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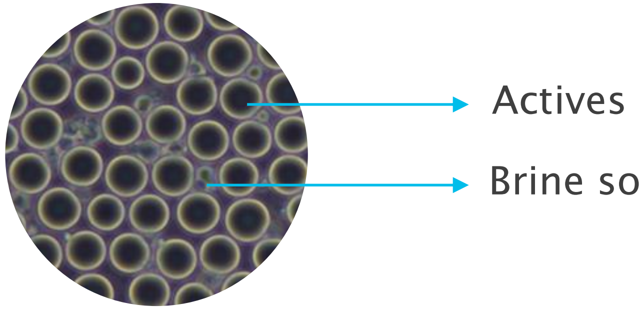
OIL&GAS

Exclusive Chemical Technologies

WHAT IS HIMOLOC?



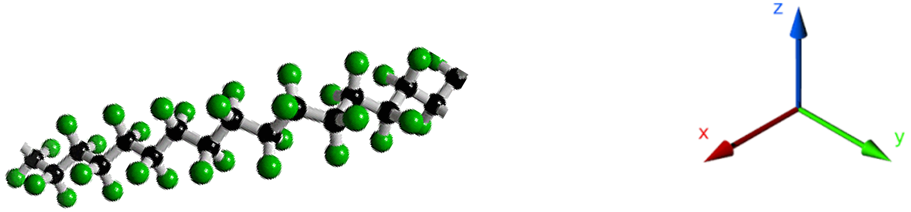
Pure product | Solution at 1%

Soluble polymer in **aqueous matrix**

Pure vs. dissolved aspect

Ionic charge: Cationic, Anionic, Non-ionic and Amphoteric

Estructure: Cross-Linked and linear



Micropolymers with 3D structure (greater charge accessibility → Increases Reactivity)

HIMOLOC ADVANTAGES

EASY

Can be dissolved in any type of water (even seawater in Offshore platforms) with a simple static mixer or Direct Dosing is possible

ENVIROMENTALLY FRIENDLY

FREE of Solvents, Mineral Oils and Surfactants. Excellent for protecting formations/water from emulsions

OPTIMAL

Fast Reaction Polymers (non inversion needed) and versatile applications

AD HOC POLYMERS

Monomer and structure combination design for efficient applications

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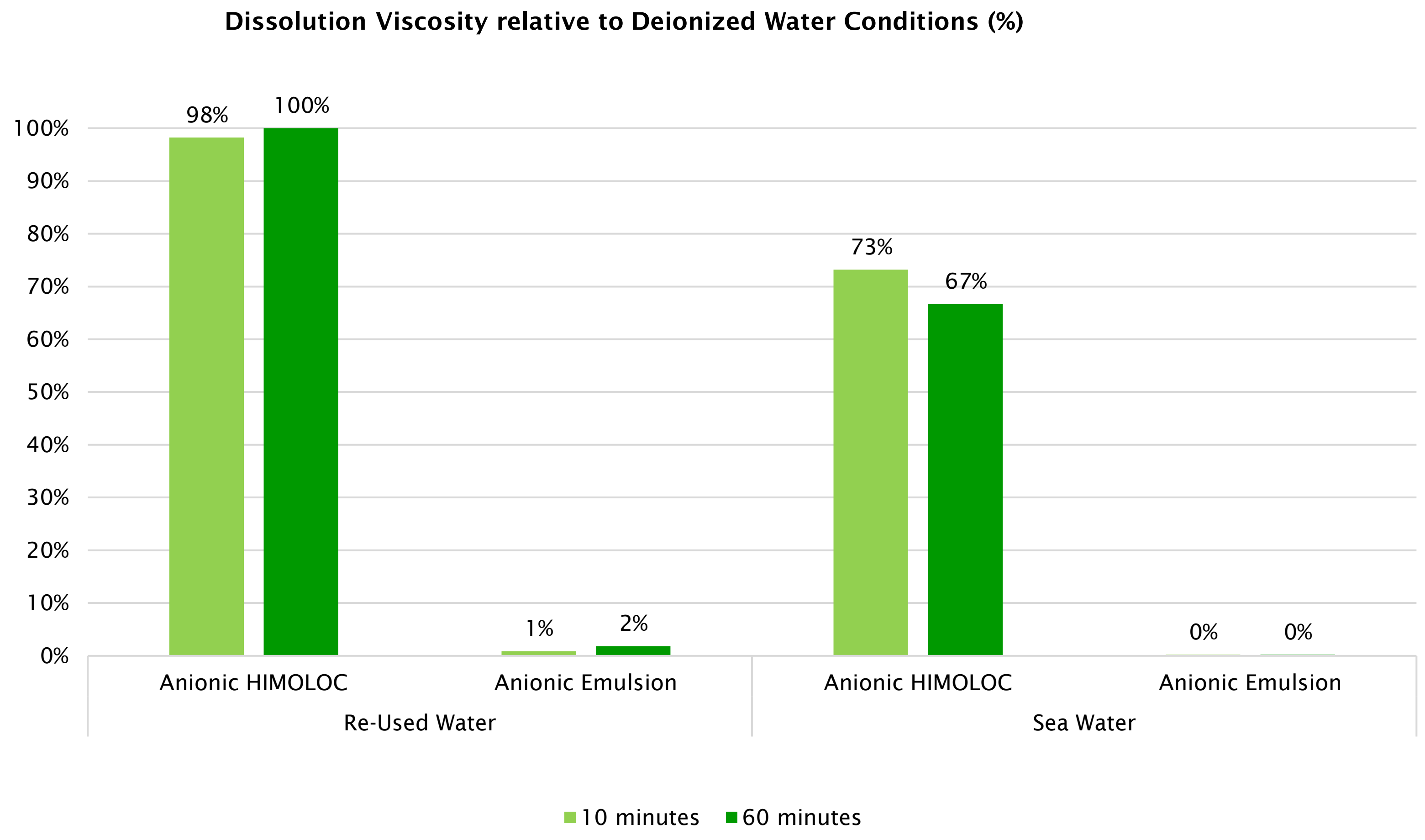
TECHNOLOGY COMPARISON

