MARY KAY O'CONNOR PROCESS SAFETY CENTER
TEXAS A&M ENGINEERING EXPERIMENT STATION

20th Annual International Symposium
October 24-26, 2017 • College Station, Texas

A Strategy Based on Aspen Plus for Venting and Leaks from Vessels

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ABSTRACT

Severe accidents have occurred when vessels release their contained material either accidentally or intentionally to prevent further catastrophic accidents. Several models have been developed to deal with simulating these events where rigorous thermodynamic procedures are used to improve the estimation. The approach developed in this work takes advantage of the commercial software Aspen Plus to estimate all required thermodynamic properties including estimation of sonic releases. The procedure is developed in the Excel environment where the strategy is programmed to call and run an Aspen Plus file, while keeping control on the integration to solve a quasi-steady-state model. The simple Euler method is applied to solve the dynamic release model. Physical characteristics of the vessel can easily be incorporated to detect the releasing phase. The releasing behavior is modelled with the internal models for valves include in Aspen Plus, where sonic estimation is already implemented. Estimation takes advantage of the simulation package and results are in good agreement with experimental data reported in the literature.

Key words: Venting, vessel releases, sonic fluid, simulation, simulation.