



Armolube[®] and Armofuel[®] solutions



Powering your
lubricants and fuels

Nouryon

Our story

Over the course of our nearly 400-year journey to becoming a global specialty chemicals leader, we have built up a wealth of expertise, forged long-term customer partnerships, and earned a place among the best-performing companies in our industry in terms of safety, sustainability, and reliability.

With manufacturing, research and development, and technical service operations spanning more than 80 countries, our global presence fosters reliability and customer intimacy. Through our robust portfolio of brands, we remain focused on meeting challenges faced by our customers across a range of industries – today and in the future.

Our solutions for lubricants and fuels

For more than 40 years, our **Armolube®** lubricant and **Armofuel®** fuel solutions have played an essential role in powering people around the world, one molecule at a time.

We design innovative solutions to round out formulations for automotive, industrial, metalworking, and electric vehicle fluids as well as gasoline, diesel, and alcohol fuels. We have partnered with some of the most respected lubricant and fuel brands to help achieve their performance objectives with additional benefits such as natural-derived and ash-free components.

For more than 40 years, our lubricant and fuel solutions have played an essential role in our customers formulations to deliver high performance fluids.

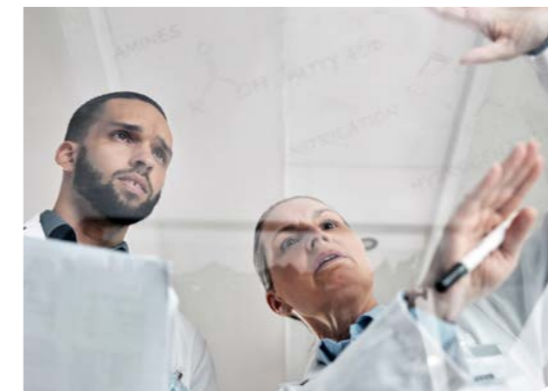


Our expertise in lubricants and fuels

Decades of experience have generated a body of knowledge that allows us to create a consistent, diverse palette of amines and polymers. Formulators trust our broad range of surfactant and polymer solutions to improve efficiency, productivity, and reliability across multiple applications to keep the world moving.

To go far, go together

We believe collaboration is key to your success and devote ourselves to understanding your needs.



Through research, testing, and design, we support the industry's ability to formulate lubricants and fuels that meet next-generation specifications and OEM requirements. We remain steadfastly focused on promoting customer growth and evolution.

- Delivering a diverse and versatile portfolio to continually elevate your formulations
- Extending your component design options to meet specifications and regulatory needs with our fatty amine surfactant and amine derivative technology capabilities
- Providing flexibility, operational efficiencies, and supply resiliency through a global manufacturing and technical support

When what's inside matters

We enable you to do more with less. Our **Armolube®** lubricant and **Armofuel®** fuel solutions pave the way for more sustainable options such as natural-derived, ash-free, and zinc-free solutions to meet next-generation and sustainability requirements without compromising performance.

Our versatile chemistry products are designed to reduce friction, inhibit corrosion, and improve lubricity, so we can partner with customers to usher in the future of fluids in the automotive, metalworking, industrial, grease, diesel, gasoline, and EV applications.

Armolube® lubricant solutions: This portfolio has a history of delivering quality and performance through a broad spectrum of products delivering key functionalities for lubricants. The range includes anti-wear agents, friction modifiers, grease thickener precursors, and emulsifiers, among others.

Armofuel® fuel solutions: Since the mid-1970s, we have supported the development of cleaner and more efficient fuels by developing alternative fuels with global OEMs. Our current portfolio comprises lubricity improvers, friction modifiers, demulsifiers, ignition improvers for alcohol fuels, and intermediates for cold flow improvers and detergents.

Designed for performance

When performance matters, turn to the experts

To deliver the necessary functional ingredients for a range of formulations and applications, we must align our capabilities with ever-changing market demands.

As a leading supplier of specialty surfactants and polymers, our alkylation and ethoxylation capabilities allow us to deliver the necessary functional ingredients for many formulations and applications.

As one of the largest global manufacturers of fatty amine products and derivatives, we offer a robust selection of fatty amine chemistries suitable for applications in many industrial and consumer products.

