You know the destination

WE'LL HELP YOU REACH IT SUSTAINABLY

LUBRIZOL LIFE SCIENCE

Driven by Innovation, Powered by Partnership

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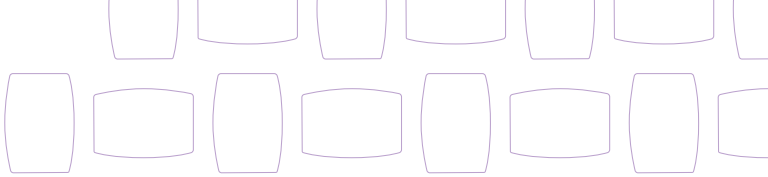


RAW MATERIALS

Improving environmental performance allows us to understand how the building blocks of our ingredients interact with the environment.

LUBRIZOL'S MANUFACTURING

By finding ways to reduce the footprint of our manufacturing, we pass on the positive impact to our ingredients.

CUSTOMER MANUFACTURING

Enabling our customers with technology that helps to reduce their environmental impact and cost.

POST USE

Understanding the ultimate fate of our ingredients in finished product use means that we help consumers reduce their impact.

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

Lubrizol Life Science aligns its goals with the United Nations Sustainable Development Goals (UNSDGs).

With unique manufacturing and ingredients that require fewer raw materials and less water, energy and heat to process we can reduce the impact of making finished products.

By understanding the fate and transport of our ingredients we ensure that our polymers do not harm the marine environment.

With the transition to RSPO certified feed stock and commitment to Mass Balance Certification, we are working with suppliers to reduce palm deforestation and preserve natural habitats.

PEMULEN™ EZ-4U POLYMERIC EMULSIFIER

The production of a skin care cream is a time and energy consuming process in which the emulsifiers play a central role. **Pemulen™ EZ-4U polymeric emulsifier** can improve our customers' formulations sustainability profile.

FEATURES:

COLD PROCESS
Save energy preparing emulsions at room temperature, compared to traditional hot processes (60-80°C) / (140-176°F).

FAST DISPERSION
Reduce mixing time and save energy with rapid aqueous dispersion.

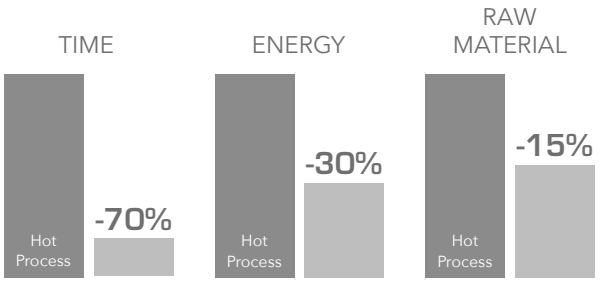
MULTI-FUNCTIONALITY
Easily achieved emulsion stability without the need for additional polymeric emulsifiers, co-emulsifiers or fatty alcohols.

In traditional/hot processes, the water phase is known to be the most **energy-intensive** and **time-consuming.**

WATER PHASE

80% of total **energy** consumption

55% of total **time** consumption



Estimated improvements, based on internal calculation, on the water phase with Pemulen™ EZ-4U polymeric emulsifier.

AVALURE™ FLEX-6 POLYMER

Avalure™ Flex-6 polymer can replace emulsifers and film formers.

Avalure™ Flex-6 polymer is a water-dispersible, multifunctional powder that provides emulsification, co-thickening, film formation, pigment dispersion and soft feel in skin care applications.

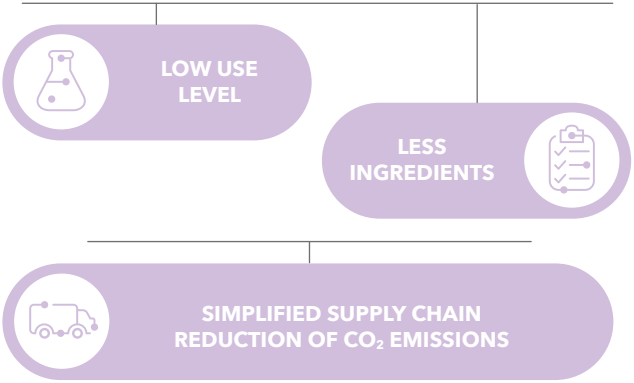
FEATURES:

MULTI-FUNCTIONALITY
Decrease both the number and use level of other ingredients by using one polymer for emulsification, film forming and rheology control.

