

**ASSESSMENT OF ENVIRONMENTAL IMPACT FOR
ACCIDENTAL RELEASE OF HEAVY GAS**

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Abstract

An air dispersion model can be used to mathematically simulate air pollutants dispersion in the ambient atmosphere. These dispersion results can be used to predict their environmental impact, concentrations and movement. Such predicted data of hazardous gases released after a chemical accident are valuable since it can be used to provide timely information to emergency response providers as well as to make decisions on siting chemical plants at safe distances from settlements during plant development stages.

Dense gas dispersion is the focus of this research as several pressurized dense gas release accidents have happened during the last few years in this country. These gases form clouds heavier than air when released to the atmospheric environment. In this study a mathematical model for the dispersion of heavy gas due to an accidental release is presented in order to determine the environmental impact.

The heavy gas model was then used to simulate the dispersion of negatively buoyant and highly toxic chlorine gas to illustrate the use of heavy gas dispersion modeling in hazard analysis. A worst case scenario study with stability class A, was used for an accidental release of 900kg of chlorine from a location in Kaluthara district in Sri Lanka. To determine the impact of the release probit analysis, safe distance and hazardous time period calculations were done. From the model results, for a 900kg chlorine release, safe Immediately Dangerous to Life or Health (IDLH) distance was above 490m. Within this hazardous zone the safe time period starts after 5.44 minutes from the release. Further, this model can be used to predict information, such as concentration variation of the substance released with time and, cloud dimensions such as height and radius. For validation, experimental data in literature were collected and a sensitivity analysis was done to identify the best values for the model parameters.

Key-words: Dense gas dispersion, environmental impact, chlorine, accidental release, safe distance

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