Nouryon technology capabilities

Nitrogen derivatives

- Primary amines
- Secondary amines
- Tertiary amines
- Diamines
- Higher amines
- Ethoxylated amines
- Ethoxylated diamines
- Amine salts
- Amine oxides
- Amides

Anionic surfactants

- Sulfonates
- Phosphate esters
- Alkyl naphthalene sulfonates

Non-ionic surfactants

- Alkyl glucosides
- Alkanolamides
- Alkoxyated alcohols
- Alkoxyated alkyl phenols

Chelating agents

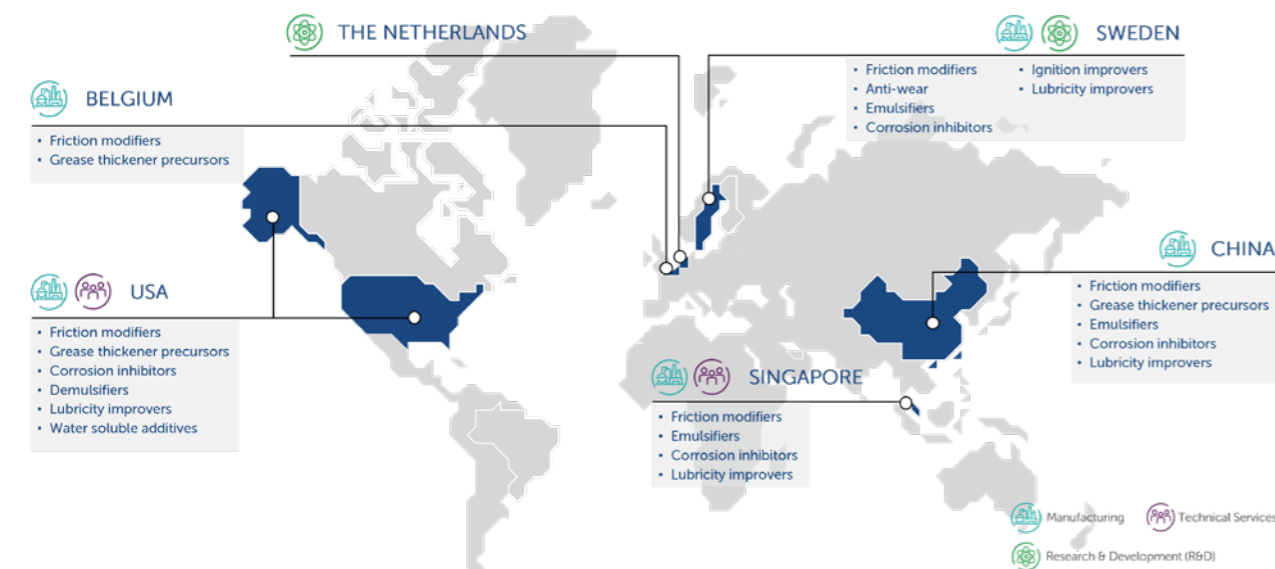
- MGDA
- GLDA
- Glucoheptonate
- EDTA
- MGDA
- GLDA
- Glucoheptonate
- EDTA

Global presence to support customers

Our manufacturing, research and development, and technical services span the globe so we can foster reliability and customer intimacy.

A holistic understanding of key application requirements and robust testing methods enable us to provide customer support where and when it's needed.

Lubricant & Fuels global capabilities map



Designed for sustainability

Where performance meets sustainability

We develop what's inside so you can deliver fuel and lubricant products that support growing demands for increasingly sustainable products without compromising on performance. Our innovative solutions are engineered for formulators to meet end-use application specifications and sustainability, regulatory, and environmental requirements such as improving engine efficiency, increasing fuel economy, and promoting cleaner emissions.

In close partnership with our customers, we create innovative solutions while focusing on

- Developing natural-derived, ash-free, and zinc-free solutions that meet or surpass customers' performance objectives
- Using partly or fully bio-based and renewable raw materials to allow flexibility and stability (e.g., tallow and vegetable-based)
- Designing solutions with a better toxicology profile across different functionalities
- Delivering reliable access to our products and expertise in every region across the globe
- Continuing company-wide reductions of our carbon footprint, waste, and water use, aspiring to be a net-zero organization by 2050

