TNO Built Environment and Geosciences

Process Industry
Schoemakerstraat 97
P.O. Box 6005
2600 JA Delft
The Netherlands

www.tno.nl

T +31 15 269 69 00
F +31 15 262 07 66
info-IenT@tno.nl

TNO report

CATO-D2.3.04

Chemical looping combustion inside CATO final report (UT & TNO test results)

Date	1 July 2008
Author(s)	Geerdink, P., Noorman, S.
Assignor	CATO
Project number	004.35107/01.29
Classification report	Confidential
Title	CATO-D2.3.4 Chemical looping combustion final report
Abstract	
Report text	
Appendices	
Number of pages	22 (incl. appendices)
Number of appendices	0

1 Public Summary

The objective of this research was to qualify CO_2-capture technologies based on denitrogenation conversion with power plant efficiency losses less than 5% through fundamental and industrial research. Subsequently, initiate dissemination activities to involve industry, both large and small companies, with the aim to prepare further technology development and demonstration.

Chemical Looping Combustion (CLC) is drawing increasing interest in its potential to capture 100% CO_2 at a relatively low efficiency penalty. Numerous different set ups can be applied to perform this process. This report focuses on the results that were obtained with two of the most promising set ups so far: the packed bed reactor of Twente University and the membrane assisted reactor of TNO (figure 1).

Twente University's packed bed chemical-looping combustion reactor was investigated experimentally to provide an experimental proof-of-principle. Using information obtained from both the reduction and oxidation cycles, the measured maximum temperature rise and front velocities in the packed bed corresponded very well with analytical expressions describing the system, especially when the contribution of the formation of carbon during the reduction cycle was taken into account.

TNO experimented with its membrane assisted chemical looping reactor, filled with either Nickel Oxide or Perovskite that was produced by Sintef. Multiple cycles were performed at high pressure (30 bar) and high temperature (>1000°C). Temperature and gas composition was continuously measured to indentify the reactivity and limitations of the set up.

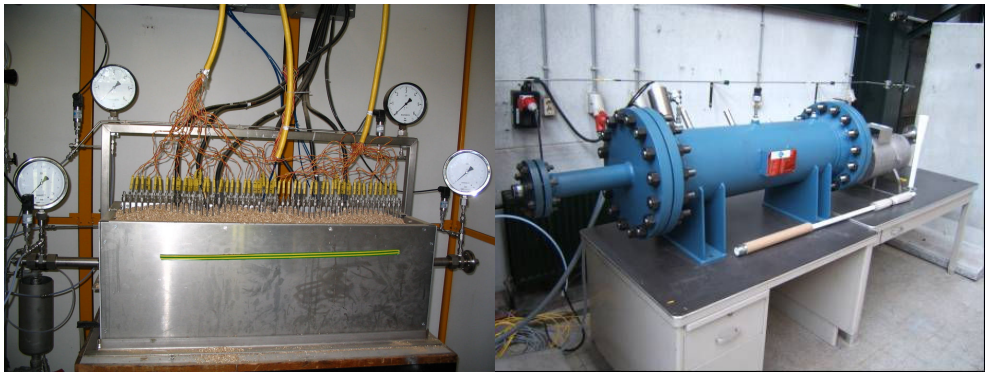

Figure 1: CLC set up of Twente University (left) and TNO (right)

In this research the proof of principle of both concepts was delivered. In membrane assisted CLC reduction of the material proved to be challenging, while oxidation showed high reactivity and heat production.

The remainder of this report is CONFIDENTIAL.