Understanding the Formation of Heat Transfer Fluid Aerosols in Air

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ABSTRACT

Mist or aerosol explosions present a serious hazard to process industries. Heat transfer fluids are widely used in the chemical process industry, are flammable above their flash points, and can cause explosions. Though the possibility of aerosol explosions has been widely documented, knowledge about the explosive potential of such aerosols is limited. Studying the formation of such aerosols by emulating leaks in process equipment will help define a source term for aerosol dispersions and aid in characterizing their explosion hazards.

Current research by the Mary Kay O’Connor Process Safety Center involves the non-intrusive measurement of such aerosol sprays using a Malvern Instrument Diffraction Particle Analyzer. Predictive models relating the aerosol formation distances, aerosol droplet sizes, and volume concentrations to bulk liquid pressures, temperatures, fluid properties, leak sizes and ambient conditions are developed. These models will be used to predict the conditions under which leaks will result in the formation of aerosols and ultimately help in estimating the explosion hazards of heat transfer fluid aerosols. Important information can be gleaned about the effects of various fluid properties on aerosol formation behavior. The goal is to provide information that will help improve process safety in industry.