



KREZOL
GROUP



Krezol product line for the oil and gas industry



Krezol Group is a manufacturer of KR series compositions for the stimulation of oil and gas production. Our compositions have a wide range of application and have been successfully used at the oil-gas fields more than 5 years. The product range includes more than 25 modifications for different types of wells, oil and downhole complications. Our products have a high purity degree and they are made of high-purity acids, surfactants and modifiers of foreign and local production. One of the advantages of KR series reagents is the simplicity of preparation and application of resulting solutions.



Research

- Development of fracturing fluids thickeners and structurants based on polymer-free surfactants, acid fracturing fluids, thickened fracturing fluids destructors (including encapsulated)
- Development of acid compositions for specific types of complications.
- Development of chemicals for integrated chemicalization of oil recovery
- Development of bottom-hole formation zone treatment technologies

Production

- Production of fracturing fluids thickeners and structurants based on polymer-free surfactants, acid fracturing fluids, fracturing fluids destructors
- Production of high purity acid compositions, dry salt systems and ready heavy well-killing fluids without solid phase
- Production of complex reagents:
 - Hydrocarbon and mutual solvents
 - Hydrocarbon, biopolymer and polysaccharide deflecting systems
 - inhibitors of asphalt, resin, paraffin deposits; scale inhibitors, hydrate inhibitors, corrosion inhibitors
 - Demulsifiers
 - Bactericides

Special purpose agents produced by Krezol Group



Inorganic salts deposition

- Acid compositions for different salts depositions removal (carbonates, sulphides, sulphates and Fe-hydroxides, including those with presence of asphaltenes/resins/alkanes deposition) - KR-1K, KR-2T.
- Salts deposition inhibitors KR-10-IS(A), KR-10-IS(B)- effective inhibition of deposition of sulphates, carbonates (including barium sulphate) at different temperatures.

Corrosion/ biological corrosion

- Corrosion inhibitors for pressurizing deposits - KR-10-CI(A).
- Corrosion inhibitors for oil-gathering systems - KR-10-CI(B).
- Bactericides.

Asphaltenes/resins/alkanes depositions (ARAD)

- ARAD Solvents KR-4R of A,B and C classes for ARAD control.
- KR-10ARPD Detergent inhibitor of A,B and C classes.

Oil treatment

- Demulsifying agents.
- Hydrogen sulphides scavengers

Bottomhole formation zone treatment (BFZT), Oil production rate increase methods (OPRIM), Water production limitation (WPL)

- Complex compositions for BFZT and High-Tech BFZT in carbonate reservoirs with complications of different grade and origin KR-1K, KR-10C, KR-1HK .
- Complex compositions for BFZT and High-Tech BFZT in terrigenous reservoirs with complications of different grade and origin KR-2T, KR-20C, KR-2HK
- Complex gel-forming composition for preparation of viscous-elastic acid compositions KR-5Q
- Complex composition for reciprocal solvents mixture needed for High-Tech BFZT - KR-4D
- Complex hydrocarbon solvent for High-Tech BFZT and dewaxing of wells KR-4R
- Complex composition for preparation of viscous-elastic gel for High-Tech BFZT and sparring killing of well KR-3G
- Complex composition for preparation of hydrophobic inverted emulsions for High-Tech BFZT and sparring killing of well KR-3E

Demulsifying agents KR-10-EI(A), KR-10-EI(B)

Hydrates solvent KR-4D (A)



Reasons for the use of KR series high-purity acids

KR series high-purity acidic compositions are multicomponent mixtures with synthetic and reactive hydrochloric acid, characterized by:

- Long-term storage with the absence of "salting out" and precipitation

- Extremely low iron content and absence of harmful impurities

- Saving the components of the saturating additives pack (iron Fe_3 + content controller, inhibitor, demulsifier, antislack, retardant) maintaining predetermined efficiency

- Lower cost

- Proved higher efficiency compared to the inhibited hydrochloric acid

- Available saturating additives pack provides compatibility with formation fluids - oil and water, iron Fe_3 + content control prevents the formation of acid-oil emulsions and insoluble precipitates

Appearance	Liquid from yellow to reddish colour
Mass fraction of hydrogen chloride,%, in the range of	15,0-34,0
Density at 68 F, g/cm3	1,08-1,17
Mass fraction of iron,%, no more than	0,001

Range of application

Production well stock – stimulation of oil and gas production in producing wells with carbonate reservoirs, which lowered productivity due to formation of inorganic colmatant in bottom-hole areas. Injection well stock - increase of well injection capacity, the removal of the skin factor.

