

# Technology Fact Sheet



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December 7, 2009

## AlkyClean® Process Receives Affordable Green Chemistry Award

The AlkyClean process, a solid acid catalyst alkylation technology, has received the American Chemical Society 2010 Award for Affordable Green Chemistry. The award recognizes outstanding scientific discoveries that lay the foundation for environmentally-friendly products or manufacturing processes. The AlkyClean process has been developed and demonstrated by Lummus Technology, Albemarle Corporation and Neste Oil Corporation.

**Production:** Alkylate, a high-value, high-octane blending component used to produce greener, reformulated grades of gasoline.

**Technology:** AlkyClean solid acid catalyst alkylation technology

**Description:** The AlkyClean process uses a solid acid catalyst to produce alkylate without the drawbacks of the existing hydrofluoric and sulfuric acid-based technologies. Neither acid soluble oils nor spent acids are produced, and there is no need for product post-treatment of any kind. In addition, eliminating the use of toxic and corrosive liquid acids reduces maintenance and monitoring requirements while significantly enhancing personnel safety and reducing environmental concerns.

**CB&I Advantage:** The AlkyClean process has been successfully proven in a demonstration unit running on a slip stream of a hydrofluoric acid unit feed at Neste Oil's Porvoo refinery in Finland, containing all the key elements of a commercial plant. The quality and yield of the alkylate product and the overall economics of the process are at least on par with the liquid acid processes.

### Benefits:

FEATURES	BENEFITS
Robust, true solid acid catalyst	Eliminates corrosive liquid acid use and associated safety concerns – Tolerant to feedstock impurities, changes in feedstock olefin composition, and process upsets
Removes safety risks associated with liquid acids	Lower maintenance and monitoring requirements – Eliminates costs associated with mitigation and disposal
Low pressure, liquid phase operation in the temperature range of 50°C - 90°C	Eliminates refrigeration requirements associated with sulfuric acid – Carbon steel construction material results in lower costs
Does not produce acid soluble oil by-product	Improves alkylate yield – No by-product disposal requirement
No emissions to air, water or ground	Environmentally friendly process

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