



# Production chemical solutions



Oilfield applications

**Nouryon**

# Oilfield solutions: A wellspring for sustainable success now and in the future

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We are continuously innovating to deliver solutions that satisfy the evolving demands of our oilfield customers.

Tap into decades of global oilfield experience, an internationally integrated supply chain, and a dedicated customer support team to achieve high performing oilfield solutions.

Combining a wealth of expertise with an innovative portfolio, we provide you with the tried-and-tested and custom solutions you need to enhance your drilling, production, stimulation, cementing, and cleaning processes.

With a strong understanding of the growing challenges you face, our Oilfield experts are committed to solving your problems and driving performance in a sustainable way.

Our Oilfield product range features solutions that:

- Add value to oil production in a cost-efficient and sustainable manner by improving water-oil separation processes
- Focus on critical flow assurance issues in oil and gas production
- Help customers develop high-performance oil and water-based drilling formulations
- Address a wide range of stimulation applications
- Act as dispersants, retarder additives, and rheology stabilizers
- Provide support in oilfield cleaning applications like degreasing rig equipment, well-bore cleanup, cuttings cleaning, and removing screen blockage

To learn more about how we can help you, please contact us: [oilfield@nouryon.com](mailto:oilfield@nouryon.com)



# Production solutions

We help address issues faced by production engineers and service providers. The production, separation, and purification of crude oil and gas must be achieved not only safely but also quickly, economically, and in compliance with the regulatory restrictions of the operator's environment.

## World-class production chemistries

We provide an extensive range of products that, as formulated additives, can address most of the compelling issues confronting production engineers and service providers on a daily basis.

## Demulsifiers

The stability, thus "severity", of an emulsion is unique to each reservoir and may even vary from well to well. As such, it is necessary to develop demulsifier blends specifically targeted at the fluids produced. Our Witbreak® demulsifier products should be considered as concentrated raw materials, or intermediates, for the preparation and/or formulation of oilfield demulsifiers and dehydrating chemicals.

Synergistic effects in formulated demulsifiers are well known. For instance blends of intermediates from different chemical groups make better demulsifiers than blends using intermediates from the same family of compounds. Some demulsifier bases have special properties that give them more optimal blending characteristics.

This is the case with the highly oil soluble (low RSN) polyglycols. Blended with oxyalkylated resins, some excellent demulsifier formulations have been developed for the oil industry. Other effective combinations include oxyalkylated resins blended with polyols, diepoxides or polyacrylate-based intermediates.

Our latest addition, the Witbreak® NEO demulsifier range is based on new building blocks, that are NP-free and non-BTEX. Their high activity and low pour point facilitate customized blending.

Function	RSN	Chemistry	Recommended products	Key attributes	Appearance
Dryer	8.2	Glycol ester	Witbreak® DGE-169	Water-in-oil demulsifier and waste oil demulsifier, heavy oil	Liquid
Dropper	16.0	Glycol ester	Witbreak® DGE-182	Desalter	Liquid
Dropper	17.0	Poly glycol	Witbreak® DPG-482	Water-in-oil demulsifier and desalter	Liquid
Dropper	14.9	Resin oxyalkylate	Witbreak® DRA-21	Water-in-oil demulsifier and waste oil demulsifier, interface control	Liquid
Dropper	20.2	Resin oxyalkylate	Witbreak® DRA-22	Desalter, interface control	Liquid

