The Catalytic Conversion of Ethanol to Gasoline with High Performance

Setthawat Sitthithai[1] and Tawan Sooknoi[1*]

[1]*Catalytic Chemistry Research Unit and Department of Chemistry, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand*

*e-mail: kstawan@kmitl.ac.th

In this work, the effective production of gasoline from bio-ethanol was carried out for alternative promising fuel. In order to generate C-C bond and end up with the hydrocarbons, the ethanol was dehydrogenated promoting by 10%Ag/SiO_2 catalyst whiles the aldol condensation, dehydration and oligomerization can be facilitated over acid function e.g. H-ZSM-5. The double bed catalytic system was used to test catalytic activity. The effect of contact time and temperature were investigated. From product distribution along the contact time profile, we found that the reaction pathway was purposed through the dehydrogenation of fed-ethanol to acetaldehyde, then aldol condensation to generate C-C bond via higher aldehyde intermediate and given higher alcohol respectively. Finally, the higher alcohol can be dehydrated and oligomerized into gasoline. The temperature was screened from 350 to 450^{o}C. At lower temperature, acetaldehyde which is the reaction intermediate, was predominated and given low yield of higher hydrocarbons. The higher hydrocarbons were reached the maximum yield at 450^{o}C. However, the competitive adsorption of aldehyde was the main cause of deactivation that was suppressed at 450^{o}C.

Keywords: Ethanol, Aldol Condensation, Gasoline