

Hydrogen production by catalytic decomposition of methane over carbon black catalysts in a fluidized bed

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A fluidized bed made of quartz with I.D. of 0.055 m and 1.0 m in height was employed as the reactor for the thermocatalytic decomposition of methane to produce CO₂ free hydrogen. The fluidized bed was proposed for the continuous withdraw of product carbons from the reactor. The methane decomposition rate with the carbon black catalyst was quickly reached a quasi-steady state rate and remained for several hour. Several kinds of carbons blacks were employed as the catalyst to examine the reaction activity. The methane thermocatalytic decomposition reaction was carried out at the temperature range of 850 - 925 °C, methane gas velocity of 1.0 - 3.0 U_{mf} and the operating pressure of 1.0 atm. Effect of operating parameters such as reaction temperature, gas velocity and surface area of catalysts on the reaction rates was investigated. The produced carbon by the methane thermocatalytic decomposition was deposited on the surfaces of carbon catalysts and the morphology was observed by SEM and TEM images