Products for Oilfield Applications
Delivering proven and sustainable oilfield solutions
Global Technology

UNITED STATES
Regional Office
- The Woodlands (Texas)

Research and Development Site
- The Woodlands (Texas)

Manufacturing Location
- Clear Lake (Texas)
- Chocolate Bayou (Texas)
- Dayton (Texas)
- Lake Charles (Louisiana)
- Port Neches (Texas)

SOUTH AMERICA
Regional Office
- Mexico City, Mexico

APAC
Regional Office
- Mumbai, India
- Botany, Australia

Research and Development Site
- Brooklyn, Australia
- Mumbai, India

Manufacturing Location
- Ankleshwar, India
- Botany, Australia
Indorama provides a diverse range of products

Indorama Ventures Oxides & Derivatives is a leading chemical intermediates and surfactants producer with a diverse range of products in growth markets. Our products are used in a variety of applications throughout the oil production industry — from production chemicals, such as corrosion inhibitors, demulsifiers and paraffin dispersants; to drilling additives; and repair systems for cementing failures. Indorama’s surfactant chemistries help optimize exploration and production of hydrocarbons. We offer an outstanding range of specialized technologies, world-scale manufacturing, a global distribution network and in-depth understanding of the oil industry’s regulatory compliance issues, through the company’s Regulatory, Environmental, and Health & Safety (EH&S) departments. Indorama’s global manufacturing footprint and experience also allows us to provide customized products. By taking a holistic, full-process approach from product concept through commercial large-scale production, the company is well-placed to deliver proven and sustainable oilfield solutions.

Products

**AMINE**
Alkanolamines
MEA, DEA, TEA

**GLYCOLS**
MEG, DEG, TEG

**SURFACTANTS**

**Anionic**
Alkylphenol Ether Sulfates
Alkylphenol Ether Phosphates
Anionic Blends
Alkyl Sulfates
Alkyl Ether Carboxylic Acids and Salts
Alkyl Ether Sulfates
Sulfosuccinates
Alkyl Phosphates
Alkylbenzene Sulfonic Acids and Salts

**Nonionic**
Alkyl Polysaccharides
Alkylamine Ethoxylates
Block Copolymers
Alkoxylates

**Polymeric**
Alpha Olefin Maleic Anhydride Copolymers (AOMA)
SHALE INHIBITORS

- **SURFONIC® OFS 500 polyol** is a cloud point glycol system useful for lubrication and as a shale anti-swelling agent for water-based drilling muds used in formations with reactive shales. The product functions as a partial potassium chloride (KCl) replacement in drilling formulations. It is possible to tune the performance of the SURFONIC® OFS 500 to the temperature and KCl salt concentration of the mud system. The product is registered on chemical inventories in many regions of the world. A separate bulletin further describing the use and benefits of SURFONIC® OFS 500 polyol is available upon request.

VISCOSITY CONTROL

- **SURFONIC® OFS 300 additive** is a high molecular weight polyglycol. It can also be used in water-based muds to build viscosity and to protect water-sensitive shale.

EMULSIFIERS

- **SURFONIC® MW-100 optimized emulsifier** is for vegetable oils. It can be used to formulate emulsion muds or as a cleaner to remove a vegetable oil-based mud from casing prior to cementing.

- **SURFONIC® OFE 243 and OFE 244 polymeric surfactant emulsifiers** are for oil-based muds with an internal phase with electrolytes.

- **XTF 951** is a polyglycerol drilling fluid additive for invert drilling applications. It can be used as the internal phase of a non-aqueous mud to minimize the shale swelling caused by a water internal phase. The product is also useful in lubricating the drilling mud to reduce “fretting.” XTF 951, which is water-soluble and considered to be of low toxicity, can act as a shale inhibitor in water-based muds as well.
The ultra-low IFT provided by SURFONIC® OFE 201 surfactant allows well bore cleanup in high-brine completion fluids.

SURFONIC® OFE 201

- The surfactant contains alkyl side chains and a charged head group, which contribute to its ability to reduce interfacial tension and improve oil recovery.

