

Accepted Manuscript

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PII: S1359-4311(16)30318-0

DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2016.03.026>

Reference: ATE 7894

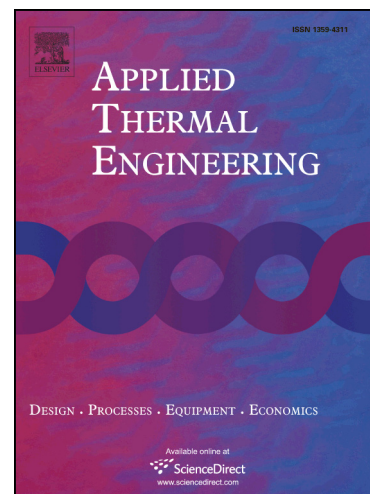
To appear in: *Applied Thermal Engineering*

Received Date: 12 September 2015

Accepted Date: 4 March 2016

Please cite this article as: H. Wang, F. Lei, W. Shao, Z. Zhang, Y. Liu, Y. Xiao, Experimental and numerical studies of pressure effects on syngas combustor emissions, *Applied Thermal Engineering* (2016), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2016.03.026>

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Experimental and numerical studies of pressure effects on syngas combustor emissionsHanlin Wang^{1,2,3}, Fulin Lei^{1,2}, Weiwei Shao^{1,2,*}, Zhedian Zhang^{1,2}, Yan Liu^{1,2}, Yunhan Xiao^{1,2}

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Abstract: Pressure effects on NO_x and CO emissions of a model syngas combustor were experimentally and numerically studied. The validated numerical method was employed to analyze pressure effects on the combustor emissions such as different mixing levels and extra reactant addition. The model combustor, fueled with 10 MJ/Nm³ coal-derived syngas, was installed in a pressurized test-rig, and emissions were measured within 0.1-0.35 MPa. Based on the flow, temperature and species fields calculated by the CFD method, a chemical reactor network (CRN) model was established. With a detailed chemical scheme, the emissions calculated by the CRN model agreed well with experimental results. The model was then employed to calculate emissions within pressure range from 0.1 to 2.0 MPa, with the adiabatic flame temperature in the primary zone varied from 1477 to 2317 K. The calculated NO_x and CO emissions generally showed exponential relationship with the operating pressure, except that the NO_x emission decreased at higher pressure

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