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Call for Papers

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Title:

Autothermal reforming: a flexible syngas route with future potential

Abstract:

The autothermal reforming technology has been widely discussed in the past on conferences and in technical magazines. Compared to the steam methane reformer (SMR) with its multitude of tubes the autothermal reformer (ATR) offers a much simpler mechanical setup and superior operational robustness. The ATR can provide a wider syngas composition range than the SMR, especially significantly lower H₂:CO ratios.

Numerous ATRs are in operation worldwide. However, most of them operate as secondary reformers in ammonia and methanol plants in collaboration with steam reformers. Only a few true stand alone ATRs have been realized up to now. For ammonia and methanol plants the technology has so far been considered uneconomical. Natural gas based GTL plants, for which the ATR is the best choice, have not been built in large numbers as yet.

A comprehensive evaluation of the economic viability of an ATR based ammonia or methanol plant must take into consideration that the ATR requires oxygen. It also provides significantly less waste heat than the SMR for process media preheating and steam generation. So far, the additional operating costs for the utilities and the capital cost for the required equipment have eliminated the cost advantages of the stand alone ATR for ammonia plants and apparently also for methanol plants.

However, with ever growing plant capacities the competitiveness of ATR based plants is improving continuously. Mainly responsible for this are the different building-cost-to-capacity relationships of SMRs and air separation plants.

Uhde established an ATR development programme some years ago. A pilot plant has been built and is in operation since June 2009. There the applicability and robustness of the Uhde ATR concept is being validated.

The paper describes the pilot plant concept, its main design features, experiences made during erection and commissioning and outlines the extensive test program. Also, an ATR based ammonia process flowsheet is presented. Finally, an economic comparison between a conventional SMR-based ammonia plant with an ATR-based plant for a large capacity is discussed.