Function

Hydrochloric acid composition with surfactants with an extremely low content of iron and other substances for hydrochloride acid treatment of average permeability carbonate reservoirs.

Composition KR-1K may be used as:

- An independent agent for simple standard hydrochloride acid treatment and acid baths;
- The base for the preparation of various types of specialized acid compositions by Krezol Group technologies.



Parameter	Grade A	Grade B
Appearance	Colorless to brown homogenous liquid	
Density at 68 F, g/cm ³	0,940-1,110	1,090-1,190
Freezing temperature, F, max	- 40	- 40
Protective effect at concentrations of scale Inhibitor 30 mg/dm ³ , %, min	90 80	90 90
<ul style="list-style-type: none"> • for calcium sulfate • for calcium carbonate 		

Application

KR-10SI inhibitor is highly effective against carbonate and sulfate deposits of mineral salts in the process of oil production, transportation and treatment. Can be used under high mineralization of produced water.

Application and Use

Exact dosages of KR-10SI for the specific fields of the Customer are determined by laboratory and pilot tests, maintained by Krezol-Group technical specialists.

Objects of application

- Downhole equipment;
- Water and oil treatment system;
- Heat power equipment.

Note

Most efficient is continuous injection of KR-10SI. The reagent use of the reagent has no negative effect on the process of oil and water treatment.



Parameter	Specification	
	Specification for KR-12BC grade A	Specification for KR-12BC grade B
Appearance	Colorless to dark-yellow liquid, opalescence is permissible	
Density at 68F, g/cm ³	0,95-1,1	0,85-1,0
Freezing temperature, F, max	-49	-31

Application
 KR-12BC Bactericide is designed for growth inhibition of sulfate-reducing bacteria, anaerobic bacteria in oilfield waters of the system “formation – well - aboveground equipment”, for bactericidal treatment of injected water to prevent the formation of biogenic hydrogen sulfide and carbon dioxide in the water gathering and treatment systems and in reservoir pressure maintenance systems, to prevent bio-corrosion, biological fouling and biodeterioration.

Application and Use
 Exact dosages of KR-12BC for the specific oil-field of the Customer are determined by laboratory and field trial tests, maintained by Krezol-Nefteservis service specialists.

Objects of application

- Reservoir-pressure maintenance system;
- Production wells and reservoirs;
- Water gathering and treatment system.

Note
 To avoid adaptation of SRB cells, it is recommended to alternate treatments by grades A and B.

Application and Use

Bactericidal activity of the commodity form, ensuring complete inhibition of sulfate-reducing bacteria (SRB), mg/dm ³ , less than	Specifications	
	KR-12BC, grade A	KR-12BC, grade B
	75-100	300-500





KR-10 Detergent inhibitor of asphalt, resin, paraffin deposits

Appearance	Light-yellow to brown liquid
Density at 68F, g/cm ³	0,900-1,100
Freezing temperature, F, max	- 40

Application
KR-10 Detergent inhibitor of Asphalt, Resin, Paraffin Deposits (ARPD) is designed to prevent resin-paraffin deposits on the surface of oilfield equipment. Inhibitor's operating characteristics allow effective prevention of ARPD from medium- and high-water-cut oils, formation of high viscosity water-in-oil emulsions.

Application and Use
For more effective use this reagent should be used after removal of ARPD by KR-4R integrated hydrocarbon solvent. Recommended dosage: 300-1000 g/t. Optimal dosages are determined by laboratory and pilot tests, depending on the ARPD nature.

Objects of application

- Production wells;
- Pipelines.

Note
Most efficient is continuous injection of KR-10 ARPD Detergent inhibitor . Periodic treatment is recommended at least once in 5-7 days.





KR-4R MODIFICATION

Appearance	Clear liquid from colorless to pale yellow
Flash point, F, not lower than	-58
Chilling point, F, not higher than	-76
Density at 68F, g/cm ³	0,72-0,90

Range of application
 The integrated hydrocarbonic KR-4D solvent made of a mixture of alcohols, dispersants and surfactants is designed to combat micro-capillary water-oil emulsions of the 1-st and 2-nd class, as well as for the moisture-free walls of low-permeability pore reservoirs during selective hydrochloric and mud acid treatments.

Function
 The штейнфев hydrocarbonic solvent for high tech bottom-hole treatment and dewaxing.