	Armolube® AW	Armolube® FM	Armolube® PA
LUBRICANTS	Anti-wear Agents <ul style="list-style-type: none"> • Phosphate ester amine salts • Alcohol alkoxyate phosphate esters 	Friction Modifiers <ul style="list-style-type: none"> • Amines (ester amines, amine oleates, alkoxyated amines) • Film-forming polymeric esters 	Thickener Precursors <ul style="list-style-type: none"> • Primary amines (vegetable and tallow based)
	Armolube® EM	Armolube® CI	Armolube® WS
	Emulsifiers <ul style="list-style-type: none"> • Alcohol ethoxylates • Alcohol alkoxyate phosphate esters • Ethoxylated amines • Anionics 	Corrosion inhibitors <ul style="list-style-type: none"> • Polyamines • Polyester amines • Proprietary blends • Imidazoline derivatives • Phosphate esters 	Water Soluble Additives <ul style="list-style-type: none"> • Chelates • Cellulose derivatives • Specialty surfactant blends
FUELS	Armofuel® FM	Armofuel® LI	Armofuel® IG
	Friction Modifiers <ul style="list-style-type: none"> • Amines (ester amines, amine oleates, alkoxyated amines) • Film-forming polymeric esters • Functionalized amides 	Lubricity Improvers <ul style="list-style-type: none"> • Amines (ethoxylated amines, diamine oleates) • Functionalized amides 	Ignition Improvers <ul style="list-style-type: none"> • Non-ionic polyethylene glycol derivative
	Armofuel® CFI	Armofuel® DE	Armofuel® CI
	Cold Flow Improvers <ul style="list-style-type: none"> • Secondary fatty amines • Amino alkylene polycarboxylic acids 	Demulsifiers <ul style="list-style-type: none"> • Glycol polyester • Amine derivative • Polyglycol ester • Resin oxyalkylate • Alkoxyated alcohols 	Corrosion Inhibitors <ul style="list-style-type: none"> • Polyamines • Polyester amines • Proprietary blends • Imidazoline derivatives • Phosphate esters

Armolube® portfolio



Product functionality	Benefits	Regional Availability			
		NA	EU	NEA	SEA
Anti-wear					
Armolube® AW 101 Alcohol alkoxylate phosphate ester	<ul style="list-style-type: none"> Ashless composition Extreme pressure performance enhancement gains Exceptionally high stability in the presence of strong alkali, acidic, and electrolyte solutions Strong dispersion, wetting, and detergency capabilities 	●	●	●	●
Armolube® AW 102 Alcohol alkoxylate phosphate ester	<ul style="list-style-type: none"> Ashless composition Good friction reduction Significant extreme pressure performance enhancement Good wetting agent capabilities Low foaming characteristics Strong dispersion and detergency capabilities Readily biodegradable with favorable hazard identification status 	●	●	●	●
Friction Modifiers					
Armolube® FM 103 Di-coco alkyl-amine	<ul style="list-style-type: none"> Ashless composition Effectively boosts Total Base Number (TBN) of lubricants Effective static accumulator High static friction coefficients and durable positive slope during oxidative and mechanical stressing in ATF formulations 	●			
Armolube® FM 210 N-oleyl-1,3-diaminopropane	<ul style="list-style-type: none"> Ashless composition Good boundary friction reduction Good corrosion inhibition Strong TBN boosting performance Used with other FMs to overcome shudder (slip-stick) problem 	●	●	●	●
Armolube® FM 402 Tallow alkylamine + 2 EO	<ul style="list-style-type: none"> Ashless composition Outstanding boundary friction reduction Improves fuel economy Improves "break-in" characteristics of fluid in ATF formulations 	●	●	●	●
Armolube® FM 601 Esteramine	<ul style="list-style-type: none"> Label-free and zero SAPS Moderate anti-wear and TBN boosting performance Synergy with MoDTC giving exceptional low friction coefficient across all speed/contact conditions Improves fuel economy Reduces need for molybdenum additives Enables formulation cost efficiency 	●		●	●

