

Design and analysis of synthesis natural gas(SNG) process for coke oven by-product utilization

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Synthetic Natural Gas(SNG) is most promising synthetic energy resources that can substitute natural gas which is used by energy sources or feedstock for synthesis of chemicals. There is more than 7×10^{10} m³ coke-oven gas(COG) made by coke-oven process in coke plant as by-product worldwide annually. COG contains CO₂, CO which can influence to earth as green house gas. So emission and usage by combustion of COG cause environment problems. On the other hand, COG is also H₂-rich gas which is high potential energy source for generation, synthesis and so on. In spite of high potential, much of COG is not used properly. This study proposes a new co-feed process by assisting SNG process with COG. COG is used by separation to H₂ and rich-CH₄ gas. H₂ from COG can adjust the H/C ratio for synthesis of CH₄, which can reduce or remove water gas shift reaction. Rich-CH₄ gas is used to generate power by turbine, and partial CO₂ from flue gas is used to methanation process. These features of process give high the efficiency of carbon utilization, while the energy analysis shows the efficiency of co-feed process increases about 10%, moreover, co-feed process is more economic than conventional SNG process by economic analysis.