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(71) Applicant: LUMMUS TECHNOLOGY LLC [US/US];
5825 North Sam Houston Parkway West, Suite 600, Hous-
ton, TX 77086 (US).

(72) Inventors: BARIAS, Rosette; 5825 North Sam Hous-
ton Parkway West, Suite 600, Houston, TX 77086 (US).
CHEN, Liang; 5825 North Sam Houston Parkway West,
Suite 600, Houston, TX 77086 (US).

(74) Agent: GRIFFITH, Aron, T. et al.; Osha Bergman Watan-
abe & Burton LLP, 1100 Louisiana Street, Suite 4900,
Houston, TX 77002 (US).

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(54) Title: TRIFUNCTIONAL PROCESSES IN CATALYTIC DISTILLATION

(57) Abstract: A process for the production of alkyl ethers including feeding a hydrocarbon feedstock and a first alcohol feedstock to a fixed bed reactor containing an etherification catalyst. The hydrocarbon feedstock and the first alcohol feedstock are contacted in the first fixed bed reactor to react the isoolefins with the alcohol in the presence of the etherification catalyst to produce a first product stream. The first product stream is fed together with a hydrogen feedstock and a second alcohol feedstock to a catalytic distillation reaction system containing a trifunctional catalyst to concurrently isomerize at least a portion of the alpha-olefins, hydrogenate at least a portion of the diolefins, and etherify at least a portion of the isoolefins and alcohol, producing a bottoms product comprising the one or more ethers and an overhead product comprising n-alkanes, isoalkanes, unreacted alpha-olefins, unreacted internal-olefins, unreacted isoolefins, and unreacted alcohol.



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