Rajaram Bal et al., J Pet Environ Biotechnol 2014, 5:4
http://dx.doi.org/10.4172/2157-7463.S1.008

OMICS Group Conferences
Accelerating Scientific Discovery

2nd World Congress on
Petrochemistry and Chemical Engineering
October 27-29, 2014 Embassy Suites Las Vegas, USA

Formation of Ilmenite-type $CoTiO_3$ on TiO_2 and its performance in oxidative dehydrogenation of cyclohexane with molecular oxygen

Rajaram Bal and Madhukar Omkarnath Garg
CSIR-Indian Institute of Petroleum, India

Dehydrogenation of hydrocarbons is an important commercial conversion process because of the great demand for dehydrogenated hydrocarbons, required to manufacture various chemical products such as detergents, high octane motor fuels, pharmaceutical products, plastics, synthetic rubbers, etc. Direct dehydrogenation of alkane to alkene is an endothermic reaction which required relatively high temperature to obtain high yield. But high reaction temperature favours high thermal cracking to lower alkane and coke formation, resulting a decrease in product yield and rapid catalyst deactivation. Therefore to overcome those limitation, one approach is the introduction of molecular oxygen in the dehydrogenation reaction. During the large-scale production of benzene via catalytic cracking of straight chain fossil hydrocarbons and subsequent purification of benzene from the 'heart-cut' tower significant quantity of impurity persist Common impurities found in benzene are water, cyclohexane, cyclohexene, toluene, methylcyclohexane, etc. Removal of those impurities requires high temperature, so it should be beneficial to supress the extra energy so that the production cost will reduces. Hence the catalytic low temperature oxidative dehydrogenation of cyclohexane to benzene can provide the solution. Ilmenite-type $CoTiO_3$ supported on TiO_2 was prepared and their catalytic activities were tested for oxidative dehydrogenation of cyclohexane to produce benzene. The catalyst was characterized by XRD, FE-SEM, HR-TEM, XPS, TPR and XANES. XRD reveals the formation of ilmenite-type $CoTiO_3$ on TiO_2. The catalyst showed 87.8% cyclohexane conversion with 89.2% benzene selectivity at 450°C in a continuous fixed bed down flow reactor at atmospheric pressure. The influence of different reaction parameters like temperature, gas hour space velocity (GHSV), Co loading were studied in detail.

raja@iip.res.in