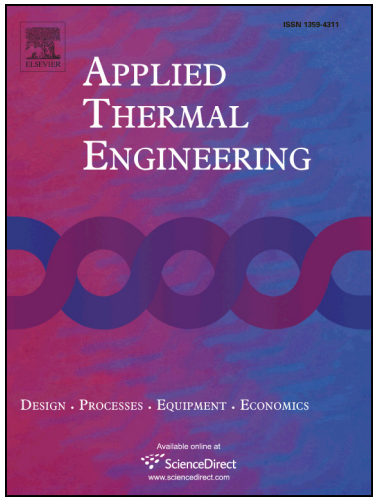

Chemical Thermodynamics Analysis for in-situ Gasification Chemical Looping Combustion of Lignite with Phosphogypsum for Syngas

Jie Yang, Liping Ma, Jianxiao Tang, Hongpan Liu, Bin Zhu, Yan Lian, Xiaojing Cui

PII: S1359-4311(16)32493-0
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2016.10.106
Reference: ATE 9308

To appear in: *Applied Thermal Engineering*

Received Date: 10 June 2016
Revised Date: 16 October 2016
Accepted Date: 17 October 2016

Please cite this article as: J. Yang, L. Ma, J. Tang, H. Liu, B. Zhu, Y. Lian, X. Cui, Chemical Thermodynamics Analysis for in-situ Gasification Chemical Looping Combustion of Lignite with Phosphogypsum for Syngas, *Applied Thermal Engineering* (2016), doi: http://dx.doi.org/10.1016/j.applthermaleng.2016.10.106

Chemical Thermodynamics Analysis for in-situ Gasification Chemical Looping Combustion of Lignite with Phosphogypsum for Syngas

Jie Yang, Liping Ma,* Jianxiao Tang, Hongpan Liu, Bin Zhu, Yan Lian, Xiaojing Cui

Key Laboratory of Resourcing by Waste Recycling, Kunming University of Science and Technology, Kunming, Yunnan 650093, China

Corresponding Author

*E-mail: LipingMa_KMUST@163.com. Tel./Fax: +86-871-65920508.

Abstract: Phosphogypsum (PG) is a by-product of wet phosphoric acid, whereas low rank coal-lignite has high moisture and high-sulfur which seriously influence its direct use. As a promising raw material for chemical industry, syngas can be obtained through a properly designed in-situ gasification chemical looping combustion process (IG-CLC). This concept was demonstrated using a thermodynamic software Factsage, by employing PG as oxygen carrier and lignite as fuel under different conditions. The experiments were conducted in laboratory to confirm the theoretical calculations. The results showed that the product of syngas mainly came from solid-solid reaction and gas-solid reaction. Meanwhile, the optimal conditions for syngas production were found to be: the PG/lignite ratio of about 1; reaction temperatures of over 850 °C. In addition, water vapor and carbon dioxide were found to have promotive effect on the syngas output. For PG/lignite ratio of 1 and at 850 °C, the values for lower heating value (LHV) and