Original Article

Consequence Modelling and Analysis of Hydrogen Release from Methyl Ester Hydrogenation Plant Using PHAST

Mashaida Md Sharif[a*], Musab Abdul Razak[a]

[a] *Department of Chemical and Environmental Engineering, Universiti Putra Malaysia, 43400 Serdang UPM, Selangor, Malaysia*

* Corresponding author: mashaida.sharif@emeryoleo.com

ABSTRACT : *The incident involving hydrogen release in industry has become a major concern since numerous incidents were observed to have occured over the years. This paper is designed to do the consequence modelling and analysis using PHAST Simulator for the release rate, potential fire and vulnerability to human by lethality versus probit simulated at 5 mm, 35 mm and 70 mm leak scenarios and three types of atmospheric stability at hydrogenation plant in Telok Panglima Garang. The simulation was carried out by inputting data of leak scenario, meteorological data, material data and process data related to the hydrogenation plant. The simulation results were analyzed and discussed on the discharge rate, dispersion concentration and effect of jet fire such as flame length, downwind distance and lethality for radiation intensity level of 4 kW/m^2, 12.5 kW/m^2 and 37.5 kW/m^2. Based on the results, the discharge rate and radiation intensity are dependent on the leak sizes regardless of the different atmospheric conditions. However, the dispersion is dependent on both atmospheric stability and leak sizes. Lastly, the lethality and area of impact are simulated from the radiation intensity produced by the jet fire for each leak size. To conclude, adoption of PHAST software is vital for consequence modelling as this software is able to illustrate the outcomes of hazards due to loss of containment and with this will enable related personnel to respond effectively to any hazardous incidents. As a recommendation, hydrogen fixed gas detectors are proposed for installations at specific location after taking into account the smallest leak that may happen which is at 5 mm leak size.*

Keywords - *Consequence Modelling, Hydrogen Release, PHAST, Process Safety*