	HIMOLOC Technology	Emulsions	Powder
Application	Very cheap equipment	Expensive equipment	Very expensive equipment
Prior to use	No need to stir	Stir recomended	Hygroscopic products can clog
Solubility	Complete between 0,1% - 5%	They need to be prepared at certain concentrations	Very difficult, implies poor polymer utilisation
Dissolution time	< 10 min Instant with a Static Mixer	> 25 min	> 60 min
Freezing temperature	Very low	Low	N/A
VOC's emission	NO	YES	NO
Increase in COD and BOD	NO	YES	NO
Effect of water quality on dissolution	NO	YES	YES
Direct application	YES	NO	NO
Shelf life	9 months	6 months	12 months

POLYMER DISSOLUTION

- HIMOLOC Technology allows the use of reused water or even seawater (OFFSHORE) without decreasing efficiency as with other PAM technologies.



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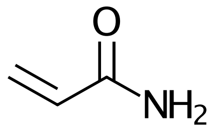
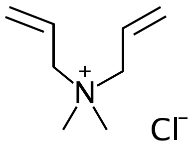
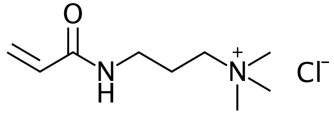
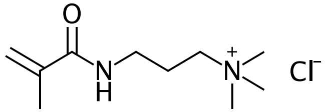
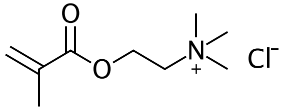
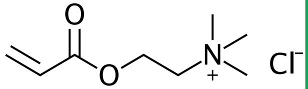
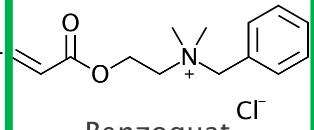
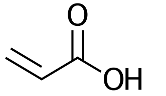
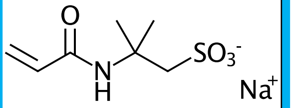
HIMOLOC FORMULATION



AAM: Acrylamide
C_3H_5NO
71.08 g/mol

Base monomer for the formulation of PAM's (Polyacrylamides)

