

Sorption Enhanced Reaction Process Progress Report 2004-2005

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Authors

Cobden, P.D.; Reijers, H.T.J.; Elzinga, G.D.; Dijkstra, J.W.; Kluiters, S.C.A.; Boon, J.; Brink, R.W. van den

ECN Hydrogen & Clean Fossil Fuels, Energy Research Centre of the Netherlands.

Abstract

Sorption-enhanced reforming of methane is an attractive option for the combined production of electricity and capture of CO₂. In this process, the steam reforming catalyst is mixed with a CO₂ sorbent. During the reaction, CO₂ is adsorbed implying an increase of the hydrogen production rate. Once the sorbent is saturated, it must be regenerated using purge gas, usually steam. Compared with other purge gases (air, nitrogen, methane), steam can be easily separated, thus enabling the supply of a concentrated CO₂ stream suitable for sequestration. The amount of steam needed for CO₂ removal from the saturated sorbent determines the system efficiency of the process to a large extent. This report deals with four important aspects of the process, which have been studied at ECN over the period 2004-2005. Chapter 2 and 3 contain a description of the work performed for deliverable 7 of work package 2.2 of the CATO programme (*Development of novel adsorbents for CO₂ capture and hydrogen production*). The most important aspects and insights gained from this work will be summarised in this report, in which sorbent identification, sorption-enhanced reactions, system studies and kinetics modelling will be discussed.