

Methane Oxidation to Methanol in Oleum Medium: Finding Solutions to Overcome Limitations

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Selective C-H activation of methane to methanol or its precursor is an important issue both from a practical and academic standpoint. Recently, methane oxidation to methylbisulfate(MBS) in oleum media attracted great attention by the development of highly active homogeneous Pt catalysts K_2PtCl_4 and $(DMSO)_2PtCl_2$. However, lots of challenges associated with the use of strong acid remains in the commercialization of this method. One of the challenges is catalyst deactivation. Although $(DMSO)_2PtCl_2$ is more active than Periana catalyst and more stable than K_2PtCl_4 , it also deactivated to $PtCl_2$. In this study, Pt-black catalyst was used for the methane oxidation in oleum media. A MBS yield of 82.1 % with a selectivity of 96.5% was obtained at a catalyst loading of 1.6 mM at 180 °C, which proved the highest catalytic activity of Pt-black for this reaction. Furthermore, catalyst deactivation was not observed after the reaction. Separation of methane oxidation product from MBS-H₂SO₄ solution could be proceeded by using simple distillation method at the temperature lower than 100°C.