Function	RSN	Chemistry	Recommended products	Key attributes	Appearance
Dryer	11.5	Resin oxyalkylate	Witbreak® DRB-11	Water-in-oil demulsifier	Liquid
Dryer	8.9	Resin oxyalkylate	Witbreak® DRB-127	Water-in-oil demulsifier	Liquid
Dropper	14.9	Resin oxyalkylate	Witbreak® DRC-163	Water-in-oil demulsifier, interface control	Liquid
Dropper	12.5	Resin oxyalkylate	Witbreak® DRC-164	Water-in-oil demulsifier	Liquid
Dropper	7.5	Resin oxyalkylate	Witbreak® DRC-167	Water-in-oil demulsifier	Liquid
Dropper/ Wetting	20.5	Resin oxyalkylate	Witbreak® DRC-168	Water-in-oil demulsifier, excellent refinery desalter	Liquid
Dropper	11.6	Resin oxyalkylate	Witbreak® DRC-229	Water-in-oil demulsifier	Liquid
Dropper	14.3	Resin oxyalkylate	Witbreak® DRC-232	Water-in-oil demulsifier and desalter	Liquid
Dryer	5.0	Diepoxide	Witbreak® DRI-9010	Water-in-oil demulsifier, waste oil demulsifier and desalter	Liquid
Dryer	5.7	Diepoxide	Witbreak® DRI-9026	Water-in-oil demulsifier, waste oil demulsifier and desalter	Liquid
Dropper	7.5	Polyacrylate	Witbreak® DRI-9030	Water-in-oil demulsifier, heavy oil	Liquid
Dropper	7.8	Polyacrylate	Witbreak® DRI-9037	Water-in-oil demulsifier and waste oil demulsifier	Liquid
Dryer	13.5	Resin oxyalkylate	Witbreak® DRL-3134	Water-in-oil demulsifier and desalter	Liquid
Dropper	7.9	Polyacrylate	Witbreak® DRM-9510	Water-in-oil demulsifier, waste oil demulsifier and desalter	Liquid
Dropper/ Dryer	23.4	Polyoxyalkylene glycol	Witbreak® DTG-62	Water-in-oil demulsifier, waste oil demulsifier and desalter, interface control	Liquid
Dropper	10.6	Resin oxyalkylate	Witbreak® GBG-3172	Water-in-oil demulsifier	Liquid
Dropper/ Treater	4.7	Glycol poly ester	Witbreak® NEO-110	Water-in-oil demulsifier, OSPAR compliant, BTEX and NP free. High activity. Very good drier/treater for particular crudes.	Liquid
Dropper	9	Glycol poly ester	Witbreak® NEO-120	Water-in-oil demulsifier, OSPAR compliant, BTEX and NP free. High activity. Dropper properties esp. in 50-70°C separation temp region.	Liquid
Dropper/ Treater	5	Glycol poly ester	Witbreak® NEO-130	Water-in-oil demulsifier, OSPAR compliant, BTEX and NP free. High activity. Excellent treater/dropper in 50-70°C separation temp region. In most cases showing good water quality.	Liquid
Dryer/ Treater	14.5	Amine derivative	Witbrea® NEO-210	Resolves emulsions in mid/heavy crude oils, combined with excellent drying in top-cut phase	Liquid
Dropper/ Interface	24	Amine derivative	Witbreak® NEO-220	Interface enhancer with dropper and coalescer properties for a range of oils	Liquid
Dropper/ Desalter	21	Alkoxyate block polymer	Witbreak® NEO-230	Dropper and sometimes overall treater for mid/heavy oils. Desalting properties for production/refinery.	Liquid
Anti-sludge		Surfactant blend	Witbreak® 770	Sludge control, slop and waste oil demulsifier	Liquid
Wetting agent		Branched DDBSA	Witconic® 1298H	Branched DDBSA, acid form, 98% active	Liquid
Anti-sludge		Alkylaryl sulfonate	Petro® IPSA Liquid	Slug treatment and dispersant for aged emulsion and water wet suspended solids	Liquid

## Water clarifiers / Deoilers

The performance of separation systems can be significantly improved using flocculating agents. The flocculants – referred interchangeably as deoilers (removal of oil) or water clarifiers (improvement in water quality) – are designed to function in the high salinity brines common in produced waters.

Our products include a range of natural and synthetic materials to meet the performance and environmental needs of the market. It is also helpful to note that combinations of our demulsifier bases have been seen to enhance the performance of our de-oiler products.

Function	Chemistry	Recommended products	Key attributes	Appearance
Deoiler/ Flocculant	Polycationic	Alcoclear® CCP-II	Removes oil, suspended solids, emulsions and other contaminants from oilfield waters. For coalescers, precipitators, gun barrels, skimmers, and other oilfield water handling equipment.	Liquid
Deoiler	Amphoteric copolymer	Floc Aid® 19	Ultra-stable aqueous demulsifier, non-ionically modified. Ready to use liquid form, or to dilute for further preparations.	Liquid

## Corrosion inhibition

Armohib® corrosion inhibitors include a broad range of essential ingredients that can be used to tackle both sweet and sour oilfield corrosion. Our range of products can provide corrosion inhibition in a variety of forms, including oil soluble, water dispersible, and water soluble.

