 3102, 3004-A, 3004-B

Description: compositions based on heterocyclic compounds in polar solvent.

Application: for prevention of thermal polymerization upon styrol production in condensation systems of contact gas and in the processes of hydrocarbon condensate separation.

Recommended consumption: 50–500 ppm, optimal dosage for each specific case is determined depending on the content of styrol in the wellstream and operating temperatures.

Peculiarities:

- Reduces styrol losses.
- Stabilizes furnace oil.

DEWAXOL 5001 polymerization inhibitor

Description: mixture of phenols with bulky substituents.

Application: applied for preservation of commercial properties of monomers during transportation and storage.

Recommended consumption: 10–200 ppm, optimal dosage for each specific case is determined depending on the composition of the product transported.

Peculiarities:

- Reacts extremely quickly with peroxide compounds, suppressing polymerization reaction.

Lubricity diesel fuel additives ATREN LUB, ATREN of A and K brands

Description: tailor-made combination based on fatty acids of their ethers.

Application: for improvement of the lubricity level of diesel fuels (reduction of the wear scar diameter according to GOST R ISO 12156-1).

Recommended consumption: 50–500 ppm depending on quality (fraction and group composition, sulfur content) and quantity of diesel fuel components, it is determined during laboratory testing of the additive.

Peculiarities:

- The chemical efficiency is based on the formation of a modified layer of metal that ensures a smooth distribution of load and reducing wear, resulting from the chemical interaction of the additive with fine films of oxides on the wearing surfaces.

Depressors of heavy petroleum product and medium distillates DEWAXOL

Description: mixture of polymers and surfactants in solvent.

Application: for decreasing pour point temperature/residual fuels and vacuum gasoils fluidity.

Recommended consumption: 50–2,000 ppm, dosage is determined subject to physical and chemical profile of treated fuel and selected during laboratory and industrial tests.

Peculiarities:

- It improves gasoil and fuel oil viscosity and flow characteristics that reduces costs for pumping and discharge of petroleum products.
- Decreases scaling on tank walls during transportation of heavy fuels.
- Feeding of the additive may be performed in concentrated form (after preheating) or in the form of preheated additive solution in diesel fuel. The treated petroleum product temperature before additive injection should be 10–15 °C higher than pour point temperature of contained paraffins.

Coking inhibitor DEWAXOL 1001

Description: composition based on polyisobutylenesuccinimides and amine derivatives in hydrocarbon solvent.

Application: in oil refining industry, in thermal processes of oil and petroleum products refining to decrease carbon deposits on surface of heat-exchange, furnace, and rectifying equipment and pipelines.

Recommended consumption: 15–45 ppm, dosage is adjusted during experimental and industrial application.

Peculiarities:

- Inhibiting effect is reached due to chemical binding of polymerization and polycondensation centers of coke particles.
- Decrease of scale deposition and increase of service life of furnace, reaction chamber, rectifying and heat-exchange equipment.

DEWAXOL 1004

Description: composition based on polyisobutylenesuccinimides and amine derivatives in hydrocarbon solvent.

Application: in thermal processes of oil and petroleum products refining. It is fed before heat-exchange equipment on raw material heating unit and/or before furnaces during the initial time after the plant start.

Recommended consumption: 15–50 ppm, dosage is adjusted during experimental and industrial application.

Peculiarities:

- It is a thermally stable agent in wide range of high temperatures with stabilizing, inhibiting and dispersing properties.

Coking inhibitor DEWAXOL 1002

Description: mixture of amine derivatives and disperser in hydrocarbon solvent.

Application: in oil refining industry in thermal processes of oil and petroleum products refining to decrease carbon deposits on surface of heat-exchange, furnace, and rectifying equipment and pipelines.

Recommended consumption: 15–45 ppm, dosage is adjusted during experimental and industrial application.

Peculiarities:

- Inhibiting effect is reached owing to chemical binding of polymerization and polycondensation centers of coke particles.
- Decrease of scale deposition and increase of service life of furnace, reaction chamber, rectifying and heat-exchange equipment.

Inhibitor DEWAXOL 1003

Description: mixture based on alkyl phosphates in hydrocarbon solvent.

Application: in oil refining industry in thermal processes of oil and petroleum products refining. It is fed before heat-exchange equipment on raw material heating unit and/or before furnaces during the initial time after the plant start.

Recommended consumption: 40–80 ppm.

Peculiarities:

- Stabilizes metal surfaces, prevents adsorption of coke particles.