	CATIONIC MONOMERS						ANIONIC MONOMERS	
Name	DADMAC	APTAC	MAPTAC	MADAMQUAT	ADAMQUAT (MCQ)	BZQUAT (BZQ)	AA	AMPS **(ATBS)**
Chemical structure	 DADMAC $C_8H_{16}ClN$ 161.67 g/mol	 APTAC $C_9H_{19}ClN_2O$ 206.9 g/mol	 MAPTAC $C_{10}H_{21}ClN_2O$ 220.74 g/mol	 Madamquat or MC75 $C_9H_{18}ClNO_2$ 207.7 g/mol	 Adamquat or MC80 $C_8H_{16}ClNO_2$ 193.45 g/mol	 Benzoquat $C_{14}H_{20}ClNO_2$ 269.77 g/mol	 Acrylic Acid $C_3H_4O_2$ 72.06 g/mol	 NaAMPS $C_7H_{12}NNaO_4S$ 229.23 g/mol
Benefits	Helps neutralise the negative surface charge of colloids	High resistance to hydrolysis	High resistance to hydrolysis	Very high molecular weights can be obtained	Allows high molecular weights to be obtained at reasonable cost	Unique DERYPOL monomer with hydrophobic part for improving Oil/Water separation	Very high molecular weights can be obtained	High resistance to hydrolysis. For acid pH and/or HTHP systems

HIMOLOC Technologies for Oil&Gas

DRILLING

Range of specifically polymers for water-based drilling muds designed to complement and enhance the systems, enabling minimum non-production time and improved well performance

STIMULATION

Polymer ranges specifically designed and developed to enhance many aspects of well stimulation such as Friction Reducers and Gelling Polymers

EOR

Polymer EOR technologies designed to extract more recoverable resources and extend the life of the well by Enhancing Oil Recovery operations

PRODUCTION

Broad product portfolio for water treatment, including coagulants, floculants and emulsion breakers to treat produced water for reuse or disposal to meet operational and environmental targets

DRILLING MUD Additives

PAM’S produced in a variety of molecular weights, ionicity and compositions for specific applications for water-based fluid systems

Product	Cationicity (molar %)	Composition	Molecular weight	Viscosity
TG325	10%	AAM/MCQ	High	<1500 cp
TG30	35%	AAM/MCQ/BZQ	High	<1000 cp
TX7360	64%	AAM/MCQ /BZQ	Crosslinked	<2500 cp
DR4000	80%	AAM/BZQ/MCQ	Medium	<500 cp

Product	Anionicity (molar %)	Composition	Molecular weight	Viscosity
GO2000	0%	AAM	Medium	<2000 cp
GO2010	10%	AAM/AAC	High	<3000 cp
GA8713	13%	AAM/AMPS	Medium	<400 cp
GAX973	13%	AAM/AMPS	Crosslinked	<400 cp
GO2030	30%	AAM/AAC	High	<2000 cp
GO7130	30%	AAM/AAC/AMPS	Very High	<500 cp

Product	Cationic/ Anionic	Composition	Molecular weight	Viscosity
ZW322LMW	50% / 20%	AAM/BZQ/ AAC/MCQ	Low	<1500 cp

Application	Products
Rheology Control (Viscosifiers)	**GO** series **GA8713** for HTHP systems
Fluid Loss Control	**ZW322LMW**
Bentonite Extender	**GAX973**
Shale Encapsulation	**GAX973**
Mud Dewatering (Flocculants)	**TG / TX / DR** series **GO** series
Produced Water Treatment (Flocculants)	**TG / DR** series **GO** series

