



Shell NEODOL® Alcohol Ethoxylates

Your first choice for hard surface
cleaning formulations



Shell Chemicals



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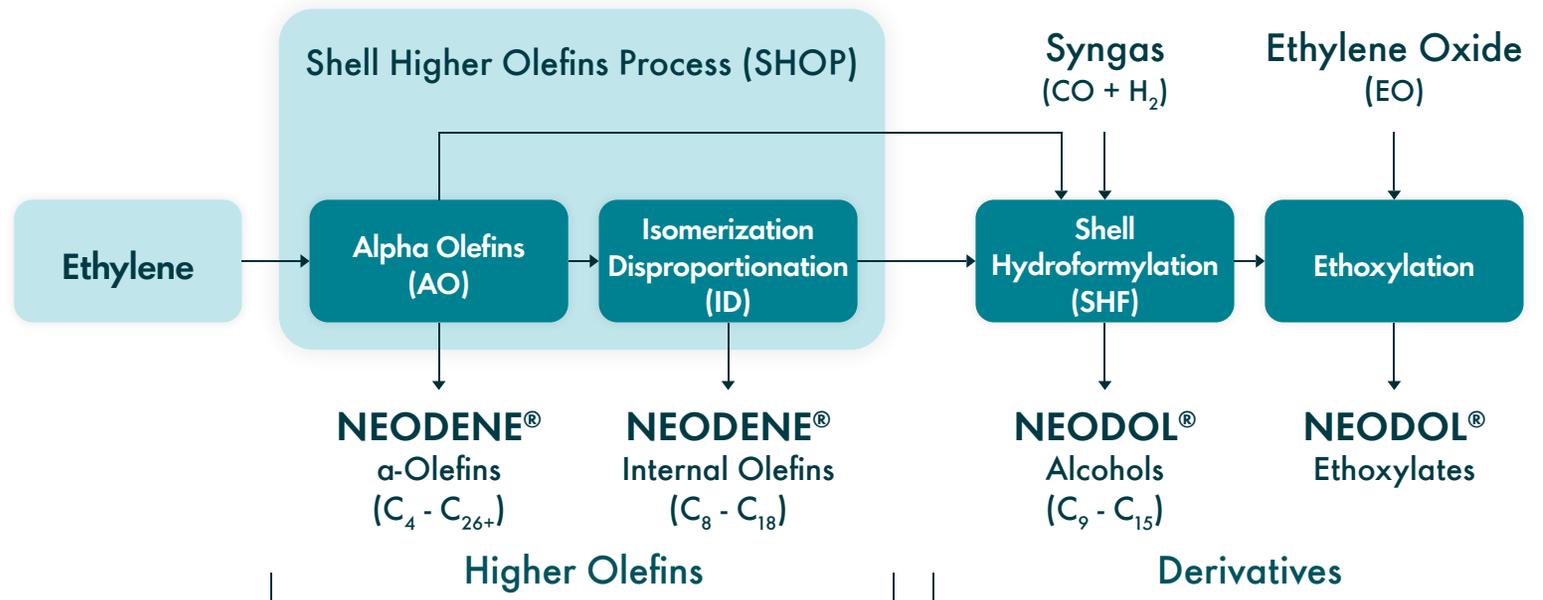
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Shell NEODOL® delivers more

Today's consumers demand more from their cleaning products. From performance to hygiene, hard surface cleaning products need to provide fast, effective cleaning across different surfaces and soils encountered in everyday life. Manufacturers continue to innovate to meet market demand for high-performance products that offer convenience and quick cleaning for kitchens, baths and floors. Our portfolio of Shell NEODOL products provides manufacturers with the flexibility to formulate to meet these demands.

