



# Lubricants and Fuels

Nouryon

# Designing for performance as the experts' expert

Nouryon is proud to be a leading global supplier of surfactants and polymers to the lubricant and fuel formulation industry. How have we become leaders? By designing for performance as the experts' experts and delivering essential solutions for shared success.

Partnering with our customers is the way we do business. Often designing exclusive new chemicals for our customers, we've helped the largest lubricant and fuel producers in the world develop and deliver successful new products and leading brands to the marketplace. Combining our unique knowhow in creating customized synthesis of amines and polymers with our customers' expertise, we continue to enhance the industry's ability to formulate lubricants and fuels that meet next-generation legislation and OEM requirements. Equally



important, we continue to help formulators innovate and gain competitive advantage worldwide. Based on our global footprint, integrated supply chain and decades of experience, our customers rely on our proven ability to ensure local product availability and supply alternatives. As a worldwide chemical company, we provide notification and regulatory support for all regions.



# Delivering essential solutions for shared success

With our long history of producing surfactants, we have proven we can meet our customers demands of consistent high quality technology.

We also have continuously improved production procedures, quality assurance and safety, leading to products with even more reliable performance and higher purity.

Our customer-driven employees take every precaution to deliver products within a unique specification every time. With our analytical laboratories integrated into our production facilities, we can deliver each batch with a Certificate of Analysis to meet the customers targets.



## Synthesis and tech service lab capabilities

We have three dedicated synthesis labs based in North America and Europe for development of new or tailor-made products for our customers. These laboratories are equipped to fully simulate production and have the same capabilities to react amines into various surfactants. We also have a pilot production facility that can prepare smaller quantities for field trials.

Our technical centers can support surface analysis, application and physical characterization.

### List of capabilities:

- MTM, HFRR, QCMD, interfacial tension, surface tension, contact angle.
- XPS (State-of-the-art machine acquired early 2013 for point analysis, imaging and depth profiling. Different sputter guns allow depth profiling of organic and inorganic materials.)
- SEM-EDX (high resolution SEM imaging, highly sensitive EDX detector)
- SIMS
- Raman microscopy (532 nm and 785 nm excitation)
- IR microscopy / IR imaging machine
- NMR (600 MHz, number of 2D correlation NMR tools for diffusion studies)