Usage
 The field service technicians of "Krezol Group" will conduct the selection of optimal consumption and the integrated hydrocarbonic KR-4R solvent application technologies at specific fields of the Customer.

Advantages
 The complex hydrocarbonic KR-4R solvent has features of a polar solvent, it actively softens and dissolves asphalt, resin, paraffin deposits;; effectively solves "the water-oil conflict" at the interphase boundary, thus providing deep penetration of alcohol-acid composition in remote reservoir compartments, mixing with the oil in the remote sections formation, promotes sharp increase of its mobility and displacing the factor of solution gas-oil ratio.



Appearance	Free flowing powder from white to yellow colour
Bulk density, kg/m ³ , in the range of	0,80–0,95
Hydrogen ion activity 1.0% water solution.	6,0-8,0

Range of application

Gelling agent KR-3G is designed for regulation and selective redistribution of acid composition flows during the BHT with complex heterogeneous injectivity profile, as well as for increase the coverage of treatment during acid hydrofracturing and non-damaging well killing.

Usage

The field service technicians of "Krezol Group" will conduct the selection of optimal consumption and KR-3G gelling agent application technologies at specific fields of the Customer.

Advantages

Gelling agent KR-3G makes possible to control the gel final viscosity by varying its concentration in a wide range depending on the geological conditions and problems to solve.





Range of application

Stimulation of oil and gas production in carbonate reservoirs with the temperature up to 164F which reduced productivity due to formation of inorganic colmatants in bottom-hole areas, complex organic colmatants, stabilized oil-water emulsions.

Function

Concentrate for acid composition preparation in field and steady-state conditions.
KR-1OC composition used for simple hydrochloric acid treatment, as well as for high-tech bottom-hole treatment (BHT) with different formation stimulation technologies at wells with the reservoir, composed mainly of carbonates (with a minimum of clays and other aluminum silicates), with average resin content oil and surfactants - asphaltenes which contribute to the formation and stabilization of stable acid-oil emulsions and finely divided sediments of insoluble salts of metals (Fe_3^+ , Ba_2^+ , Ca_2^+ , Mg_2^+ , Al_3^+)

Appearance	Liquid from colorless to reddish
Mass fraction of hydrogen chloride,%, in the range of	15,0-34,0
Density at 68F, g/cm ³	1,08-1,17
Mass fraction of iron,%, no more than	0,001

Advantages:

- prevents the formation of resistant high-viscosity oil emulsions and secondary sediments;
- Slows the reaction of the acid with the reservoir rock in 5-12 times, providing a deep penetration of the agent into the formation;
- effectively washes the pores of the filter cake from asphalt, resin, and paraffin deposits;
- the reservoir perforation walls becomes hydrophobized, what leads to the deeper acid penetration into the formation while increasing its permeability as per oil;
- Stabilizes the iron ions in solution on dissolving the iron-containing rocks and sediments.
- Provides a low corrosivity.



Appearance	Liquid from yellow to reddish colour
Mass fraction of hydrogen chloride,%, in the range of	11,0-34,0
Mass fraction of hydrogen fluoride,%, in the range of	4,0-5,0
Density at 68F, g/cm³	1,08-1,14
Mass fraction of iron,%, no more than	0,001

Range of application

KR-2OC acid composition is recommended for stimulation of oil and gas production in colmataged producing wells in terrigenous reservoirs of oil wells, tend to resistant acid-oil emulsion formation.

Function

KR-2OC composition is used for simple mud acid treatment, as well as for high-tech bottom-hole treatment (BHT) with different reservoir stimulation technologies at wells with terrigenous reservoir, with average resin content oil and surfactants - asphaltenes which contribute to the formation and stabilization of stable acid-oil emulsions and finely divided sediments of insoluble salts of metals (mostly sulfides).

Acid composition KR-2OC:

- prevents the formation of resistant high-viscosity oil emulsions and secondary sediments;
- Slows the reaction speed of the acid with the reservoir rock in 5-12 times, providing a deep penetration of the agent into the layer;
- Effectively washes the pores of the filter cake from asphalt, resin, and paraffin deposits;
- the reservoir perforation walls becomes hydrophobized, what leads to deeper acid penetration into the formation while increasing its permeability as per oil;
- Stabilizes the iron ions in solution by dissolving the iron-containing rocks and sediments, provides a low corrosivity.