Depressing and dispersing agents for diesel fuels DEWAXOL 2001–2004

Description: composition based on different copolymers, amides in hydrocarbon solvent.

Application: for improvement of diesel fuel low-temperature properties, as well as for fuel separation in cold storage.

Recommended consumption: 100–1,500 ppm, dosage is adjusted during laboratory testing.

Peculiarities:

- Decreases cold filter plugging point temperature and pour point temperature of diesel fuels.
- Provides sedimentation stability of diesel fuels in cold storage.
- Increases opportunities for producing diesel fuels of the required grade/class (by low-temperature properties) by involving fractions with a higher end-boiling point.

Dispersing agent DEWAXOL 2005

Description: Description: composition based on amides of fatty amines in hydrocarbon solvent.

Application: in oil refining industry to prevent paraffin crystal precipitation in fuels during storage at a temperature lower than cloud point temperature.

Recommended consumption: 50–1,000 ppm, dosage is adjusted during pilot tests and industrial use.

Peculiarities:

- Prevents paraffin precipitation.
- Prevents fuel separation with depressor additives in cold storage.

INNOVATIONS FOR PROVISION OF THE QUALITY OF WATER AND COAL BENEFICATION



Scimol WS corrosion inhibitors

Description: compositions of organic and nonorganic substances.

Application: in open and unvented systems of water supply of industrial enterprises for decrease of corrosion rate. They provide effective protection of ferrous and non-ferrous metals, perform functions of scale inhibitors and dispersant agents of mineral deposits.

DESCUM-2 scale inhibitor

Description: water solutions containing organic phosphonic acids, polymeric components and special processing additives as active ingredients.

Application: in water supply of industrial enterprises for prevention of carbonate, sulfate, ferruginous, phosphate and other deposits on the internal surfaces of the water-cooled, heat exchange and process equipment, and for prevention of deposits formation on the membrane surfaces of reverse osmosis plants.

Peculiarities:

- Allow to wash off old deposits.
- They are effective if hardness of recirculated water is up to 50–60 mg-eq/dm³.

ATREN-BIO biocides

Description: nonoxidizing biocides.

Application: in water treatment and water supply systems of different industrial fields for biological pollution prevention.

ATREN-BD biodispersing additive

Description: water- alkaline solutions of surface-active materials.

Application: in water supply systems of industrial enterprises for removal and destruction of the biological and hydrocarbon films from the surfaces of process equipment and pipelines, as well as to prevent growth of anaerobic bacteria. They increase effectiveness of biocide treatment.

SEURVEY flocculation agents

Description: powdered and liquid water-soluble polyelectrolytes with different charge and molecular weight.

Application: in different fields of industry in the processes of purification of waste and recirculated water, thickening and decantation of slurry and deposits, in the process of coal, ore and minerals beneficiation; and in other technological processes.

Peculiarities:

- Allow to increase significantly the capacity of horizontal and radial-flow settling tanks, flotation plants of filtration and other equipment.
- SEURVEY line also includes chemical agents for treatment and purification of drinking water.

DECLEAVE-M coagulants

Description: line of DECLEAVE-M organic and nonorganic coagulants.

Application: applied for cleaning from suspended solids, oil products and other contaminations of waste and recirculated water, for preliminary purification of industrial water in the process of water treatment; used in the processes of thickening and decantation of industrial and utility slurry; in the process of coal, ore and minerals beneficiation; and in other technological processes at different industrial enterprises.



DESCUM-2, H-3901-RO scale inhibitors

Description: water solutions containing organic phosphonic acids, polymeric components and special processing additives as active ingredients.

Application: applied in water treatment processes to prevent deposition of sediments (water insoluble

iron compounds, carbonates of alkaline earth and other metals) on the surfaces of membrane of the reverse osmosis plants.

Peculiarities:

- Allow to prevent and wash off deposits from the surfaces of membrane of the reverse osmosis plants, and thereby increase their operating life.



UNICOL floatation agents

Description: integrated coal flotation reagents containing a blowing agent and a collecting agent.

Application: applied for flotation of all known types of coal: fatty, gas, coking, noncoking, and anthracite.

Peculiarities:

- UNICOL, C possesses an evident property of a collecting agent.
- UNICOL, F possesses a more evident property of a blowing agent.
- Flotation agents ,C and F, are mixed together in any ratio and applied jointly or separately, depending on the conditions.
- A pronounced synergistic effect is achieved in case of joint use of the chemical agents.
- They form a stable foam which is decanted very well. They act selectively in the range of all sizes of particles in the pulp slurry.



