One-Step Conversion of Methane to High Value Aromatics

Technology #2019-023

**Efficiently converts methane to aromatic hydrocarbons**

A new catalyst and process efficiently converts methane to aromatic hydrocarbons. The catalyst is pre-treated molybdenum (Mo) carbide with added zirconium (Zr) metal particles which can be easily regenerated. Compared to the molybdenum (Mo) carbide catalyst alone, the addition of the Zr metal particles resulted in a greater than 2x increase in methane conversion and increases in benzene, naphthalene and toluene yields. The process uses staged and stratified catalyst beds which further improves the conversion efficiency. This new process uses methane or natural gas as the feedstock and creates hydrogen as a byproduct.

**Increased single pass conversion and yield**

Aromatics are currently produced primarily from oil-derived feedstocks via catalytic reforming or cracking of heavy naphthas. However, oil shortages and price spikes could adversely affect the supply and price of aromatic hydrocarbons. Efficiently converting methane, a major component of natural gas, to aromatic hydrocarbons has enormous economic incentive. Until now, no industrial process is able to convert methane to aromatics in a single-stage catalytic process. This new process and catalyst provide a method for single pass conversion of methane to aromatic hydrocarbons without negatively impacting selectivity.

**Phase of Development**

- Proof of concept. Demonstrated single pass conversion of methane and regeneration of the absorbent on a bench scale lab-reactor in successive regeneration cycles.
Benefits

• Single step methane conversion
• Enhanced yield of aromatic products from methane
• No unfavorable impact on selectivity
• Uses abundant sources of methane (e.g., natural gas)

Features

• Converts methane to aromatic hydrocarbons and hydrogen
• Employs a regenerative catalyst
• Creates hydrogen as a byproduct
• Circumvents equilibrium limitations encountered in methane dehydroaromatization

Applications

• Alternative to reforming methane to syngas
• Converting methane to aromatic hydrocarbons and hydrogen
• Manufacture of aromatic hydrocarbons

Interested in Licensing?

The University relies on industry partners to further develop and ultimately commercialize this technology. The license is for the sale, manufacture or use of products claimed by the patents. Please contact Larry Micek to share your business needs and licensing and technical interests in this technology.

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