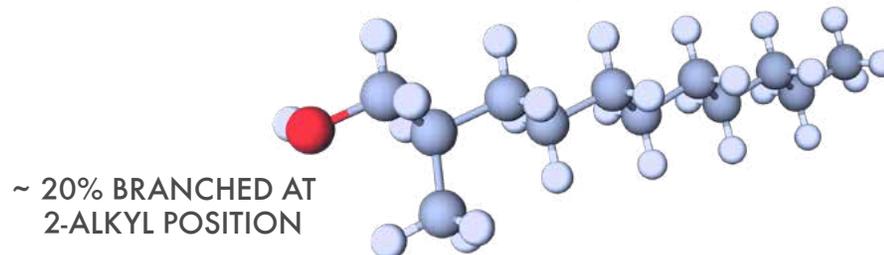
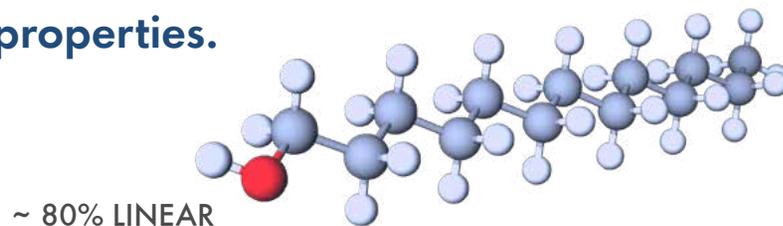


Our proprietary manufacturing process



Shell NEODOL delivers more (continued)

Shell NEODOL alcohol ethoxylates have been meeting this global demand as a trusted and valued ingredient in cleaning formulations for decades. For manufacturers seeking go-to solutions, Shell NEODOL 91-6 and SHELL NEODOL 91-8 are versatile alcohol ethoxylates for cleaning performance in hard surface cleaning applications. Shell Chemicals modified oxo alcohols with even and odd numbered carbon chains have a **unique combination of linear branching (80/20) and carbon chain variation, delivering good balance across several fundamental surfactant properties.**



Performance benefits of light branching

The light branching of Shell NEODOL products can improve handling properties and compatibility with other ingredients. These low molecular weight (C9-11) molecules provide fast diffusion to water/surface and water/soil interaction, delivering fast wetting with excellent soil removal on many types of high-trafficked hard surface areas including kitchens, baths, floors, and more.

Shell NEODOL alcohols and their derivatives are classified as **“readily biodegradable”** according to the OECD guidelines for chemicals. Products in this category are **environmentally preferred**. The essentially linear structure provides comparable properties and performance to commonly used oleo alcohol-based ethoxylates.



- Excellent water solubility
- Low dynamic surface tension
- Rapid wetting
- Rapid cleaning
- Excellent soil removal

Multi-purpose, multi-surface solution

Manufacturers continue to innovate to meet market demand for high performance products that offer convenience and quick cleaning for kitchens, baths and floors. Our portfolio of Shell NEODOL products provides manufacturers the flexibility to formulate to meet these demands.

Hard surface cleaning manufacturers needing versatility in their formulation have selected Shell NEODOL for more than four decades. Because of their **well-balanced hydrophobic/hydrophilic structures**, Shell NEODOL alcohol-based ethoxylates provide excellent **fast wetting action, emulsification, detergency, and solubility.**



Multi-purpose, multi-surface solution (continued)

They deliver high quality through the consistent broad range ethylene oxide distribution with 1,4-dioxane levels below 1ppm. This ethylene oxide distribution provides a range of products for tackling different soils. Additionally, the inherent free-alcohol content acts as a solvent to soften and solubilize kitchen-baked-on soils.