Various methods of corrosion control are employed in the field, but film forming corrosion inhibitors are one of the most commonly used. The hydrophobic tails of the surfactants pack together to create a hydrophobic layer, which minimizes contact between the water and pipe and reduces the corrosion potential.

Function	Chemistry	Recommended products	Key attributes	Appearance
Acid corrosion inhibitor	Proprietary Surfactant blend	Armohib® CI-31	Organic acids inhibitor	Liquid
General corrosion inhibition	Mixed polyamine + TOFA imidazoline	Armohib® CI-41	Cost-effective, proprietary, all-around imidazoline for various tasks from standard sweet corrosion inhibition to main component in gas CI formulations	Liquid
	DETA + TOFA imidazoline	Armohib® CI-209 (Americas+Asia)/ Armohib® CI-219 (EU)	Cost-effective, proprietary, all-around imidazoline for various tasks from standard sweet corrosion inhibition to main component in gas CI formulations	Liquid
	TEPA + TOFA imidazoline	Armohib® CI-300	Imidazoline based CI with larger hydrophilic head group, useful in a blend with CI-41, CI-209, CI-219 under certain conditions. Soluble in MEG.	Liquid
	Oligomeric ester quat	Armohib® CI-5150	OSPAR compliant polymeric CI for sweet corrosion. Excellent brine tolerance and solubility profile.	Liquid
			Polymeric CI for sweet corrosion, low aquatox, readily biodegradable in seawater, low foaming	Liquid
Polymeric ester amine	Armohib® CI-5174	Polymeric CI for sweet and sour corrosion. Good brine tolerance.	Liquid	
Secondary inhibitor, formulation aid	Coco alkylamine	Armeen® C	Secondary inhibitor, formulation aid	Liquid
	Soya quat	Arquad® SV-50	HT stable and water soluble	Liquid
	Coco diamine	Duomeen® CD	HT stable intermediate	Liquid
	Oleyl diamine	Duomeen® OL (US)/ Duomeen® O (EU)	HT stable. Also used for boilers, condensers, refineries, etc.	Liquid
	Tallow diamine	Duomeen® T	HT stable. Also used for boilers, condensers, refineries, etc.	Solid
	Ethoxylated tallow diamine	Ethoduomeen® T/13	Oil soluble, HT stable. Also used for boilers, condensers, refineries, etc.	Liquid
			Water soluble, HT stable, good brine tolerance. Also used for boilers, condensers, refineries, etc.	Liquid
	Ethoxylated oleyl alkylamine	Ethomeen® O/12	Oil soluble, inhibiting formulation aid, acid thickening	Liquid
	Ethoxylated soya alkylamine	Ethomeen® SV/12	Oil soluble, inhibiting formulation aid, acid thickening	Liquid



Function	Chemistry	Recommended products	Key attributes	Appearance
Secondary inhibitor, formulation aid	Ethoxylated tallow alkylamine	Ethomeen® T/12	Oil soluble, inhibiting formulation aid, acid thickening	Paste
		Ethomeen® T/15	HT stable. Also used for boilers, condensers, refineries, etc.	Liquid/paste
		Ethomeen® T/25	Water soluble, HT stable. Also used for boilers, condensers, refineries, and cleaning.	Liquid
Inhibition booster	Phosphate ester	Phospholan® PE-169	For single use or as intensifier in formulations. For oxygen corrosion.	Liquid
		Phospholan® PE-65	For single use or as intensifier in formulations. For oxygen corrosion.	Liquid

## Gas scrubbing

Sour gas is present in many oilfield processes, each with a specific gas flow, H<sub>2</sub>S content, and concentration of other gasses. As a result, there are many desulfurization techniques that are commercially available. Liquid redox sulfur recovery is the gas sweetening technique of choice for process streams having an intermediate sour gas content (0.1-20 mt S per day). In this process, H<sub>2</sub>S is oxidized in the presence of an Iron (III) chelate to produce elemental sulfur that can be easily removed from the process.

We offer a range of chelates suitable for Redox sulfur recovery that fully meet the needs for this process: active in the appropriate pH range, ensure stable Fe-complex under reaction conditions, and compatible with other gaseous compounds. Based on different criteria, products based on HEDTA are the most suitable for this process.

