

Characterization of active sites on carbon black through acetylene adsorption

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Carbon black is used mostly as rubber reinforcing material, pigment and conductive material. Recently, it has been shown that carbon black acts as a stable catalyst for methane decomposition above 1123 K which aims hydrogen production without CO_x emission. In order to determine the active sites on various carbon blacks, we examined C_2H_2 adsorption at 773 K and 873 K. The adsorption experiment was carried out with repeated pulse injections of C_2H_2 into a He stream flowing through carbon black powders, and the amount of C_2H_2 adsorption was measured by using TCD. As the injection was repeated at 773 K, the amount of adsorption gradually decreased and eventually the adsorption did not occur any more. However, it was found at 873 K that a constant amount of C_2H_2 was consumed for each injection after a certain number of injections. Fairly good relationships were obtained between the cumulated acetylene adsorption at 773 K or the constant C_2H_2 consumption at 873 K and the methane decomposition rate over carbon blacks at 1123 K and 1173 K.