Shell NEODOL properties for hard surface cleaning

Surfactant	Shell NEODOL 91-5	Shell NEODOL 91-6	Shell NEODOL 91-8
Hydrophilic-Lipophilic Balance	11.6	12.4	13.9
Initial Dynamic Surface Tension Reduction (0.5 wt.%)	58	58	52
Surface Tension (dynes/cm)	25	26	29
Cloud Point (°C at 1 wt.%)	36	52	80
Viscosity (cP at 30 °C)	18	21	27
Solution Time (min.)	0.4	0.1	1.5
CMC (wt.%)	0.015	0.02	0.03
1.4-dioxane	< 1 ppm	< 1 ppm	< 1 ppm

**% reduction in surface tension after 0.03 second. The measure values between 52 - 58 % are very high results compared with other alcohol ethoxylates showing very fast wetting and resulting cleaning.*

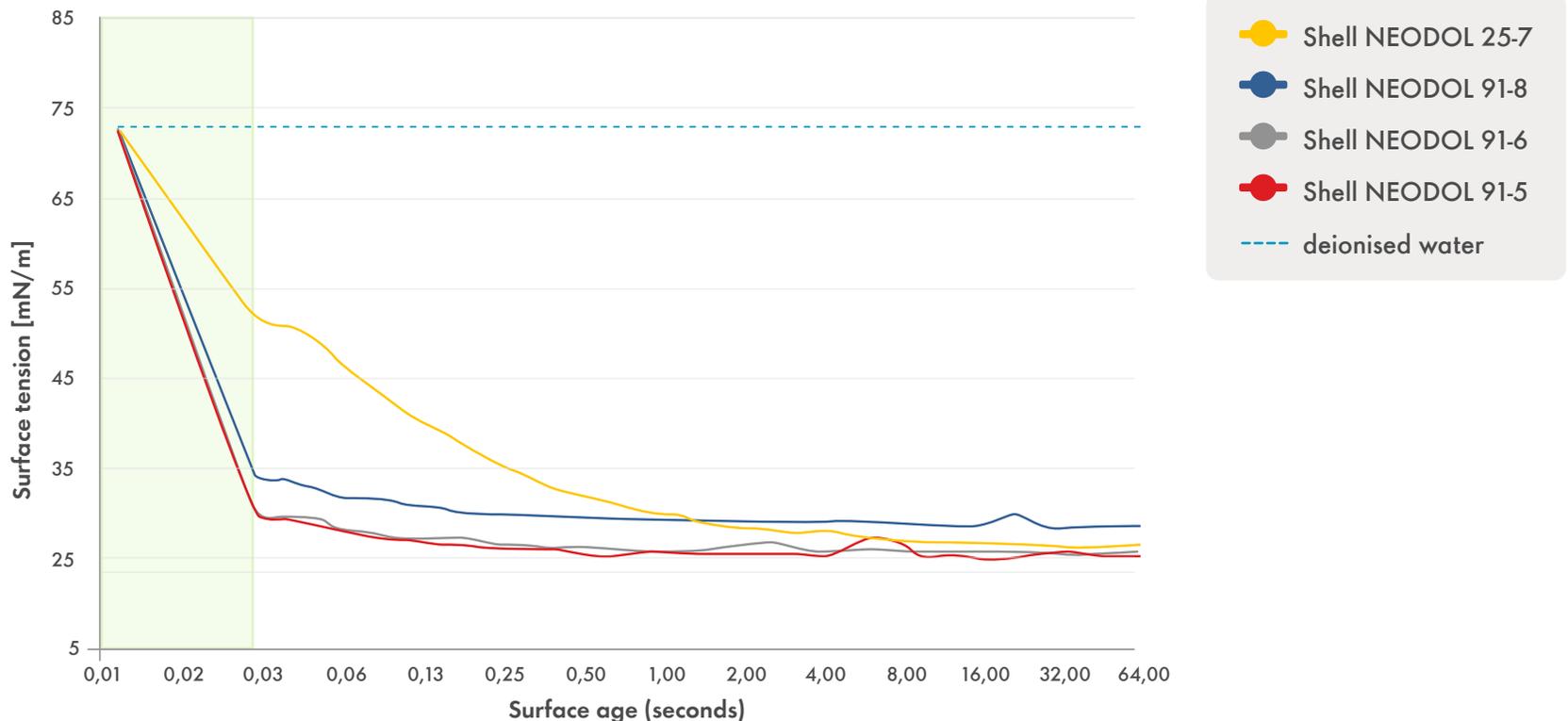
Beyond being tough on stains, Shell NEODOL 91-8, provides emulsifying and solubilizing hydrophobic fragrance ingredients to meet consumer demand for products that smell fresh and clean while delivering stable product formulations. **Their low critical micelle concentration (CMC) requires less product to begin cleaning, therefore can provide cost-effective formulation performance (see table).**

