

Promotional Effect of Au on Fe/HZSM-5 Catalyst for Methane Dehydroaromatization

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Benzene, Toluene, and Xylene (BTX) are industrially valuable aromatic compounds and its production process using natural gas has been limited due to low selectivity for BTX when direct conversion of methane into aromatics under nonoxidative condition was applied. Therefore, development of catalysts for methane dehydroaromatization (MDA) with improved catalytic performance is necessary.

In the present work, Fe was introduced as an active metal and various noble metals (Au, Ag, Pt, and Rh) with dehydrogenation ability to break the C-H bond were introduced as promoters to facilitate the formation of Fe carbide. These effects ultimately aimed to improve the activity of the catalysts. Among the noble metal-promoted Fe catalysts, Fe-Au catalyst exhibited the highest yield for aromatics. Thus, this work primarily focused on studying the promotional effect of Au on the catalyst. To elucidate the reasons for the improved catalytic activity, the catalysts were characterized by a series of techniques, and the correlation between performance and catalyst properties was discussed.