

ACCIDENTAL RELEASES OF TOXIC GAS ACETYLENE-SIMULATION WITH ALOHA SOFTWARE

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ABSTRACT: Uncontrolled acetylene release during production processes, transportation, or storage can lead to explosions and detonations endangering safety of people and material assets. This paper investigates the impact of accidental release of acetylene gas in surrounding areas. The ALOHA software has been used in this paper to modelling of acetylene release. The modelling was performed for an accidental release of 2,000 kg acetylene from direct source for one minute. For a typical average atmospheric condition in location, this accidental acetylene release would cause a red zone of 197 m (15,000 ppm) and yellow zone of 483 m (2,500 ppm) to downwind from the source. Inadequate storage can lead to accidental situations and negative impact on people and the environment.

Keywords: air pollution, ALOHA, acetylene, modelling.

INTRODUCTION

In the recent years, world has seen a wide range of major accidents with a number of fatalities, economic losses, and damage to the environment. These accidents can lead to serious danger to human health and the environment, which can occur inside or outside the establishment (Ilić et al., 2018). The chemical industry is one of the major potential environmental polluters. The release of any chemical may lead to toxic effects, fire, and explosion, and it makes the activity critical for safety systems to be made efficient and adequate to mitigate the haphazard in case of emergency. (Yadav et al., 2022). A great variety of its negative impacts affect both living organisms and material assets. Particularly dangerous are industrial sites, where emergencies are possible with the sudden formation of intense, diverse impact factors (shock waves, heat waves, emission of toxic substances). In this case, it is extremely important to predict the risk of damage to personnel in the workplace during emergencies (Biliaiev et al., 2020a).

According to European Union Directive-Seveso II, a chemical accident is defined as a result of unplanned and unpredicted events in the course of industrial activity being manifested through the emission of toxic substances in the environment or through fire or explosion. The accidents comprising one or more hazardous chemicals jeopardize humans and the environment both immediately or with delay, inside or outside the installation (Komatina et al., 2018). In addition to the proven impact on humans, the impact on

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