Ease of handling

Shell NEODOL 91-5 and Shell NEODOL 91-6 offer low pour points and can be easily diluted with water to obtain lower temperature stability for good storage stability. In addition, their properties result in fast and effective cleaning. While the versatility of Shell NEODOL 91-8 also provides effective cleaning performance across a range of applications, the high compatibility with electrolytes offers flexibility to adjust the formulation (e.g. Cloud Point) to application.

Initial surface tension reduction after 30 ms

(100% water = ~72 mN/m @ 20°C)



Dynamic Surface Tension of 0.5% w/w solutions of Shell NEODOL 91 ethoxylates vs NEODOL 25-7 measured with a bubble pressure tensiometer

Spotlight on dish care

Among household activities, dishwashing remains a daily chore that occupies several hours per week for average consumers. Consumer preference is for products that work quickly, perform well, and leave a spotless clean. For manufacturers formulating for the performance customers expect, Shell NEODOL 91-6 and Shell NEODOL 91-8 offer flexible solutions.

They are **non-ionic co-surfactants** that deliver **improved formulability and product stability**, plus more effective and faster cleaning of dish surfaces. These properties are ideal for traditional hand dishwashing products as well as ready-to-use dish sprays. Fast surface tension reduction helps to quickly remove grease and food stains. They balance the primary, anionic surfactants which deliver **excellent cleaning and foaming performance**.



Formulating with Shell NEODOL 91-5, Shell NEODOL 91-6 and Shell NEODOL 91-8



Product end uses

	N91-5	N91-6	N91-8
Household products			
All purpose cleaner	×	×	×
Multi-functional laundry products	×	×	×
Laundry liquids		×	×
Hand dishwash liquid		×	×
Spray-on dish liquid		×	×
Tub & tile bathroom cleaner	×	×	×
Glass cleaner	×	×	×
Industrial & institutional cleaners			
Hard surface cleaners	×	×	×
Car wash cleaners	×	×	×
Laundry liquids		×	×
Laundry powders		×	×
Metal soak cleaners		×	×
Solvent cleaners/degreasers		×	×

Certified safer ingredients

Several Shell NEODOL products are U.S. Environmental Protection Agency (EPA) approved as CleanGredients with several also listed on the EPA Safer Choice ingredient (SCIL) list, having met **safer criteria for people, pets, and the planet.**

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In Europe, Shell NEODOL grades are listed in the Detergents Ingredients Database (DID) which can support product applications for environmental standards/schemes such as Ecolabel: Shell NEODOL 91-5; Shell NEODOL 91-6 and Shell NEODOL 91-8. Shell NEODOL alcohol ethoxylates are kosher certified.

The infographic features a central light blue rounded rectangle with the 'CLEANGREDIENTS' logo at the top right. To the left of this rectangle is a 'SAFER CHOICE' logo with the text 'Meets U.S. EPA Safer Product Standards™' and the URL 'epa.gov/saferchoice'. Inside the central rectangle, there are nine dark blue rounded rectangles arranged in a 3x3 grid. Each rectangle contains the text 'Shell NEODOL' followed by a grade number. The top row contains grades 23-1, 91-6, and 91-8. The middle row contains grades 135-1, 135-3, and 135-7. The bottom row contains grades 1, 25, and 91. Below the grid, the text 'Safer Choice Ingredient List' is centered.

