Effect of speciated HC on the alteration of catalytic performance of modern TWC

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The TWC performance including the removal of CO and NO can be altered by the presence of the speciated hydrocarbons (unburned and partially oxidized HCs) in exhaust gas stream. In the present study, speciated HCs including methane, ethanol, propene, propane, m-xylene or n-octane has been introduced into the full feed stream simulating real gasoline engine exhaust to examine the effect of an individual HC on the TWC performance of modern commercial Pd-only and Rh-only catalysts. For Pd-only catalyst, the CO oxidation activity was hardly affected by the presence of methane, while the addition of each individual ethanol, propene, m-xylene or n-octane apparently inhibits the CO oxidation reaction attributable to the competitive adsorption of CO with each HC species. For Rh-only catalyst, the effect of the presence of HC on the oxidation activities of CO was negligible, whereas the NO removal activity was significantly affected by the HC species under the full feed condition. The NO reduction activity was enhanced by the inclusion of propene or m-xylene in feed, while the presence of methane hardly affected the NO removal performance due to the negligible reactivity of methane toward NO.