

## Abstract

Safety analysis of nuclear and chemical/petrochemical facilities is the systematic process that is carried out throughout the design process to ensure that all the relevant safety requirements are met by the proposed design of the plant. Safety analysis should incorporate both deterministic and probabilistic approaches. These approaches have been shown to complement each other and both should be used in the decision making process on the safety and ability of the plant to be licensed. This paper deals with the deterministic safety approach in order to distill the experience of nuclear and chemical/petrochemical protection engineering through a safety analysis approach aiming at analysis of chemically reacting processes including thermodynamic and chemical reactions modelling that are present in both industries. For instance, there are some similarities between the Bhopal disaster and Three Mile Island-Fukushima-like H<sub>2</sub> deflagration-detonation scenarios in nuclear containments. The phenomenology is similar in that the temperature and the pressure caused by exothermic reactions had increased dramatically leading to a loss of containment. The study aims to translate and adapt to general chemically reacting modelling, major features of the equivalent analysis inside the nuclear containments. Compartment containment for H<sub>2</sub> deflagrations has been translated and adapted, with fixed tools, to the methyl-isocyanate storage tank 610 of the Bhopal plant