Partial oxidation of gasoline to synthesis gas over Pd catalyst for on board hydrogen deNOx system

김학주*, 류재홍[1], 양정일, 정 헌
한국에너지기술연구원 합성석유연구센터;
[1]고려대학교 화공생명공학과
(hakjukim@kier.re.kr*)

With the developed injection and vaporization system, fast start-up within 4min was accomplished with low energy consumption practicable for transportation application. The catalytic partial oxidation of gasoline fuel was carried out by varying the C/O ratio and steam/C ratio within GHSV in the range of 100,000~150,000h^{-1}. Maximum syngas production was achieved at C/O ratio near 1.5. Introduction of steam was essential for preventing coke formation. It was found that operation above steam/C ratio of 1.0 was required to suppress coke formation on the surface of catalyst. Maximum gasoline fuel conversion reached 95% at optimized reaction conditions producing syngas with H_2/CO ratio of 1.5 to 2.0. Multilayer catalyst bed reaction test was performed for the tracing the reaction mechanism of gasoline fuel partial oxidation to syngas under palladium based catalyst. Distribution of temperature profiles and products analysis showed that the bulk partial oxidation proceeded via Mars-van Krevelen mechanism. Production of syngas with higher H_2/CO ratio (> 2.0) was materialized by introducing another nickel based steam reforming catalyst bed below the conventional system.