Product	Grade
Shell NEODOL	23-1
Shell NEODOL	91-6
Shell NEODOL	91-8
Shell NEODOL	135-1
Shell NEODOL	135-3
Shell NEODOL	135-7
Shell NEODOL	1
Shell NEODOL	25
Shell NEODOL	91

Safer Choice Ingredient List



The path to sustainable solutions

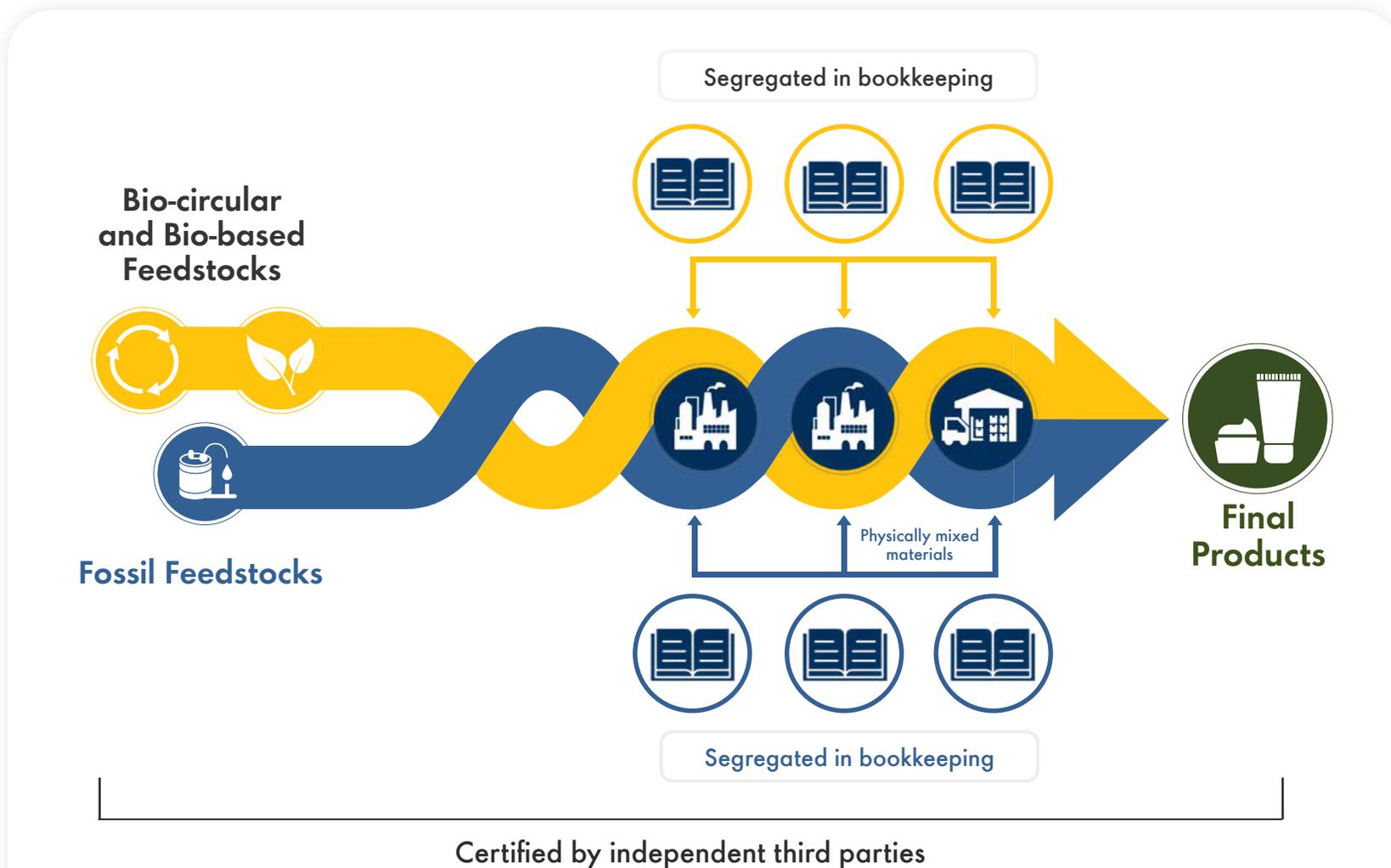
For manufacturers seeking to incorporate more sustainable ingredients without sacrificing performance, **Shell Chemicals' sustainability portfolio now includes bio-based and bio-circular solutions, using the mass balance accounting approach.**