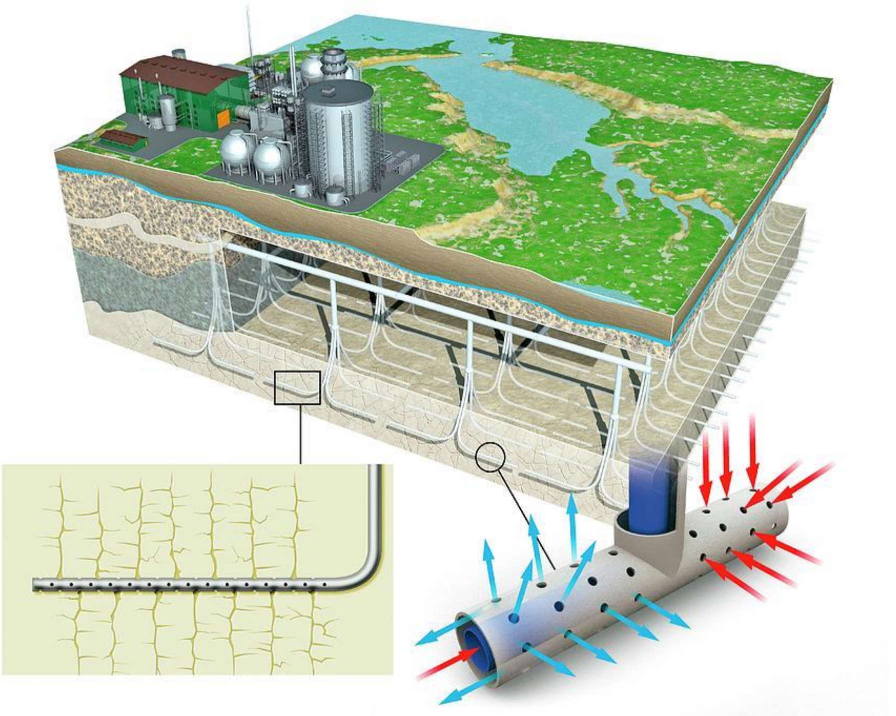
STIMULATION Additives

High-performing polymeric Friction Reducers that provide economic, **environmental** and operational benefits to Hydraulic Fracturing customers

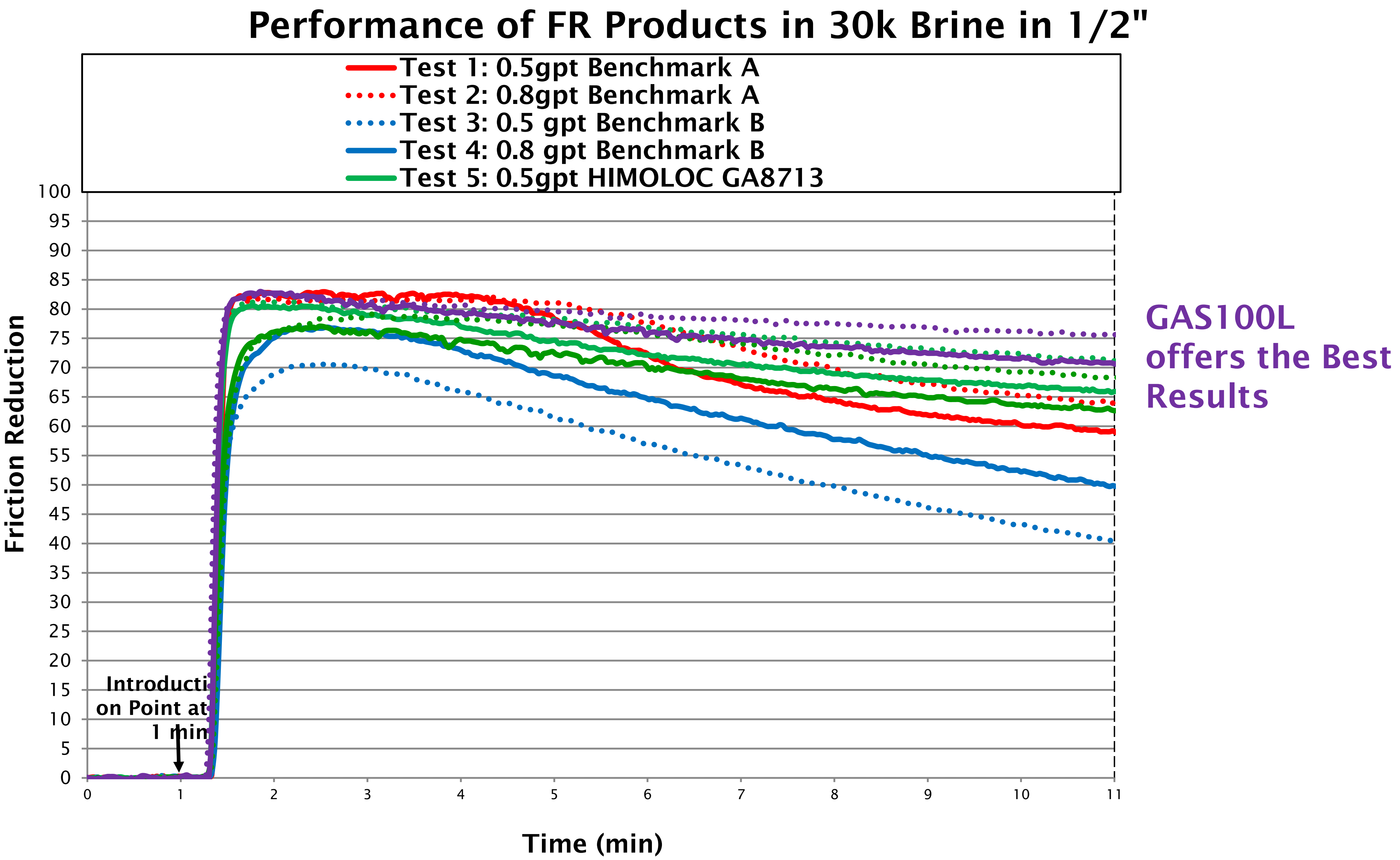
Product	Anionicity (molar %)	Composition	Molecular weight	Viscosity
GA8713	13%	AAM/AMPS	Medium	<400 cp
GAS100L	**25%**	**AAM/AMPS/AcNa**	**Medium**	**<2000 cp**
GO8230	30%	AAM/AAC/AMPS	Very High	<1500 cp