Function	Chemistry	Recommended products	Key attributes	Appearance
Iron complex	HEDTA ferric complex	Dissolvine® H-FE-4.5	Stable, water soluble metal chelate, 4.5% iron content	Liquid
		Dissolvine® H-FE-5.5-GS	Superior performance, specially designed for gas sweetening, higher Fe <sup>3+</sup> content reduces plugging, chemical waste and make-up volumes	Liquid
Chelating agent	HEDTA	Dissolvine® H-40	Sequestering agent at 40% solution forming highly stable metal ion chelates in a wide pH range	Liquid
		Dissolvine® H-50-GS	Low sodium, high assay HEDTA solution specially tailored for gas sweetening to reduce water input and sodium oxalate precipitation	Liquid

## Scale control

We have developed a wide range of specialized scale solvers and inhibitors that allow the treatment of all common scales in a range of production conditions. We have assessed the performance of these products under a series of standard conditions to give indicative performance, as well as physical property characteristics for these materials.

The performance of scale inhibitors is highly dependent upon the conditions of application. It is suggested that scale inhibitor screening be performed under representative field conditions. Similarly, the heterogeneous nature of oilfield scales demand further tests with real field samples for final chemical selection.

Function	Chemistry	Recommended products	Key attributes	Appearance
Barium sulfate inhibitor	Polycarboxylate	Alcoflow® 250	Superior barium sulfate inhibitor. Ultra-brine stable. High solids.	Liquid
Sulfate and carbonate scale inhibitor	Multipolymer	Alcoflow® 270	High pH inhibitor effective in a broad scope of scales	Liquid
Calcium phosphate inhibitor	Multipolymer	Alcoflow® 300	Copolymer of acrylic acid and sulfonated monomers, multifunction performance for excellent scale control	Liquid
Scale inhibitor	Multipolymer	Alcoflow® 750	Patented methanol tolerant scale inhibitor. Excellent multiscale control.	Liquid
Sulfate and carbonate scale inhibitor	Hybrid polymer	Alcoflow® 880	Biodegradable hybrid polymer – OSPAR compliant	Liquid
Sodium chloride inhibitor	Sulfonated co-polymer	Alcoflow® 920	Unique sodium chloride inhibitor with high pH and methanol tolerance	Liquid
Calcium carbonate inhibitor	Phosphino carboxylic acid	Alcoflow® S29	Cost-effective calcium carbonate inhibitor and dispersant. Offers superior control of barium sulfate scales.	Liquid
Scale inhibitor	Phosphino polycarboxylic acid	Narlex® LD-54	Phosphonated polymer for squeeze/residual determination	Liquid
Calcium-based scale dissolver	Ethylenediamine-tetraacetic acid, tetrasodium salt	Dissolvine® E-39	Most widely used chelating agent for scale dissolution over a wide pH range	Liquid
Iron oxide scale dissolver	Ethylenediamine-tetraacetic acid, diammonium salt	Dissolvine® AM2-45	Low corrosive scale dissolver. Preferred when iron oxide is present combined with Cu, Ca, Mg.	Liquid
Sulfide scale dissolver	Diethylenetriamine pentaacetic acid, pentasodium salt	Dissolvine® D-50	Strong and low corrosive chelating agent, ideal for heavy and transition metal based scales	Liquid
Barium sulfate dissolver	Diethylenetriamine pentaacetic acid potassium salt	Dissolvine® StimWell™ DDH	Low corrosive scale dissolver, best choice for BaSO <sub>4</sub> , SrSO <sub>4</sub> and CaSO <sub>4</sub>	Liquid
Calcium carbonate dissolver	Glutamic acid, N, N-diacetic acid, sodium salt	Dissolvine® StimWell™ HTF	OSPAR compliant, low corrosive scale dissolver. Excellent compatibility with ESP tools and elastomers.	Liquid
Calcium sulfate dissolver	Glutamic acid, N, N-diacetic acid, sodium salt (high pH)	Dissolvine® StimWell™ DGH	Non-corrosive, high temperature scale dissolver. Biodegradable, excellent compatibility with ESP and elastomers.	Liquid

## Paraffin inhibition and dispersion

We have developed a range of high-performance chemical additives to help tackle even the most challenging of paraffinic crudes and condensates either in paraffin remediation or continuous treatment regimes.