Product functionality	Benefits	Regional Availability			
		NA	EU	NEA	SEA
PU Thickener Precursors (primary amine)					
Armolube® PA 101 Tallow alkylamine	<ul style="list-style-type: none"> Ashless composition For PU greases, imparts good high-temperature performance, high shear stability, low oil separation, and improved oxidative stability Can be used in the formulation of low sulfur, low ash, and low phosphorus and/or low zinc-content lubricants TBN boosting benefits 	●			
Armolube® PA 103 Distilled octadecyl amine	<ul style="list-style-type: none"> Ashless composition Imparts good high-temperature performance High shear stability Low oil separation and improved oxidative stability TBN boosting benefits 	●	●	●	●
Armolube® PA 104 Hydrogenated tallow alkylamine – distilled	<ul style="list-style-type: none"> Ashless composition Imparts good high-temperature performance High shear stability Low oil separation and improved oxidative stability TBN boosting benefits 	●	●	●	●
Emulsifiers					
Armolube® EM 404 Alcohol ethoxylate	<ul style="list-style-type: none"> Ashless composition TBN boosting gains Good high-temperature performance High shear stability Low oil separation and improved oxidative stability 	●	●		●
Armolube® EM 406 Alcohol ethoxylate	<ul style="list-style-type: none"> All-around excellent emulsifier for Group II and naphthenic base oils Enables micro-emulsion formation 		●		
Armolube® EM 407 Alcohol ethoxylate	<ul style="list-style-type: none"> Water soluble co-emulsifier with moderate foam-forming properties 		●	●	●
Armolube® EM 413 Polyester	<ul style="list-style-type: none"> Label-free co-emulsifier with moderate HLB 		●		
Armolube® EM 505 Alcohol alkoxylate	<ul style="list-style-type: none"> Strongly hydrophilic block-copolymer emulsion stabilizer 	●	●	●	●

TBN: Total Base Number; ATF: Automatic Transmission Fluid; HLB: Hydrophilic Lipophilic Balance

Armofuel® portfolio

Product Functionality	Benefits	Regional Availability			
		NA	EU	NEA	SEA
Lubricity Improvers					
Armofuel® LI 202 Ethoxylated amine	<ul style="list-style-type: none"> Ashless composition Low melting and pour points enabling wide effective temperature range for handling and application Effective lubricity improver for neat methanol and ethanol fuels Excellent hard water tolerance, acid and alkali stability 	●	●	●	●
Armofuel® LI 204 Ethoxylated fatty amine	<ul style="list-style-type: none"> Ashless composition Significant multi-functional performance benefits: corrosion inhibition, Total Base Number (TBN), detergency, and dispersancy 	●	●	●	●
Friction Modifiers					
Armofuel® FM 301 Tallow propylene diamine dioleate	<ul style="list-style-type: none"> Ashless composition Effectively enhances lubricity in diesel and gasoline fuels Helps obtain synergistic additive mixtures that provide wear and/or friction reduction in fuels, in particular gasoline fuels Improves electrical conductivity of gasoline fuels Good corrosion inhibition, elastomer compatibility, and dispersancy benefits 	●	●	●	●
Armofuel® FM 303 N-tallow-1, 3-diaminopropane	<ul style="list-style-type: none"> Ashless composition Significant TBN benefits Acts as a water barrier while promoting adhesion and adsorption Serves effectively as a film former and corrosion inhibitor additive 	●	●	●	●
Ignition Improvers					
Armofuel® IG 110 Non-ionic polyethylene glycol derivative	<ul style="list-style-type: none"> Ensures proper combustion without forming any deposits in the engine Ash-free with good solubility and ideal for improving ignition with methanol Mitigates ignition issues and minimizes wear problems Allows marine engines to deliver outstanding performance with a dramatic reduction in emissions, eliminating the need for costly after-treatment devices 	●	●	●	●
Cold Flow Improvers (intermediates)					
Armofuel® CFI 110 Di-hardened tallowalkyl-amine	<ul style="list-style-type: none"> Ashless composition Useful TBN boosting capabilities Versatile intermediate for making a variety of functional additives: paraffin dispersants, dispersants for fuels and lubricants, ashless anti-wear additives, and fuel detergents 	●	●	●	●

TBN: Total Base Number



Contact us for detailed product information
website | nouryon.com/fuels-and-lubricants
email | lubes.fuels@nouryon.com

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 approximately 8,200 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.

All information concerning our products and/or all suggestions for handling and use contained herein (including formulation and toxicity information) are offered in good faith and are believed to be reliable. However, Nouryon makes no warranty express or implied (i) as to the accuracy or sufficiency of such information and/or suggestions, (ii) as to any product's merchantability or fitness for a particular use or (iii) that any suggested use (including use in any formulation) will not infringe any patent. Nothing contained herein shall be construed as granting or extending any license under any patent. The user must determine for itself by preliminary tests or otherwise the suitability of any product and of any information contained herein (including but not limited to formulation and toxicity information) for the user's purpose. The safety of any formulations described herein has not been established. The suitability and safety of a formulation should be confirmed in all respects by the user prior to use. The information contained herein supersedes all previously issued bulletins on the subject matter covered.

Products mentioned are trademarks of Nouryon and registered in many countries.

nouryon.com