Product	Cationicity (molar %)	Composition	Molecular weight	Viscosity
DR2500	10%	AAM/BZQ	Medium	<400 cp
MG12A	10%	AAM/DIMAPAQUAT	High	<3000 cp
MG11M	10%	AAM/MAPTAC	High	<3000 cp

Product	Ionicity	Composition	Molecular weight	Viscosity
GA50	Amphoteric	AAM/APTAC/AMPS	High	<1500 cp



Application	Products
Friction Reducer	**GA8713** & **GAS100L** for HTHP and High Salinity systems **GO8230** for Universal conditions **DR2500** for fresh water to low salinity systems **MG12A** & **MG11M** & **GA50** for HTHP & SAGD (Steam Assisted Gravity Drainage) systems


Performance of FR Products in 30k Brine in 1/2"
Test 1: 0.5gpt Benchmark A
Test 2: 0.8gpt Benchmark A
Test 3: 0.5 gpt Benchmark B
Test 4: 0.8 gpt Benchmark B
Test 5: 0.5gpt HIMOLOC GA8713
Friction Reduction
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Introducti
on Point at
1 min
0
1
2
3
4
5
6
7
8
9
10
11
Time (min)
GAS100L
offers the Best
Results

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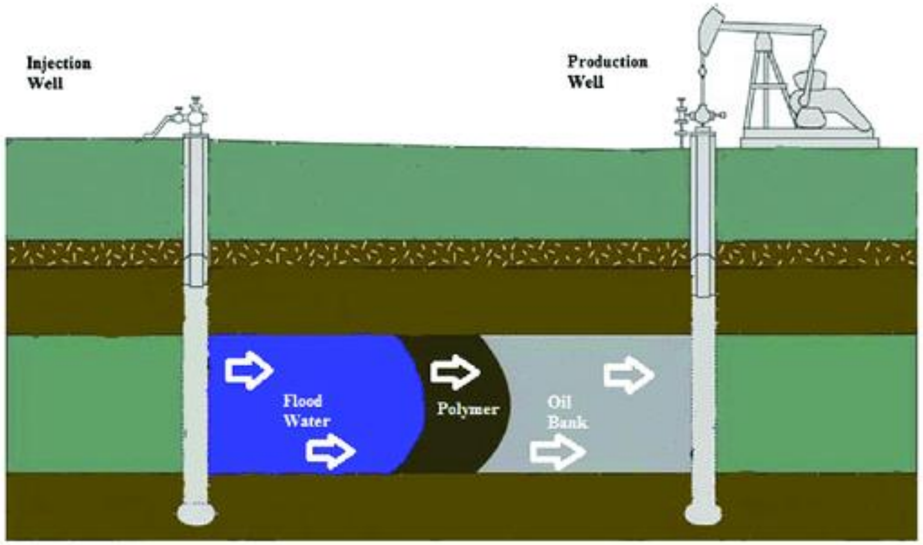
EOR Additives

Chemical Enhanced Oil Recovery by Polymer Flooding increases production efficiency and extends the economic producing life of conventional oil resources