ENHANCED PIGMENT DISPERSION
Achieve same or improved coverage with lower levels of pigment through excellent pigment dispersion.

COLD PROCESS
Reduce energy consumption through cold processing.

1% AVALURE™ FLEX-6 POLYMER =
2% EMULSIFIERS + 2% FILM FORMER



Potential improvements with Avalure™ Flex-6 polymer based on internal calculations.

CARBOPOL® SMART POLYMERS

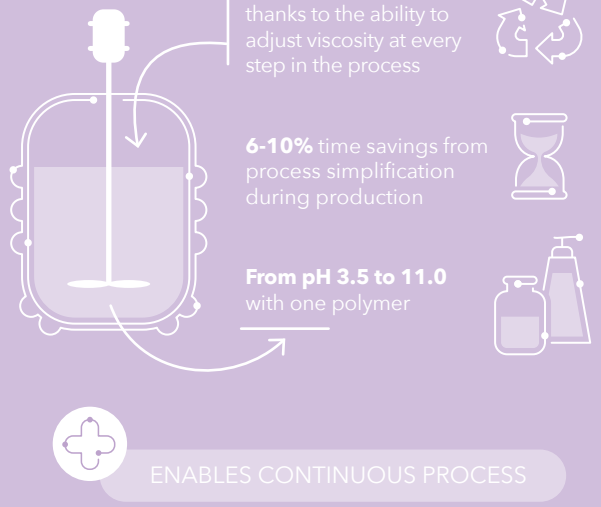
Aside from luxurious feel, exceptional flow and enhanced visual appeal, **Carbopol® smart polymers** open the door to infinite possibilities by easing formulation, improving process throughput, reducing energy consumption and lowering manufacturing costs.

FEATURES:

NO NEUTRALIZATION
Ease the production process, save time and avoid multiple pH adjustments.

ORDER OF ADDITION FLEXIBITY
Allow post-addition to better control batch aeration, reduce the need for vacuum suction and lower energy consumption.

MULTIPLE FORMULATIONS
Save on materials and storage with broad pH compatibility in a variety of applications.



Potential improvements with Carbopol® Smart polymers based on internal calculations and tests.

CARBOPOL® STYLE 2.0 POLYMER

Environmental Performance:

> Multifunctionally reduces raw materials.
> Less ingredients, no need to use fixatives.
> Up to 37% ingredient reduction (no fixative).

> 5% Reduced CO_2 transportation emissions VS Liquid Polymers.

Formulation benefits improving natural content and meeting sustainable trend.
Ultra-fast/easy dispersion reducing energy and allowing up to 35% time reduction.

OILKEMIA™ 5S POLYMER

Environmental Performance:

> Inherently Biodegradable.
> High Natural content RCI 0.73

> Improved processing compared to competitive materials which require heating up to 100°C/ 212°F. **Up to 20% reduction in energy.**

Potential improvements based on internal calculations.

Formulation benefits include improving natural content and meeting the sustainable trend needs:

Oilkemia™ 5S polymer is better designed to thicken vegetable derived oils and could be positioned to favor “natural derived formulations” and provide high performance.

MATRIFUSE™ S-1 DISPERSANT

Environmental Performance:

> High Natural Content RCI 0.79
> Inherently biodegradable.

> Manufacturing & formulation benefits using pigment stock solutions:

Lower viscosity ▸ requires less energy to remix or to load in manufacturing batch.

Higher pigment loading ▸ save time & storage space. Ability to use natural emollients in finish formulation instead of just dispersing oils.

Formulation benefits include improving natural content and meeting the sustainable trend needs:

Formulate more naturally without impacting performance. Lubrizol's dispersant blend is highly compatible with a wide range of pigment coatings and emollients of various polarity.

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