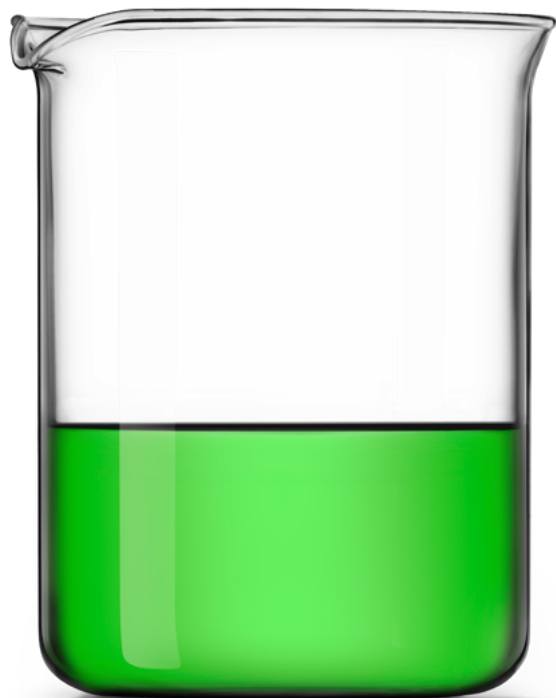


# GREENER surfactants



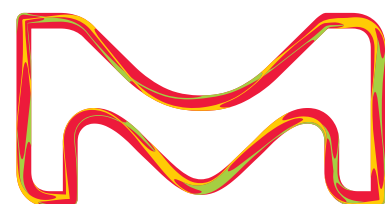
## The New Grades that Degrade

Surfactants are essential for numerous chemical applications – as detergents, wetting agents, emulsifiers, foaming agents, dispersants, and more. But this also means that there's a vast amount released into the environment. That's why we're expanding our range of greener surfactants. They readily degrade into harmless products after use, leaving nothing behind except reliable results.

These surfactants are part of our growing portfolio of sustainable products and solutions that are designed to help you reduce the ecological impact of your research. While they are aligned with "The 12 Principles of Green Chemistry", our greener alternatives still deliver excellent quality and efficacy to meet the highest standards in research and production. Discover how we can help you reach new frontiers – sustainably.

Explore all greener alternatives:

[SigmaAldrich.com/sustainable-lab](https://SigmaAldrich.com/sustainable-lab)

















# SAME PERFORMANCE, SMALLER FOOTPRINT

## ECO Tween™ and ECO Brij™ Detergents Series

With the new ECO series of surfactants, you have all of the performance benefits of traditional petroleum-based products. But none of the ecological drawbacks. That's because ECO surfactants are made using bio-based ethylene oxide (EO) from biomass ethanol, so they are completely renewable. Moreover, they are manufactured at a plant which runs on a high proportion of renewable energy, further reducing your carbon footprint when using ECO surfactants.

### Key Features

- 100% renewable
- 100% bio-based
- Non-APEO
- Performance identical to petrochemical-derived surfactants
- Superior performance to other bio-based nonionic options
- Lower carbon footprint than petrochemical ingredients
- USDA BioPreferred® Program third-party certification
- Mild, suitable for skin contact applications to minimize irritation

Catalog No.	Product Name	
STS0200	ECO Tween™ 20	
STS0201	ECO Tween™ 40	
STS0202	ECO Tween™ 60	
STS0203	ECO Tween™ 65	
STS0204	ECO Tween™ 80	
STS0205	ECO Tween™ 85	
STS0210	ECO Brij™ C10	
STS0211	ECO Brij™ L23	
STS0212	ECO Brij™ L4	
STS0213	ECO Brij™ O10	
STS0214	ECO Brij™ O20	
STS0215	ECO Brij™ S10	
STS0216	ECO Brij™ S100	
STS0218	ECO Brij™ S20	



# Extremely Capable, Highly Biodegradable

## TERGITOL™ 15-S and ECOSURF™ Detergents Series

TERGITOL™ 15-S and ECOSURF™ are two series of biodegradable nonionic surfactants that combine uncompromising performance with outstanding sustainability. We offer a variety of greener alternatives to help you significantly lower your environmental impact in a wide range of formulating applications.