Mass balance allows hard surface cleaning manufacturers to partially replace conventional materials and products with more sustainable alternatives without establishing new manufacturing processes while retaining product quality and consistency. The process is certified by an independent third-party which helps provide assurance, transparency, and credibility for sustainability claims. Mass balance also helps **reduce resource consumption** and **minimize environmental impact** while **retaining product quality and consistency**. It is not just about the final product; it is about transforming the way we create and manufacture to help you deliver on your sustainability goals.

Shell Chemicals has several third-party certification systems in place where the bio-based content is verified by an independent organization, and more are being added to provide options for our customers.

Understanding mass balance

Shell Chemicals' bio-based content is verified by independent, third-party certification organizations such as (but not limited to) REDcert, SCS Global Services, and ISCC PLUS.



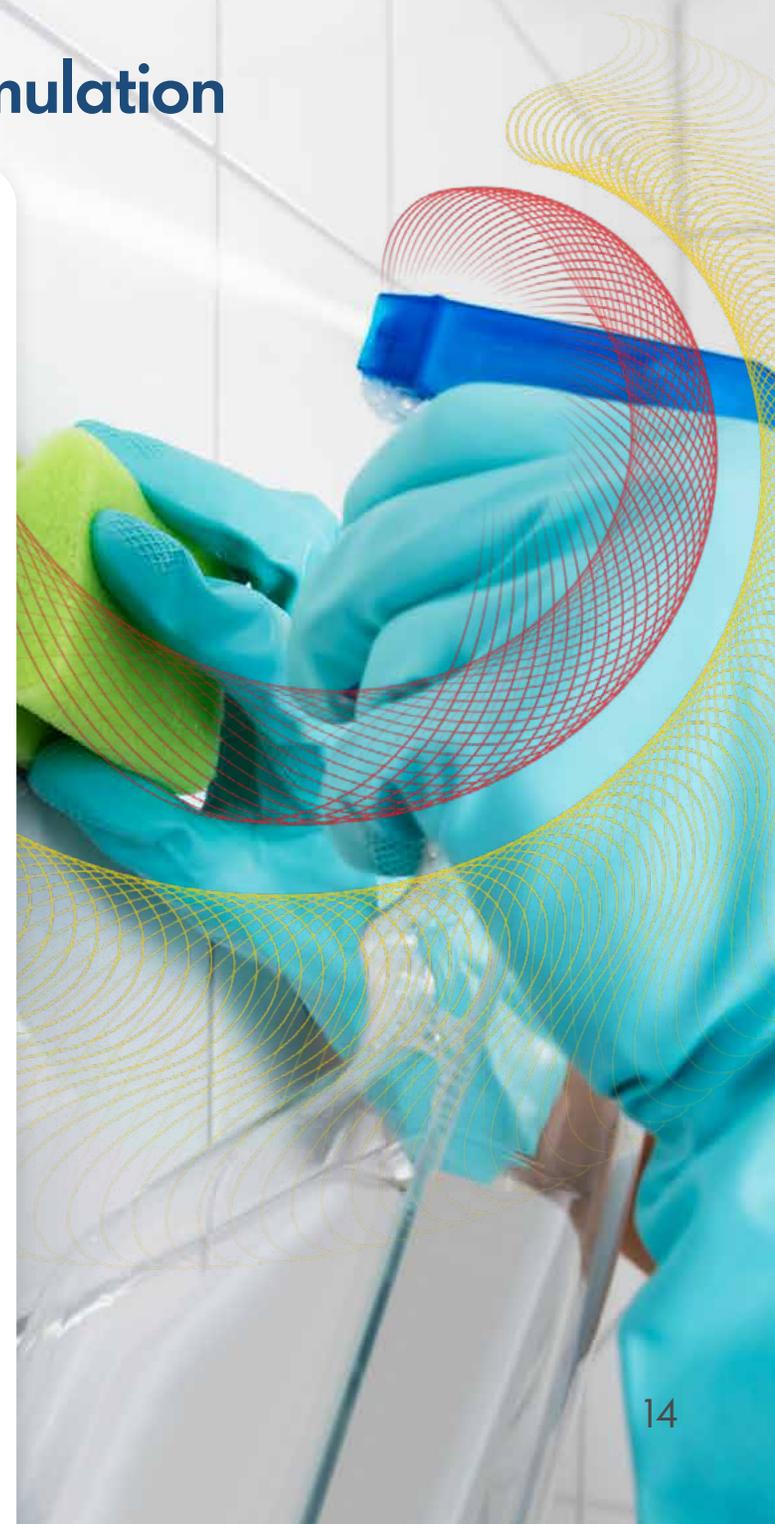
Shell NEODOL: Examples of product formulation