Production Chemicals

**CLEANERS/DEGREASERS**
- Alkylether Methyl Blends
- Linear Alkylbenzene Sulfonic Acid
- Sulfonates
  - SURFONIC® VBS Series
  - SURFONIC® OFE 321
  - SURFONIC® OFE 201

**CORROSION INHIBITORS - WATER SOLUBLE**
- Quaternary Ammonium Compounds
- Nonylphenol Ethoxylates
  - TERIC® N Series
  - SURFONIC® N Series

**CORROSION INHIBITORS**
- Imidazoline
- Phosphate Esters
- Alkoxylated Fatty Amines
  - Amine Derivatives
  - SURFONIC® EDA-4/80
  - SURFONIC® OFC 100
  - SURFONIC® PE Series
  - SURFONIC® T Series

**DEFOAMERS**
- Polyols
- Fatty Alcohol Ethoxylates
  - SURFONIC® POA-17R2
  - SURFONIC® LF Series

**DEMULSIFIERS**
- Anionic
  - SURFONIC® OFD 750
  - SURFONIC® OFD 775
  - SURFONIC® XOF-22A

- Polyl
  - SURFONIC® OFD 101
  - SURFONIC® OFD 328
  - SURFONIC® OFD 335
  - SURFONIC® POA-17R2
  - SURFONIC® POA-L61
  - UNIMAX® WL 660
  - UNIMAX® WL 5000

- Oxyalkylated Polyamine
  - SURFONIC® OFD 150
  - SURFONIC® OFD 301
  - SURFONIC® OFD 302
  - SURFONIC® OFD 360

**HYDRATE INHIBITORS**
- MEG
- Polymeric
  - SURFONIC® OFH Series

**PARAFFIN AND ASPHALTENE CONTROL**
- Maleic-based Polymers
- Ethoxylates
- Alkylbenzene Sulfonates
- Sulfonates
  - SURFONIC® OFP Series
  - SURFONIC® OFA Series
  - SURFONIC® L Series
  - SURFONIC® OFE 201

**SCALE INHIBITORS**
- Phosphate Esters
- Amine Phosphates
  - SURFONIC® PE Series
  - SURFONIC® EDA-4/80
  - SURFONIC® OFI Series

**SPECIALIZED SOLVENTS**
- Alcohol Ethoxylates
- Glycol-based Solvents
  - SURFONIC® L Series

**SULFUR SCAVENGERS**
- Triazines
  - SURFONIC® XTA 793
  - SURFONIC® XTA 797

**WATER CLARIFIERS**
- Polymers
  - Polysaccharides
  - SURFONIC® NB Series
  - SURFONIC® PC Series
  - ECOTERIC™ 7500
**SCALE INHIBITORS**

- **XTA 892** and **SURFONIC® EDA-4/80** amine ethoxylates can be reacted with fatty acid anhydrides or mixed with acidic phosphate esters to form corrosion inhibitors for water- and oil-based systems.
- **SURFONIC® OFI 230S** and **232S** polyaminomethylene phosphonates can be used in scale inhibiting.
- **SURFONIC® PE-2852** phosphate ester can be used without further reaction as a scale inhibitor.

**PARAFFIN AND ASPHALTENE CONTROL**

- **SURFONIC® OFP 359**, **OFP 961**, **OFP 962**, **OFP 963**, **OFP 964** and **OFP 965** polymers are pour point depressants for waxy crude oil. They work by modifying the crystal structure of paraffin in produced fluids.
- In hot oiling applications, **SURFONIC® N Series** nonylphenol ethoxylates and **XOF-30A** alkylbenzene sulfonic acid are used to help penetrate and dissolve the wax during treatment.
- Other paraffin dispersants can be formulated from solvent mixtures and surfactants. One example is a mix of Stoddard solvent with **SURFONIC® L24-2** and **L24-9** surfactants.
- **JEFF-FLOW® A 2524** surfactant is an oil-soluble asphaltene dispersant capable of both preventing precipitation of asphaltenes and redispersing previously settled agglomerations.
- **XOF-22A**, **XOF-23A** and **XOF-26A** alkylaryl sulfonates, with side chains of short, intermediate and long length, are able to keep asphaltenes dispersed in crude oil and oil emulsions.
- **SURFONIC® OFA 830** dispersant is a polymeric asphaltene dispersant effective in lowering the viscosity of heavy crudes and preventing asphaltene deposition.