**TERGITOL™ 15-S Series:** Versatile, high-performance secondary alcohol ethoxylates (SAEs) to replace primary alcohol ethoxylates (PAEs), nonylphenol ethoxylates (NPEs), octylphenol ethoxylates (OPEs), and other general purpose surfactants.



















**ECOSURF™ SA Series:** Seed-oil-based biodegradable nonionic surfactants with excellent wetting, detergency, formulation, and handling characteristics.

**ECOSURF™ EH Series:** Biodegradable nonionic surfactants with low aquatic toxicity, and high formulation flexibility, which meet or exceed environmental guidelines.

**ECOSURF™ EH Series:** Specialty surfactants approved for use as inert ingredients according to 40 C.F.R. § 180.910, 920, 930, 940 (2014), which fulfill US EPA Design for the Environment criteria, and are listed as safer products by CleanGredients®.

### Key Features


- Readily biodegradable (OECD 301F)
- >60% biodegradation within 28 days
- Superior wetting
- Excellent oily soil removal
- Rapid dissolution and good rinsability
- Low odor
- No gel range

Catalog No.	Product Name	
15S7	TERGITOL™ 15-S-7	
15S9	TERGITOL™ 15-S-9	
STS0001	TERGITOL™ 15-S-30	
STS0002	TERGITOL™ 15-S-40	
STS0003	TERGITOL™ 15-S-40 solution	
STS0005	Triton™ CG-110	
STS0006	ECOSURF™ EH-9	
STS0007	ECOSURF™ SA-9	
STS0012	ECOSURF™ EH-9 solution 90% in water	
STS0013	TERGITOL™ 15-S-5	
STS0014	TERGITOL™ 15-S-15	
STS0015	ECOSURF™ EH-3	
STS0016	ECOSURF™ EH-6	
STS0017	ECOSURF™ SA-4	
STS0018	ECOSURF™ SA-7	
STS0019	TERGITOL™ 15-S-3	
STS0020	TERGITOL™ 15-S-12	
STS0021	TERGITOL™ 15-S-20 solution	

# 12 principles

## of Green Chemistry

The 12 Principles of Green Chemistry were proposed to encourage scientists to use more sustainable chemical processes and products. These principles are represented by the icons below to provide a quick reference for the classification of our greener substitutes and biorenewable alternatives.

Our greener alternative products with this icon  fulfill at least one of the following criteria:

- Reengineered by our scientists to significantly improve their environmental footprint
- Aligned with the 12 Principles of Green Chemistry
- Help make greener alternatives possible through enabling technologies



### 1 Prevention

It is better to prevent waste than to treat or clean up waste after it has been created.



### 2 Atom Economy

Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.



### 3 Less Hazardous Chemical Syntheses

Wherever practicable, synthetic methods should be designed to use and generate substances that possess little or no toxicity to human health and the environment.



### 4 Designing Safer Chemicals

Chemical products should be designed to affect their desired function while minimizing their toxicity.



### 5 Safer Solvents and Auxiliaries

The use of auxiliary substances (e.g., solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used.



### 6 Design for Energy Efficiency

Energy requirements of chemical processes should be recognized for their environmental and economic impacts and should be minimized. If possible, synthetic methods should be conducted at ambient temperature and pressure.



### 7 Use of Renewable Feedstocks

A raw material or feedstock should be renewable rather than depleting whenever technically and economically practicable.



### 8 Reduce Derivatives

Unnecessary derivatization (use of blocking groups, protection/ deprotection, temporary modification of physical/chemical processes) should be minimized or avoided if possible, because such steps require additional reagents and can generate waste.



### 9 Catalysis

Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.



### 10 Design for Degradation

Chemical products should be designed so that at the end of their function they break down into innocuous degradation products and do not persist in the environment.



### 11 Real-time Analysis for Pollution Prevention

Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.



### 12 Inherently Safer Chemistry for Accident Prevention

Substances and the form of a substance used in a chemical process should be chosen to minimize the potential for chemical accidents, including releases, explosions, and fires.