Product	Anionicity (molar %)	Composition	Molecular weight	Viscosity
GO2010	10%	AAM/AAC	High	<3000 cp
GA8713	13%	AAM/AMPS	Medium	<400 cp
GO8230	30%	AAM/AAC/AMPS	Very High	<1500 cp
GO5077	50%	AAM/AAC/AMPS	High	<1000 cp

AMPS: Sulphonated Monomer



Application	Products
Polymer Flooding	**GA8713** for HTHP and High Salinity systems **GO8230** for Universal conditions
Gel Water Shutoff	**GA8713** with PEI

HIMOLOC GA8713 crosslinked with PEI

Gel Water ShutOff Formulation

- 5.000 ppm of HIMOLOC GA8713
- 5.000 ppm PEI (25% solids content)
    - 0.1 wt% NaCl
    - pH = 11
- Dissolution Viscosity at 20ºC = 230 cp
- After 2h at 140ºC the results was a GEL with 12.000 cp of viscosity

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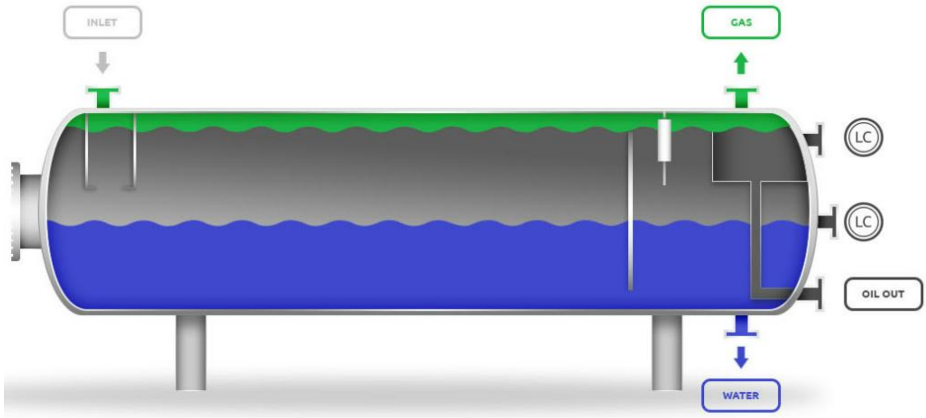
PRODUCTION Additives

Solutions for solving oilfield problems related to oil and water separations improving production and operating profitability (API, FWKO, DAF units, etc.)



Product	Cationicity (molar %)	Composition	Molecular weight	Viscosity
DR2500	10%	AAM/BZQ	Medium	<400 cp
DR3000	35%	AAM/BZQ/MCQ	Medium	<400 cp
DR6020	60%	AAM/BCQ/MCQ	Medium	<400 cp
DR4000	80%	AAM/BZQ/MCQ	Medium	<500 cp

Application	Products
Phase Separation	DR series GO series
Emulsion Breaker (Deoilers)	DR4000 KT2533
Dewatering (Flocculants)	TG / TX / DR series GO series
Water Treatment (Flocculants)	TG / DR series GO series
Ship Ballast Water	DR series GO series

Product	Anionicity (molar %)	Composition	Molecular weight	Viscosity
GO2010	10%	AAM/AAC	High	<3000 cp
GO8230	30%	AAM/AAC/AMPS	Very High	<1500 cp
GO5077	50%	AAM/AAC/AMPS	High	<1000 cp

Product	Cationic	Composition	Molecular weight	Viscosity
Hygreen KT2533	100%	Tannin Based + Poly BZQ	Low-Medium	<7000 cp

DUST CONTROL Additives

Dust suppression product range, specifically designed for petroleum coke, tailings and roads

Product	Ionicity	Composition	pH	Solids	Viscosity
AD500	Anionic	AAM/AAC	2,0-4,0	44%	<1500 cp
AD342E	Anionic	Styrene Acrilate	8,0-9,0	43%	<200 cp

Application	Products
Petroleum Coke Pile (Dust Control)	**AD500**
Road Dust Control	**AD342E**

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5 KEY IDEAS TO REMEMBER

Oil&Gas Technologies

GREEN – Free of solvents, Mineral Oils and Surfactants

EASY – Static Mixer or Direct Dosing

Different & Exclusive Monomers Combination

HTHP and High Salinity Systems Polymers

Phase Separation High Performance Polymers

Thank you for your attention!

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