

**EASTMAN**

Eastman **GEM**<sup>™</sup>

2-ethylhexyl palmitate

*for skin care and color cosmetics*



# Redefining sustainable manufacturing

*the beauty is in the process*

Eastman GEM™ technology is setting a new standard in sustainably manufactured cosmetic ingredients. Eastman GEM 2-ethylhexyl palmitate is manufactured via Eastman's proprietary GEM technology, a process that uses enzymes and closely controlled manufacturing conditions to eliminate high temperatures, strong acids, and unwanted by-products, and consumes less energy compared with conventional manufacturing processes. Eastman GEM 2-ethylhexyl palmitate is a high quality material with the added benefit of sustainable manufacturing, guided by the U.S. EPA's Twelve Principles of Green Chemistry. *The beauty is in the process.*

## Sustainable advantages of GEM technology

- Low energy consumption
- Low greenhouse gas emissions
- Minimal waste generated
- No process water consumption
- Adheres to the Twelve Principles of Green Chemistry
- Can utilize natural source materials to produce ingredients

## A closer look

Benefits of GEM technology vs. conventional manufacturing

- 52% reduction in CO<sub>2</sub> emissions
- 59% reduction in energy consumption
- 93% waste reduction
- 100% reduction in process water consumed
- E factor of 0.06



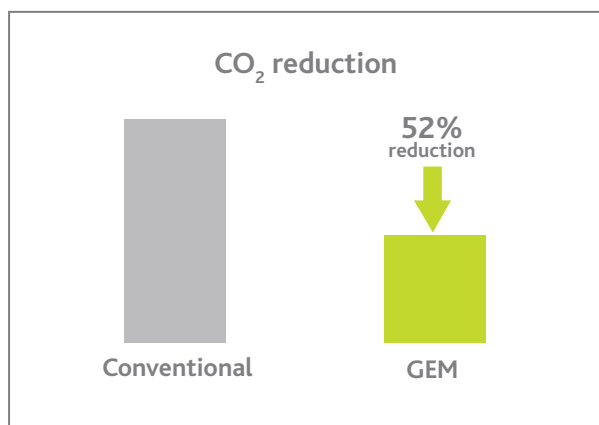
Winner of the 2009  
Presidential Green Chemistry  
Challenge Award\*

Property	Typical
Refractive index	1.4445–1.4465
Specific gravity at 25°C	0.85–0.865
Saponification value	150–160

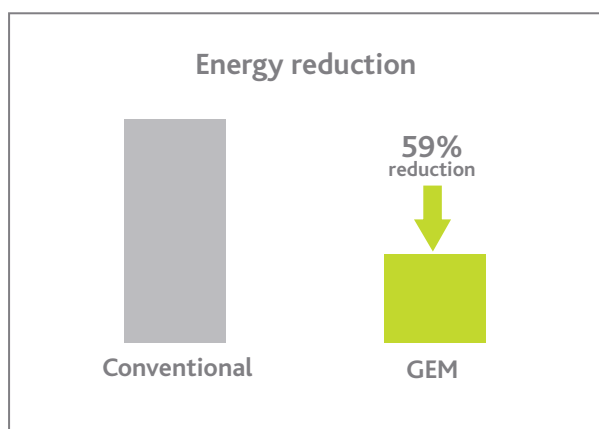
Property	Specification	Typical
Identity	—	Consistent with structure
Appearance	Clear, colorless liquid	Conforms
Assay	95% min.	>98%
Acid number	2 max.	<1.5
Pt-Co (APHA) color	25 max.	<10
Iodine value	1 max.	<0.5

\*Eastman GEM™ technology was formerly known as the Eastman green biocatalytic process.