# Solutions for lubricants and fuels

Product	Chemical description	Appearance	TBN	HLB	Engine oil	Drive line	Grease	Marine fuel	Diesel fuel	Ethanol fuel	Industrial
AMPHOLAK YJH-40	Amphoteric surfactant	Liquid	n/a	-	-	-	-	-	-	-	Metal working emulsifier
AQUATREAT AR-40	Polyacrylic acid	Liquid	n/a	-	-	-	-	-	-	-	Metal working dispersant
ARMEEN 12D	Dodecyl amine	Solid	297-304	10.7	-	-	PU grease	-	-	-	-
ARMEEN 18D Flakes/Prills	Octadecyl amine	Solid	204-211	7.9	-	-	PU grease	-	-	-	-
ARMEEN 2C	Dicoalkyl amine	Solid	140-155	4.2	Intermediate	Intermediate	-	-	-	-	-
ARMEEN 2HT	Hydrogenated ditallow amine	Solid	109-115	1.0	-	-	-	-	Intermediate	-	-
ARMEEN 8D	Octyl amine	Liquid	555	12.6	-	-	PU grease	-	-	-	-
ARMEEN CD	Cocoalkyl amine	Liquid	272-285	10.3	-	-	-	-	-	-	Hydraulics friction modifier
ARMEEN DM18D	Dodecyl dimethyl amine	Liquid	180-191	7.1	-	Friction modifier	-	-	-	-	-
ARMEEN MHTL8	2-Ethylhexyl hydrogenated tallow methyl amine	Liquid	141	4.0	Neutralisation	-	-	-	-	-	-
ARMEEN OL	Oleyl amine	Liquid	202-212	8.0	Friction modifier, neutralisation	Friction modifier	-	-	-	-	-
ARMEEN T	Tallow amine	Paste	203-217	8.2	Friction modifier	-	PU grease	-	-	-	-
ARMEEN TM-97	Tallow amine	Solid	209-217	8.2	-	-	Thickener	-	-	-	-
ARMOFUEL 134	Ethoxylated fatty diamine	Liquid	-	-	-	-	-	Emulsifier	-	-	-
ARMOFUEL 2020	Nonylphenol resin	Liquid	n/a	-	-	-	-	Dispersant	-	-	-
ARMOLUBE 211	Fatty amine oleate	Solid	170-190	8.6	Friction modifier	Friction modifier	-	-	-	-	-
ARMOLUBE T	Esteramine	Liquid	87	3.6	Friction modifier	-	-	-	-	-	-
ARQUAD 2C NITRITE	Dicoco dimethyl ammonium nitrate	Liquid	n/a	17.5	-	-	-	-	Anti static	-	-
ARQUAD 2C-75	Dicoco dimethyl ammonium chloride	Liquid	n/a	17.3	-	-	-	-	Anti static	-	Metal working corrosion inhibitor
ARQUAD 2HT-75	Dihydrogenated tallow dimethyl ammonium chloride	Paste	n/a	13.2	-	-	-	-	Anti static	-	-
BERAID 3555M	Polyethylene glycol derivate	Liquid	n/a	-	-	-	-	-	-	Ignition improver	-
BEROL 087	Non-ionic surfactant alcohol based	Liquid	n/a	11.5	Detergent	-	-	-	-	-	Cleaning
DUOMEEN C	Cocoalkyl diamine	Paste	409-442	18.2	Friction modifier	-	-	-	-	-	Metal working (chemical intermediate, corrosion inhibitor, cleaner, dispersant, emulsifier)
DUOMEEN O	Oleyl diamine	Liquid/paste	320-350	16.2	Friction modifier	Friction modifier	-	-	-	-	Metal working (corrosion inhibitor, lubricity, cleaner, dispersant, emulsifier)
DUOMEEN T	Tallow diamine	Liquid/paste	320-350	15.6	Friction modifier	Friction modifier	-	-	-	-	Metal working (corrosion inhibitor, lubricity additive)
DUOMEEN TDO	Fatty amine oleate	Paste	115-130	25.9	Friction modifier	-	-	-	Friction modifier	-	-
ETHODUOMEEN T/13	Ethoxylated fatty diamine	Liquid/paste	239	19.0	-	-	-	-	-	-	Rolling oil iron control, corrosion inhibitor, emulsifier
ETHOMEEN C/12	Ethoxylated fatty amine	Liquid	187-200	12.0	Friction modifier	-	-	-	-	-	-
ETHOMEEN O/12	Ethoxylated fatty amine	Liquid	155-164	9.9	Friction modifier	-	-	Lubricity additive	-	-	Metal working (lubricity, cleaning)
ETHOMEEN T/12	Ethoxylated fatty amine	Paste	156-165	10.4	Friction modifier	Friction modifier	-	Lubricity additive	-	-	Metal working lubricity, iron control
ETHOMEEN T/15	Ethoxylated fatty amine	Liquid	116	11.2	-	-	-	-	-	-	Rolling oil iron control, corrosion inhibitor, emulsifier
ETHYLAN 1005	Non-ionic surfactant alcohol based	Liquid	n/a	11.6	-	-	-	Dispersant	-	-	Metal working dispersant
ETHYLAN TB345	Non-silicone alkoxyated polymer	Liquid	n/a	20.5	-	-	-	-	Defoamer	-	Metal working defoamer
ETHYLAN TD1085 / BEROL 048	Non-ionic ethoxylated alcohol	Liquid	n/a	13.7	Detergent	-	-	-	-	-	Metal working wetting, dispersant, emulsifier
OAA	Octylacrylamide	Solid	n/a	-	-	-	-	-	-	-	-
PHOSPHOLAN PE 169	Phosphate ester	Liquid	n/a	-	-	-	Antiwear	-	-	-	Metal working antiwear, emulsifier
PHOSPHOLAN PE65	Phosphate ester	Liquid	n/a	n/a	-	-	Antiwear	-	-	-	Metal working antiwear, emulsifier
PHOSPHOLAN PHB 14	Phosphate ester	Liquid	n/a	n/a	-	-	Antiwear	-	-	-	Metal working antiwear, emulsifier
TRIAMICIDE	Dodecyl dipropylene triamine	Liquid	341-365	26.7	-	-	-	-	-	-	Metal working biocide (non sentising formaldehyde free)
WITBREAK DRA-21	Oxyalkylated phenolic resin	Liquid	n/a	-	-	-	-	-	Demulsifier	-	-
WITBREAK DRM-9510	Nonionic polyacrylate	Liquid	n/a	-	-	-	-	-	Demulsifier	-	-
WITBREAK RTC-330	Polycationic aqueous solution	Liquid	n/a	-	-	-	-	-	-	-	Metal working oil scavenger synthetic fluids
WITCAMIDE 511	Fatty alkanolamide	Liquid	n/a	-	-	-	-	-	-	-	-

