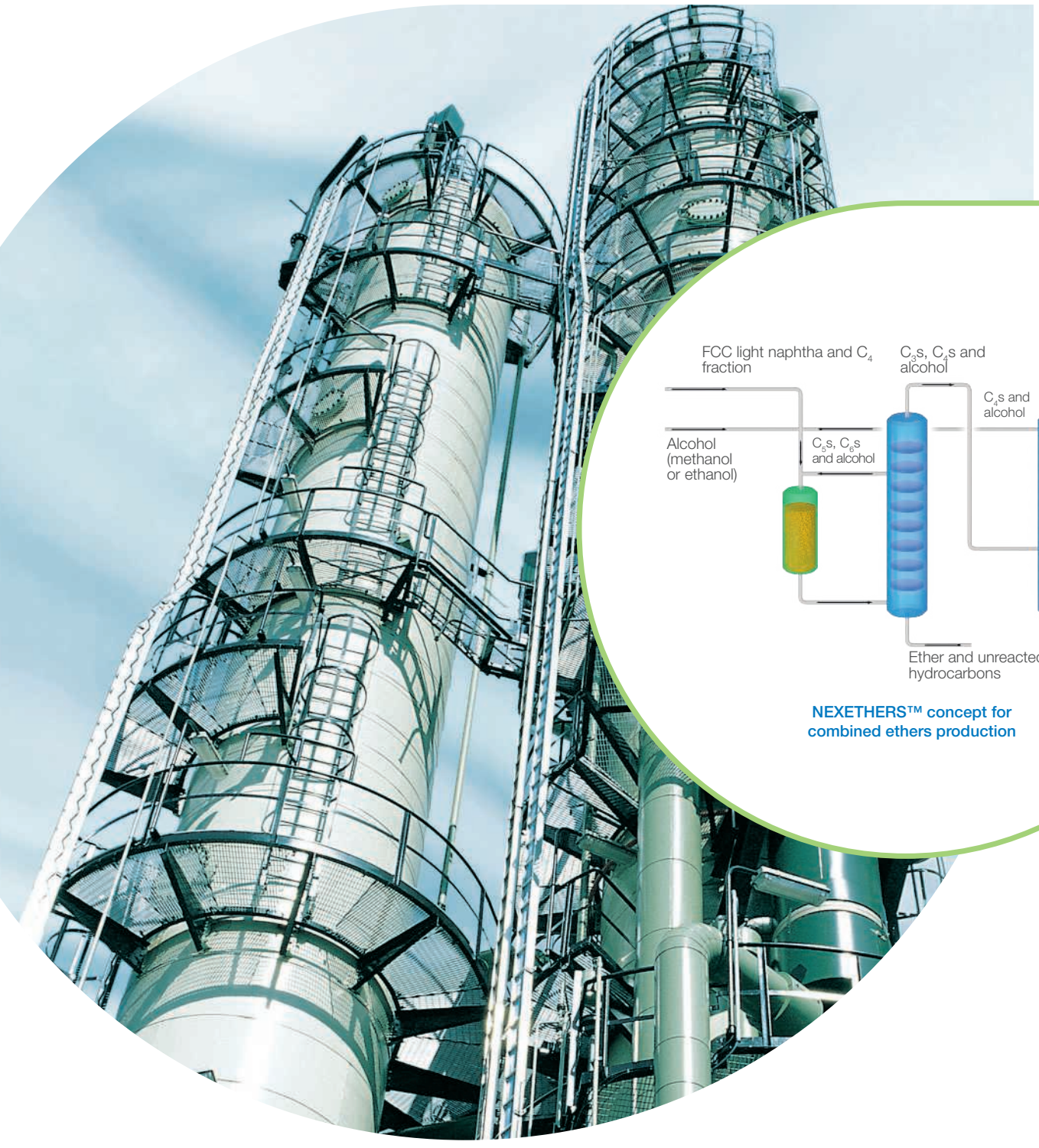
NEXETHERS™

Entire Refinery Ether Production in a Single Unit



NEXETHERS™ concept for combined ethers production

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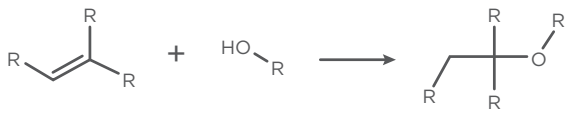
NEXETHERS™ for combined ethers production

Wide Range of Fuel Ethers from a Process with Superb Availability

All gasoline fuel producers face today the challenge of achieving current and future specifications with high availability at low cost. Urge to meet modern gasoline standards creates a need for optimal solution for upgrading any C4 – C7 streams to highest value. With optimized single unit process, a wide range ethers blend will be the perfect blending stock for gasoline pool – now and in the future.



C4-C7 OLEFINS ALCOHOL MTBE/TAME/THxME/THpME ETBE/TAEE/THxEE/THpEE

Process Solution

In the NEXETHERS™ process, tertiary iso-olefins and alcohol react to ethers in the presence of a catalyst, typically a commercial cation exchange resin.

Reactor effluent is routed to the main fractionator which separates ether products and heavy hydrocarbons (C5s and heavier) from unreacted C4 hydrocarbons and lighter components. Most of the alcohol and unreacted tertiary iso-olefins are recycled to the reactors via a side draw-off. The remaining alcohol and light oxygenates (dimethyl ether and water) are included in the overhead product.

The second fractionating tower serves a dual purpose: Its most important function is the near-total recovery of unreacted feed alcohol which is returned to the reactor section with the unreacted isobutylene to enhance the conversion of both components. Simultaneously, alcohol and all light oxygenates are removed from the C4 stream which is the bottom product of the distillation column.

There is normally no need for a separate oxygenate removal unit to purify the resulting raffinate-2 stream. Because the overhead stream contains only an azeotropic amount of alcohol, an almost complete conversion of feed alcohol is obtained.

Benefits

The Ultimate Combined Ethers Technology

- Extremely high MTBE/ETBE, TAME/TAEE, THxME/THxEE and THpME/THpEE yields at low cost, using low maintenance equipment.
- The ultimate integration of alcohol recovery and oxygenates removal – significant increase in isoolefin conversion and essentially total alcohol conversion.
- No additional equipment is required for processing ethanol.

Easy Operability

- Individually controlled reactor temperatures ensure high ether yield with minimal side product formation.
- Conventional catalyst available from several sources, needs no complex loading procedures.

Feed Flexibility

- The capability to process any feed in the C4 to C7 range with only loose requirements for pre-distillation.
- Complete freedom to choose between methanol and ethanol.
- With bioethanol feed, NEXETHERS™ provides a low-cost way to maximize biogasoline yield from cracked and olefinic feedstocks.

High Availability

- No need to shut-down the unit during catalyst change.
- Excellent availability and track record for easy operation.

Yields & Conversions

Design yields and conversions are subject to optimization. Typical values are:

MTBE	99%	ETBE	96%
TAME	91%	TAEE	85%
THxME	68%	ThxEE	45%

THpME	25%	ThpEE	20%
Methanol	99.5%	Ethanol	99.7%

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