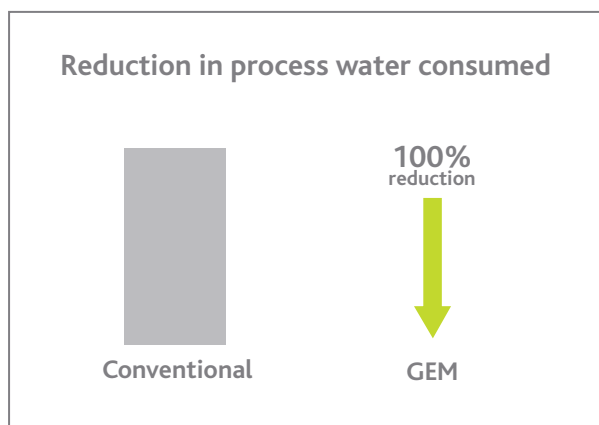




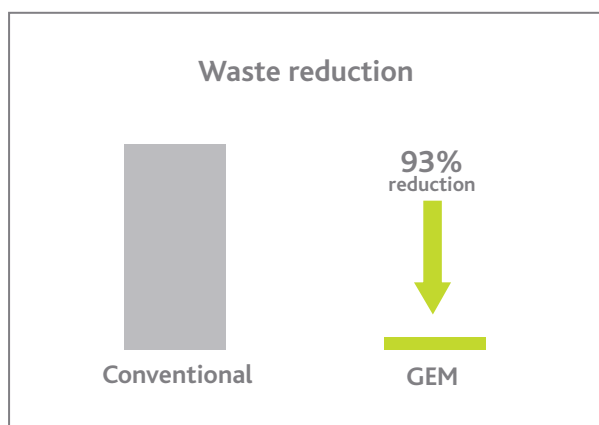
**Did you know . . .** that compared with conventional processes the 52% reduction in CO<sub>2</sub> emissions with GEM technology to produce 100 metric tons is approximately the same amount of CO<sub>2</sub> emitted from driving a standard sized car 14,400 miles?



**Did you know . . .** that compared with conventional processes the 59% reduction in energy consumption using GEM technology to produce 100 metric tons is enough to power a standard laundry dryer for 5,900 loads?



**Did you know . . .** that compared with conventional processes the 100% reduction in process water consumed with GEM technology to produce 100 metric tons is approximately the amount of water contained in 141,000 standard bottles of water?



**Did you know . . .** that Eastman GEM™ technology can reduce waste by 93% compared with conventional processes?

Data shown is based on a simple process analysis comparing Eastman GEM™ technology to the process described in US patent 6635775 (B1, Example 13). Data is based on a gate-to-gate screening LCA.



The results of insight™

**Eastman Chemical Company  
Corporate Headquarters**

P.O. Box 431  
Kingsport, TN 37662-5280 U.S.A.

Telephone:  
U.S.A. and Canada, 800-EASTMAN (800-327-8626)  
Other Locations, (1) 423-229-2000  
Fax: (1) 423-229-1193

**Eastman Chemical Latin America**

9155 South Dadeland Blvd.  
Suite 1116  
Miami, FL 33156 U.S.A.

Telephone: (1) 305-671-2800  
Fax: (1) 305-671-2805

**Eastman Chemical B.V.**

Fascinatio Boulevard 602-614  
2909 VA Capelle aan den IJssel  
The Netherlands

Telephone: (31) 10 2402 111  
Fax: (31) 10 2402 100

**Eastman (Shanghai) Chemical  
Commercial Company, Ltd. Jingan Branch**

1206, CITIC Square  
No. 1168 Nanjing Road (W)  
Shanghai 200041, P.R. China

Telephone: (86) 21 6120-8700  
Fax: (86) 21 5213-5255

**Eastman Chemical Japan Ltd.**

MetLife Aoyama Building 5F  
2-11-16 Minami Aoyama  
Minato-ku, Tokyo 107-0062 Japan

Telephone: (81) 3-3475-9510  
Fax: (81) 3-3475-9515

**Eastman Chemical Asia Pacific Pte. Ltd.**

#05-04 Winsland House  
3 Killiney Road  
Singapore 239519

Telephone: (65) 6831-3100  
Fax: (65) 6732-4930

[www.eastman.com](http://www.eastman.com)

Although the information and recommendations set forth herein are presented in good faith, Eastman Chemical Company makes no representations or warranties as to the completeness or accuracy thereof. You must make your own determination of their suitability and completeness for your own use, for the protection of the environment, and for the health and safety of your employees and purchasers of your products. Nothing contained herein is to be construed as a recommendation to use any product, process, equipment, or formulation in conflict with any patent, and we make no representations or warranties, express or implied, that the use thereof will not infringe any patent. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS AND NOTHING HEREIN WAIVES ANY OF THE SELLER'S CONDITIONS OF SALE.

Safety Data Sheets providing safety precautions that should be observed when handling and storing our products are available online or by request. You should obtain and review available material safety information before handling our products. If any materials mentioned are not our products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed.

© 2013 Eastman Chemical Company. Eastman and GEM are trademarks of Eastman Chemical Company.