Appearance	Liquid from yellow to reddish colour
Mass fraction of hydrogen chloride,%, in the range of	24,0-36,0
Density at 68F, g/cm ³	1,11-1,18
Mass fraction of iron,%, no more than	0,001

Acid composition of the KR-1HK:

- Prevents the formation of highly resistant acid-oil emulsion and secondary sediments;
- Slows the reaction of the acid with the reservoir rock in 5-12 times, providing a deep penetration of the agent into the formation;
- effectively washes the pores of the filter cake from asphalt, resin, and paraffin deposits;
- the reservoir perforation walls becomes hydrophobized, what leads to the deeper acid penetration into the formation while increasing its permeability as per oil;
- Stabilizes the iron ions in solution on dissolving the iron-containing rocks and sediments.

Function

KR-1HK composition applied for simple hydrochloric acid treatment, as well as for high-tech bottom-hole treatment (BHT) with different formation stimulation technologies at wells with the carbonate reservoir with high content of clay materials (over 10%), elevated rock temperature (above 194F) with average resin content oil and surfactants - asphaltenes which contribute to the formation and stabilization of stable acid-oil emulsions and finely divided sediments of insoluble salts of metals.

Range of application

Used for stimulation of oil and gas production in carbonate reservoirs, which lowered productivity due to formation of colmatant in bottom-hole formation zones, as well as oil-water emulsions.



Appearance	Liquid from yellow to reddish colour
Mass fraction of hydrogen chloride,%, in the range of	21,0-32,0
Mass fraction of hydrogen fluoride,%, in the range of	4,0-5,0
Density at 68F, g/cm³	1,12-1,18
Mass fraction of iron,%, no more than	0,001

Usage

KR-2HK acid composition is used for stimulation of oil and gas production in carbonate reservoirs, which reduced productivity due to formation of colmatant in bottom-hole formation zones.

KR-2HK acid composition is recommended for oil wells, tend to resistant acid-oil emulsion formation.

Function

KR-2HK composition is used for simple mud acid treatment, as well as for high-tech bottom-hole treatment (BHT) with different reservoir stimulation technologies at wells with the terrigenous reservoir, with high resin content oil and surfactants – asphaltenes, during its implementation there is some risk of resistant acid-oil emulsions formation and settling of colmatage sediment of insoluble salts of iron, aluminum, barium, etc., as well as complications induced with high reservoir temperature (above 194F).

Range of application

KR-2HK acid composition:

- - prevents the formation of resistant high-viscosity oil emulsions and secondary sediments;
- slows the reaction speed of the acid with the reservoir rock in 5-12 times, providing a deep penetration of the agent into the formation;
- effectively washes the pores of the filter cake from asphalt, resin, and paraffin deposits;
- the reservoir perforation walls becomes hydrophobized, what leads to deeper acid penetration into the formation while increasing its permeability as per oil;
- stabilizes the iron ions in solution by dissolving the iron-containing rocks and sediments, provides a low corrosivity.



Appearance	Liquid from yellow to reddish colour
Mass fraction of hydrogen chloride,%, in the range of	11,0-34,0
Mass fraction of hydrogen fluoride,%, in the range of	4,0-5,0
Density at 68F, g/cm³	1,08-1,14
Mass fraction of iron,%, no more than	0,001

Range of application
 Production well stock - stimulation of oil and gas in production wells with carbonate reservoirs, which lowered productivity due to formation of inorganic colmatant in bottom-hole areas.
 Injection well stock - increase of well injection capacity, the removal of the skin factor.

Function
 Acid composition with surfactants with an extremely low content of iron and other harmful impurities for mud acid treatments of the average permeability terrigenous reservoirs.
 KR-2T composition can be used as:
 - An independent agent for simple standard mud acid treatments (with prior overflush of KR-1HK acid buffer composition) and acid baths;
 - The base for the preparation of various types of specialized mud acid compositions by technologies and of concentrates of Krezol Group.

Usage
 In a case when acid composition KR-2T is delivered as a concentrate the desired concentration of the working solution is reached by diluting fresh water.
 The field service technicians of "Krezol Group" will conduct the selection of optimal unit consumption and acid composition KR-2T injection technologies at specific fields of the Customer.



Range of application

Concentrate is an integrated composition of surfactants: emulsifiers, water repellents, dispersant and high molecular weight surfactant - an emulsion stabilizer. It is used to produce hydrophobic invert emulsions with adjustable parameters for the selective hydrochloric acid emulsion treatments of bottom-hole formation zones and non-damaging well killing.

