

HYDROGEN PRODUCTION IN A FLUID WALL REACTION SYSTEM

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New experiments to produce hydrogen via thermal methane decomposition have been conducted in a new fluid wall reaction system.

The experimental set up was formed by a graphite reactor heated by a furnace up to 1800°C. The reactor system was formed by two concentric tubes; the innermost was graphite and the outer was recrystallised alumina. Methane was introduced through the graphite tube and a carrier gas, to prevent carbon deposition inside the graphite tube, was feed in the space between both tubes. As carrier gas, argon or hydrogen was used. Refrigerated stainless steel seals were used to guarantee a gas tight facility.

Several tests were carried out at 1700°C using a constant flow rate of argon or hydrogen, as carrier gas, of 500ml/min. The flow rate of methane was varied from 100ml/min to 500ml/min. Practically a 100% of methane conversion into hydrogen was achieved under the conditions tested.

During the tests a carbon plug was formed blocking the flow of methane through the graphite tube. Methane decomposition took place on the external surface of the graphite tube.

The post test examination of the experimental set up showed an important carbon deposition placed at the ends of the highest temperature zone and a change of the colour of this are of maximum temperature, that later appears totally crumbled. Aluminium carbide was identified as the origin of this destructive process.