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Abstract Title: A New Olefins Selective Cracking Catalyst for Maximum Propylene Production from FCC Units

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Propylene from gasoline producing FCC processes accounts for approximately one-third of the world propylene production. More FCC propylene production is desirable to partly counter the escalating propylene demand, which is expected to increase by 3.6% on average for the coming years.

Light olefins production from conventional FCC units can be improved by increasing the unit operating severity such as higher cracking temperature and/or higher catalyst to oil ratio. These approaches are simple and effective but demand robust catalysts and are subjected to metallurgy limitation. In addition, higher operating severity typically leads to over cracking, decrease in gasoline production, and increase in dry gas yield. The Aramco R&D Center has been collaborating with JGC Catalysts and Chemicals Ltd. (JGC C&C) in developing new propylene selective FCC catalysts that can be deployed in FCC units to improve propylene yields without significantly altering the normal unit operating conditions.

A highly olefins selective FCC catalyst technology, CANFCC, was jointly developed by Aramco R&D Center and JGC C&C. The CANFCC catalyst technology targets to optimize operation economics of the integrated FCC units, in which high olefin yields, especially propylene, are desirable. The key to the technology is an innovative metal inserted USY zeolite, which is tailored to be the active component of olefin selective FCC catalysts.

The cracking reactivity of the CANFCC catalyst was tested under conditions of three application scenarios including a typical gasoline producing mode, a high propylene production mode, and a high severity cracking mode, using lab scale reactors such as an advanced catalyst evaluation (ACE) reactor and a microcavity testing (MAT) reactor. Additionally, pilot plant tests were carried out in an integrated catalyst circulating riser rector to evaluate CANFCC's performance for potential commercial deployment cases. CANFCC shows higher propylene yield for all tested application scenarios.

In this paper, we will present the detailed test results and discuss the perspective of commercial applications of CANFCC catalyst.