Title: Kinetics of CO_2 methanation on a Ru-based catalyst at process conditions relevant for Power-to-Gas applications

Authors: Leonardo Falbo, Michela Martinelli, Carlo Giorgio Visconti, Luca Lietti, Claudia Bassano, Paolo Deiana

PII: S0926-3373(17)31132-3
DOI: https://doi.org/10.1016/j.apcatb.2017.11.066
Reference: APCATB 16218

To appear in: *Applied Catalysis B: Environmental*

Received date: 23-8-2017
Revised date: 20-11-2017
Accepted date: 25-11-2017

Please cite this article as: Leonardo Falbo, Michela Martinelli, Carlo Giorgio Visconti, Luca Lietti, Claudia Bassano, Paolo Deiana, Kinetics of CO2 methanation on a Ru-based catalyst at process conditions relevant for Power-to-Gas applications, Applied Catalysis B, Environmental https://doi.org/10.1016/j.apcatb.2017.11.066

Kinetics of CO_2 methanation on a Ru-based catalyst at process conditions relevant for Power-to-Gas applications

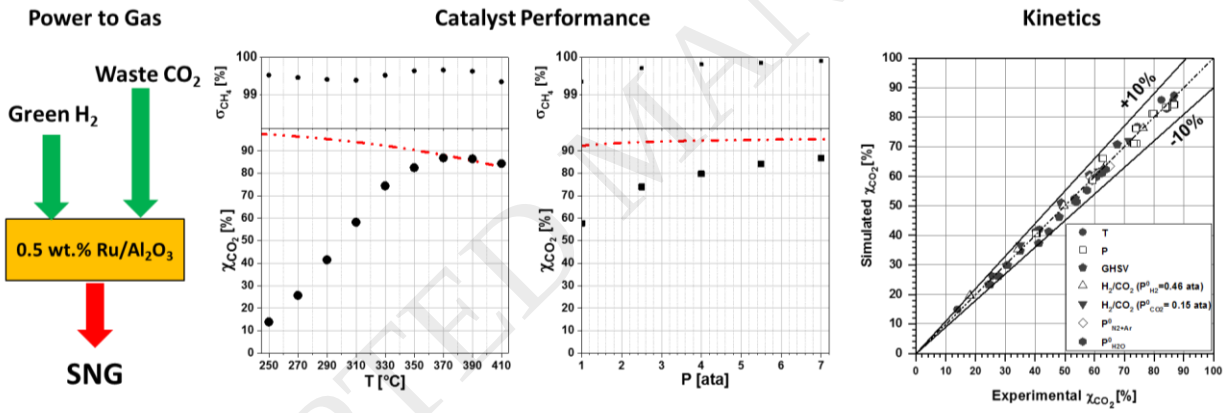
Leonardo Falbo [a], Michela Martinelli [a], Carlo Giorgio Visconti [a]*, Luca Lietti [a], Claudia Bassano [b], Paolo Deiana [b]

[a] *Politecnico Di Milano, Dipartimento di Energia, Milano, 20156, Italy*

[b] *ENEA, Santa Maria di Galeria (Roma), 00123, Italy*

**Corresponding author: carlo.visconti@polimi.it*

Graphical Abstract



Highlights

- 0.5 wt.% Ru/Al_2O_3 catalyst is used for the methanation of concentrated CO_2 streams
- Catalyst performance is assessed in a wide range of conditions, including P > 1 ata
- The catalyst is highly selective to CH_4, with minor amounts of CO as byproduct
- Literature rate laws aren't satisfactory in describing data collected under pressure
- A novel rate expression kinetics is proposed, accounting for the kinetic inhibition of H_2O