Multi-Surface Cleaner

Typical ingredients	Description	Shell NEODOL options
Water (aqua)		
C9-11 Pareth-8	Cleaning agent	Shell NEODOL 91-8
Sodium Alkylbenzene Sulfonate	Cleaning agent	
Citric Acid	pH control	
Sodium carbonate	Builder	
Fragrance		
Preservatives, colorants, etc.	Multiple	

Prototype Limescale Cleaner

Typical ingredients	Description	Shell NEODOL options
Water (aqua)		
C9-11 Pareth-6	Cleaning agent	Shell NEODOL 91-6
Formic acid	Descaling	
Sodium citrate	Chelating agent	
Fragrance		
Preservatives, colorants, etc.	Multiple	



Cleaning Agent & Fragrance Solubilizer: Multi-Purpose Cleaner

Typical ingredients	Description	Shell Chemicals products
Water (aqua)		
ADBAC	Antimicrobial active	
Amine Oxide	Cleaning agent	
C9-11 Pareth-8	Fragrance solubilizer	Shell NEODOL 91-8
Ethanol amine	pH adjuster	
Glycol ether	Solvent	Shell Ethyl DIPROXITOL (DPE)
Preservatives, colorants, etc.	Multiple	

Liquid Hand Dishwash

Typical ingredients	Description	Shell NEODOL options
Water (aqua)		
Sodium Alketh Sulfate	Surfactant	Shell NEODOL 23-2
Alkylamine Oxide	Surfactant	
C9-11 Pareth-8	Surfactant	Shell NEODOL 91-8
Ethanol	Solvent	
Sodium Chloride	Thickener	
Preservatives, colorants, fragrances, etc.	Multiple	





Develop your solutions with Shell Chemicals

Shell Chemicals is a global leader, producer, and supplier of alcohols, ethoxylates, and higher olefins. Manufacturers in the hard surface cleaning industry already use Shell products in their formulations and know that Shell Chemicals is a reliable partner for technical and commercial assistance.

Our bio-based products are manufactured to global standards and provide transparency and accountability with our options for third-party certification. Our integration with other Shell businesses provides our customers the ability to secure advantaged feedstocks, performance products, scale, and reliable delivery.

The scientists at Shell Chemicals continually develop, refine, and improve our product lines and are always willing to offer industry-leading expertise to customers formulating with Shell NEODOL. Application labs support our customers with:

- **Rheology**
- **Phase Behavior**
- **Cleaning performance measurement**
- **Surfactant Properties measurement**
- **Formulation**

At Shell Chemicals, Product Stewardship is paramount. We hold ourselves accountable to high standards in health, safety, security, and the environment (HSSE) for our products. By collaborating both independently and with industry groups, we are constantly evaluating and elevating our product line to address our customers' needs. By offering bio-based feedstocks, based on mass balance, you can enhance your products to meet growing consumer demand for more sustainable adhesive products.

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