Seminar

Topic： Mechanism of Fe additive improving the catalytic stability of Mo/HZSM-5 in the methane dehydroaromatization

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Venue： **Room 312, IPE Mansion**

Abstract

Direct conversion of methane to petrochemicals, particularly aromatics, remains a formidable challenge. The non-oxidative methane dehydroaromatization to benzene and naphthalene over Mo/HZSM-5 catalyst has proven it a promising alternative way to produce the aromatics from methane resources. But the equilibrium-limited low CH4 conversion and rapid deactivation behavior of the catalyst requires that the reaction be operated at a severe condition (temperature and space velocity not lower than 1073 K and 10,000 mL/g/h, respectively) and in a mode in which the continuous regeneration of deactivated catalyst is allowable. This thus arises many practical problems to be considered. We have involved the research and development on methane dehydroaromatization catalyst and process since 1999. Our much effort has led us to some key technologies including H2 used-catalyst regeneration technology, the binder-added, highly active Mo/HZSM-5 catalyst preparation technology, and binder-free zeolite catalyst preparation and fluidization technology. Since the rate of coke removal via the reaction of H2 + C = CH4 is much lower than coke burning rate, how to increase catalyst regeneration rate still remains a urgent problem to be solved. Very recently we have tested 9 kinds of metal-modified Mo/HZSM-5 catalysts to try to find a solution to this problem. We have found that Fe is the only effective additive and its addition to Mo/HZSM-5 leads to a remarkable improvement in the activity stability with formation of a considerable amount of carbon nanotubes (CNT). In this presentation, the effect and possible mechanisms of Fe additive improving the activity stability of Mo/HZSM-5 in the non-oxidative methane dehydroaromatization will be presented and discussed in detail.