

# Eastman™ emollient esters from green biocatalytic process

## Key benefits

- Manufactured via green process
- Natural emollient
- Moisture barrier

Eastman is taking enzymatic biocatalysis to new heights to create innovative ingredients for natural cosmetics and personal care products.

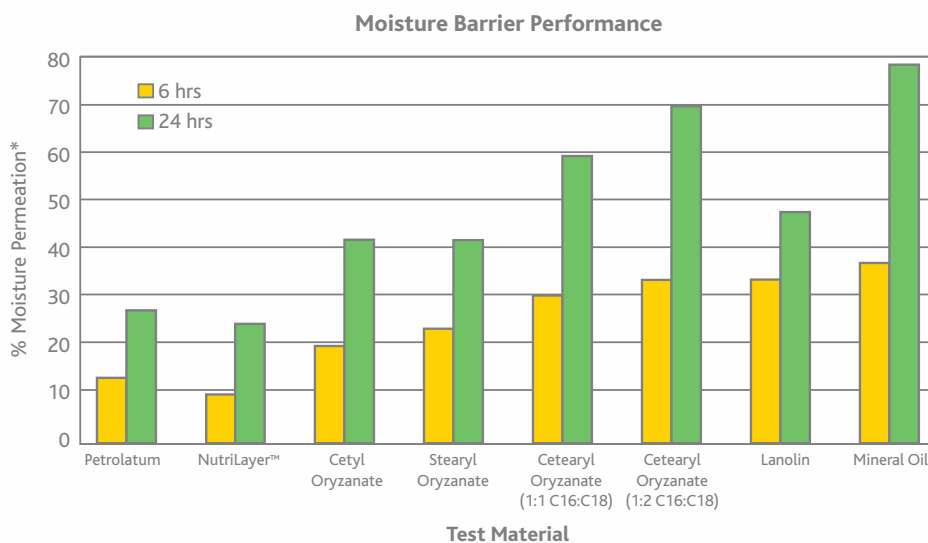
Eastman's green biocatalytic process redefines efficiency and environmental responsibility. Eastman scientists discovered that by carefully controlling conditions, their reaction process can be run at low temperatures and without added solvents. By working solvent-free, Eastman avoids even trace levels of undesirable solvents in their products and eliminates the environmental impact of disposing of process solvents as waste. To achieve high conversion of the biocatalyzed reactions, any by-products produced (usually water or ethanol) are removed by sparging with nitrogen. This modification drives the esterification to completion with high efficiency, after

which the supported biocatalyst pellets are easily filtered from the product. In many cases, the single-step, solvent-free biocatalytic esterification reaction yields product that is >90% pure without further downstream processing, saving time and energy and reducing material use.

Featured new ingredients made using our green process are Eastman™ oryzanate esters, natural botanical emollients ideally suited for increasing the natural product content of personal care creams and lotions that readily mix with other oil phase components. The moisture barrier performance of these ingredients suggests their use as a natural alternative to petrolatum.

In Eastman's adaptation of proven enzymatic technology, renewable and reusable reaction catalysts drive the low temperature esterification of natural source ingredients. The product featured only hints at the possibilities offered by this new technology.

We invite you to stretch your imagination... and we're ready to help you turn it into reality.



\*Amount of water permeating coated membrane as compared to uncoated membrane. Membrane coating was a mixture of 1:1 test material:mineral oil.

# EASTMAN

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