These products fall into three categories:

- Paraffin dispersants – surfactants used either in solvent treatments of pre-existing deposits or in continuous application to keep paraffin crystallites suspended in the solvent/crude and flushed out of the system without depositing

- Paraffin inhibitors – oil-soluble polymers that bond with paraffins them from bonding with each other and forming larger crystalline structures. In essence, they inhibit the formation of paraffinic deposits by keeping paraffins in solution.
- Pour-point depressants – additives used to limit wax gelling, usually induced by cold temperature exposure, by interfering with the crystallization process and keeping the bulk fluid mobile

Function	Chemistry	Recommended products	Key attributes	Appearance
Inhibitor/crystal modifier	Copolymer	Armohib® PC-105	Paraffin inhibitor and pour-point depressant. Also asphaltene inhibitor.	Paste/solid
Inhibitor/crystal modifier/dispersant	Proprietary blend	Armohib® PC-150	Paraffin inhibitor and pour-point depressant	Liquid
Paraffin/asphaltene dispersant	Anionic surfactant	Petro® IPSA Liquid	Tank-bottoms cleaner. Slug treatment as a dispersant.	Liquid
		Witconate® P-1059	Paraffin control for production equipment, tank bottoms and downhole applications	Clear amber liquid

## Asphaltene inhibition

Precipitation of asphaltenes is usually a result of destabilization of the solubility of high molecular weight components in the oil. The source of destabilization is typical of production conditions i.e. pressure decline, pH change, crude mixing, etc.

If non-chemical techniques cannot be employed to eliminate an asphaltene problem, then chemical inhibitors must be sought. We have created a specialty inhibitor product to help with this specific production problem.

Function	Chemistry	Recommended products	Key attributes	Appearance
Inhibitor and dispersant	Alkyl amine derivative	Armohib® AI-1000	Prevent asphaltenes from agglomerating, precipitating or depositing. It can break up or remove already formed agglomerates or precipitates.	Liquid/paste
Inhibitor	Copolymer	Armohib® PC-105	High performing crystal modifier, also acting as wax inhibitor.	Paste/solid
Asphaltene/paraffin dispersant	Anionic surfactant	Petro® IPSA	Tank-bottoms cleaner. Slug treatment as a dispersant.	Liquid
		Witconate® P-1059	Ingredient in formulations for the cleaning of production equipment, tank bottoms and downhole applications	Clear amber liquid

## Biocides

We offer a dedicated range of non-oxidizing surface-active organic biocides. The method of action is the adsorption onto cell membranes where they disrupt the typical function of the cell. This kill mechanism is less corrosive than with oxidizing biocides and they can in fact act as corrosion inhibitors.

Selection of the right biocide will be dependent upon the organisms to be treated, the regulatory approvals applicable, and the type of treatment regime proposed. Many of the biocide chemistries mentioned become inactive once they reach the surface environment and are readily biodegraded to non-biocidal metabolic products. Due to vegetable origin of the alkyl chains of our quats and triamines, they have a high renewable carbon index (RCI).

Our biocides are specific to the regulatory body that approves the biocide for use. In countries without similar regulatory, the adoption of the practice of foreign regulators may be suitable.

Function	Chemistry	Recommended products	Key attributes	Appearance
Biocide		Arquad® MCB	EU BPR supported	Liquid
		Arquad® 2.10-50	EU BPR supported	Liquid
		Arquad® 2.10-80	US EPA approval expected H2/2022	Liquid
		Duomeen® C	US EPA approved	Liquid/paste
		Triameen® Y12D	EU BPR supported US EPA approval expected H1/2022	Liquid



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# Nouryon

Nouryon is a global, specialty chemicals leader. Markets and consumers worldwide rely on our essential solutions to manufacture everyday products, such as personal care, cleaning goods, paints and coatings, agriculture and food, pharmaceuticals, and building products. Furthermore, the dedication of more than 7,900 employees with a shared commitment to our customers, business growth, safety, sustainability and innovation has resulted in a consistently strong financial performance. We operate in over 80 countries around the world with a portfolio of industry-leading brands. Visit our website and follow us @Nouryon and on LinkedIn.

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