# Benefiting from fatty amine chemistries and insights from polymer technologies

In addition to our wide range of products, Nouryon Surface Chemistry can develop customized solutions.

We believe that partnering with our customers, combined with deep understanding of our chemistries are key to delivering superior value and tailor made solutions.

## Our core technologies

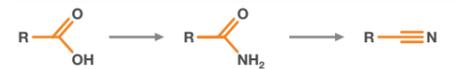
Based on our world-class nitrile technology, we develop, produce and supply amines, polymers and quaternary amines. Ethoxylation and sulfonation are also among our core capabilities.

## The chemical toolbox

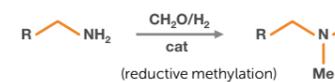
Our broad spectrum of relevant technologies includes the following:

- Amido amine and Imidazoline** - From natural fatty acids
- Amides** - Based on natural fatty acids and/or fatty amines
- Epoxydation** - Epichlorohydrin addition
- Glucosidation** - Natural-based raw material glucose
- Oxidation** - Hydrogen peroxide reactions with amines to amine oxides
- Amphoterics** - Derivatization of amines with SMCA or Acrylic acid
- Natural polymers** - Derivatives based on starch chemistry
- Acrylic polymerization** - Specialty synthetic acrylic polymers
- Phosphating** - Phosphate ester surfactants
- Cyanoethylation** - Addition of acrylonitrile to reactive hydrogen
- Carbon Disulfide** - To produce dithiocarbamate and trithiocarbamate

### Nitration, production of nitriles



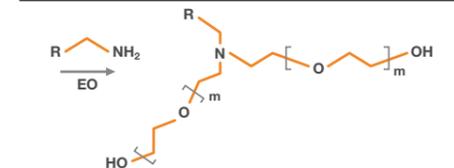
### Hydrogenation, production of amines



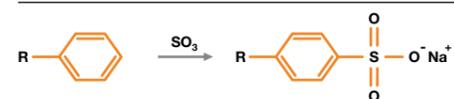
### Quaternization, production of quaternary amines



### Ethoxylation, production of nonionic surfactants



### Sulfonation, production of anionic surfactants



Surface Chemistry, a business unit of Nouryon, is a major producer of specialty chemicals. Based in Chicago, USA, our business unit operates in 50 countries, with regional marketing centers, manufacturing and R&D centers world wide. We are a leading supplier of specialty surfactants, synthetic and bio-polymer additives.

## Manufacturing

Chattanooga, USA  
Houston, USA  
Ft. Worth, USA  
Itupeva, Brazil  
Mons, Belgium  
Morris, USA  
Salisbury, USA  
Singapore  
Stenungsund, Sweden  
Stockvik, Sweden  
Boxing, China  
Ningbo, China

## R&D and TS&D Centers

Bridgewater, USA  
Croton River, USA  
Chattanooga, USA  
Mexico City, Mexico  
Deventer, The Netherlands  
Itupeva, Brazil  
Mumbai, India  
Singapore  
Shanghai, China  
Stenungsund, Sweden

## Headquarters

Chicago, USA  
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We are a global specialty chemicals leader. Markets worldwide rely on our essential chemistry in the manufacture of everyday products such as fuels, plastics, coatings, asphalt, agrochemicals, personal care and lubricants items. Building on our nearly 400-year history, the dedication of our 10,000 employees, and our shared commitment to business growth, strong financial performance, safety, sustainability and innovation, we have established a world-class business and built strong partnerships with our customers.

We operate in over 80 countries around the world and our portfolio industry-leading brands includes Armeen, Armolube, Armofuel, Beraid, Berol, Dissolvine, Duomeen, Ethomeen, Ethylan and Phospholan.

For more information visit [surfacechemistry.nouryon.com](http://surfacechemistry.nouryon.com)

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