

ESTIMATION OF METHANE FUGITIVE EMISSIONS FROM HYDROGEN
PRODUCTION PROCESS VIA COAL GASIFICATION ROUTE.

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ABSTRACT

This study was carried out to estimate the amount of methane fugitive emissions from hydrogen production process via coal gasification route. The study was based on the hypothesis that stated that *“Production of hydrogen via coal gasification route releases a lot of methane and carbon dioxide fugitive emissions and that the global warming potentials of the methane and carbon dioxide released during this process are relatively significant”*. A pre-calculated process model approach was used to estimate the amount of fugitive emissions of methane released from the process. The approach refers to a set of fugitive emission rate data has been pre-calculated for standard module types in a chemical by a previous study. In this particular study, several new process modules which have not been considered by the previous database are employed, which are the gasifier and cyclone. Therefore in this study, the fugitive emissions database for these modules needed to be first created. The capacity of the plant after simulation was estimated to be 12120kg of hydrogen per hour and it has been calculated that this production process leads to the release of a fugitive amount of 1.153kg/h with the highest release being contributed by the absorber (0.266kg/h) and the least emissions is from the cyclone (0.036kg/h). Among the chemical components, carbon dioxide contributes to the highest fugitive emission amount throughout the whole production process (0.53615kg/h) whereas hydrogen sulphide gives the least emission (0.000102851kg/h). As for methane, the fugitive emissions were estimated to be 0.001186805kg/h. The contribution to global warming potential due to methane fugitive emissions was estimated to be 4.44% whereas that of carbon dioxide was 95.5%. Although methane is reported to have a global warming potential value 21 times greater than that of carbon dioxide, the production of hydrogen via coal gasification yields more carbon dioxide fugitive emissions whose contribution to global warming potential is much more significant than methane.