Invert emulsion "works" in two ways:

- As flow diverter: without having such high viscosity as gel systems, invert hydrophobic emulsions have function of selective redistribution flows of acid-oil compound to oil zones.
- As retarded acid: hydrophobicity of invert KR-3E emulsion causes "sealing" of water interlayers (due to the high surface tension between the phases of the hydrocarbon and water) with simultaneous deep penetration of combined emulsified acid in low-permeability areas of oil zones. With the following prolonged exposure of the released acid on the rock. An acid composition restores or forms new "needle-like" porous filter after the process of disintegration in invert emulsion capillaries into hydrocarbon and acid composition. Whereas hydrocarbon wets the newly formed capillary structure, directing it to the oil filtration.

The composition of the KR-3E invert emulsion allows to eliminate the hazard of secondary sedimentation due to interaction of the oil active components with the acid composition, as well as stabilize asphalt, resin, and paraffin deposits.

Advantages

KR-3E complex compound is used:

- To preserve the reservoir properties, lost circulation and permeability inversion control in the process of non-damaging well kill.
- To slow the rate of hydrochloric acid neutralization, the selective treatment of oil-saturated sections with low permeability, the redistribution of process liquids during drilling-in and selectively treatment of bottom-hole formation zone in order to improve oil recovery of wells with geological complications such as a low-permeability and / or untapped and high absorption zones.

Application as a flow diverter of invert hydrophobic emulsions.





KR-4D MODIFICATION

Appearance	Clear liquid from colorless to pale yellow
Flash point, F, not lower than	35,6
Chilling point, F, not higher than	-76
Density at 68F, g/cm³	0,73-0,88

Range of application
 The integrated mutual KR-4D solvent made of a mixture of alcohols, dispersants and surfactants is designed to combat micro-capillary water-oil emulsions of the 1-st and 2-nd class, as well as for the moisture-free walls of low-permeability pore reservoirs during selective hydrochloric and mud acid treatments.

Usage
 The field service technicians of "Krezol Group" will conduct the selection of optimal consumption and the integrated mutual KR-4D solvent application technologies at specific fields of the Customer.

Function
 The integrated mutual solvent for high-tech bottom-hole treatment and well dewaxing.

Advantages.
 The complex mutual KR-4D solvent has features of a polar solvent, it actively softens and dissolves asphalt, resin, paraffin deposits; effectively solves "the water-oil conflict" at the interphase boundary, thus providing deep penetration of alcohol-acid composition in remote reservoir compartments, mixing with the oil in the remote sections formation, promotes sharp increase of its mobility and displacing the factor of solution gas-oil ratio.



Self-diverting KR-5Q acid composition



Range of application
KR-5Q self-diverting acid composition is designed to regulate the coverage of the acid treatment and the selective processing of drowning. It is used for the oil production stimulation in fractured carbonate reservoirs with high permeability interlayers in the reservoir. And also to prevent complications related to the fact that during bottom-hole formation zone treatment highly permeable areas are exposed to acid.

Self-diverting acid composition
Brand KR-5Q is intended for well treatment in carbonate reservoirs of pore-fractured type with substantial layer heterogeneity.

Usage
The field service technicians of "Krezol Group" will conduct the selection of optimal consumption and KR-5Q self-diverting acid composition application technologies at specific fields of the Customer.

Advantages
The possibility of regulating reservoir acidizing coverage.
Increased efficiency in the use of acidic composition due to the expenditures absence in areas of high permeability, as well as for caving.
The absence of reservoir pore space colmatation when using self-diverting acid composition.



Range of application

K-well killing heavy fluid is designed for:

- terrigenous mud (clay) well kill operations with a minimum content of carbonates and calcite;
- oil and gas condensate well kill operations with abnormally high reservoir pressure;
- oil and gas condensate well kill operations with formation waters that are incompatible with chlorine-calcium well killing fluids;
- oil and gas condensate well kill operations with a high content of clay and / or argillaceous cement in reservoir rock;
- Drilling-in and completion of the producing intervals.

Usage

Desired concentration of working solution is reached by dilution dry concentrate with fresh water.

If necessary, the selection of the optimal consumption rates and K-well killing fluid application technologies are performed by field service technicians of "Krezol Group".

Advantages

K-well killing fluid is very soluble in water without the formation of solid phase.

K-well killing fluid is frost-resistant, the range of application of K-well killing heavy fluid reaches -33,7 F. The maximum specific gravity of K-well kill heavy fluid is 1.47 - 1.52 g/cm³ depending on the temperature.

