

Catalytic Decomposition of Methane over Pigment Carbon Blacks

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For the production of CO₂-free hydrogen, the characteristics of catalytic activity of pigment carbon blacks for catalytic decomposition of methane were investigated under atmospheric pressure at 1123–1223K in a fixed bed. The pigment carbon blacks of Hiblack series (HI blacks : Degussa Corp.) exhibited stable catalytic activity. For HI blacks, the specific catalytic activity increased with the specific surface area. However, the activation energies were nearly the same regardless of the specific surface area. The initial activities of conductive carbon blacks, Ketjen black EC 600JD (KT-600 : Mitsubishi Chemical Corp.) and Black Pearls 2000 (BP-2000 : Cabot Corp.) which have very high specific surface areas, were higher than those of HI blacks. However, the activities of the conductive carbon blacks decreased slowly. The activation energies over the conductive carbon blacks (~ 140 kJ/mol) were considerably lower than those over HI blacks (~ 180 kJ/mol). The activity of HI-900L was comparable to that of KT-600. The reaction orders over HI blacks decreased from ca. 1 to ca. 0.7 as the specific surface area decreased. The reaction order over BP-2000 was near 1.0 whereas that over KT-600 was 0.71.