ABOUT MIRRICO GROUP OF COMPANIES



Mirrico Group of Companies is a Russian group of production-service companies in the field of chemical solutions for industrial markets.

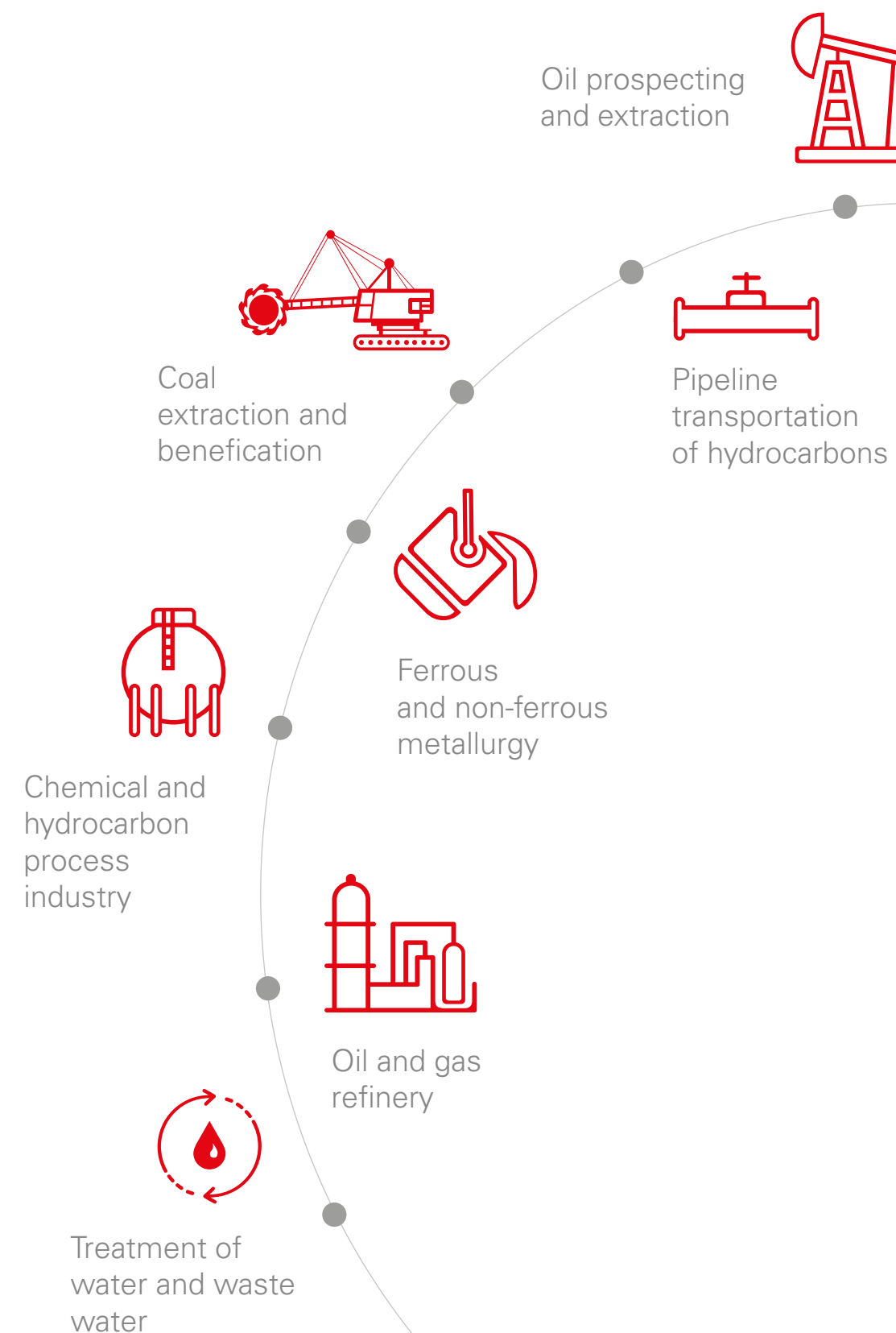
Mirrico Group of Companies creates unique products and technologies, which outrun their market analogues owing to serious investments to researches and developments. Today Mirrico Group of Companies sets itself a task to offer consumers better solutions at the lowest prices.

ISO 9001:2008 quality management system, which is implemented and is in effect in all subsidiaries of Mirrico Group of Companies, confirms stability and guarantees high quality of the products.

Main types of activity:

- Development, manufacture and supply of chemicals
- Backup of chemical solutions

Fields of business interests of Mirrico Group of Companies





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