K-well killing heavy fluid does not cause corrosion.

Permeability restoring coefficient of oil-saturated core reaches 105% when K-well killing fluid is used.

K-well killing fluid have an inhibitory effect on the clay rocks.

K-well kill heavy fluid are compatible with sodium, potassium, and potassium-containing formation waters.

K-well killing fluids are incompatible with calcium chloride solutions.



Range of application

Ca-well killing heavy fluid is designed for:

- Well kill operations in carbonate reservoirs
- Oil and gas condensate well kill operations with abnormally high reservoir pressure;
- Drilling-in and completion of the producing intervals.

Function

Well killing fluid with the density from 1.00 to 1.64 g/cm³ without solid phase is designed for well kill operations in carbonate reservoirs.

Advantages

- Ca-well killing heavy fluid is soluble in water without formation of solid phase, slightly gelled.
- Ca-well killing fluid is compatible with calcium chloride solutions
- The maximum specific gravity of Ca-well kill heavy liquid is 1.64 g/cm³ depending on the temperature.



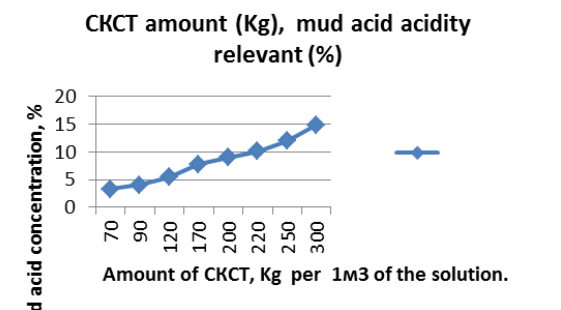
Appearance	Crystal mass from white to cream-coloured
Solubility in water	Complete with small amount of foam
Dissolution rate of low-carbon steel at 68F (10% solution) g/m³ per hour, no faster than.	0,2
The dissolving ability of 12% working solution by CaCO₃, kg /t, at least	46

Range of application

KR-7 CKCT dry acid composition is designed for oil and gas well treatment in terrigenous reservoirs with oil averse to stable emulsion formation. It is used as a 10-15% solution in water with a density of up to 1.025 g/cm³.

Function and Usage

KR-7 CKCT is prepared by adding water to the appropriate amount of dry acid composition, the recommended amount of reagent is 100-250 kg per 1m³ of the solution KR-7 CKCT working form rate is 1-2 m³ per 1 meter of perforation.



KR-7 CKCK DRY ACID COMPOSITION



Appearance	Crystal mass from white to cream coloured
Solubility in water	Complete with small amount of foam
Dissolution rate of low-carbon steel at 68F (10% solution) g/m³ per hour, no faster then.	0,2
The dissolving ability of 12% working solution by CaCO₃, kg /t, at least	42

Range of application

KR-7 CKCK dry acid composition is designed for oil and gas well treatment in carbonate reservoirs with oil averse to stable emulsions formation. It is used as a 10-15% solution in water with a density of up to 1.022 g/cm³.

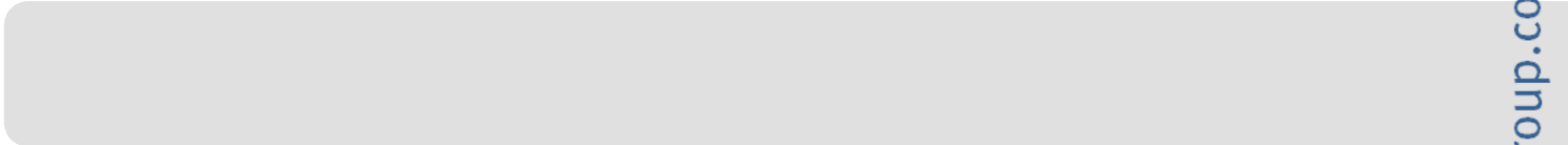
Function and Usage

KR-7 CKCK is prepared by adding water to the appropriate amount of dry acid composition, the recommended amount of reagent is 100-250 kg per 1m³ of the solution KR-7 CKCK composition rate is 1-2 m³ per 1 meter of perforation.

KR-7 CKCK dry acid composition is a mixture of organic acids with effective acid corrosion inhibitors and surfactants.

The field service technicians of "Krezol Group" will conduct the selection of optimal consumption and KR-7 CKCK dry acid composition application technologies at specific fields of the Customer.





Thank you for your attention!

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