

# GREENER ALTERNATIVES

A better tomorrow starts  
with better research today



## Design for Sustainability (DfS) Framework

Our gold-standard design approach keeps sustainability at the forefront of each stage of the product life cycle as we **research, develop, and re-engineer** products to minimize environmental and health impacts, and simultaneously improve product performance. We leverage quantitative sustainability improvements for our customers and our own researchers.

As a result of our efforts, we offer a growing portfolio of Greener Alternative Products that reduce environmental impacts.

## Our Greener Standards

Greener alternatives does not mean making compromises. We hold our green products to the highest standard and recognize the needs of our customers to meet environmental impact goals. We are committed to providing products and solutions that enable this competitive edge, while contributing to a healthier ecosystem and world. We also collaborate with suppliers, vendors and partners to carry our commitment across our value chain.



## Categories of Greener Alternative Products

Click on a category to view a list of products.



### Re-engineered Products

This category applies to products that have been re-engineered by our scientists that use fewer resources, are less hazardous, generate less waste, or increase efficiency. We use our DOZN™ system to evaluate each re-engineered product, thereby quantifying the greener alternative.

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### 12 Principles Aligned Products

If a product demonstrates one or more characteristics that align with the 12 Principles of Green Chemistry, then it is designated "greener" and can be found in this category.

Our new greener solvent Cyrene™ is aligned with the principle "Designing Safer Chemicals". It is bio-renewable, significantly less hazardous than the solvents it is intended to replace, and has a carbon footprint close to zero.

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### Enabling Products

Enabling products are those that enable the research of alternative energy. Many of our products are used by scientists to unlock the power of nature, including a wide variety of materials used for energy generation, storage and efficiency. These products enable the research of alternative energies for things like algae as biofuel and are therefore considered "greener." Some of the products in this category may not be greener themselves but they are key in the development of greener solutions.

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### Design for Sustainability (DfS) Developed Products

Our DfS approach is embedded into the product development process in order to substantially increase the sustainability standards in seven areas of opportunity—without significant trade-offs. Our new Stericup® E sterile filters exemplify DfS, as they significantly reduce plastic and packaging that enter the laboratory and waste stream, as opposed to comparable sterile filters.

# 12 principles of Green Chemistry



Waste Prevention



Atom Economy



Less Hazardous  
Chemical Synthesis



Designing Safer Chemicals



Safer Solvents and Auxiliaries



Design for Energy Efficiency



Use of Renewable Feedstocks



Reduce Derivatives



Catalysis



Design for Degradation



Real-time Analysis for  
Pollution Prevention



Inherently Safer Chemistry  
for Accident Prevention

## DOZN™

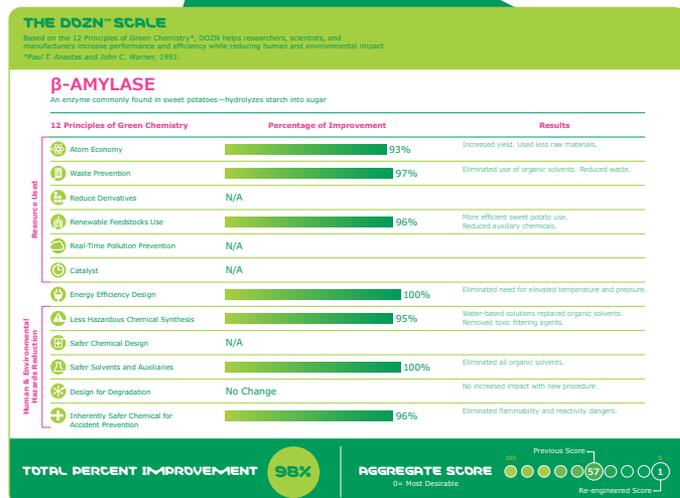
We build upon our own researchers' creativity to execute more sustainable products and processes by using DOZN™ to identify the pivot points in which customers/users can implement significant improvements.

Our approach to evaluating greener chemicals is based on the 12 Principles of Green Chemistry.

These principles distill into three major categories: improving resource use, more efficient use of energy, and minimizing human and environmental hazards.

The results we share with our customers/users are presented for each principle, for each major category and as an overall aggregated score.

Learn more about DOZN™ at [SigmaAldrich.com/dozn](https://SigmaAldrich.com/dozn)

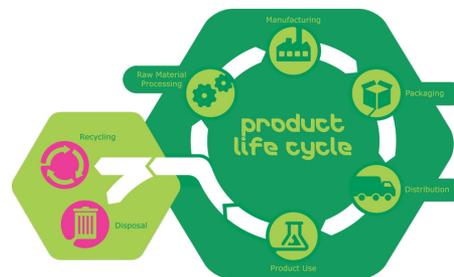


# Design for Sustainability (DfS) Development

DfS-Development is our unique process through which we design new products with sustainability as a key focus in each stage of the Product Development Process. Our parallel goal is to maximize the product features that improve its performance and ease of use.

We measure product sustainability characteristics using our DfS scorecard. It consists of 23 sustainability aspects grouped into seven categories in order to cover the major areas of environmental and human impacts.

Our DfS-Development process contributes to developing innovative products that meet—and even surpass—the growing sustainability expectations of our customers.



[SigmaAldrich.com/dfs](https://SigmaAldrich.com/dfs)

## our portfolio in action

### Stericup® E and Steritop® E Sterile Filtration Systems



The innovative design allows our customers to directly connect their bottle containing the media or buffer to the filtration unit, avoiding the use of the plastic funnel. This led to multiple sustainability improvements including the reduction up to 48% of the amount of plastic and the reduction up to 69% of packaging.

[SigmaAldrich.com/stericup-e](https://SigmaAldrich.com/stericup-e)

### Cyrene™



Our bio-based potential alternative to petroleum-based DMF and NMP solvent is produced at near energy neutral helping to increase sustainability. Cyrene™ has demonstrated a superior performance in the production of graphene, just one of its many applications in addition to medicinal chemistry.

[SigmaAldrich.com/cyrene](https://SigmaAldrich.com/cyrene)

To start making your lab greener, visit

[SigmaAldrich.com/greener](https://SigmaAldrich.com/greener)

### GenElute™-E Single Spin nucleic acid purification kits



Through our single spin technology we are introducing a convenient procedure enabling a faster purification of nucleic acid samples without the use of chaotropic salts, organic solvents or EDTA, resulting in improved downstream applications such as real-time PCR. By eliminating the bind and wash steps, our GenElute™-E kits help reduce the use of plastic consumables by 55% and avoid hazardous liquid waste compared to traditional silica-based kits.

[SigmaAldrich.com/singlespin](https://SigmaAldrich.com/singlespin)

### ZooMab® Recombinant Antibody Technology



Unlike traditional monoclonal antibodies, ZooMab® monoclonal antibodies are produced with a proprietary recombinant technology that greatly reduces the involvement of animals. Further, all ZooMab® antibodies are lyophilized and shipped ambiently in reduced packaging - no polystyrene coolers or ice bricks. Compared to traditional antibody shipping, this will allow us to reduce emissions for ZooMab® antibodies by at least 75 metric tonnes of CO<sub>2</sub>eq by 2025.

[SigmaAldrich.com/zoomab](https://SigmaAldrich.com/zoomab)

To place an order or receive technical assistance:

Order/Customer Service: [SigmaAldrich.com/order](https://SigmaAldrich.com/order)

Technical Service: [SigmaAldrich.com/techservice](https://SigmaAldrich.com/techservice)

Safety-related Information: [SigmaAldrich.com/safetycenter](https://SigmaAldrich.com/safetycenter)

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