**CORROSION INHIBITORS**

- Indorama offers **SURFONIC® OFC 100** which is a 1:1 DETA: TOFA imidazoline. More water-soluble imidazoline derivatives may be prepared via ethoxylation. **SURFONIC® OFC 105, 110 and 120** are the 5-, 10- and 20- mole ethoxylates of **SURFONIC® OFC 100**, respectively.
- **XTA 892** and **SURFONIC® EDA-4/80** products are ethoxylated ethyleneamines that can be reacted with fatty acid anhydrides or mixed with acidic phosphate esters to form corrosion inhibitors for water- and oil-based systems. (US Patents 5,582,792; 5,391,636 and 3,514,251).
- Ethanolamines DEA can be used for acid neutralization.
- Phosphate esters derived from ethoxylated alcohols or alkylphenols can be formulated into corrosion inhibitors for high water-cut systems in the oilfield. (US Patents 5,611,992 and 3,510,436). **SURFONIC® PE-1198LA** and **PE-2852** surfactants are products for consideration in this application. **SURFONIC® T Series** surfactants can be used to neutralize the phosphate esters, giving some alkalinity and buffering to the formulation.
- Alkoxylated fatty amines, like **SURFONIC® T-2 surfactant**, can be used to prevent corrosion and to thicken hydrochloric acid (HCl) in acidizing formulations. Generally, propargyl alcohol is used in combination with the surfactant for complete anti-corrosion protection.
- Ethanolamine TEA can be used to make phosphates.

**Imidazoline derived from oleic acid and DETA**

\[
\text{H}_2\text{N-CH}_2-\text{CH}_2-N-\text{CH}_2-\text{CH}_2-\text{NH}_2 + \text{R-COOH} \rightarrow \text{H}_2\text{O} \rightarrow R = \text{C}_{17}, \text{unsaturated}
\]

**Production Chemicals**
**DEMULSIFIER**

Indorama’s oilfield demulsifiers are effective components of demulsifier formulations. These materials should be formulated with other materials based on bottle field tests to create effective demulsifier formulations.

- **Anionic:** These products are resistant to over-treating. They offer solids wetting capability and can help destabilize emulsions containing fine particles. They do not drop water as quickly as other classes of demulsifiers.

- **Oxyalkylated Polyamine:** The oxyalkylated polyamine demulsifiers exhibit good emulsion-breaking characteristics. In most cases, they tend to be slow water-coalescing agents. In some cases, water drop can be rapid. Some products in this class are good overall demulsifiers for heavy oils and oil sands production. In some crude oils, these materials have a water-shedding capability.

- **Polyol:** The polyol demulsifiers are effective emulsion breakers and are available in a wide range of relative solubility number (RSN) values. Although high RSN value polyols may cause water clarity issues, such issues can normally be corrected with combinations of low RSN alkylphenol resin alkoxylates. The polyol demulsifiers can give good emulsion breaking, but often need other materials to complete the separation of the water. SURFONIC® OFD 101 demulsifier is a diol, while SURFONIC® OFD 328 and OFD 335 demulsifiers are triols. SURFONIC® OFD 328 and 335 demulsifiers have found wide range applicability in Eastern European crudes.

**SOLVENT MISCIBILITY**

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<td>10%</td>
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About Indorama

Indorama Ventures is a world-class chemical company and a global integrated leader in PET and fibers serving major customers in diversified end-use markets. Following our core strategies, we develop innovative products for customer needs and to make great products for society. Headquartered in Bangkok, Thailand, Indorama Ventures has operating sites in 31 countries on five continents – in Africa, Americas, Asia, Europe & Eurasia.

Integrated Oxides & Derivatives

Indorama Ventures Oxides & Derivatives is a leading chemical intermediates and surfactants producer with a diverse range of products in growth markets such as home & personal care, agrochemicals, oilfield technologies, fuel & lube additives and more.

In January 2020, Indorama Ventures Public Company Limited completed its acquisition of Huntsman’s world-class integrated oxides and derivatives business, including:

- **Surfactants**: Integrated producer of a wide range of products for home and personal care, oilfield technologies, agriculture and process industries.

- **Ethylene and Derivatives**: Highly integrated manufacturer of ethylene, ethylene oxide, ethylene glycol, ethanolamines and other derivatives.

- **Propylene Oxide & Derivatives**: Highly competitive technology offerings in propylene glycol, methyl tertiary butyl ether (MTBE) and other derivatives.

Our operating sites include a large flagship site on the US Gulf Coast (USGC) at Port Neches, as well as Chocolate Bayou, Dayton and Clear Lake in Texas, Lake Charles, Louisiana, Ankleshwar, India and Botany, Australia.