# Methane oxidation over Pd-Pt/$Al_2O_3$ supported on alumina: impact of Pt-Pd ratio and reaction environment

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The activation of $CH_4$ over monometallic PGM catalysts normally requires high reaction temperatures above 500 ℃. Moreover, modern engines emit lower temperature of exhaust gases. This also makes the $CH_4$ oxidation challengeable since the intrinsic activity of PGM catalysts is strongly sensitive to the $O_2$ concentration. In this study, we prepared seven Pd-Pt catalysts supported on γ-alumina as a function of Pd:Pt ratio while fixing a total number of Pd, Pt metal (350 μmol/$g._{cat}$). The $CH_4$ oxidation was tested with respect to the $O_2/CH_4$ ratio varying $O_2$ concentration. The catalysts were also tested under the dry and wet feed to characterize the inhibition of water. The Pd-rich catalysts represented the light off curves at lower temperature region at around 300 ℃. The inhibition of water on the $CH_4$ oxidation was more pronounced over the Pd-only catalysts, while the Pd:Pt-3:1 catalysts showed a superior overall activity against the presence of hydroxyl group on catalytic surfaces. The beneficial effect of Pt presented in the bimetallic Pd/Pd catalyst may be attributed to the increased adsorption stability for methane under the wet condition.