Utilization of Petcoke for Methanol Production: A Technical Comparative Assessment Between Slurry and Dry Feed Gasification Technologies

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Petcoke is an important byproduct of delayed coker units of crude refineries. Atleast 6000 Tons per day of petcoke is generated in the kingdom of Saudi Arabia alone which is the world's leading crude oil producer. Over several decades petcoke has found its place worldwide as a valuable source of fuel for power generation and cement production and as a source of pure carbon for producing graphite electrodes and in other metal processing industries. However, its commercial utility as a feedstock for petrochemicals production is not well known. There is definite opportunity to utilize these petcoke resources to generate value added products. Gasification of Petcoke can be a valuable source of syngas which is key for basic chemicals such as Methanol which in turn can be used to produce Olefins and other important derivatives. Alternatively, syngas from petcoke can provide extra hydrogen for refineries.

Although gasification is a conventional technology to convert coal to syngas, it is technologically very differentiated and several factors need to be considered to choose the suitable technology to gasify petcoke. The factors include feedstock properties and composition, its calorific value and rank, end product and production scale. Out of all types of gasification technologies, entrained flow gasification is widely practiced commercially owing to its large scale applicability. There are two major types of entrained flow gasification in market based on feed type one being Slurry feed based and the other being Dry feed based. Both these technologies have their own technical advantages and disadvantages.

This paper aims to provide a model based technical comparative assessment between the performance of Slurry based and Dryfeed based gasification technologies for syngas generation from a typical refinery petcoke feedstock towards the scope of methanol production. The advantages and disadvantages of these technologies under direct quench and syngas cooler configurations are discussed in detail. The overall CO2 production from both the cases are assessed as well to represent environmental impact.