Decomposition of tar in gas from updraft gasifier by thermal cracking

Continuing earlier work with tar reduction by partial oxidation of pyrolysis gas [1] thermal cracking has been evaluated as a gas cleaning process. The work has been focusing on cleaning gas from updraft gasifiers, and the long term purpose is to develop a tar cleaning unit based on thermal cracking. An experimental set-up has been built, in which a flow of contaminated gas can be heated up to 1290°C in a reactor made of pure Al2O3. Four measurements were made. Three with gas from a pyrolysis unit simulating updraft gasifier, and one with gas from an updraft gasifier. Cracking temperatures was 1200, 1250 and 1290°C, and the residence time at this temperature was 0.5 second. The measurements show that at the selected residence time of 0.5 second, the gas flow in a thermal tar cracking unit has to be heated to at least 1250°C to achieve sufficient tar cleaning. At 1290°C, a tar content as low as 15 mg/Nm³ was obtained on gas from an updraft gasifier. The lower heating value of the cleaned gas was 6.0 MJ/Nm³, and the energy content of the non condensable gasses was 19% higher than before cracking.

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